Appendix 1

Complete List of the Sediment Samples

Table A1.1. A complete list of the sediment samples that were collected during the 2005 sediment sampling program for the Upper Columbia River remedial investigation/feasibility study (from CEE 2004).

River Mile	Sample Type[11]	Sample Location ID[5,6,7,8,9]	Focus Area[10]	Approximate Elevation[1]	Approximate Depth @ 1255'[2]	Object X[3]	Object Y[3]	Latitude[4]	Longitude[4]
744	Bioassay Sample	744A1/744X1	1	1274	AP of 1255'	2409133.8260	745534.5144	48.999851	-117.630486
744	Bioassay Sample	744A2/744X3	1	1284	AP of 1255'	2408048.7421	745493.5988	48.999863	-117.635009
744	Focus-Area Sample	744X1	1	1274	AP of 1255'	2409133.8260	745534.5144	48.999851	-117.630486
744	Focus-Area Sample	744X2	1	1267	AP of 1255'	2408926.2915	745526.6894	48.999853	-117.631351
744	Focus-Area Sample	744X3	1	1284	AP of 1255'	2408048.7421	745493.5988	48.999863	-117.635009
743	Bioassay Sample	743A1/743X1	1	1273	AP of 1255'	2407134.8923	741132.6963	48.988025	-117.639565
743	Bioassay Sample	743A2/743X3	1	1280	AP of 1255'	2406704.7375	741183.6273	48.988214	-117.641346
743	Focus-Area Sample	743X1	1	1273	AP of 1255'	2407134.8923	741132.6963	48.988025	-117.639565
743	Focus-Area Sample	743X2	1	1266	AP of 1255'	2406993.2656	741149.4655	48.988087	-117.640152
743	Focus-Area Sample	743X3	1	1280	AP of 1255'	2406704.7375	741183.6273	48.988214	-117.641346
742	Bioassay Sample	742A1/742X1	1	1267	AP of 1255'	2406634.0448	735798.8413	48.973477	-117.642570
742	Bioassay Sample	742A2/742X5	1	1282	AP of 1255'	2406038.9473	736021.3427	48.974154	-117.645007
742	Beach Sample	742B1	1	1274	AP of 1255'	2406615.5356	735330.1689	48.972195	-117.642728
742	Core Sample	742C1	1	1259	AP of 1255'	2406547.2621	735831.2883	48.973575	-117.642925
742	Focus-Area Sample	742X1	1	1267	AP of 1255'	2406634.0448	735798.8413	48.973477	-117.642570
742	Focus-Area Sample	742X2	1	1259	AP of 1255'	2406547.2621	735831.2883	48.973575	-117.642925
742	Focus-Area Sample	742X3	1	1271	AP of 1255'	2406387.5411	735891.0068	48.973757	-117.643579
742	Focus-Area Sample	742X4	1	1280	AP of 1255'	2406218.2825	735954.2911	48.973950	-117.644273
742	Focus-Area Sample	742X5	1	1282	AP of 1255'	2406038.9473	736021.3427	48.974154	-117.645007
741	Bioassay Sample	741A1/741X3	1	1279	AP of 1255'	2401684.3448	733472.9334	48.967668	-117.663557
741	Focus-Area Sample	741X1	1	1267	AP of 1255'	2401995.8870	732980.8073	48.966285	-117.662346
741	Focus-Area Sample	741X2	1	1259	AP of 1255'	2401837.5146	733230.9794	48.966988	-117.662962
741	Focus-Area Sample	741X3	1	1279	AP of 1255'	2401684.3448	733472.9334	48.967668	-117.663557
740	Bioassay Sample	740A1/740X1	1	1281	AP of 1255'	2397896.0128	729935.4351	48.958408	-117.679917
740	Focus-Area Sample	740X1	1	1281	AP of 1255'	2397896.0128	729935.4351	48.958408	-117.679917
740	Focus-Area Sample	740X2	1	1271	AP of 1255'	2397548.2772	730268.7394	48.959359	-117.681306
740	Focus-Area Sample	740X3	1	1280	AP of 1255'	2397417.3108	730394.2707	48.959718	-117.681829
739	Bioassay Sample	739A1/739X3	1	1266	AP of 1255'	2393238.4723	727724.9404	48.952876	-117.699659
739	Focus-Area Sample	739X1	1	1279	AP of 1255'	2393408.8906	727206.0439	48.951436	-117.699039
739	Focus-Area Sample	739X2	1	1247	7.91	2393311.4396	727502.7661	48.952259	-117.699394
739	Focus-Area Sample	739X3	1	1266	AP of 1255'	2393238.4723	727724.9404	48.952876	-117.699659
738	Bioassay Sample	738A1/738X3		1280	AP of 1255'	2389664.0365	724403.3432	48.944178	-117.715082
738	Beach Sample	738B1		1285	AP of 1255'	2385996.2728	722388.5608	48.939067	-117.730668
738	Baseline Sample	738X1		1274	AP of 1255'	2390000.7171	724394.1713	48.944115	-117.713684
738	Baseline Sample	738X2		1265	AP of 1255'	2389832.4724	724398.7542	48.944146	-117.714382
738	Baseline Sample	738X3		1280	AP of 1255'	2389664.0365	724403.3432	48.944178	-117.715082
737	Bioassay Sample	737A1/737X3		1276	AP of 1255'	2385499.2117	722643.2044	48.939819	-117.732691
737	Core Sample	737C1		1258	AP of 1255'	2385369.6647	722369.4898	48.939084	-117.733276
737	Baseline Sample	737X1		1280	AP of 1255'	2385138.1515	721880.3366	48.937770	-117.734320
737	Baseline Sample	737X2		1258	AP of 1255'	2385369.6647	722369.4898	48.939084	-117.733276
737	Baseline Sample	737X3		1276	AP of 1255'	2385499.2117	722643.2044	48.939819	-117.732691
736	Bioassay Sample	736A1/736X1		1280	AP of 1255'	2380311.3032	720662.8852	48.934966	-117.754587
736	Tributary Sample	736T1		1289	AP of 1255'	2377789.6228	721580.4554	48.937755	-117.764917
736	Tributary Sample	736T2		1258	AP of 1255'	2378377.6116	720437.3199	48.934560	-117.762662
736	Baseline Sample	736X1		1280	AP of 1255'	2380311.3032	720662.8852	48.934966	-117.754587
736	Baseline Sample	736X2		1259	AP of 1255'	2380171.9477	720969.9422	48.935823	-117.755115
736	Baseline Sample	736X3		1280	AP of 1255'	2380005.2535	721337.2375	48.936847	-117.755747
735	Beach Sample	735B1		1284	AP of 1255'	2376139.0028	715756.5857	48.921986	-117.772741
735	Baseline Sample	735X1		1265	AP of 1255'	2378417.9785	718510.8069	48.929280	-117.762814
735	Baseline Sample	735X2		1212	43.04	2378191.3283	718704.8436	48.929836	-117.763724
735	Baseline Sample	735X3		1273	AP of 1255'	2377969.7327	718894.5530	48.930380	-117.764613

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River Mile	Sample Type[11]	Sample Location ID[5,6,7,8,9]	Focus Area[10]	Approximate Elevation[1]	Approximate Depth @ 1255'[2]	Object X[3]	Object Y[3]	Latitude[4]	Longitude[4]
734	Bioassay Sample	734A1/734X1		1280	AP of 1255'	2374842.1794	715463.7247	48.921326	-117.778179
734	Core Sample	734C1		1257	AP of 1255'	2374625.8558	715818.8687	48.922322	-117.779019
734	Baseline Sample	734X1		1280	AP of 1255'	2374842.1794	715463.7247	48.921326	-117.778179
734	Baseline Sample	734X2		1257	AP of 1255'	2374625.8558	715818.8687	48.922322	-117.779019
734	Baseline Sample	734X3		1275	AP of 1255'	2374368.9840	716240.5821	48.923505	-117.780017
733	Bioassay Sample	733A1/733X1		1249	5.7	2370498.6143	713181.1634	48.915546	-117.796603
733	Baseline Sample	733X1		1249	5.7	2370498.6143	713181.1634	48.915546	-117.796603
733	Baseline Sample	733X2		1246	8.61	2370383.3777	713302.0855	48.915889	-117.797062
733	Baseline Sample	733X3		1277	AP of 1255'	2370043.2388	713659.0057	48.916904	-117.798417
732	Baseline Sample	732X1		1280	AP of 1255'	2369119.0290	708868.8067	48.903885	-117.803042
732	Baseline Sample	732X2		1255	0.2	2368048.1820	709397.7552	48.905449	-117.807404
732	Baseline Sample	732X3		1273	AP of 1255'	2366790.1618	710019.1584	48.907286	-117.812529
731	Baseline Sample	731X1		1276	AP of 1255'	2365136.1879	705079.6088	48.893936	-117.820204
731	Baseline Sample	731X2		1246	8.81	2364849.1230	705266.3229	48.894479	-117.821366
731	Baseline Sample	731X3		1277	AP of 1255'	2363851.5278	705915.1829	48.896362	-117.825404
730	Bioassay Sample	730A1/730X3		1250	4.87	2361394.6620	701727.6621	48.885157	-117.836287
730	Tributary Sample	730T1		1279	AP of 1255'	2359149.5763	697874.9333	48.874845	-117.846231
730	Baseline Sample	730X1		1261	AP of 1255'	2362096.9405	701335.6561	48.884008	-117.833434
730	Baseline Sample	730X2		1243	11.84	2361603.8246	701610.9093	48.884815	-117.835437
730	Baseline Sample	730X3		1250	4.87	2361394.6620	701727.6621	48.885157	-117.836287
729	Bioassay Sample	729A1/729X1		1251	3.68	2358314.3750	698099.7809	48.875549	-117.849663
729	Tributary Sample	729T2		1250	5.41	2358004.9410	698016.9258	48.875355	-117.850961
729	Baseline Sample	729X1		1251	3.68	2358314.3750	698099.7809	48.875549	-117.849663
729	Baseline Sample	729X2		1204	50.63	2358254.9170	698216.9115	48.875876	-117.849891
729	Baseline Sample	729X3		1283	AP of 1255'	2358042.9192	698634.5411	48.877043	-117.850704
728	Baseline Sample	728X1		1256	AP of 1255'	2353246.0516	696560.0664	48.871869	-117.870953
728	Baseline Sample	728X2		1185	70.35	2353175.4081	696799.6050	48.872532	-117.871208
728	Baseline Sample	728X3		1251	3.78	2353124.0026	696973.9123	48.873015	-117.871393
727	Bioassay Sample	727A1/727X1		1249	5.86	2350542.9439	692351.8848	48.860628	-117.882845
727	Baseline Sample	727X1		1249	5.86	2350542.9439	692351.8848	48.860628	-117.882845
727	Baseline Sample	727X2		1203	51.52	2350058.9720	692719.5307	48.861686	-117.884796
727	Baseline Sample	727X3		1269	AP of 1255'	2349442.4372	693187.8777	48.863034	-117.887280
726	Baseline Sample	726X1		1265	AP of 1255'	2345948.0204	689691.5872	48.853824	-117.902339
726	Baseline Sample	726X2		1207	47.57	2345736.1608	690067.1764	48.854874	-117.903159
726	Baseline Sample	726X3		1271	AP of 1255'	2345509.8327	690468.4146	48.855997	-117.904035
725	Focus-Area Sample	725X1	2	1275	AP of 1255'	2342092.4982	686452.5801	48.845354	-117.918850
725	Focus-Area Sample	725X2	2	1192	63.03	2341800.8995	686692.4086	48.846041	-117.920022
725	Focus-Area Sample	725X3	2	1280	AP of 1255'	2341329.6145	687080.0219	48.847151	-117.921917
724	Bioassay Sample	724A1/724X1	2	1252	2.84	2341411.8427	681191.9434	48.831016	-117.922500
724	Bioassay Sample	724A2/724X3	2	1250	4.57	2340625.3625	681383.4873	48.831623	-117.925733
724	Focus-Area Sample	724X1	2	1252	2.84	2341411.8427	681191.9434	48.831016	-117.922500
724	Focus-Area Sample	724X2	2	1230	24.78	2341220.4904	681238.5465	48.831164	-117.923287
724	Focus-Area Sample	724X3	2	1250	4.57	2340625.3625	681383.4873	48.831623	-117.925733
723	Bioassay Sample	723A1/723X1	2	1251	4.17	2340355.8999	676211.0082	48.817484	-117.927662
723	Bioassay Sample	723A2/723X5	2	1250	4.78	2339515.3168	676811.7710	48.819216	-117.931054
723	Core Sample	723C1	2	1223	32.28	2340066.2115	676418.0480	48.818081	-117.928831
723	Focus-Area Sample	723X1	2	1251	4.17	2340355.8999	676211.0082	48.817484	-117.927662
723	Focus-Area Sample	723X2	2	1223	32.28	2340066.2115	676418.0480	48.818081	-117.928831
723	Focus-Area Sample	723X3	2	1250	4.78	2339515.3168	676811.7710	48.819216	-117.931054
723	Focus-Area Sample	723X4	2	1280	AP of 1255'	2338870.6976	677272.4790	48.820544	-117.933655
723	Focus-Area Sample	723X5	2	1276	AP of 1255'	2338225.2668	677733.7654	48.821874	-117.936260

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River Mile	Sample Type[11]	Sample Location ID[5,6,7,8,9]	Focus Area[10]	Approximate Elevation[1]	Approximate Depth @ 1255'[2]	Object X[3]	Object Y[3]	Latitude[4]	Longitude[4]
722	Focus-Area Sample	722X1	2	1277	AP of 1255'	2335174.5796	673421.2323	48.810377	-117.949584
722	Focus-Area Sample	722X2	2	1212	42.97	2335127.8701	674355.5979	48.812941	-117.949633
722	Focus-Area Sample	722X3	2	1276	AP of 1255'	2335109.5176	674722.7179	48.813948	-117.949652
721	Focus-Area Sample	721X1	2	1276	AP of 1255'	2329675.9567	675258.5484	48.815972	-117.972103
721	Focus-Area Sample	721X2	2	1230	24.93	2329754.9531	675650.7703	48.817038	-117.971715
721	Focus-Area Sample	721X3	2	1273	AP of 1255'	2329842.6137	676086.0092	48.818221	-117.971284
718	Beach Sample	718B1		1272	AP of 1255'	2322307.1738	664334.7130	48.786798	-118.004331
718	Baseline Sample	718X1		1280	AP of 1255'	2322539.3706	665983.0273	48.791289	-118.003117
718	Baseline Sample	718X2		1215	40.11	2321228.4123	665917.4619	48.791242	-118.008561
718	Baseline Sample	718X3		1255	0.3	2320074.1809	665859.7351	48.791200	-118.013355
715	Core Sample	715C1		1179	76.03	2311757.9525	654361.0334	48.760534	-118.049555
715	Baseline Sample	715X1		1271	AP of 1255'	2312510.3490	653566.5070	48.758283	-118.046557
715	Baseline Sample	715X2		1179	76.03	2311757.9525	654361.0334	48.760534	-118.049555
715	Baseline Sample	715X3		1271	AP of 1255'	2311499.4761	654633.9831	48.761307	-118.050585
714	Beach Sample	714B1		1272	AP of 1255'	2309740.3820	644388.6275	48.733418	-118.059403
713	Bioassay Sample	713A1/713X3		1251	4.03	2310775.9296	643425.8809	48.730679	-118.055259
713	Baseline Sample	713X1		1270	AP of 1255'	2312229.0813	644268.8339	48.732844	-118.049116
713	Baseline Sample	713X2		1206	49.33	2311462.6445	643824.2347	48.731702	-118.052356
713	Baseline Sample	713X3		1251	4.03	2310775.9296	643425.8809	48.730679	-118.055259
711	Beach Sample	711B1		1281	AP of 1255'	2320208.9140	631583.4364	48.697302	-118.017997
710	Baseline Sample	710X1		1280	AP of 1255'	2320903.9764	629488.8839	48.691495	-118.015438
710	Baseline Sample	710X2		1203	51.69	2318497.3423	629304.8560	48.691232	-118.025423
710	Baseline Sample	710X3		1282	AP of 1255'	2316637.0613	629162.6058	48.691028	-118.033141
708	Bioassay Sample	708A1/708X3	3	1252	2.96	2312343.5457	623154.2582	48.674997	-118.051804
708	Beach Sample	708B1	3	1278	AP of 1255'	2311003.6194	621102.1670	48.669508	-118.057652
708	Core Sample	708C1	3	1196	58.89	2312639.4794	622529.3777	48.673256	-118.050673
708	Focus-Area Sample	708X1	3	1269	AP of 1255'	2313023.3844	621718.7411	48.670997	-118.049207
708	Focus-Area Sample	708X2	3	1196	58.89	2312639.4794	622529.3777	48.673256	-118.050673
708	Focus-Area Sample	708X3	3	1252	2.96	2312343.5457	623154.2582	48.674997	-118.051804
707	Focus-Area Sample	707X1	3	1279	AP of 1255'	2307315.2636	618884.8044	48.663798	-118.073235
707	Focus-Area Sample	707X2	3	1184	71.15	2307132.7617	620517.6959	48.668289	-118.073747
707	Focus-Area Sample	707X3	3	1265	AP of 1255'	2306694.3976	624439.8520	48.679076	-118.074978
706	Bioassay Sample	706A1/706X1	3	1250	4.71	2305039.4886	617635.9241	48.660600	-118.082830
706	Bioassay Sample	706A2/706X7	3	1251	4.3	2297482.8776	623017.5314	48.676078	-118.113290
706	Tributary Sample	706T1	3	1244	10.61	2297035.6414	622220.5294	48.673938	-118.115256
706	Tributary Sample	706T2	3	1283	AP of 1255'	2297605.1031	621343.9229	48.671482	-118.113029
706	Focus-Area Sample	706X1	3	1250	4.71	2305039.4886	617635.9241	48.660600	-118.082830
706	Focus-Area Sample	706X2	3	1239	16.46	2304038.6081	618348.7233	48.662651	-118.086863
706	Focus-Area Sample	706X3	3	1216	39.03	2302883.9677	619171.0258	48.665016	-118.091517
706	Focus-Area Sample	706X4	3	1193	62.34	2301966.9899	619824.0718	48.666895	-118.095213
706	Focus-Area Sample	706X5	3	1234	20.84	2300528.5960	620848.4560	48.669841	-118.101010
706	Focus-Area Sample	706X6	3	1233	21.82	2298921.9426	621992.6698	48.673131	-118.107487
706	Focus-Area Sample	706X7	3	1251	4.3	2297482.8776	623017.5314	48.676078	-118.113290
705	Focus-Area Sample	705X1	3	1276	AP of 1255'	2304352.2086	616198.5515	48.656730	-118.085884
705	Focus-Area Sample	705X2	3	1122	133.1	2299179.1954	616931.2573	48.659242	-118.107165
705	Focus-Area Sample	705X3	3	1270	AP of 1255'	2298414.7334	617039.5357	48.659612	-118.110310
704	Bioassay Sample	704A1/704X1	3	1251	4.41	2305583.5899	611943.4408	48.644954	-118.081422
704	Core Sample	704C1	3	1192	63.46	2300098.2463	611669.2432	48.644738	-118.104137
704	Focus-Area Sample	704X1	3	1251	4.41	2305583.5899	611943.4408	48.644954	-118.081422

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River Mile	Sample Type[11]	Sample Location ID[5,6,7,8,9]	Focus Area[10]	Approximate Elevation[1]	Approximate Depth @ 1255'[2]	Object X[3]	Object Y[3]	Latitude[4]	Longitude[4]
704	Focus-Area Sample	704X2	3	1192	63.46	2300098.2463	611669.2432	48.644738	-118.104137
704	Focus-Area Sample	704X3	3	1263	AP of 1255'	2298151.7838	611571.9445	48.644661	-118.112197
701	Baseline Sample	701X1		1260	AP of 1255'	2296564.8353	598876.5676	48.610038	-118.120608
701	Baseline Sample	701X2		1153	102.47	2295100.1476	599108.1316	48.610814	-118.126625
701	Baseline Sample	701X3		1278	AP of 1255'	2294220.4295	599247.2129	48.611279	-118.130239
699	Tributary Sample	699T1		1215	39.59	2299472.7120	585602.4823	48.573394	-118.110537
698	Bioassay Sample	698A1/698X1		1250	4.51	2296891.7406	584491.8468	48.570602	-118.121353
698	Baseline Sample	698X1		1250	4.51	2296891.7406	584491.8468	48.570602	-118.121353
698	Baseline Sample	698X2		1145	110.37	2293876.9482	585550.7760	48.573793	-118.133643
698	Baseline Sample	698X3		1266	AP of 1255'	2292763.9124	585941.7236	48.574971	-118.138181
695	Baseline Sample	695X1		1250	4.84	2293079.4959	571838.5330	48.536307	-118.138918
695	Baseline Sample	695X2		1129	125.89	2292163.5938	572001.2673	48.536840	-118.142673
695	Baseline Sample	695X3		1271	AP of 1255'	2289589.0539	572458.7008	48.538340	-118.153227
692	Bioassay Sample	692A1/692X1		1251	3.85	2289736.0864	561668.4991	48.508767	-118.154171
692	Core Sample	692C1		1125	129.58	2284072.8166	564954.4444	48.518306	-118.177051
692	Baseline Sample	692X1		1251	3.85	2289736.0864	561668.4991	48.508767	-118.154171
692	Baseline Sample	692X2		1125	129.58	2284072.8166	564954.4444	48.518306	-118.177051
692	Baseline Sample	692X3		1251	3.66	2282459.0480	565890.7858	48.521024	-118.183573
689	Bioassay Sample	689A1/689X3		1251	4.07	2277341.9389	552857.5567	48.485800	-118.206510
689	Baseline Sample	689X1		1263	AP of 1255'	2281727.3943	550386.1662	48.478618	-118.188788
689	Baseline Sample	689X2		1107	147.62	2281233.6718	550664.3999	48.479427	-118.190783
689	Baseline Sample	689X3		1251	4.07	2277341.9389	552857.5567	48.485800	-118.206510
687	Bioassay Sample	687A1		1250	4.76	2279358.2282	540946.2367	48.452980	-118.199882
687	Beach Sample	687B1		1263	AP of 1255'	2274121.6602	540672.1336	48.452718	-118.221486
686	Bioassay Sample	686A1/686X3		1252	2.93	2276706.1511	536103.5828	48.439961	-118.211484
686	Baseline Sample	686X1		1259	AP of 1255'	2279244.3031	536230.3505	48.440071	-118.201016
686	Baseline Sample	686X2		1104	151.08	2278498.8225	536193.1175	48.440039	-118.204090
686	Baseline Sample	686X3		1252	2.93	2276706.1511	536103.5828	48.439961	-118.211484
683	Baseline Sample	683X1		1269	AP of 1255'	2285323.5682	523837.4312	48.405548	-118.177747
683	Baseline Sample	683X2		1104	150.6	2280599.4970	521936.1610	48.400784	-118.197452
683	Baseline Sample	683X3		1272	AP of 1255'	2278996.0823	521277.5864	48.399130	-118.204142
680	Bioassay Sample	680A1/680X1	4	1251	4.08	2288374.7154	511573.6969	48.371661	-118.166942
680	Focus-Area Sample	680X1	4	1251	4.08	2288374.7154	511573.6969	48.371661	-118.166942
680	Focus-Area Sample	680X2	4	1114	140.67	2283787.1991	510741.8164	48.369816	-118.185923
680	Focus-Area Sample	680X3	4	1261	AP of 1255'	2282102.1995	510436.2658	48.369138	-118.192894
679	Focus-Area Sample	679X1	4	1273	AP of 1255'	2289348.1269	506210.3646	48.356876	-118.163705
679	Focus-Area Sample	679X2	4	1105	149.83	2285333.4291	505870.5801	48.356325	-118.180256
679	Focus-Area Sample	679X3	4	1259	AP of 1255'	2283015.7720	505674.4249	48.356007	-118.189811
678	Bioassay Sample	678A1/678X1	4	1249	6.01	2289748.1580	501699.6700	48.344480	-118.162704
678	Focus-Area Sample	678X1	4	1249	6.01	2289748.1580	501699.6700	48.344480	-118.162704
678	Focus-Area Sample	678X2	4	1198	56.66	2288345.7080	501395.6916	48.343781	-118.168511
678	Focus-Area Sample	678X3	4	1207	47.81	2286741.2324	501047.9243	48.342980	-118.175154
678	Focus-Area Sample	678X4	4	1109	145.73	2285846.9079	500854.0808	48.342534	-118.178857
678	Focus-Area Sample	678X5	4	1168	87.48	2284630.4371	500590.4127	48.341926	-118.183893
678	Focus-Area Sample	678X6	4	1204	50.74	2283582.3787	500363.2476	48.341403	-118.188232
678	Focus-Area Sample	678X7	4	1271	AP of 1255'	2283044.5330	500246.6704	48.341134	-118.190459
677	Bioassay Sample	677A1/677X3	4	1251	4.24	2283725.8372	494981.5069	48.326645	-118.188403
677	Focus-Area Sample	677X1	4	1270	AP of 1255'	2291602.1230	497186.9914	48.331941	-118.155731
677	Focus-Area Sample	677X2	4	1098	156.85	2286441.5784	495748.0472	48.328489	-118.177137
677	Focus-Area Sample	677X3	4	1251	4.24	2283725.8372	494981.5069	48.326645	-118.188403

Table A1.1. A complete list of the sediment samples that were collected during the 2005 sediment sampling program for the Upper Columbia River remedial investigation/feasibility study (from CEE 2004).

River Mile	Sample Type[11]	Sample Location ID[5,6,7,8,9]	Focus Area[10]	Approximate Elevation[1]	Approximate Depth @ 1255'[2]	Object X[3]	Object Y[3]	Latitude[4]	Longitude[4]
676	Bioassay Sample	676A1/676X3	4	1252	2.59	2284274.1636	489785.6174	48.312359	-118.186885
676	Core Sample	676C1	4	1102	152.96	2287306.5523	490676.5739	48.314513	-118.174304
676	Focus-Area Sample	676X1	4	1273	AP of 1255'	2292940.2257	492360.8867	48.318592	-118.150924
676	Focus-Area Sample	676X2	4	1102	152.96	2287306.5523	490676.5739	48.314513	-118.174304
676	Focus-Area Sample	676X3	4	1252	2.59	2284274.1636	489785.6174	48.312359	-118.186885
673	Beach Sample	673B1		1281	AP of 1255'	2293617.7047	475869.5669	48.273348	-118.150504
673	Baseline Sample	673X1		1280	AP of 1255'	2296471.1099	478031.3233	48.278997	-118.138483
673	Baseline Sample	673X2		1078	177.04	2294761.8656	476976.4408	48.276271	-118.145650
673	Baseline Sample	673X3		1280	AP of 1255'	2293639.0672	476283.6372	48.274480	-118.150357
670	Baseline Sample	670X1		1280	AP of 1255'	2292726.8427	460341.3087	48.230891	-118.156378
670	Baseline Sample	670X2		1117	138	2291963.5021	461016.0262	48.232812	-118.159412
670	Baseline Sample	670X3		1278	AP of 1255'	2290729.0927	462084.5287	48.235857	-118.164322
667	Baseline Sample	667X1		1271	AP of 1255'	2286610.3260	447610.9744	48.196594	-118.183257
667	Baseline Sample	667X2		1116	138.88	2285792.5989	447734.1045	48.197009	-118.186591
667	Baseline Sample	667X3		1271	AP of 1255'	2281606.5666	448364.4209	48.199129	-118.203656
664	Baseline Sample	664X1		1239	15.52	2286623.9100	431364.7927	48.152084	-118.185493
664	Baseline Sample	664X2		1101	154.42	2285481.8025	431488.2286	48.152529	-118.190152
664	Baseline Sample	664X3		1271	AP of 1255'	2282390.2843	431822.3513	48.153735	-118.202763
662	Beach Sample	662B1		1276	AP of 1255'	2275702.3100	421672.3563	48.126550	-118.231552
661	Bioassay Sample	661A1/661X1		1250	4.7	2274989.5561	421916.5302	48.127285	-118.234435
661	Baseline Sample	661X1		1250	4.7	2274989.5561	421916.5302	48.127285	-118.234435
661	Baseline Sample	661X2		1096	159.19	2273202.5177	424486.3451	48.134491	-118.241394
661	Baseline Sample	661X3		1261	AP of 1255'	2272148.0402	425996.1355	48.138724	-118.245502
658	Bioassay Sample	658A1/658X3		1252	3.43	2272005.1602	406702.3110	48.085876	-118.248740
658	Baseline Sample	658X1		1274	AP of 1255'	2277481.2182	406981.9619	48.086136	-118.226310
658	Baseline Sample	658X2		1078	177.37	2275938.0533	406900.0969	48.086055	-118.232631
658	Baseline Sample	658X3		1252	3.43	2272005.1602	406702.3110	48.085876	-118.248740
657	Beach Sample	657B1		1273	AP of 1255'	2271329.2380	398552.6555	48.063610	-118.252622
655	Baseline Sample	655X1		1280	AP of 1255'	2269910.1996	390603.5815	48.041961	-118.259510
655	Baseline Sample	655X2		1059	196.38	2267931.5168	392510.4076	48.047366	-118.267334
655	Baseline Sample	655X3		1272	AP of 1255'	2266116.8299	394259.1933	48.052323	-118.274511
652	Baseline Sample	652X1		1266	AP of 1255'	2252389.2596	390089.0277	48.042135	-118.331165
652	Baseline Sample	652X2		1049	206.35	2252464.2579	391676.2438	48.046477	-118.330648
652	Baseline Sample	652X3		1271	AP of 1255'	2252545.6501	393398.7909	48.051189	-118.330086
649	Baseline Sample	649X1		1280	AP of 1255'	2241512.7305	385428.6039	48.030326	-118.376213
649	Baseline Sample	649X2		1057	197.82	2237786.1574	386525.0703	48.033655	-118.391294
649	Baseline Sample	649X3		1256	AP of 1255'	2236638.4433	386862.7616	48.034680	-118.395939
646	Baseline Sample	646X1		1269	AP of 1255'	2243287.1696	373583.7434	47.997715	-118.370514
646	Baseline Sample	646X2		1044	211.01	2242609.0894	373180.9853	47.996671	-118.373335
646	Baseline Sample	646X3		1270	AP of 1255'	2240197.2505	371748.4317	47.992957	-118.383367
644	Bioassay Sample	644A1/644X3	5	1249	6.03	2246443.6377	363543.0214	47.969926	-118.358947
644	Core Sample	644C1	5	1161	93.53	2248404.3750	363993.4922	47.970988	-118.350887
644	Focus-Area Sample	644X1	5	1270	AP of 1255'	2249620.1141	364272.8026	47.971645	-118.345890
644	Focus-Area Sample	644X2	5	1035	220.32	2249026.6076	364136.4473	47.971324	-118.348330
644	Focus-Area Sample	644X3	5	1249	6.03	2246443.6377	363543.0214	47.969926	-118.358947
643	Focus-Area Sample	643X1	5	1258	AP of 1255'	2249527.7183	358094.2769	47.954724	-118.347082
643	Focus-Area Sample	643X2	5	1037	217.86	2248211.6573	358027.5464	47.954658	-118.352459
643	Focus-Area Sample	643X3	5	1280	AP of 1255'	2246434.8362	357940.2276	47.954575	-118.359718

Table A1.1. A complete list of the sediment samples that were collected during the 2005 sediment sampling program for the Upper Columbia River remedial investigation/feasibility study (from CEE 2004).

River Mile	Sample Type[11]	Sample Location ID[5,6,7,8,9]	Focus Area[10]	Approximate Elevation[1]	Approximate Depth @ 1255'[2]	Object X[3]	Object Y[3]	Latitude[4]	Longitude[4]
642	Bioassay Sample	642A1/642X1	5	1250	4.86	2249569.4490	352459.5582	47.939282	-118.347654
642	Beach Sample	642B1	5	1287	AP of 1255'	2250052.9699	348607.0234	47.928683	-118.346190
642	Focus-Area Sample	642X1	5	1250	4.86	2249569.4490	352459.5582	47.939282	-118.347654
642	Focus-Area Sample	642X2	5	1239	16.13	2249161.1623	352439.2242	47.939262	-118.349322
642	Focus-Area Sample	642X3	5	1148	107.12	2248278.6565	352395.2724	47.939220	-118.352926
642	Focus-Area Sample	642X4	5	1042	212.63	2247429.3903	352348.4215	47.939166	-118.356395
642	Focus-Area Sample	642X5	5	1108	146.59	2247017.0148	352332.4379	47.939159	-118.358079
642	Focus-Area Sample	642X6	5	1168	87.48	2246633.0464	352313.3151	47.939140	-118.359647
642	Focus-Area Sample	642X7	5	1271	AP of 1255'	2246243.1318	352293.8957	47.939121	-118.361240
641	Bioassay Sample	641A1/641X1	5	1250	4.85	2249307.6212	346965.2176	47.924250	-118.349445
641	Focus-Area Sample	641X1	5	1250	4.85	2249307.6212	346965.2176	47.924250	-118.349445
641	Focus-Area Sample	641X2	5	1014	241.16	2248104.6249	346913.2013	47.924214	-118.354356
641	Focus-Area Sample	641X3	5	1270	AP of 1255'	2246598.3484	346830.2978	47.924120	-118.360507
640	Bioassay Sample	640A1/640X3	5	1251	4.38	2248111.9855	341502.1260	47.909387	-118.355037
640	Focus-Area Sample	640X1	5	1270	AP of 1255'	2251628.6893	341677.2434	47.909556	-118.340682
640	Focus-Area Sample	640X2	5	1050	204.73	2250446.9684	341618.3985	47.909499	-118.345505
640	Focus-Area Sample	640X3	5	1251	4.38	2248111.9855	341502.1260	47.909387	-118.355037
639	Tributary Sample	639T1		1074	181.35	2253047.8855	335996.5979	47.893864	-118.335650
639	Tributary Sample	639T2		1117	137.88	2252429.0227	334486.3140	47.889781	-118.338370
637	Bioassay Sample	637A1/637X1	Ecology	1251	3.75	2250937.0655	325865.4596	47.866292	-118.345584
637	Beach Sample	637B1	Ecology	1286	AP of 1255'	2246545.1314	325930.7376	47.866859	-118.363460
637	Focus-Area Sample	637X1	Ecology	1251	3.75	2250937.0655	325865.4596	47.866292	-118.345584
637	Focus-Area Sample	637X2	Ecology	1152	102.94	2250564.6769	325962.4245	47.866591	-118.347088
637	Focus-Area Sample	637X3	Ecology	1119	135.68	2250051.7000	326095.9969	47.867003	-118.349159
637	Focus-Area Sample	637X4	Ecology	1007	248.16	2249279.2491	326297.5147	47.867623	-118.352278
637	Focus-Area Sample	637X5	Ecology	1218	36.59	2248438.1405	326516.1467	47.868296	-118.355674
637	Focus-Area Sample	637X6	Ecology	1244	10.74	2247792.0557	326684.3789	47.868814	-118.358283
637	Focus-Area Sample	637X7	Ecology	1284	AP of 1255'	2247123.3456	326858.5017	47.869350	-118.360984
634	Bioassay Sample	634A1/634X1		1253	2.06	2245735.2924	310998.3703	47.826015	-118.368705
634	Baseline Sample	634X1		1253	2.06	2245735.2924	310998.3703	47.826015	-118.368705
634	Baseline Sample	634X2		1010	244.91	2243569.7973	313209.9219	47.832264	-118.377229
634	Baseline Sample	634X3		1257	AP of 1255'	2240714.0717	317586.0484	47.844505	-118.388284
631	Baseline Sample	631X1		1272	AP of 1255'	2226855.9313	315195.9662	47.839148	-118.444994
631	Baseline Sample	631X2		985	269.81	2227759.8045	316791.5204	47.843443	-118.441114
631	Baseline Sample	631X3		1282	AP of 1255'	2228526.0225	318144.0789	47.847084	-118.437824
628	Bioassay Sample	628A1/628X1		1250	4.88	2220289.1950	328838.0478	47.877085	-118.470016
628	Baseline Sample	628X1		1250	4.88	2220289.1950	328838.0478	47.877085	-118.470016
628	Baseline Sample	628X2		979	275.54	2220225.8098	330111.1550	47.880579	-118.470115
628	Baseline Sample	628X3		1271	AP of 1255'	2220157.5500	331482.1615	47.884342	-118.470221
625	Baseline Sample	625X1		1269	AP of 1255'	2203052.9303	328012.3438	47.876252	-118.540322
625	Baseline Sample	625X2		980	274.95	2203631.5556	328661.3856	47.877983	-118.537886
625	Baseline Sample	625X3		1282	AP of 1255'	2205626.0047	330898.5509	47.883950	-118.529489
622	Bioassay Sample	622A1/622X3		1251	4.05	2203438.8918	345525.6013	47.924211	-118.536620
622	Baseline Sample	622X1		1273	AP of 1255'	2199767.6171	342801.0617	47.917044	-118.551917
622	Baseline Sample	622X2		980	274.68	2201978.6661	344441.9332	47.921360	-118.542705
622	Baseline Sample	622X3		1251	4.05	2203438.8918	345525.6013	47.924211	-118.536620
619	Baseline Sample	619X1		1273	AP of 1255'	2185689.2489	344121.0057	47.921791	-118.609150
619	Baseline Sample	619X2		929	326.02	2185520.9774	347500.0365	47.931064	-118.609438
619	Baseline Sample	619X3		1229	26.1	2185483.8192	348246.1974	47.933111	-118.609501

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River Mile	Sample Type[11]	Sample Location ID[5,6,7,8,9]	Focus Area[10]	Approximate Elevation[1]	Approximate Depth @ 1255'[2]	Object X[3]	Object Y[3]	Latitude[4]	Longitude[4]
616	Bioassay Sample	616A1/616X3		1250	4.6	2168923.9128	354352.6298	47.951137	-118.676330
616	Tributary Sample	616T1		998	256.86	2167357.4382	354086.8232	47.950529	-118.682751
616	Tributary Sample	616T2		1027	228.23	2166665.5251	352344.2311	47.945806	-118.685771
616	Baseline Sample	616X1		1270	AP of 1255'	2169237.9542	347607.5887	47.932629	-118.675821
616	Baseline Sample	616X2		943	312.27	2169118.5368	350172.4516	47.939667	-118.676015
616	Baseline Sample	616X3		1250	4.6	2168923.9128	354352.6298	47.951137	-118.676330
615	Beach Sample	615B1		1284	AP of 1255'	2164780.0160	346232.3940	47.929201	-118.694155
613	Baseline Sample	613X1		1272	AP of 1255'	2162301.4473	340941.6527	47.914891	-118.704858
613	Baseline Sample	613X2		917	337.88	2160717.4574	340862.7834	47.914795	-118.711324
613	Baseline Sample	613X3		1280	AP of 1255'	2159195.7068	340787.0131	47.914702	-118.717536
610	Baseline Sample	610X1		1245	9.78	2148737.0076	336621.9912	47.904068	-118.760627
610	Baseline Sample	610X2		952	302.7	2149165.9405	338048.1432	47.907945	-118.758722
610	Baseline Sample	610X3		1279	AP of 1255'	2149670.2965	339725.0656	47.912503	-118.756482
607	Focus-Area Sample	607X1	6	1269	AP of 1255'	2132907.7331	340950.1683	47.917080	-118.824682
607	Focus-Area Sample	607X2	6	904	350.94	2134595.4687	343088.5410	47.922820	-118.817573
607	Focus-Area Sample	607X3	6	1277	AP of 1255'	2136305.4189	345255.0589	47.928634	-118.810369
606	Bioassay Sample	606A1/606X3	6	1251	3.62	2133226.4405	347454.3919	47.934882	-118.822690
606	Focus-Area Sample	606X1	6	1258	AP of 1255'	2130362.4425	346406.5484	47.932215	-118.834480
606	Focus-Area Sample	606X2	6	924	331.21	2131486.5960	346817.8397	47.933262	-118.829853
606	Focus-Area Sample	606X3	6	1251	3.62	2133226.4405	347454.3919	47.934882	-118.822690
605	Bioassay Sample	605A1/605X1	6	1250	5.35	2126931.2433	349741.9969	47.941599	-118.848122
605	Bioassay Sample	605A2/605X9	6	1251	4.04	2133457.5594	353919.1466	47.952582	-118.821058
605	Beach Sample	605B1	6	1283	AP of 1255'	2134500.0142	355028.2286	47.955547	-118.816686
605	Core Sample	605C1	6	1119	136.29	2128503.8830	350748.5606	47.944247	-118.841601
605	Focus-Area Sample	605X1	6	1250	5.35	2126931.2433	349741.9969	47.941599	-118.848122
605	Focus-Area Sample	605X2	6	1139	116.43	2127652.5039	350203.6379	47.942814	-118.845131
605	Focus-Area Sample	605X3	6	1119	136.29	2128503.8830	350748.5606	47.944247	-118.841601
605	Focus-Area Sample	605X4	6	1076	179.43	2129513.3844	351394.6890	47.945946	-118.837415
605	Focus-Area Sample	605X5	6	936	319.04	2130524.4915	352041.8450	47.947647	-118.833222
605	Focus-Area Sample	605X6	6	1030	225.2	2131604.8084	352733.2983	47.949465	-118.828742
605	Focus-Area Sample	605X7	6	1249	6.24	2132754.3117	353469.0343	47.951399	-118.823974
605	Focus-Area Sample	605X8	6	1251	4.04	2133457.5594	353919.1466	47.952582	-118.821058
605	Focus-Area Sample	605X9	6	1280	AP of 1255'	2134588.6603	354643.1044	47.954485	-118.816366
604	Focus-Area Sample	604X1	6	1273	AP of 1255'	2125221.4510	351445.6298	47.946389	-118.854917
604	Focus-Area Sample	604X2	6	915	340.18	2127386.9600	355562.8568	47.957519	-118.845650
604	Focus-Area Sample	604X3	6	1285	AP of 1255'	2128636.0940	357937.8029	47.963939	-118.840302
603	Bioassay Sample	603A1/603X1	6	1251	4.39	2122449.3610	353031.1504	47.950929	-118.866059
603	Beach Sample	603B1	6	1265	AP of 1255'	2122207.2550	352478.5832	47.949432	-118.867104
603	Focus-Area Sample	603X1	6	1251	4.39	2122449.3610	353031.1504	47.950929	-118.866059
603	Focus-Area Sample	603X2	6	921	334.18	2122382.1340	354381.0606	47.954633	-118.866192
603	Focus-Area Sample	603X3	6	1252	3.36	2122227.3490	357489.1247	47.963162	-118.866500
600	Baseline Sample	600X1		1271	AP of 1255'	2109136.4430	348050.4260	47.938199	-118.920874
600	Baseline Sample	600X2		922	332.53	2107854.7260	350746.7332	47.945676	-118.925829
600	Baseline Sample	600X3		1258	AP of 1255'	2107194.5340	352135.5594	47.949527	-118.928381

Notes:

[1] Elevation data are based on 1947-1949 bathymetric data and use USBR 1937 datum. Bioassay sample elevation assumes 1,250 +/- feet based on two feet below water elevation.

The actual bioassay sample elevation was about 2 feet below actual water surface at time of sampling.

[2] Depth is based on the anticipated Lake Roosevelt pool elevation of 1,255 feet during April 2005. Depths denoted as AP (Above Pool) of 1255' were not anticipated to be under water during April 2005 sampling.

(Assumes pool elevation of 1,255 feet. Pool elevation may be lower than 1,255 feet based on expected inflow into the reservoir.)

[3] Object X and Object Y coordinates are based on Washington State Plane NAD 1983.

…continued on next page

Table A1.1. A complete list of the sediment samples that were collected during the 2005 sediment sampling program for the Upper Columbia River remedial investigation/feasibility study (from CEE 2004).

River Mile	Sample Type[11]	Sample Location ID[5,6,7,8,9]	Focus Area[10]	Approximate Elevation[1]	Approximate Depth @ 1255'[2]	Object X[3]	Object Y[3]	Latitude[4]	Longitude[4]

[4] Latitude and Longitude are based on Washington State Plane NAD 1983.

[5] Sample locations are denoted with river mile followed by location in channel, with X1 denoting the left bank of the Columbia River (looking downstream).

Baseline Samples not taken in focus areas have the following nomenclature

X1 : Bank of Columbia River (looking downstream)
X2 Baseline Sample between Left and Right Bank of Columbia River (looking downstream)
X3 Baseline Sample on Right Bank of Columbia River (looking downstream)

Examples

At River mile 600, "sample Location" 600X1 is the left bank, 600X2 is mid channel, and 600X3 is the right bank

Baseline Samples from a focus area have the following nomenclature

Different focus areas have different amounts of baseline samples with as few as three and as many as nine.
X1 : Bank of Columbia River (looking downstream)
X2 Baseline Sample between Left and Right Bank of Columbia River (looking downstream)
X3 Baseline Sample between Left and Right Bank of Columbia River (looking downstream)
X4 Baseline Sample between Left and Right Bank of Columbia River (looking downstream)
X5 Baseline Sample between Left and Right Bank of Columbia River (looking downstream)
X6 Baseline Sample between Left and Right Bank of Columbia River (looking downstream)
X7 Baseline Sample between Left and Right Bank of Columbia River (looking downstream)
X8 Baseline Sample between Left and Right Bank of Columbia River (looking downstream)
X9 Baseline Sample on Right Bank of Columbia River (looking downstream)

Examples

For example, at river mile 603, "Sample Location" 603X1 is the left bank, 603X2 is mid channel, and 603X3 is the right bank (all directions are based looking downstream).

At river mile 637, "Sample Location" 637X1 is the left bank, 637X7 is the right bank, while locations 637X2, 637X3, 637X4, 637X5, and 637X6 span across the transect in-between the two bank sample locations.

At river mile 605, "Sample Location" 605X1 is the left bank, 605X9 is the right bank, while locations 605X2, 605X3, 605X4, 605X5, 605X6, 605X7, 605X8 span across transect between the two bank sample locations.

[6] Tributary Samples with a location denoted as T1 represents a sample taken at the mouth of the tributary. Tributary samples with a location as T2 represent a sample taken downstream of the tributary denoted.

[7] Beach Sample locations are denoted as B1

[8] Core Sample locations are denoted as C1

[9] Bioassay sample location correspond with a baseline sample location in all cases with the exception of the bioassay sample at river mile 687

[10] Focus Areas

Focus Area #1 (RM744 - RM740) - represents top of study area
Focus Area #2 (RM725 - RM721) - represents apparent end of major slag deposition area
Focus Area #3 (RM708 - RM704) - represents Marcus Flats deposition area
Focus Area #4 (RM680 - RM676) - represents apparent high mercury, cadmium, and organic carbon deposition area
Focus Area #5 (RM644 - RM640) - represents corridor between the Spokane and Colville Indian Reservations
Focus Area #6 (RM607 - RM603) - represents Lower Reservoir Reach

[11] Refer to Section 6.2 of the document text for a description of each sample type.

Appendix 2

Identification of Candidate Data Sets

Appendix 2 Identification of Candidate Data Sets

A2.0 Introduction

A step-wise approach was used to compile, evaluate, and analyze the sediment toxicity and sediment chemistry data generated for the Upper Columbia River. These steps included:

- Identification and acquisition of candidate data sets;
- Screening of candidate data sets;
- Compilation of data into a relational database;

The first step, identification and acquisition of candidate data sets is described in this Appendix. Steps 2 and 3 are further described in Appendix 3.

A2.1 Identification and Acquisition of Candidate Data Sets

The project database was developed from the data and information collected during the 2005 USEPA sampling program, and compiled by CH2MHill (CEE 2006a; Stefanoff *et al.* 2006; Schut and Stefanoff 2007) with the support of MacDonald Environmental Sciences Ltd. (MESL). Additional candidate data sets for potential inclusion in the project database were identified from MacDonald and Ingersoll (2002), and from Besser *et al.* (2008). Table A2.1 summarizes all candidate data sets that were screened for possible inclusion in the project database. The most relevant information on pore-water chemistry, sediment chemistry, and sediment toxicity data to support the development of thresholds for predicting sediment toxicity for the UCR were considered for inclusion into the project database. Appendix 3 contains additional information on the data set screening criteria that were applied.

A2.2 Data Summary

A total of three data sets met the screening criteria described in Appendix 3. Tables A2.2 and A2.3 present the sediment chemistry data available from each of the selected studies on a station-by-station basis. Summaries of the available whole sediment chemistry data have also been prepared for surficial (i.e., ≤15cm; Table A2.4) and sub-surface (i.e., >15cm; Table A2.5) sediment samples (see Appendix 9 for all whole sediment chemistry and control-adjusted toxicity data used to develop thresholds for predicting sediment toxicity). The available pore-water chemistry data are presented in Table A2.6. Finally, the raw sediment toxicity data for all three studies are contained in Table A2.7 to A2.9.

A2.3 References Cited

Bennett, J. and J. Cubbage. 1992a. Copper in sediments from Steilacoom Lake, Pierce County, Washington. Sediment Management Unit. Washington Department of Ecology. Olympia, Washington. 34 pp + Appendices.

Bennett, J. and J. Cubbage, 1992b. Effects of polycyclic aromatic hydrocarbons (PAHs) in sediments from Lake Washington on freshwater bioassay organisms and benthic macroinvertebrates. Washington State Department of Ecology. 28 +app Washington State Department of Ecology. Olympia, Washington.

Besser, J.M., W.G. Brumbaugh, C.D. Ivey, C.G. Ingersoll, and P.W. Moran. 2008. Biological and chemical characterization of metal bioavailability in sediments from Lake Roosevelt, Columbia River, Washington, USA. Archives of Environmental Contamination and Toxicology 54(4): 557-570.

CEE (CH2M Hill and Ecology and Environment, Inc.). 2006a. Phase 1 sediment sampling data evaluation. Upper Columbia River Site CERCLA RI/FS. Contract No. 65-S7-04-01. Draft Final. Prepared for USEPA Region 10. Seattle, WA.

Cubbage, J. 1992. Survey of Contaminants in sediments in Lake Union and joining waters (Salmon Bay, Lake Washington Ship Canal, and Portage Bay. Urban Bay Action Team. Northwest Regional Office. Washington State Department of Ecology. Olympia, Washington.

ENSR Consulting and Engineering. 1994. Vancouver works baseline sediment characterization. Document #0225-006-405 ENSR Consulting and Engineering. Aluminum Company of America. (As cited in WDOE 2001).

Era, B. and D. Serdar. 2001. Reassessment of toxicity of Lake Roosevelt sediments. Environmental Assessment Program. Washington State Department of Ecology. Olympia, Washington. 10 pp. + app.

FishPro Engineering and Environmental Consultants. 1991. Biological report on sediment and water bioassays and benthic community determination at Unimar Yard 1 Dry Dock Facility. (As cited in WDOE 2001).

Ingersoll, C.G., W.G. Brumbaugh, A.M. Farag, T.W. La Point, and D.F. Woodward. 1992. Effects of metal-contaminated sediment, water, and diet on aquatic organisms. Second draft of the final report for the USEPA Milltown endangerment assessment project. National Fisheries Contaminant Research Center. U.S. Fish and Wildlife Service. Columbia, Missouri. Prepared for U.S. Environmental Protection Agency. Helena, Montana. 99 pp. + apps.

Johnson, A. 1991. Review of metals, bioassay, and macroinvertebrate data from Lake Roosevelt benthic samples collected in 1989. Washington State Department of Ecology. Olympia, Washington.

Johnson, A. and D. Norton. 1988. Screening survey for chemical contaminants and toxicity in sediments at five lower Columbia River ports, September 22-24, 1987. Washington State Department of Ecology (WDE). Olympia, Washington.

Johnson, A. and D. Norton. 1989. Screening survey for chemical contaminants and toxicity in drainage basins at Paine Field, August 10-12, 1987. WA-07-0010. Washington State Department of Ecology. Environmental Investigations and Laboratory Services Program. Olympia, Washington. 32 pp.

Johnson, A. and D. Norton. 2001. Chemical analysis and toxicity testing of Spokane River sediments collected in October, 2000. Publication No. 01-03-029. Environmental Assessment Program. Washington State Department of Ecology. Olympia, Washington. 30 pp. + app.

Johnson, A. and R. Plotnikoff. 2000. Review of sediment quality data for the Similkameen River. Publication No. 01-03-027. Environmental Assessment Program. Washington State Department of Ecology. Olympia, Washington. 24 pp. + app.

Johnson, A., D. Norton, and B. Yake. 1989. An assessment of metals contamination in Lake Roosevelt. WA-CR-9010. Washington State Department of Ecology. Toxics Investigations/Ground Water Monitoring Section. Olympia, Washington. 71 pp.

Landau Associates, Inc. 1993. Mill Creek and East Drain sediment sampling and analysis report. Western Processing Phase II Kent, Washington. Draft report. Prepared for Western Processing Corporate Trustee. Prepared by Landau Associates Inc. Edmonds, Washington.

MacDonald, D.D., and C.G. Ingersoll. 2002. Development and evaluation of sediment quality standards for the Confederated Tribes of the Colville Indian Reservation; Including the Lake Roosevelt and Okanogan River Basins. Prepared for Confederated Tribes of the Colville Reservation. Nespelem, Washington.

Tetra Tech. 1993. Final Report: Lower Columbia River backwater reconnaissance survey. Volume 2: Data Validation Report Appendix A. Prepared for The Lower Columbia River Bi-State Water Quality Program. Prepared by Tetra Tech. Redmond, Washington.

USACE (U.S. Army Corps of Engineers). 1995. Guidelines for statistical treatment of less than detection limit data in dredged sediment evaluations. EEDP-04-23. Waterways Experiment Station. Vicksburg, Mississippi.

WDOE (Washington Department of Ecology). 2001. Sediment Quality Information System (SEDQUAL): Release 4. Sediment Management Unit. Seattle, Washington.

Table A2.1. Listing of the candidate sediment chemistry and sediment toxicity data sets screened to support development of thresholds for predicting sediment toxicity for COPCs, COPC mixtures, and slag indicators in the Upper Columbia River.

Location	Sampling Date	n	Sediment Toxicity Tests Conducted	Sediment Chemistry	Reference	Data Set Screen Result	Reason for Exclusion
Columbia River Basin							
Lower Columbia River, Reed Island, Camas Slough, Vancouver, Kalama, Longview, Ilwaco	1987	12	48-hour *Daphnia pulex* (S); 96-h *Hyalella azteca* (S)	PAHs, metals, TOC, grainsize, phthalate acid esters	Johnson and Norton 1988	Excluded	Incompatible test duration and organism life-stage
Lake Roosevelt, Lower Arrow Lake, Upper Columbia River	1986	5	10-day WS *Hyalella azteca* (S)	Metals, TOC, grainsize	Johnson *et al.* 1989	Excluded	Incompatible test duration and organism life-stage
Lake Roosevelt	1989	5	10-day WS *Hyalella azteca* (S)	Metals, TOC, grainsize	Johnson 1991	Excluded	Incompatable test duration
Colville River, Kettle River, Kootenay River, Lake Roosevelt, Pend D'Oreille River, Sanpoil River, Spokane River, Upper Columbia River		22 22	7-day WS *Ceriodaphnia dubia* (S, R) 7-day WS *Hyalella azteca* (S)	PAHs, metals, phenolics, TOC, grainsize	Bortleson *et al.* 1994	**Accepted (16 of 22 stations; *C. dubia* only)**	6 of 22 stations excluded because out of study area and didn't meet reference station criteria. *H. azteca* excluded because of incompatible test duration.
Columbia River	1993	15	10-day WS *Hyalella azteca* (S)	PAHs, PCBs, metals, dioxins and furans, OC pesticides, SVOCs, phenolics, TOC, grainsize	Tetra Tech 1993	Excluded	Incompatible test duration and organism life-stage
Lower Columbia River	1993	6	10-day WS *Hyalella azteca* (S)	PAHs, metals, TOC, grainsize	Brady 1994	Excluded	Incompatible test duration and organism life-stage
Lower Columbia River	1993	4	14-day WS *Hyalella azteca* (S)	PAHs, PCBs, metals, TOC, grainsize	ENSR Consulting and Engineering 1994	Excluded	Incompatible test duration and organism life-stage
Similkameen River	1998	4	10-day WS *Hyalella azteca* (S)	Metals, TOC, grainsize	Johnson and Plotnikoff 2000	Excluded	Outside of study area

Table A2.1. Listing of the candidate sediment chemistry and sediment toxicity data sets screened to support development of thresholds for predicting sediment toxicity for COPCs, COPC mixtures, and slag indicators in the Upper Columbia River.

Location	Sampling Date	n	Sediment Toxicity Tests Conducted	Sediment Chemistry	Reference	Data Set Screen Result	Reason for Exclusion
Columbia River Basin (continued)							
Bead Lake, Latah Creek, Little Spokane River, Lower Long Lake, Middle Long Lake, Spokane River, Upper Long Lake	2000	8 8	20-day WS *Chironomus dilutus* (S, G) 28-day WS *Hyalella azteca* (S, G)	PAHs, PCBs, metals, OC pesticides, SVOCs, TOC, grainsize	Johnson and Norton 2001	Excluded	Outside of study area
Auxillary Gage, Boundary, Castle Rock, Goodeve Creek, Grand Coulee Dam, Kettle River, Lower Arrow Lake, Sanpoil River, Swawilla Basin, Whitestone Creek	2001	10 10	20-day WS *Chironomus dilutus* (S, G) 10-day WS *Hyalella azteca* (S)	Metals, TOC, grainsize	Era and Serdar 2001	Excluded	Incompatible toxicity test, but 7 of 10 stations within study area
Lake Roosevelt, Sanpoil River, Upper Columbia River	2004	8	12-day WS *Chironomus dilutu* s (S, G) 28-day WS *Hyalella azteca* (S, G)	Metals, SEM and AVS, TOC, moisture, grainsize	Besser *et al.* 2008	**Accepted**	NA
Barnaby Creek, Cheweka Creek, Crown Creek, Fivemile Creek, Flat Creek, Lake Roosevelt, Nancy Creek, Upper Columbia River	2005	56 280	7-day WS *Ceriodaphnia dubia* (S, R) 10-day WS *Chironomus dilutus* (S, G) 28-day WS *Hyalella azteca* (S,G) None. Sediment chemistry data only	Metals, SEM and AVS, PAHs, PCBs, OC pesticides, SVOCs, grainsize	Stefanoff *et al.* 2006; Schut and Stefanoff 2007	**Accepted** [1]	NA
Pend Oreille River Basin							
Milltown Reservoir, Rock Creek, Silver Bow Creek, Upper Clark Fork River	1991	15 15	14-day WS *Chironomus riparius* (S, G) 28-day WS *Hyalella azteca* (S, G, R)	PAHs, metals, SEM and AVS, TOC, grainsize	Ingersoll *et al.* 1992	Excluded	Outside of study area
Puget Sound							
Big Gulch, Japanese Gulch, Marshy Lake, Powder Mill Gulch, Stickney Lake	1987	5	10-day WS *Hyalella azteca* (S)	PAHs, metals, PCBs, OC pesticides, SVOCs, phenolics, TOC, grainsize	Johnson and Norton 1989	Excluded	Outside of study area

Table A2.1. Listing of the candidate sediment chemistry and sediment toxicity data sets screened to support development of thresholds for predicting sediment toxicity for COPCs, COPC mixtures, and slag indicators in the Upper Columbia River.

Location	Sampling Date	n	Sediment Toxicity Tests Conducted	Sediment Chemistry	Reference	Data Set Screen Result	Reason for Exclusion
Puget Sound (continued)							
Lake Union	1990	9	10-day WS *Hyalella azteca* (S)	PAHs, PCBs, metals, OC pesticides, SVOCs, TOC, grainsize	Cubbage 1992	Excluded	Outside of study area
Black Lake, Steilacoom Lake	1990	4	14-day WS *Hyalella azteca* (S)	Metals, AVS	Bennett and Cubbage 1992a	Excluded	Outside of study area
		4	7-day WS *Ceriodaphnia dubia* (R)				
		4	10-day WS *Chironomus dilutus* (S, G)				
Lake Washington	1990-91	11	14-day WS *Hyalella azteca* (S)	PAHs, TOC, grainsize	Bennett and Cubbage 1992b	Excluded	Outside of study area
		4	7-day WS *Ceriodaphnia dubia* (S, R)				
		4	14-day WS *Chironomus dilutus* (S, G)				
Lake Union	1991	9	14-day WS *Hyalella azteca* (S, G)	PAHs, PCBs, metals	FishPro Engineering and Environmental Consultants 1991	Excluded	Outside of study area
East Drain, Mill Creek	1992	19	> 20-day WS *Chironomus dilutus* (S, E)	PAHs, PCBs, metals, OC pesticides, SVOCs, AVS, TOC	Landau Associates Inc. 1993	Excluded	Outside of study area
		19	10-day WS *Hyalella azteca* (S)				

n = number of samples; WS = whole sediment; S = survival; R = reproduction; G = growth; E = emergence; TOC = total organic carbon; NA = not applicable; OC = organochlorine; SVOC = semi-volatile organic compounds; SEM = simultaneously extracted metals; AVS = acid volatile sulphides; PAH = polycyclic aromatic hydrocarbon; PCB = polychlorinated biphenyl.

[1] This is the data set that represents the matching sediment chemistry and sediment toxicity data collected by USEPA in 2005, the primary focus of this investigation.

Table A2.2. Summary of sediment chemistry data by station for the 2005 USEPA sampling program (Stefanoff *et al.* 2006; Schut and Stefanoff 2007) and Besser et al. (2008).

		Besser *et al.* (2008)								**UCR Reference Sites**						**UCR Test Sites**						
Chemical of Potential Concern	**Reference Criteria**	**LR1**	**LR2**	**LR3**	**LR4**	**LR5**	**LR6**	**LR7**	**SA8[1]**	**RM685R1[1]**	**RM686R1[1]**	**RM705R1[1]**	**RM721R1[1]**	**RM726R1[1]**	**RM732R1[1]**	**RM603A1(X1)**	**RM605A1(X1)**	**RM605A2(X8)**	**RM606A1(X3)**	**RM616A1(X3)**	**RM622A1(X3)**	**RM628A1(X1)**
Metals (mg/kg DW)																						
Arsenic	9.79	8.6	**22**	**13**	2.8	8.6	**9.9**	**32**	8.4	<1.9	<1.4	<1.8	2.25	3.1	3.4	6	3	4.2	3.1	4.9	**13.7**	7.1
Cadmium	0.99	0.3	**7.7**	**7.1**	0.2	**4.3**	**4.3**	**4.3**	0.48	0.85	0.19	0.16	0.415	0.58	**1.3**	0.23	<0.62	0.67	0.28	0.14	0.16	0.058
Chromium	43.4	ND	ND	ND	ND	ND	ND	ND	ND	23.8	8.9	6.9	22.2	23.9	7.4	14	6.4	13.5	12.6	10.7	12	7.2
Copper	31.6	10	**84**	**68**	12	**78**	**290**	**2800**	22	16.3	5.5	7.9	15.1	16.7	6.6	11.8	6	11.5	7.9	8.5	11.6	8.7
Lead	35.8	10	**270**	**400**	9	**220**	**200**	**1110**	16	10.1	3.8	6.2	12.5	14.5	25.5	11.1	3.9	16.8	10.4	6.1	10.9	7.4
Mercury	0.18	0.003	**0.84**	**1.1**	0.01	**0.65**	**0.32**	0.02	0.03	0.026	0.008	**HND**	0.035	0.02	0.015	0.017	0.006	0.075	0.013	0.009	0.019	0.007
Nickel	22.7	ND	ND	ND	ND	ND	ND	ND	ND	**24.3**	5.8	4.9	14.5	15.2	5.3	12.7	5.7	11.3	10	9.5	10	7
Zinc	121	81	**970**	**910**	54	**940**	**3100**	**26000**	120	72.8	26.1	31.1	54.8	60.5	49	94.2	27.9	**140**	102	49.5	62.5	40.7
Simultaneously Extracted Metals (SEM; µmol/g)																						
(ΣSEM - AVS)/*f*oc	130	106	**375**	**637**	**149**	**714**	**2360**	**92200**	25.5	7.92	9.52	17.5	-176	42.3	31.1	**264**	**437**	**296**	**341**	**357**	**457**	**188**
Meets Reference Criteria?		**Yes**	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	No	No
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)																						
Anthracene	57.2	ND	ND	ND	ND	ND	ND	ND	ND	<9	<9	<7	<7	<8	<9	<5	<5	<5	<6	<6	<6	<5
Benz[a]anthracene	108	ND	ND	ND	ND	ND	ND	ND	ND	0.7	1	<7	<7	0.3	<9	<5	<5	<5	<6	<6	<6	<5
Dibenzo[a,h]anthracene	33	ND	ND	ND	ND	ND	ND	ND	ND	<9	<9	<7	<7	<8	<9	<5	<5	<5	<6	<6	<6	<5
Benzo[a]pyrene	150	ND	ND	ND	ND	ND	ND	ND	ND	<9	<9	<7	<7	<8	<9	<5	<5	<5	<6	<6	<6	<5
Chryene	166	ND	ND	ND	ND	ND	ND	ND	ND	1	2	<7	<7	<8	<9	<5	<5	<5	<6	<6	<6	<5
Fluoranthene	423	ND	ND	ND	ND	ND	ND	ND	ND	1	3	0.6	<7	16.5	<9	<5	<5	<5	<6	<6	<6	<5
Fluorene	77.4	ND	ND	ND	ND	ND	ND	ND	ND	<9	<9	<7	<7	<8	<9	<5	<5	<5	<6	<6	<6	<5
Naphthalene	176	ND	ND	ND	ND	ND	ND	ND	ND	2	3	2	1	0.9	2	1	1	4.3	1	2	4.7	1
Phenanthrene	204	ND	ND	ND	ND	ND	ND	ND	ND	1	1	0.6	<7	21.5	0.3	<5	<5	0.2	0.2	<6	<6	<5
Pyrene	195	ND	ND	ND	ND	ND	ND	ND	ND	1	3	<7	<7	34	<9	<5	<5	<5	<6	<6	<6	<5
ΣPAH_{13}	1610	ND	ND	ND	ND	ND	ND	ND	ND	34.4	40.7	35.3	39.8	101	48	28.9	28.9	29.9	31.9	35.7	38.2	28.9
$\Sigma ESB\text{-}TU_{FCV}$	0.1	ND	ND	ND	ND	ND	ND	ND	ND	0.00524	0.0128	0.00751	0.0073	0.0112	0.00852	**0.13**	**0.202**	0.0329	0.0516	**0.133**	**0.151**	**0.107**
Meets Reference Criteria?		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	**Yes**	**Yes**	No	No	No

Table A2.2. Summary of sediment chemistry data by station for the 2005 USEPA sampling program (Stefanoff *et al.* 2006; Schut and Stefanoff 2007) and Besser et al. (2008).

Chemical of Potential Concern	Reference Criteria	Besser *et al.* (2008)								UCR Reference Sites						UCR Test Sites						
		LR1	LR2	LR3	LR4	LR5	LR6	LR7	SA8[1]	RM685R1[1]	RM686R1[1]	RM705R1[1]	RM721R1[1]	RM726R1[1]	RM732R1[1]	RM603A1(X1)	RM605A1(X1)	RM605A2(X8)	RM606A1(X3)	RM616A1(X3)	RM622A1(X3)	RM628A1(X1)
Polychlorinated Biphenyls (PCBs; µg/kg DW)																						
ΣPCBs	59.8									11.1	11.7	9.3	9.1	10.1	11.3	6.95	6.7	6.7	7.15	7.35	7.7	7.05
Meets Reference Criteria?		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Organochlorine Pesticides (µg/kg)																						
Chlordane (Total)	3.24	ND	ND	ND	ND	ND	ND	ND	ND	<1.36	<1.42	<1.14	<1.09	<1.2	<1.38	<0.84	<0.82	<0.84	<0.86	<0.9	<0.92	<0.86
Dieldrin	1.9	ND	ND	ND	ND	ND	ND	ND	ND	<1.4	<1.4	<1.2	<1.1	<1.2	<1.4	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87
ΣDDD	4.88	ND	ND	ND	ND	ND	ND	ND	ND	<2.8	<2.8	<2.4	<2.2	<2.4	<2.8	<1.7	<1.66	<1.7	<1.76	<1.82	<1.86	<1.74
ΣDDE	3.16	ND	ND	ND	ND	ND	ND	ND	ND	<2.8	<2.8	<2.4	<2.2	<2.4	<2.8	<1.7	<1.66	<1.7	<1.76	<1.82	<1.86	<1.74
ΣDDT	4.16	ND	ND	ND	ND	ND	ND	ND	ND	<2.8	<2.8	<2.4	<2.2	<2.4	<2.8	<1.7	<1.66	<1.7	<1.76	<1.82	<1.86	<1.74
DDTs (Total)	5.28	ND	ND	ND	ND	ND	ND	ND	ND	**HND**	**HND**	**HND**	**HND**	**HND**	**HND**	<5.1	<4.98	<5.1	<5.28	**HND**	**HND**	<5.22
Endrin	2.22	ND	ND	ND	ND	ND	ND	ND	ND	<1.4	<1.4	<1.2	<1.1	<1.2	<1.4	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87
Endrin Aldehyde	2.22	ND	ND	ND	ND	ND	ND	ND	ND	<1.4	<1.4	<1.2	<1.1	<1.2	<1.4	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87
Endrin Ketone	2.22	ND	ND	ND	ND	ND	ND	ND	ND	<1.4	<1.4	<1.2	<1.1	<1.2	<1.4	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87
Lindane	2.37	ND	ND	ND	ND	ND	ND	ND	ND	<0.68	<0.71	<0.57	<0.545	<0.6	<0.69	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43
Heptachlor Epoxide	2.47	ND	ND	ND	ND	ND	ND	ND	ND	<0.68	<0.71	<0.57	<0.545	<0.6	<0.69	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43
Meets Reference Criteria?		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
COPC Mixtures																						
Mean PEC-$Q_{METALS, PAHs, PCBs}$[2]	0.1	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	0.066	0.0246	0.0237	0.0511	0.0586	0.0486	0.0508	0.0256	0.0575	0.0433	0.0366	0.0548	0.0344
Mean PEC-Q_{METALS}[3]		0.129	1.4	1.48	0.0787	1.08	2.29	17.2	0.177	0.18	0.0546	0.0559	0.138	0.157	0.127	0.141	0.0657	0.161	0.118	0.0973	0.151	0.0915
Mean PEC-$Q_{METALS(1\%OC)}$[4]	0.1	**0.391**	**0.519**	**0.822**	**0.342**	**0.675**	**1.53**	**61.4**	0.0932	0.0566	0.0359	0.0261	0.0566	0.04	0.0505	**1.42**	**1.02**	**0.391**	**0.432**	**0.804**	**1.27**	**0.756**
Meets Reference Criteria?		No	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	No	No
Conventionals																						
TOC (%)		0.33	2.7	1.8	0.23	1.6	1.5	0.28	1.9	3.18	1.52	2.14	2.44	3.91	2.52	0.0996	0.0641	0.413	0.273	0.121	0.119	0.121
Station Meets Reference Criteria?		No	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	No	No

Table A2.2. Summary of sediment chemistry data by station for the 2005 USEPA sampling program (Stefanoff *et al.* 2006; Schut and Stefanoff 2007) and Besser et al. (2008).

Chemical of Potential Concern	Reference Criteria	UCR Test Sites																				
		RM634A1(X1)	**RM637A1(X1)**	**RM640A1(X3)**	**RM641A1(X1)**	**RM642A1(X1)**	**RM644A1(X3)**	**RM658A1(X3)**	**RM661A1(X1)**	**RM676A1(X3)**	**RM677A1(X3)**	**RM678A1(X1)**	**RM680A1(X1)**	**RM686A1(X3)**	**RM687A1**	**RM689A1(X3)**	**RM692A1(X1)**	**RM698A1(X1)**	**RM704A1(X1)**	**RM706A1(X1)**	**RM706A2(X7)[1]**	**RM708A1(X3)**
Metals (mg/kg DW)																						
Arsenic	9.79	**13.5**	3.9	9.3	3.4	4.1	**14.1**	5.1	1.4	3.4	2.7	1.6	**11.7**	1.3	5.7	2.1	0.81	7.9	4.9	4.5	1.4	5.8
Cadmium	0.99	0.14	<0.58	0.29	**2.4**	**2.1**	0.15	0.405	0.32	0.18	0.4	0.27	**12.7**	0.11	**2.1**	0.13	<0.58	**5.3**	**2**	**3.8**	0.42	**4.8**
Chromium	43.4	14	8.3	19.3	24.1	17.9	25.9	30.6	16.6	24.4	29.7	16.9	**70.4**	9.1	21.2	16.9	8.05	34.9	22.8	21.3	24.9	20.7
Copper	31.6	16.5	7	17.8	28	19.9	22.6	23.1	10.8	21.1	23.7	11.8	**82.5**	10.8	27	14.7	6.05	**164**	25.9	**78.8**	26.2	**106**
Lead	35.8	12.7	5.7	18.4	**67.7**	**82.4**	17.7	19.1	21.1	9.85	12	9.7	11.7	6.6	**136**	12.3	4.15	**309**	**72.4**	**197**	14.7	**192**
Mercury	0.18	0.008	0.006	0.02	**0.34**	**0.23**	0.01	0.018	0.017	0.0435	0.012	0.012	**0.88**	0.01	**0.41**	0.034	<0.13	**0.87**	**0.23**	**0.66**	0.044	**0.43**
Nickel	22.7	13.4	6.4	22.7	20.5	14.8	**26.4**	**27.4**	14.4	21.8	**25.4**	13.9	**147**	10.6	21	15.1	6.55	**25.3**	19.8	15.5	15.9	16.4
Zinc	121	76.4	30.9	90.2	**355**	**292**	64	88.8	**191**	60.1	70.4	58.7	69	40.7	**281**	62.6	32	**954**	**204**	**764**	97.5	**1340**
Simultaneously Extracted Metals (SEM; µmol/g)																						
ΣSEM - AVS/ƒoc	130	**261**	**286**	**265**	**364**	**675**	**282**	**1000**	**776**	**350**	121	**1020**	**232**	**333**	**703**	**230**	**466**	**627**	**240**	**715**	2.58	**793**
Meets Reference Criteria?		No	No	No	No	No	No	No	No	No	**Yes**	No	No	No	No	No	No	No	No	No	**Yes**	No
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)																						
Anthracene	57.2	<6	<5	<5	<9	<6	<5	<6	<5	<5.5	<6	<5	<6	<5	<6	<6	<5	<8	<6	<9	<9	0.6
Benz[a]anthracene	108	<6	<5	0.2	0.7	0.2	<5	<6	<5	<5.5	<6	<5	0.2	<5	<6	<6	<5	2	0.5	2	<9	2
Dibenzo[a,h]anthracene	33	<6	<5	<5	<9	<6	<5	<6	<5	<5.5	<6	<5	<6	<5	<6	<6	<5	0.7	<6	<9	<9	0.6
Benzo[a]pyrene	150	<6	<5	<5	<9	<6	<5	<6	<5	<5.5	<6	<5	2	<5	<6	<6	<5	2	<6	2	<9	<8
Chryene	166	<6	<5	0.6	2	0.5	<5	0.2	<5	<5.5	<6	<5	4	<5	1	<6	1.35	5	0.9	3	1	3
Fluoranthene	423	<6	<5	0.8	1	0.7	<5	1.6	<5	<5.5	<6	<5	0.4	<5	1	0.2	<5	5	0.7	5	2	4
Fluorene	77.4	<6	<5	<5	<9	<6	<5	<6	<5	<5.5	<6	<5	<6	<5	<6	<6	<5	<8	<6	<9	<9	0.6
Naphthalene	176	1	1	1	3	1	1	1	2	2.65	1	4.2	1	4.1	5.1	4.8	4.15	4	4.7	3	7.7	1
Phenanthrene	204	<6	<5	0.4	1	0.5	<5	0.2	0.2	<5.5	0.2	<5	<6	<5	2	<6	<5	6	2	4	0.8	4
Pyrene	195	<6	<5	1.45	1	0.5	<5	1.6	13	<5.5	<6	<5	14	<5	0.8	<6	<5	4	0.7	4	2	4
ΣPAH_{13}	1610	34.5	28.9	22.8	36.7	22.1	28.9	26.3	30.1	34.4	31.4	31.9	33.5	34.1	31.9	38	33	48.7	28.5	47.5	49.5	32.7
ESBTU FCV_{13}	0.1	**0.234**	**0.353**	0.0475	0.0126	0.0148	0.0937	0.0424	**0.101**	**0.136**	0.0264	**0.108**	0.0631	**0.222**	0.00931	0.0439	**0.398**	0.0101	0.0162	0.0106	0.00779	0.0109
Meets Reference Criteria?		No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	**Yes**	No	**Yes**	No	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Table A2.2. Summary of sediment chemistry data by station for the 2005 USEPA sampling program (Stefanoff *et al.* 2006; Schut and Stefanoff 2007) and Besser et al. (2008).

Chemical of Potential Concern	Reference Criteria	UCR Test Sites																				
		RM634A1(X1)	RM637A1(X1)	RM640A1(X3)	RM641A1(X1)	RM642A1(X1)	RM644A1(X3)	RM658A1(X3)	RM661A1(X1)	RM676A1(X3)	RM677A1(X3)	RM678A1(X1)	RM680A1(X1)	RM686A1(X3)	RM687A1	RM689A1(X3)	RM692A1(X1)	RM698A1(X1)	RM704A1(X1)	RM706A1(X1)	RM706A2(X7)[1]	RM708A1(X3)
Polychlorinated Biphenyls (PCBs; µg/kg DW)																						
ΣPCBs	59.8	7.35	6.3	7.1	11.9	8	6.6	7.25	7.05	7.1	8	6.6	7.15	6.5	41.2	7.7	6.5	11	7.35	11.1	12.4	9.65
Meets Reference Criteria?		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Organochlorine Pesticides (µg/kg)																						
Chlordane (Total)	3.24	<0.9	<0.76	<0.85	<1.46	<1	<0.82	<0.88	<0.86	<0.87	<1	<0.82	<0.88	<0.8	<0.98	<0.94	<0.8	<1.32	<0.9	<1.34	<1.5	<1.18
Dieldrin	1.9	<0.92	<0.77	<0.86	<1.5	<1	<0.82	<0.9	**2.8**	<0.875	<1	<0.83	**3.6**	<0.81	<1	<0.95	<0.81	<1.3	<0.92	<1.4	<1.6	<1.2
ΣDDD	4.88	<1.84	<1.54	<1.73	<3	<2	<1.64	<1.8	<1.74	<1.75	<2	<1.66	1.335	<1.62	<2	<1.9	<1.62	<2.6	<1.84	<2.8	<3.2	<2.4
ΣDDE	3.16	<1.84	<1.54	<1.73	<3	<2	<1.64	<1.8	<1.74	1.4	0.69	1.295	1.335	<1.62	**5.7**	<1.9	<1.62	<2.6	<1.84	<2.8	**HND**	0.96
ΣDDT	4.16	<1.84	<1.54	<1.73	<3	<2	<1.64	<1.8	<1.74	1.575	<2	<1.66	**10.89**	<1.62	**10.1**	<1.9	<1.62	<2.6	<1.84	<2.8	<3.2	<2.4
DDTs (Total)	5.28	**HND**	<4.62	<5.19	**HND**	**HND**	<4.92	**HND**	<5.22	3.85	2.69	2.955	**13.56**	<4.86	**16.8**	**HND**	<4.86	**HND**	**HND**	**HND**	**HND**	3.36
Endrin	2.22	<0.92	<0.77	<0.86	<1.5	<1	<0.82	<0.9	1.8	<0.875	<1	<0.83	<0.89	<0.81	<1	<0.95	<0.81	<1.3	**3.6**	<1.4	<1.6	<1.2
Endrin Aldehyde	2.22	<0.92	<0.77	<0.86	<1.5	<1	<0.82	<0.9	<0.87	<0.875	<1	<0.83	<0.89	<0.81	<1	<0.95	<0.81	<1.3	<0.92	<1.4	<1.6	<1.2
Endrin Ketone	2.22	<0.92	<0.77	<0.86	<1.5	<1	<0.82	<0.9	<0.87	<0.875	<1	<0.83	<0.89	<0.81	<1	<0.95	<0.81	<1.3	<0.92	<1.4	<1.6	<1.2
Lindane	2.37	<0.45	<0.38	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41	1.7	<0.4	<0.49	<0.47	<0.4	<0.66	1.6	<0.67	<0.75	<0.59
Heptachlor Epoxide	2.47	<0.45	<0.38	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41	<0.44	<0.4	<0.49	<0.47	<0.4	<0.66	<0.45	<0.67	<0.75	<0.59
Meets Reference Criteria?		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**
COPC Mixtures																						
Mean PEC-$Q_{METALS, PAHs, PCBs}$[2]	0.1	0.062	0.0293	0.0732	**0.136**	**0.12**	0.0829	0.0788	0.0527	0.0591	0.0691	0.043	0.0629	0.0311	**0.167**	0.0464	0.0243	**0.374**	**0.116**	**0.251**	0.0631	**0.329**
Mean PEC-Q_{METALS}[3]		0.174	0.0774	0.208	0.388	0.346	0.238	0.224	0.146	0.165	0.194	0.118	0.177	0.082	0.439	0.126	0.0618	1.1	0.335	0.735	0.169	0.971
Mean PEC-$Q_{METALS(1\%OC)}$[4]	0.1	**2.64**	**2.11**	**0.939**	**0.275**	**0.484**	**1.72**	**0.9**	**1.09**	**1.54**	**0.364**	**0.835**	**0.682**	**1.2**	**0.263**	**0.326**	**1.66**	**0.509**	**0.419**	**0.375**	0.058	**0.66**
Meets Reference Criteria?		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**Yes**	No
Conventionals																						
TOC (%)		0.0658	0.0366	0.22	1.41	0.716	0.138	0.250	135	0.107	0.533	0.141	0.259	0.68	1.67	0.387	0.37	2.17	0.8	1.96	2.91	1.47
Station Meets Reference Criteria?		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**Yes**	No

Table A2.2. Summary of sediment chemistry data by station for the 2005 USEPA sampling program (Stefanoff *et al.* 2006; Schut and Stefanoff 2007) and Besser et al. (2008).

Chemical of Potential Concern	Reference Criteria	UCR Test Sites																					
		RM713A1(X3)	RM723A1(X1)	RM723A2(X3)	RM724A1(X1)	RM724A2(X3)	RM727A1(X1)	RM729A1(X1)	RM730A1	RM733A1(X1)	RM734A1	RM736A1(X1)	RM737A1(X3)	RM738A1(X3)	RM739A1(X3)	RM740A1(X1)	RM741A1(X3)	RM742A1(X1)	RM742A2(X5)	RM743A1(X1)	RM743A2(X3)	RM744A1(X1)	RM744A2(X3)
Metals (mg/kg DW)																							
Arsenic	9.79	4.6	2.3	4.4	3.1	2.1	7.85	2	2.4	6.6	<1.3	4.8	3.6	8.5	7.9	5.2	8.2	6.3	8.2	8.7	4.7	6.9	**10.7**
Cadmium	0.99	**2.85**	0.53	**2.7**	0.14	**2.2**	**3**	**1.1**	**3.5**	**2.9**	**1.8**	**4.3**	**1.2**	0.27	**1.8**	**2**	**2.1**	**3.4**	0.65	**2**	**1.7**	**1.5**	<0.62
Chromium	43.4	20.4	12.6	20.3	22.1	**49**	18.9	14.5	25.4	38.6	25.9	20.7	**111**	**100**	29.1	21.5	33.1	29.6	**72.3**	28.5	28.6	26.4	**89.3**
Copper	31.6	**65**	22.2	**195**	21	**969**	**130**	**183**	**400**	**641**	**396**	**129**	**1920**	**1630**	**367**	**181**	**458**	**399**	**1240**	**356**	**325**	**390**	**1540**
Lead	35.8	**148**	24.5	**203**	16	**267**	**170**	**68.4**	**266**	**1390**	**148**	**214**	**163**	**215**	**114**	**118**	**166**	**182**	**221**	**201**	**142**	**141**	**183**
Mercury	0.18	**0.55**	0.038	**0.39**	0.017	0.11	**0.325**	0.06	0.16	0.083	0.09	**0.33**	**0.22**	<0.12	**0.3**	0.14	0.17	0.16	0.052	0.17	0.12	0.15	0.048
Nickel	22.7	16	12	12.2	21.7	10.6	12.4	6.3	7.7	9.5	6.6	15.1	11.6	9.3	12	11	9.9	10.6	10.9	11.1	9.9	9.7	11.2
Zinc	121	**539**	**179**	**2290**	93.1	**8410**	**1280**	**1250**	**4690**	**8200**	**4610**	**1760**	**12300**	**14400**	**2120**	**1480**	**3190**	**2920**	**8330**	**2560**	**2380**	**2480**	**9940**
Simultaneously Extracted Metals (SEM; µmol/g)																							
ΣSEM - AVS/*f*oc	130	**897**	**2350**	**1490**	**749**	**11200**	**2680**	**7600**	**59600**	**28300**	**91900**	**2550**	**128000**	**38400**	**2660**	**3240**	**7440**	**62900**	**56300**	**4600**	**13500**	**11100**	**143000**
Meets Reference Criteria?		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)																							
Anthracene	57.2	<6.5	<5	<7	<6	<6	<6	<5	<6	<6	<6	1	<5	<5	<6	0.4	0.2	<5	<5	<6	<6	<5	<6
Benz[a]anthracene	108	0.75	0.9	1	2	1	1.25	1	0.4	0.5	0.9	6	<5	<5	1	1	3	0.2	0.4	0.5	0.9	0.4	0.2
Dibenzo[a,h]anthracene	33	<6.5	<5	<7	<6	<6	<3.2	<5	<6	<6	<6	<7	<5	<5	<6	<5	1	<5	<5	<6	<6	<5	<6
Benzo[a]pyrene	150	0.85	<5	<7	4	2	0.85	0.8	<6	<6	1	7	<5	<5	<6	<5	4	<5	0.6	<6	0.9	<5	<6
Chryene	166	1.5	1	3	6	2	1.85	2	0.7	0.5	1	7	<5	<5	2	11.5	4	0.4	2	0.9	1	0.9	0.4
Fluoranthene	423	2	2	3	11	<6	1	7	1	0.9	0.9	14	<5	<5	3	22.5	5	0.6	0.6	1	2	0.9	0.9
Fluorene	77.4	<6.5	<5	<7	0.7	<6	<6	0.4	<6	<6	<6	1	<5	<5	<6	<5	<6	<5	<5	<6	<6	<5	<6
Naphthalene	176	1.5	1	3	2	1	1	1	1	4.7	3	2	1	1	2	1	2	4.3	0.9	4.8	4.7	4.4	4.5
Phenanthrene	204	2	1	4	5	1	1	3	0.9	0.5	1	10	0.2	<5	2	21.5	2	0.4	0.4	0.9	0.9	0.4	0.4
Pyrene	195	1.5	2	2	8	2	0.85	2	0.9	0.7	1	13	<5	<5	2	17.5	4	0.4	0.6	0.9	2	0.6	0.7
ΣPAH_{13}	1610	27.4	23.3	39	51.7	28	22	22.9	23.8	26.3	25.8	72.5	26.6	28.9	30.5	86.2	32.1	21.5	18.2	27.5	27.9	22.8	28.1
ESBTU FCV_{13}	0.1	0.0146	0.0289	0.0123	0.021	0.0188	0.0165	0.0414	0.0727	0.0353	**0.203**	0.0494	0.0824	0.0398	0.0251	0.0655	0.0363	**0.126**	0.0561	0.02	0.0548	0.0271	**0.104**
Meets Reference Criteria?		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	No

Table A2.2. Summary of sediment chemistry data by station for the 2005 USEPA sampling program (Stefanoff *et al.* 2006; Schut and Stefanoff 2007) and Besser et al. (2008).

		UCR Test Sites																					
Chemical of Potential Concern	**Reference Criteria**	**RM713A1(X3)**	**RM723A1(X1)**	**RM723A2(X3)**	**RM724A1(X1)**	**RM724A2(X3)**	**RM727A1(X1)**	**RM729A1(X1)**	**RM730A1**	**RM733A1(X1)**	**RM734A1**	**RM736A1(X1)**	**RM737A1(X3)**	**RM738A1(X3)**	**RM739A1(X3)**	**RM740A1(X1)**	**RM741A1(X3)**	**RM742A1(X1)**	**RM742A2(X5)**	**RM743A1(X1)**	**RM743A2(X3)**	**RM744A1(X1)**	**RM744A2(X3)**
Polychlorinated Biphenyls (PCBs; µg/kg DW)																							
ΣPCBs	59.8	8.33	7.15	9.1	7.9	8	8	6.48	7.15	7.35	7.15	8.55	7.05	6.6	8	6.7	7.8	6.7	7.05	7.7	7.7	7.05	7.15
Meets Reference Criteria?		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Organochlorine Pesticides (µg/kg)																							
Chlordane (Total)	3.24	<1.02	<0.88	<1.12	<0.96	<1	<0.98	<0.78	<0.86	<0.9	<0.86	<1.04	<0.84	<0.82	<1	<0.84	<0.94	<0.84	<0.86	<0.94	<0.92	<0.86	<0.86
Dieldrin	1.9	<1.05	<0.89	<1.1	<0.97	<1	<1	**2.2**	<0.88	<0.91	<0.88	<1.1	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94	<0.86	<0.88
ΣDDD	4.88	<2.1	<1.78	<2.2	<1.94	<2	<2	<1.6	<1.76	<1.82	<1.76	<2.2	<1.72	<1.64	<2	<1.7	<1.92	<1.7	<1.74	<1.9	<1.88	<1.72	<1.76
ΣDDE	3.16	0.64	<1.78	<2.2	1.055	<2	<2	<1.6	1.32	<1.82	<1.76	<2.2	<1.72	<1.64	<2	0.545	<1.92	0.84	<1.74	1.125	<1.88	<1.72	<1.76
ΣDDT	4.16	<2.1	<1.78	<2.2	<1.94	0.78	1.25	0.63	0.84	<1.82	<1.76	<2.2	<1.72	<1.64	<2	<1.7	<1.92	1.275	<1.74	<1.9	<1.88	<1.72	<1.76
DDTs (Total)	5.28	2.74	**HND**	**HND**	2.995	2.78	3.25	2.23	3.04	**HND**	<5.28	**HND**	<5.16	<4.92	**HND**	2.245	**HND**	2.965	<5.22	3.025	**HND**	<5.16	<5.28
Endrin	2.22	<1.05	<0.89	<1.1	<0.97	<1	<1	**2.9**	<0.88	<0.91	<0.88	<1.1	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94	<0.86	<0.88
Endrin Aldehyde	2.22	<1.05	<0.89	<1.1	<0.97	<1	<1	<0.8	<0.88	<0.91	<0.88	<1.1	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94	<0.86	<0.88
Endrin Ketone	2.22	<1.05	<0.89	<1.1	<0.97	<1	<1	<0.8	<0.88	<0.91	<0.88	<1.1	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94	<0.86	<0.88
Lindane	2.37	<0.51	<0.44	<0.56	<0.48	<0.5	<0.49	1.2	<0.43	<0.45	<0.43	<0.52	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46	<0.43	<0.43
Heptachlor Epoxide	2.47	<0.51	<0.44	<0.56	<0.48	<0.5	<0.49	<0.39	<0.43	<0.45	<0.43	<0.52	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46	<0.43	<0.43
Meets Reference Criteria?		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
COPC Mixtures																							
Mean PEC-$Q_{METALS, PAHs, PCBs}$[2]	0.1	**0.195**	0.0642	**0.433**	0.064	**1.34**	**0.302**	**0.243**	**0.773**	**1.64**	**0.7**	**0.38**	**2.03**	**2.17**	**0.437**	**0.307**	**0.599**	**0.567**	**1.41**	**0.513**	**0.453**	**0.483**	**1.66**
Mean PEC-Q_{METALS}[3]		0.57	0.181	1.28	0.177	4.01	0.893	0.718	2.31	4.91	2.09	1.13	6.08	6.49	1.3	0.906	1.78	1.69	4.21	1.53	1.35	1.44	4.98
Mean PEC-$Q_{METALS(1\%OC)}$[4]	0.1	**0.632**	**0.483**	**0.895**	**0.165**	**6.32**	**1.36**	**2.77**	**15**	**12.8**	**34.3**	**1.79**	**42.2**	**20**	**2.28**	**1.67**	**4.46**	**18.8**	**29.4**	**2.17**	**5.47**	**3.6**	**44.4**
Meets Reference Criteria?		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Conventionals																							
TOC (%)		0.902	0.375	1.44	1.07	0.635	0.658	0.260	0.154	0.383	0.0609	0.628	0.144	0.325	0.569	0.543	0.401	0.0896	0.143	0.702	0.246	0.4	0.112
Station Meets Reference Criteria?		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

…footnotes continued on next page

Table A2.2. Summary of sediment chemistry data by station for the 2005 USEPA sampling program (Stefanoff *et al.* 2006; Schut and Stefanoff 2007) and Besser et al. (2008).

Chemical of Potential Concern	Reference Criteria	UCR Test Sites																					
		RM713A1(X3)	RM723A1(X1)	RM723A2(X3)	RM724A1(X1)	RM724A2(X3)	RM727A1(X1)	RM729A1(X1)	RM730A1	RM733A1(X1)	RM734A1	RM736A1(X1)	RM737A1(X3)	RM738A1(X3)	RM739A1(X3)	RM740A1(X1)	RM741A1(X3)	RM742A1(X1)	RM742A2(X5)	RM743A1(X1)	RM743A2(X3)	RM744A1(X1)	RM744A2(X3)

COPC = chemical of potential concern; ND = no data; HND = high non-detect (i.e., value reported as less than the detection limit (DL), and the DL was greater than the threshold effect concentration);

ΣESB-TUFCV = equilibrium partitioning sediment benchmark toxic unit calculated with the final chronic value for the following PAHs: acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene.; PEC-Q = probable effect concentration quotient; OC = organic carbon; AVS = acid-volatile sulfide; foc = fraction organic carbon; Ref. - reference; TOC = total organic carbon.

[1] Selected Reference Station: See text for description of reference station selection criteria.

[2] Mean PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total PAHs; and, total PCBs (Ingersoll *et al.* 2001).

[3] Mean PEC-Q_{METALS} was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc (Ingersoll *et al.* 2001).

[4] Mean PEC-$Q_{METALS(1\%OC)}$ was calculated as the Mean PEC-Q_{METALS} normalized to 1% organic carbon (Ingersoll *et al.* 2001).

Table A2.3. Summary of sediment chemistry data by station from Bortleson *et al.* (1994).

Chemical of Potential Concern	Reference Criteria	Station ID																	
		1[1]	**2[2]**	**4[1]**	**6[1]**	**8**	**10**	**11**	**15**	**17**	**19**	**22**	**25[1]**	**29[1]**	**38**	**53[1]**	**61**	**62[2]**	**71**
Metals (mg/kg DW)																			
Arsenic	9.79	1.5	1.1	ND	8.4	**27**	**27**	**29**	**12**	**14**	9.4	ND	ND	ND	**11**	**12**	**11**	3.7	8.1
Cadmium	0.99	<0.2	<0.4	ND	**6.5**	**HND**	**HND**	**HND**	**5.2**	**6.5**	**4.6**	ND	ND	ND	**11**	**5.6**	**9.4**	**HND**	**5.6**
Chromium	43.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	31.6	9.4	7.6	ND	20	**2500**	**2800**	**2800**	**510**	**530**	**220**	ND	ND	ND	**200**	24	**66**	25	**51**
Lead	35.8	15	18	ND	**200**	**300**	**260**	**290**	**330**	**460**	**270**	ND	ND	ND	**580**	**100**	**280**	15	**170**
Mercury	0.18	0.01	0.008	ND	0.1	0.1	0.06	0.05	**0.4**	**0.6**	**0.4**	ND	ND	ND	**0.7**	0.05	**0.4**	0.03	**0.2**
Nickel	22.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	121	40	46	ND	**1400**	**12000**	**14000**	**16000**	**3200**	**2900**	**1300**	ND	ND	ND	**1200**	**1000**	**950**	120	**610**
Meets Reference Criteria?		**Yes**	**Yes**	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**Yes**	No
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)																			
Anthracene	57.2	<10	ND	<48	ND	ND	ND	ND	ND	ND	ND	<26	ND	<18	<41	ND	ND	ND	ND
Benz[a]anthracene	108	ND	ND	<110	ND	ND	ND	ND	ND	ND	ND	<56	ND	<38	<88	ND	ND	ND	ND
Dibenzo[a,h]anthracene	33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	166	ND	ND	<120	ND	ND	ND	ND	ND	ND	ND	<84	ND	<49	<140	ND	ND	ND	ND
Fluoranthene	423	<20	ND	<130	<5.1	ND	ND	ND	ND	ND	ND	<53	<13	<12	<71	<20	ND	<6.9	ND
Fluorene	77.4	ND	ND	<28	ND	ND	ND	ND	ND	ND	ND	<19	ND	ND	<31	ND	ND	ND	ND
Naphthalene	176	<150	ND	<42	<6	ND	ND	ND	ND	ND	ND	<120	<15	<7.5	<140	<6.9	ND	ND	ND
Phenanthrene	204	<54	ND	<150	<9.3	ND	ND	ND	ND	ND	ND	<120	<23	<19	<150	<21	ND	<13	ND
Pyrene	195	<11	ND	<90	ND	ND	ND	ND	ND	ND	ND	<29	<7.5	<7.5	<38	<16	ND	ND	ND
ΣPAH_{13} (NOT excluding HNDs)	1610	<265	ND	<755.3	<20.4	ND	ND	ND	ND	ND	ND	<545.5	<75.5	<169	<750	<63.9	ND	<19.9	ND
$\Sigma ESB\text{-}TU_{FCV}$	0.1	**0.115**	ND	0.0469	0.0528	ND	ND	ND	ND	ND	ND	0.0528	0.0153	0.0139	0.0677	0.0103	ND	0.0019	ND
Meets Reference Criteria?		No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Table A2.3. Summary of sediment chemistry data by station from Bortleson *et al.* (1994).

Chemical of Potential Concern	Reference Criteria	Station ID																	
		1[1]	2[2]	4[1]	6[1]	8	10	11	15	17	19	22	25[1]	29[1]	38	53[1]	61	62[2]	71
COPC Mixtures																			
Mean PEC-Q[3]	0.1	0.0362	ND	ND	**0.6309**	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.1112**	**0.4616**	ND	0.0801	ND
Mean $PEC\text{-}Q_{METALS}$[4]		0.0666	0.0731	ND	1.2613	9.2731	10.505	11.407	2.8761	3.0397	1.5253	ND	ND	ND	2.206	0.9218	1.3842	0.1598	0.8739
Mean $PEC\text{-}Q_{METALS(1\%OC)}$[5]	0.1	0.0951	0.0913	ND	**12.613**	**92.731**	**105.05**	**57.036**	**1.5137**	**1.0482**	**0.6933**	ND	ND	ND	**0.8485**	**0.6584**	**0.8651**	0.0695	**0.6722**
Meets Reference Criteria?		**Yes**	**Yes**	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**Yes**	No
Conventionals																			
TOC (%)		0.7	0.8	3.4	0.1	0.1	0.1	0.2	1.9	2.9	2.2	2.5	1.3	2.5	2.6	1.4	1.6	2.3	1.3
Station Meets Reference Criteria?		No	**Yes**	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**Yes**	No

COPC = chemical of potential concern; ND = no data; HND = high non-detect (i.e., value reported as less than the detection limit (DL), and the DL was greater than the threshold effect concentration); PAHs = polycyclic aromatic hydrocarbons; $\Sigma ESB\text{-}TU_{FCV}$ = equilibrium partitioning sediment benchmark toxic unit calculated with the final chronic value for the following PAHs: acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene.; PEC-Q = probable effect concentration quotient; OC = organic carbon; AVS = acid-volatile sulfide; foc = fraction organic carbon; Ref. - reference; TOC = total organic carbon.

[1] This station was outside of the study area, and therefore not included in the analysis.

[2] Selected Reference Station: See text for description of reference station selection criteria.

[3] Mean PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total PAHs; and, total PCBs (Ingersoll *et al.* 2001).

[4] Mean $PEC\text{-}Q_{METALS}$ was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc (Ingersoll *et al.* 2001).

[5] Mean $PEC\text{-}Q_{METALS(1\%OC)}$ was calculated as the Mean $PEC\text{-}Q_{METALS}$ normalized to 1% organic carbon (Ingersoll *et al.* 2001).

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Reach 1																
Metals																
Aluminum, total	mg/kg	45	0% (0)	10700	5550	9530	5310	23100	5480	5660	6120	7530	14000	19400	21100	NA
Antimony, total	mg/kg	45	0% (0)	25.3	16.3	18.8	1.3	62.5	3.9	5.78	11.6	21.2	39.2	47.2	51.6	NA
Arsenic, total	mg/kg	49	2% (1)	16.9	14.0	12.4	<1.3	74.4	4.74	5.2	6.9	10.5	25.6	31.0	34.5	<1.3
Barium, total	mg/kg	45	0% (0)	834	587	654	107	2280	264	285	403	581	1200	1760	1960	NA
Beryllium, total	mg/kg	45	0% (0)	1.04	0.755	0.888	0.47	3.87	0.494	0.534	0.59	0.73	1.2	1.56	2.97	NA
Cadmium, total	mg/kg	49	8% (4)	2.16	1.49	1.66	0.27	7.5	0.354	0.472	1.2	1.9	3.05	3.82	4.57	<0.62 to <3.8
Calcium, total	mg/kg	45	0% (0)	37100	18400	32400	6150	80300	15900	17900	21200	34500	47100	64000	68400	NA
Chromium, total	mg/kg	45	0% (0)	59.7	41.5	47.1	15.5	156	19.9	20.7	26.8	38.6	89.3	129	133	NA
Cobalt, total	mg/kg	45	0% (0)	27.2	20.4	20	4.8	75	6.76	7.2	10.1	14.7	42.3	57	59	NA
Copper, total	mg/kg	49	0% (0)	1120	967	677	23.4	3290	110	174	328	641	1710	2656	2800	NA
Iron, total	mg/kg	45	0% (0)	92400	70800	67900	15800	254000	20600	26000	35100	57600	149000	203000	213000	NA
Lead, total	mg/kg	49	0% (0)	310	424	224	32.6	2760	116	121	163	204	266	455	880	NA
Magnesium, total	mg/kg	45	0% (0)	8840	4060	8130	3960	20700	5260	5400	6040	7950	8930	15500	17500	NA
Manganese, total	mg/kg	45	0% (0)	1720	1350	1200	163	4920	291	398	619	1140	2490	3690	4060	NA
Mercury, total	mg/kg	49	2% (1)	0.151	0.147	0.0983	0.005	0.68	0.0170	0.0256	0.0570	0.109	0.170	0.310	0.430	<0.12
Nickel, total	mg/kg	45	0% (0)	13.7	7.06	12.7	6.6	43	9.3	9.58	10.9	12	13.1	16.5	30.1	NA
Potassium, total	mg/kg	45	0% (0)	2090	1160	1810	890	4730	974	1030	1180	1500	3200	3830	4120	NA
Selenium, total	mg/kg	45	76% (34)	3.57	3.7	2.68	2.25	19.5	1.71	1.77	1.8	2	2.35	8.48	11.1	<3.3 - <5
Silver, total	mg/kg	45	84% (38)	1.1	1.83	0.735	0.71	11.6	0.486	0.497	0.55	0.6	0.65	2.12	3.64	<0.95 - <1.9
Sodium, total	mg/kg	45	0% (0)	915	752	628	116	2780	171	206	279	602	1390	1870	2370	NA
Thallium, total	mg/kg	45	87% (39)	1.5	0.45	1.46	1.1	4.06	1.2	1.2	1.3	1.4	1.55	1.71	1.94	<2.4 - <4.7
Uranium, total	mg/kg	45	56% (25)	21.7	22.1	15.6	4.8	84.3	7.62	9.44	10.3	12.1	16.4	64	74.5	<19 - <37.6
Vanadium, total	mg/kg	45	0% (0)	31.6	11.9	29.9	19.8	68.5	20.1	20.9	23.8	28	38	43.4	59.1	NA
Zinc, total	mg/kg	49	0% (0)	8310	7020	5290	170	26600	1060	1660	2480	6110	14000	16900	21500	NA
Simultaneously Extracted (SE) Metals																
Acid volatile sulfides (AVS)	µmol/g	15	0% (0)	5.11	6.67	2.25	0.047	25	0.441	0.642	1.01	2.5	6.7	11.4	15.6	NA
SE antimony	µmol/g	14	0% (0)	0.0376	0.0371	0.0222	0.00115	0.137	0.00286	0.00486	0.017	0.0287	0.0405	0.0811	0.109	NA
SE arsenic	µmol/g	1	0% (0)	0.174	NA	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	NA
SE cadmium	µmol/g	15	13% (2)	0.0111	0.00687	0.00584	<0.000133	0.0222	0.0000698	0.00196	0.00734	0.0107	0.0156	0.0201	0.021	<0.0001
SE chromium	µmol/g	14	0% (0)	0.518	0.461	0.379	0.11	1.54	0.149	0.169	0.229	0.316	0.634	1.26	1.49	NA
SE copper	µmol/g	15	7% (1)	5.64	5.14	2.31	<0.000441	15.7	0.934	1.44	2.42	3.9	6.07	14.8	15.5	<0.0004
SE lead	µmol/g	15	0% (0)	0.876	0.758	0.651	0.0555	2.85	0.302	0.426	0.598	0.642	0.789	1.83	2.61	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
SE mercury	nmol/g	14	21% (3)	0.00320	0.00157	0.00285	0.00150	0.00598	0.00145	0.00150	0.00174	0.00289	0.00455	0.00533	0.00566	<0.002 - <0.003
SE nickel	µmol/g	15	0% (0)	0.228	0.327	0.107	0.0221	1.22	0.0353	0.0416	0.0443	0.063	0.296	0.539	0.787	NA
SE zinc	µmol/g	15	0% (0)	79.1	68.6	54.1	13.9	245	14.6	15	29.6	54.9	113	164	193	NA
∑SEM-AVS[1]	µmol/g	15	0% (0)	81.1	72.4	55.8	15.1	258	15.7	16.6	31	56	117	174	206	NA
(∑SEM-AVS)/f_{OC}[2]	µmol/g	15	0% (0)	45700	47900	21000	2550	143000	2620	2890	6020	28300	77400	113000	132000	NA
Polycyclic Aromatic Hydrocarbons (PAHs)																
∑ESB-TU_{FCV}[3]	No Units	169	0% (0)	0.0383	0.102	0.00909	0.00187	0.574	0.00191	0.00213	0.00285	0.00681	0.0251	0.0782	0.188	NA
2-Methylnaphthalene	µg/kg	45	22% (10)	5.79	24.6	1.02	0.2	<330	0.2	0.2	0.4	0.7	2	3	17.8	<4 - <330
Acenaphthene	µg/kg	45	80% (36)	22	65.2	3.1	0.2	297	0.3	2	2.5	2.5	3	3.3	187	<4 - <9
Acenaphthylene	µg/kg	45	93% (42)	9.22	26.4	3.44	2	<330	2	2	2.5	2.5	3	3.3	44.9	<4 - <330
Anthracene	µg/kg	45	76% (34)	8.95	26.4	2.72	0.2	<330	0.52	1	2	2.5	3	4.8	44.9	<4 - <330
Benz(a)anthracene	µg/kg	45	24% (11)	7.52	25.1	1.72	0.2	<330	0.22	0.4	0.6	2	2.5	11.6	18.7	<4 - <330
Benzo(a)pyrene	µg/kg	45	51% (23)	8.24	25	2.84	0.4	<330	0.6	0.82	2	2.5	3	12.6	19.2	<4 - <330
Benzo(b)fluoranthene	µg/kg	45	58% (26)	7.57	25	2.38	0.3	<330	0.4	0.64	1	2.5	3	7.8	19.7	<4 - <330
Benzo(g,h,i)perylene	µg/kg	45	36% (16)	7.52	25	2.03	0.2	<330	0.4	0.44	0.9	2	3	9	19.2	<4 - <330
Benzo(k)fluoranthene	µg/kg	45	58% (26)	7.4	25	2.18	0.2	<330	0.4	0.5	0.85	2.5	3	6.2	19.7	<4 - <330
Carbazole	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Chrysene	µg/kg	45	22% (10)	8.33	25.1	2.41	0.4	<330	0.42	0.5	1	2	3	14	19.2	<4 - <330
Dibenz(a,h)anthracene	µg/kg	45	69% (31)	8.26	25.9	2.57	0.2	<330	0.42	0.76	2	2.5	3	3.3	37.7	<4 - <330
Dibenzofuran	µg/kg	45	62% (28)	7.95	26	2.05	0.2	<330	0.24	0.4	1	2.5	2.5	3	37.7	<4 - <330
Fluoranthene	µg/kg	45	18% (8)	10.2	25.8	2.69	0.2	<330	0.34	0.6	0.9	2	5	25.2	34.2	<4 to <330
Fluorene	µg/kg	45	84% (38)	9.02	26.4	3.05	0.4	<330	1.07	2	2.5	2.5	3	3	44.9	<4 - <330
Indeno(1,2,3-c,d)pyrene	µg/kg	45	47% (21)	7.69	25	2.36	0.4	<330	0.52	0.6	1	2.5	3	10.2	19.4	<4 - <330
Naphthalene	µg/kg	45	7% (3)	5.19	8.96	3.05	0.4	57.5	0.92	1	2	3.6	4.3	4.76	18.4	<4 to <6
Nitrobenzene	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Phenanthrene	µg/kg	45	9% (4)	6.59	11.6	1.81	0.2	56.1	0.2	0.2	0.5	2	3	21.8	26.4	<5 to <6
Pyrene	µg/kg	45	16% (7)	19.6	49.3	2.83	0.2	200	0.32	0.48	0.9	2	4	31.6	146	<4 - <9
Total HMW-PAHs[4]	µg/kg	45	13% (6)	62.1	162	18	5.3	973	5.44	6.5	7.8	12	18.5	103	311	<24 - <36
Total LMW-PAHs[5]	µg/kg	45	4% (2)	66.8	172	22.9	9.6	963	11.1	11.5	13.9	16.4	19.9	48.2	436	<35 - <42
Total PAHs[6]	µg/kg	45	4% (2)	129	333	42.5	15.6	1940	18.4	19.6	22.8	27.9	34.8	151	746	<65 - <78

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Polychlorinated Biphenyls (PCBs)																
Aroclor 1016	µg/kg	45	93% (42)	1.03	2.52	0.599	<0.85	16.5	0.431	0.435	0.48	0.5	0.55	0.6	1.48	<0.85 - <1.7
Aroclor 1221	µg/kg	45	100% (45)	2.07	0.222	2.06	<3.4	<5.3	1.71	1.8	1.95	2.05	2.2	2.35	2.4	<3.4 - <7
Aroclor 1232	µg/kg	45	100% (45)	2.07	0.222	2.06	<3.4	<5.3	1.71	1.8	1.95	2.05	2.2	2.35	2.4	<3.4 - <7
Aroclor 1242	µg/kg	45	100% (45)	0.511	0.0564	0.508	<0.85	<1.3	0.426	0.435	0.48	0.5	0.55	0.6	0.6	<0.85 - <1.7
Aroclor 1248	µg/kg	45	100% (45)	0.511	0.0564	0.508	<0.85	<1.3	0.426	0.435	0.48	0.5	0.55	0.6	0.6	<0.85 - <1.7
Aroclor 1254	µg/kg	45	100% (45)	0.511	0.0564	0.508	<0.85	<1.3	0.426	0.435	0.48	0.5	0.55	0.6	0.6	<0.85 - <1.7
Aroclor 1260	µg/kg	45	93% (42)	0.925	1.99	0.591	<0.85	12.8	0.431	0.435	0.48	0.5	0.55	0.6	1.12	<0.85 - <1.7
Total PCBs[7]	µg/kg	45	93% (42)	7.62	4.58	7.12	7.6	35.4	5.64	5.78	6.3	6.7	7.35	7.8	8.44	<11.1 - <17.1
Organochlorine Pesticides																
Aldrin	µg/kg	45	91% (41)	0.241	0.122	0.225	<0.34	0.806	0.171	0.177	0.19	0.21	0.225	0.256	0.528	<0.34 - <0.69
Chlordane, total[8]	µg/kg	45	100% (45)	0.408	0.0437	0.406	<0.68	<1.04	0.34	0.35	0.38	0.41	0.43	0.466	0.47	<0.68 - <1.38
Chlordane, *cis* -	µg/kg	45	100% (45)	0.204	0.0218	0.203	<0.34	<0.52	0.17	0.175	0.19	0.205	0.215	0.233	0.235	<0.34 - <0.69
Chlordane, *trans* -	µg/kg	45	100% (45)	0.204	0.0218	0.203	<0.34	<0.52	0.17	0.175	0.19	0.205	0.215	0.233	0.235	<0.34 - <0.69
Dieldrin	µg/kg	45	91% (41)	0.513	0.322	0.465	<0.68	1.87	0.346	0.359	0.39	0.425	0.455	0.53	1.21	<0.68 - <1.4
Endosulfan sulfate	µg/kg	45	100% (45)	0.415	0.046	0.412	<0.68	<1.1	0.345	0.35	0.39	0.41	0.44	0.473	0.479	<0.68 - <1.4
Endosulfan-alpha	µg/kg	45	100% (45)	0.204	0.0218	0.203	<0.34	<0.52	0.17	0.175	0.19	0.205	0.215	0.233	0.235	<0.34 - <0.69
Endosulfan-beta	µg/kg	45	100% (45)	0.415	0.046	0.412	<0.68	<1.1	0.345	0.35	0.39	0.41	0.44	0.473	0.479	<0.68 - <1.4
Endrin	µg/kg	45	91% (41)	0.523	0.354	0.468	<0.68	1.97	0.346	0.359	0.39	0.425	0.455	0.53	1.28	<0.68 - <1.4
Endrin aldehyde	µg/kg	45	100% (45)	0.415	0.046	0.412	<0.68	<1.1	0.345	0.35	0.39	0.41	0.44	0.473	0.479	<0.68 - <1.4
Endrin ketone	µg/kg	45	100% (45)	0.415	0.046	0.412	<0.68	<1.1	0.345	0.35	0.39	0.41	0.44	0.473	0.479	<0.68 - <1.4
gamma-HCH (Lindane)	µg/kg	45	91% (41)	0.247	0.14	0.227	<0.34	0.856	0.171	0.177	0.19	0.21	0.225	0.256	0.551	<0.34 - <0.69
Heptachlor	µg/kg	45	91% (41)	0.253	0.161	0.229	<0.34	0.931	0.171	0.177	0.19	0.21	0.225	0.256	0.606	<0.34 - <0.69
Heptachlor epoxide	µg/kg	45	100% (45)	0.204	0.0218	0.203	<0.34	<0.52	0.17	0.175	0.19	0.205	0.215	0.233	0.235	<0.34 - <0.69
Hexachlorobenzene	µg/kg	45	96% (43)	7.04	26.9	0.343	0.11	<330	0.17	0.175	0.19	0.21	0.23	0.374	44.9	<0.34 - <330
Hexachlorocyclohexane-alpha	µg/kg	45	98% (44)	0.202	0.0204	0.201	0.18	<0.5	0.17	0.175	0.19	0.205	0.215	0.23	0.235	<0.34 - <0.5
Hexachlorocyclohexane-beta	µg/kg	45	100% (45)	0.204	0.0218	0.203	<0.34	<0.52	0.17	0.175	0.19	0.205	0.215	0.233	0.235	<0.34 - <0.69
Hexachlorocyclohexane-delta	µg/kg	45	100% (45)	0.204	0.0218	0.203	<0.34	<0.52	0.17	0.175	0.19	0.205	0.215	0.233	0.235	<0.34 - <0.69
Hexachlorocyclopentadiene	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Isophorone	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Methoxychlor	µg/kg	45	98% (44)	2.02	0.292	1.99	0.75	<5.2	1.7	1.72	1.9	2.05	2.15	2.33	2.35	<3.4 - <6.9
Nonachlor, *cis-*	µg/kg	45	100% (45)	0.204	0.0218	0.203	<0.34	<0.52	0.17	0.175	0.19	0.205	0.215	0.233	0.235	<0.34 - <0.69
Nonachlor, *trans-*	µg/kg	45	100% (45)	0.204	0.0218	0.203	<0.34	<0.52	0.17	0.175	0.19	0.205	0.215	0.233	0.235	<0.34 - <0.69
o,p' -DDD	µg/kg	45	100% (45)	0.415	0.046	0.412	<0.68	<1.1	0.345	0.35	0.39	0.41	0.44	0.473	0.479	<0.68 - <1.4

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
p,p' -DDD	µg/kg	45	100% (45)	0.415	0.046	0.412	<0.68	<1.1	0.345	0.35	0.39	0.41	0.44	0.473	0.479	<0.68 - <1.4
Sum DDDs (*o,p'* + *p,p'*)	µg/kg	45	100% (45)	0.829	0.092	0.824	<1.36	<2.2	0.69	0.7	0.78	0.82	0.88	0.946	0.958	<1.36 - <2.2
o,p' -DDE	µg/kg	45	96% (43)	0.425	0.0716	0.42	0.48	<1.1	0.345	0.35	0.39	0.42	0.44	0.478	0.496	<0.68 - <1.4
p,p' -DDE	µg/kg	45	87% (39)	0.403	0.0853	0.391	0.12	<1.1	0.255	0.342	0.365	0.41	0.44	0.473	0.496	<0.68 - <1.4
Sum DDEs (*o,p'* + *p,p'*)	µg/kg	45	84% (38)	0.828	0.132	0.817	0.516	<2.2	0.631	0.684	0.78	0.82	0.88	0.956	1.08	<1.36 - <2.2
o,p' -DDT	µg/kg	45	93% (42)	0.405	0.0633	0.399	0.198	<1.1	0.28	0.342	0.39	0.41	0.44	0.473	0.479	<0.68 - <1.4
p,p' -DDT	µg/kg	45	69% (31)	0.547	0.389	0.475	0.2	1.97	0.312	0.342	0.39	0.43	0.47	1.04	1.49	<0.68 - <1.4
Sum DDTs (*o,p'* + *p,p'*)	µg/kg	45	69% (31)	0.952	0.376	0.903	0.6	2.41	0.667	0.684	0.78	0.85	0.94	1.42	1.73	<1.36 - <2.2
Total DDTs	µg/kg	45	62% (28)	2.61	0.441	2.58	2.05	<6.6	2.07	2.1	2.33	2.58	2.82	3.02	3.49	<4.08 - <6.6
Oxychlordane	µg/kg	45	100% (45)	0.204	0.0218	0.203	<0.34	<0.52	0.17	0.175	0.19	0.205	0.215	0.233	0.235	<0.34 - <0.69
Toxaphene	µg/kg	45	100% (45)	20.4	2.18	20.3	<34	<52	17	17.5	19	20.5	21.5	23.3	23.5	<34 - <69
Semi-Volatile Compounds																
1,2,4-Trichlorobenzene	µg/kg	45	91% (41)	78.4	84.2	61.7	<85	424	43.1	44.3	48.5	50	55	95	307	<85 - <230
1,2-Dichlorobenzene	µg/kg	45	100% (45)	52.6	11.1	51.8	<85	<230	43	43.5	48	50	55	60	64	<85 - <230
1,3-Dichlorobenzene	µg/kg	45	100% (45)	52.6	11.1	51.8	<85	<230	43	43.5	48	50	55	60	64	<85 - <230
1,4-Dichlorobenzene	µg/kg	45	91% (41)	75.1	72.9	61.1	<85	361	43.1	44.3	48.5	50	55	95	282	<85 - <230
2,2'-oxybis(1-chloropropane)	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
2,4,5-Trichlorophenol	µg/kg	45	100% (45)	140	50.5	135	<210	<830	110	110	120	130	140	150	164	<210 - <830
2,4,6-Trichlorophenol	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
2,4-Dichlorophenol	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
2,4-Dimethylphenol	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
2,4-Dinitrophenol	µg/kg	45	100% (45)	140	50.5	135	<210	<830	110	110	120	130	140	150	164	<210 to <830
2,4-Dinitrotoluene	µg/kg	45	91% (41)	81.2	94.1	62.1	<85	484	43.1	44.3	48.5	50	55	95	312	<85 - <230
2,6-Dinitrotoluene	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
2-Chloronaphthalene	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
2-Chlorophenol	µg/kg	45	91% (41)	87.9	114	63.2	<85	514	43.1	44.3	48.5	50	55	95	428	<85 - <230
2-Fluorobiphenyl	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
2-Methylphenol	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
2-Nitroaniline	µg/kg	45	100% (45)	140	50.5	135	<210	<830	110	110	120	130	140	150	164	<210 - <830
2-Nitrophenol	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
3,3'-Dichlorobenzidine	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
3-Nitroaniline	µg/kg	45	100% (45)	140	50.5	135	<210	<830	110	110	120	130	140	150	164	<210 - <830
4-Bromophenyl phenyl ether	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
4-Chloro-3-methylphenol	µg/kg	45	91% (41)	93.8	134	64	<85	621	43.1	44.3	48.5	50	55	95	468	<85 - <230

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
4-Chloroaniline	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
4-Chlorophenyl phenyl ether	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
4-Methylphenol	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
4-Nitroaniline	µg/kg	45	100% (45)	140	50.5	135	<210	<830	110	110	120	130	140	150	164	<210 - <830
4-Nitrophenol	µg/kg	45	91% (41)	175	140	151	<210	803	110	112	125	130	145	243	508	<210 - <590
Acetophenone	µg/kg	45	98% (44)	54.6	20.5	52.4	26	<330	42.6	43.2	48	50	55	60	65	<85 - <330
Atrazine	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Benzaldehyde	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Benzoic acid	µg/kg	45	100% (45)	55.8	18.3	53.9	<85	<250	43	43.5	48.5	50	55	63	105	<85 - <250
Benzyl alcohol	µg/kg	45	100% (45)	52.6	11.1	51.8	<85	<230	43	43.5	48	50	55	60	64	<85 - <230
bis(2-chloroethoxy)methane	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
bis(2-chloroethyl)ether	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
bis(2-ethylhexyl) phthalate	µg/kg	45	89% (40)	60.3	24.1	57.2	82.5	<330	43	43.5	48.5	50	60	96.8	108	<85 - <330
Butyl benzyl phthalate	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Caprolactam	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Diethyl phthalate	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Dimethyl phthalate	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Di-n-butyl phthalate	µg/kg	45	100% (45)	55.2	20.0	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 to <330
Dinitro-o-cresol	µg/kg	45	100% (45)	140	50.5	135	<210	<830	110	110	120	130	140	150	164	<210 - <830
Di-N-octyl phthalate	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Hexachlorobutadiene	µg/kg	45	100% (45)	7.03	26.9	0.342	<0.34	<330	0.171	0.177	0.19	0.21	0.225	0.256	44.9	<0.34 - <330
Hexachloroethane	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
N-Nitrosodi-n-propylamine	µg/kg	45	91% (41)	78.5	84.1	61.7	<85	414	43.1	44.3	48.5	50	55	95	307	<85 - <230
N-Nitrosodiphenylamine	µg/kg	45	100% (45)	55.2	20	53.3	<85	<330	43	43.5	48.5	50	55	60	65	<85 - <330
Pentachlorophenol	µg/kg	45	91% (41)	182	169	152	<210	978	110	112	125	130	145	243	509	<210 - <590
Phenol	µg/kg	45	91% (41)	91.1	125	63.7	<85	571	43.1	44.3	48.5	50	55	95	458	<85 to <230
Dioxins/Furans																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	9	0% (0)	1.39	1.73	0.559	0.0847	5.18	0.0847	0.0848	0.115	0.418	2.36	3.13	4.16	NA
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	9	0% (0)	2.64	2.27	1.52	0.239	6.11	0.266	0.293	0.382	2.22	3.97	5.76	5.93	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	9	33% (3)	0.0585	0.0505	0.0435	0.0333	0.167	0.0184	0.0196	0.0215	0.0342	0.0792	0.119	0.143	<0.0344 - <0.043
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	9	11% (1)	0.0799	0.0639	0.0576	0.019	0.197	0.016	0.018	0.0344	0.0565	0.13	0.159	0.178	<0.0279
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	9	33% (3)	0.0719	0.0651	0.0493	0.0263	0.175	0.0183	0.0197	0.0263	0.0329	0.135	0.163	0.169	<0.0337 - <0.0612
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg	9	22% (2)	0.0648	0.051	0.048	0.0271	0.166	0.0149	0.0155	0.0271	0.0467	0.0929	0.127	0.146	<0.0285 - <0.0316
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	9	33% (3)	0.181	0.174	0.1	<0.0347	0.443	0.0184	0.0194	0.0303	0.102	0.318	0.437	0.44	<0.0347 - <0.0605

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	9	44% (4)	0.0438	0.0375	0.034	0.025	0.128	0.0187	0.0193	0.0196	0.025	0.0556	0.0872	0.108	<0.0363 - <0.0427
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	9	44% (4)	0.113	0.108	0.0671	<0.0343	0.279	0.0184	0.0196	0.0232	0.0657	0.173	0.278	0.279	<0.0343 - <0.061
1,2,3,7,8-Pentachlorodibenzo- p-dioxin	ng/kg	9	44% (4)	0.0537	0.0582	0.0333	<0.024	0.179	0.0123	0.0126	0.0138	0.0276	0.0687	0.129	0.154	<0.024 - <0.0314
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg	9	11% (1)	0.0543	0.0533	0.0376	0.0185	0.158	0.0136	0.0169	0.0252	0.0302	0.0523	0.138	0.148	<0.0206
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	9	11% (1)	0.0686	0.0547	0.0502	0.0187	0.174	0.0154	0.0176	0.0285	0.048	0.116	0.128	0.151	<0.0264
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	9	0% (0)	0.0869	0.0596	0.0723	0.0369	0.197	0.0375	0.0381	0.045	0.0578	0.106	0.177	0.187	NA
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	9	89% (8)	0.0308	0.0108	0.0292	<0.037	<0.0957	0.0185	0.0185	0.0227	0.0287	0.0398	0.0443	0.0461	<0.037 - <0.0957
2,3,7,8-Tetrachlorodibenzofuran	ng/kg	9	0% (0)	0.695	0.341	0.616	0.235	1.22	0.285	0.335	0.426	0.745	0.774	1.19	1.2	NA
Total Tetrachlorodibenzo-p-dioxins	ng/kg	9	33% (3)	0.0808	0.0799	0.0563	0.0366	0.255	0.0215	0.0245	0.0287	0.0605	0.0696	0.189	0.222	<0.0371 - <0.0574
Total Pentachlorodibenzo-p-dioxins	ng/kg	9	44% (4)	0.176	0.207	0.0668	<0.024	0.489	0.0123	0.0126	0.0138	0.0782	0.357	0.483	0.486	<0.024 - <0.0314
Total Hexachlorodibenzo-p-dioxins	ng/kg	9	11% (1)	1.23	1.31	0.42	<0.0342	3.03	0.0297	0.0422	0.053	0.65	2.83	2.92	2.97	<0.0342
Total Heptachlorodibenzo-p-dioxins	ng/kg	9	0% (0)	5.7	5.07	3.2	0.499	13.7	0.561	0.623	0.751	4.21	8.8	12.7	13.2	NA
Total Octachlorodibenzo-p-dioxins	ng/kg	9	0% (0)	20.5	18.7	10.7	1.35	49.4	1.52	1.69	2.67	13.4	32.6	45.4	47.4	NA
Total Tetrachlorodibenzofurans	ng/kg	9	0% (0)	1.36	0.713	1.16	0.348	2.33	0.444	0.539	0.722	1.52	1.64	2.31	2.32	NA
Total Pentachlorodibenzofurans	ng/kg	9	11% (1)	0.463	0.44	0.205	<0.0204	1.1	0.0188	0.0275	0.0498	0.364	0.899	1.05	1.08	<0.0204
Total Hexachlorodibenzofurans	ng/kg	9	0% (0)	1.27	1.41	0.568	0.0648	4.18	0.0805	0.0962	0.107	0.571	2.17	2.79	3.49	NA
Total Heptachlorodibenzofurans	ng/kg	9	0% (0)	2.84	3.28	1.18	0.124	9.86	0.144	0.165	0.269	1.14	4.71	6.13	7.99	NA
Total Octachlorodibenzofurans	ng/kg	9	0% (0)	1.52	1.28	0.865	0.13	3.28	0.145	0.16	0.229	1.12	2.72	2.91	3.09	NA
Toxic Equivalency (TEQ)[9]	ng/kg	9	0% (0)	0.194	0.182	0.114	0.0212	0.556	0.0221	0.023	0.036	0.163	0.288	0.412	0.484	NA
COPC Mixtures/Slag Indicators[10]																
Cu:Al	No Units	14	0% (0)	0.0698	0.0318	0.0628	0.0202	0.132	0.0275	0.0365	0.0528	0.0665	0.0763	0.118	0.127	NA
Mean PEC-Q	No Units	14	0% (0)	0.953	0.669	0.764	0.307	2.17	0.355	0.397	0.46	0.583	1.58	1.92	2.08	NA
Mean PEC-Q_{METALS}	No Units	49	0% (0)	4.53	3.89	3.04	0.235	17.2	0.759	1.02	1.53	3.4	6.78	10.1	11.3	NA
Mean PEC-$Q_{METALS(1\%OC)}$	No Units	49	0% (0)	13.2	23.5	2.64	0.0462	105	0.133	0.21	0.504	2.42	13.7	42.7	59.7	NA
Mean PEC-$Q_{EXTMETALS}$	No Units	18	0% (0)	4.54	4.64	2.86	0.755	17.2	0.883	1.06	1.26	2.63	5.36	10.8	12.3	NA
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	No Units	18	0% (0)	28	31.9	12.2	1.38	105	1.44	1.73	3.28	16.3	36.5	70.7	94.5	NA
ΣPEC-Q_{METALS}	No Units	49	0% (0)	29.7	23.5	20.7	1.64	92.8	5.31	7.16	10.7	23.8	47.3	57.7	74.6	NA
ΣPEC-$Q_{METALS(1\%OC)}$	No Units	49	0% (0)	79.5	126	18	0.324	521	0.929	1.47	3.53	17	95.6	286	309	NA
ΣPEC-$Q_{METALS(Cu,Pb,Zn)}$	No Units	49	0% (0)	28.1	23.1	18.5	0.782	89.1	4.19	6.05	9.45	21.1	45.3	56.2	71.4	NA
ΣPEC-$Q_{EXTMETALS}$	No Units	18	0% (0)	32	22.7	24.5	7.55	85.9	8.83	10.6	12.6	26.3	50.4	55.1	61.4	NA
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	No Units	18	0% (0)	192	168	104	13.8	525	14.4	17.3	32.8	163	302	396	472	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Zn:Cd	No Units	18	0% (0)	8790	13500	3620	409	53300	690	823	1310	2700	9870	18900	35300	NA
Nutrients/Inorganics/Conventionals																
Moisture, percent	%	10	0% (0)	10.7	8.66	6.57	1.35	26	1.4	1.44	2.08	12.2	16.2	19.7	22.9	NA
Organic carbon, total	%	52	0% (0)	2.58	2.53	1.21	0.0609	9.14	0.1	0.143	0.382	1.96	4.35	6.31	7.43	NA
Grainsize Fraction <75µm	%	45	0% (0)	9.65	7.13	7.28	1.7	38	1.86	2.34	3.4	8.6	12.9	17	19.3	NA
Clay, percent	%	44	2% (1)	0.216	0.456	NC	0	2.92	0	0	0.0241	0.0873	0.219	0.422	0.704	<1
Colloid, percent	%	45	0% (0)	0.207	0.355	NC	0	1.9	0	0	0.0115	0.084	0.226	0.472	0.954	NA
Fines, percent (silt+clay)	%	48	0% (0)	9.62	7.12	NA	0	36.1	1.74	2.37	3.52	8.67	13.0	17.0	22.2	NA
Gravel, percent	%	45	0% (0)	3.06	5.29	NC	0	20.6	0	0	0	0.4	3.1	9.72	14.6	NA
Sand - coarse, percent	%	45	0% (0)	2.11	4.19	NC	0	20.9	0	0	0	0.4	1.8	4.46	10.6	NA
Sand - fine, percent	%	45	0% (0)	62.9	21.7	57.6	10.2	92.8	21.1	32.1	47	66.1	82.1	85.3	90	NA
Sand - medium, percent	%	45	0% (0)	22.3	24.4	10.7	0.8	88.1	1.52	2.02	3.8	10	34.5	57	70.4	NA
Sand, percent	%	46	0% (0)	87.4	10	86.8	59.9	98.3	67.3	73.7	82.5	89.3	95.2	97.6	98	NA
Silt, percent	%	46	0% (0)	9.24	6.63	7.07	1.67	35.7	1.84	2.3	3.39	8.56	12.6	16.1	18.2	NA
Reach 2																
Metals																
Aluminum, total	mg/kg	43	0% (0)	8990	4730	8040	3080	22400	4220	4980	6190	7060	11000	16100	20300	NA
Antimony, total	mg/kg	43	7% (3)	13.2	16.3	6.33	0.47	55.7	1.21	1.32	2.53	5.08	17	39	52.9	<6.6 - <11.6
Arsenic, total	mg/kg	47	0% (0)	11	10.6	7.83	1.7	53.2	2.16	2.3	4.35	9.4	12.5	21.2	26.7	NA
Barium, total	mg/kg	43	0% (0)	578	584	380	80.5	2130	94.6	99.9	210	361	679	1560	2080	NA
Beryllium, total	mg/kg	43	0% (0)	0.848	0.595	0.734	0.28	3.94	0.35	0.444	0.52	0.67	0.955	1.46	1.59	NA
Cadmium, total	mg/kg	47	2% (1)	2.63	1.8	1.87	0.12	6.7	0.331	0.526	1.05	2.5	4.2	5.2	5.47	<0.55
Calcium, total	mg/kg	43	0% (0)	25400	18800	19500	4730	75000	5390	7140	11600	20000	34700	54400	66400	NA
Chromium, total	mg/kg	43	0% (0)	40.7	40.9	29.1	9.8	150	12.6	14.2	18.8	22.1	44.5	113	146	NA
Cobalt, total	mg/kg	43	0% (0)	18.3	19.8	11.9	4.2	70.1	4.71	5.26	6.3	9	21.6	56.9	62.7	NA
Copper, total	mg/kg	47	0% (0)	552	836	203	14.3	3030	22.4	29.4	77.3	181	520	1750	2750	NA
Iron, total	mg/kg	43	0% (0)	55900	64500	34900	9880	248000	12300	14000	18500	24900	57000	167000	213000	NA
Lead, total	mg/kg	47	0% (0)	183	101	144	16	460	26.8	35.4	120	195	253	313	338	NA
Magnesium, total	mg/kg	43	0% (0)	8490	4160	7730	4140	23000	4410	4470	5720	7400	10000	13200	16900	NA
Manganese, total	mg/kg	43	0% (0)	1090	1370	605	147	4860	196	211	282	434	1190	3580	4610	NA
Mercury, total	mg/kg	47	6% (3)	0.244	0.241	0.135	0.0074	1.15	0.0188	0.0288	0.06	0.16	0.395	0.55	0.597	<0.11 - <0.12
Nickel, total	mg/kg	43	0% (0)	14.3	6.5	13.3	6.3	45.8	7.71	8.36	10.5	12.4	16.4	20.3	21.6	NA
Potassium, total	mg/kg	43	0% (0)	1720	1100	1470	611	4900	676	847	1020	1250	2030	3220	4490	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Selenium, total	mg/kg	43	70% (30)	3.27	3.59	2.59	0.98	23.2	1.51	1.66	1.88	2.25	3	5.52	7.57	<3 - <6.2
Silver, total	mg/kg	43	91% (39)	0.963	1.41	0.699	0.365	7.7	0.462	0.481	0.55	0.6	0.7	0.85	2.67	<0.86 - <1.95
Sodium, total	mg/kg	43	0% (0)	598	806	310	88.5	2840	103	115	148	201	745	1890	2740	NA
Thallium, total	mg/kg	43	88% (38)	1.59	0.627	1.52	0.68	5.03	1.1	1.16	1.35	1.5	1.7	2.04	2.15	<2.2 - <4.8
Uranium, total	mg/kg	43	56% (24)	22.7	29.1	15.1	4.6	127	6.24	8.6	10.2	12.1	16.5	58.8	104	<18 - <52.5
Vanadium, total	mg/kg	43	0% (0)	27.8	8.74	26.6	11	56.1	16.2	19.7	21.5	27.2	30.9	40.6	43.5	NA
Zinc, total	mg/kg	47	0% (0)	3960	5480	1680	93.1	20100	188	260	715	1520	4300	11400	18400	NA
Simultaneously Extracted (SE) Metals																
Acid volatile sulfides	µmol/g	9	0% (0)	2.71	4.3	0.599	0.034	12.3	0.0506	0.0672	0.122	0.34	2.1	8.38	10.3	NA
SE antimony	µmol/g	8	0% (0)	0.00507	0.00322	0.00394	0.000772	0.00903	0.00131	0.00184	0.00276	0.00451	0.00786	0.00903	0.00903	NA
SE arsenic	µmol/g	1	0% (0)	0.0574	NA	0.0574	0.0574	0.0574	0.0574	0.0574	0.0574	0.0574	0.0574	0.0574	0.0574	NA
SE cadmium	µmol/g	9	0% (0)	0.0159	0.00535	0.015	0.00783	0.024	0.00794	0.00804	0.0147	0.016	0.0178	0.0219	0.023	NA
SE chromium	µmol/g	8	0% (0)	0.177	0.127	0.145	0.0789	0.385	0.0792	0.0795	0.0906	0.12	0.216	0.374	0.379	NA
SE copper	µmol/g	9	0% (0)	2.17	1.52	1.76	0.729	5	0.777	0.824	0.966	1.76	2.83	4.31	4.66	NA
SE lead	µmol/g	9	0% (0)	0.745	0.304	0.684	0.349	1.25	0.351	0.353	0.478	0.787	0.936	1.02	1.13	NA
SE mercury	nmol/g	8	0% (0)	0.00429	0.00326	0.00337	0.00135	0.011	0.00143	0.00152	0.00186	0.00351	0.00561	0.00748	0.00922	NA
SE nickel	µmol/g	9	0% (0)	0.253	0.346	0.118	0.0307	0.927	0.0347	0.0388	0.0477	0.0707	0.213	0.807	0.867	NA
SE zinc	µmol/g	9	0% (0)	30.8	31.2	19.8	5.83	88.5	6.53	7.22	8.29	17.9	38.2	79.7	84.1	NA
∑SEM-AVS[1]	µmol/g	9	0% (0)	31.3	30.1	NC	8.01	91.8	8.04	8.07	8.81	19.7	35.4	75.2	83.5	NA
(∑SEM-AVS)/f_{OC}[2]	µmol/g	9	0% (0)	9880	19000	NC	749	59600	808	867	1490	2360	7600	20900	40300	NA
Polycyclic Aromatic Hydrocarbons (PAHs)																
∑ESB-TU_{FCV}[3]	No Units	183	0% (0)	0.00966	0.0155	0.00434	0.000512	0.0822	0.000549	0.000933	0.00199	0.00438	0.0109	0.0256	0.0319	NA
2-Methylnaphthalene	µg/kg	43	12% (5)	1.75	3.37	0.903	0.2	22.2	0.2	0.2	0.4	0.9	2	3	3.95	<4 - <7
Acenaphthene	µg/kg	43	86% (37)	15.6	84.3	2.76	0.4	555	0.55	2	2.5	2.5	3.38	3.9	5.4	<4 - <11
Acenaphthylene	µg/kg	43	91% (39)	4.43	9.55	2.88	0.3	<130	2	2	2.5	3	3.5	4.4	5.5	<4 - <130
Anthracene	µg/kg	43	70% (30)	3.25	3.39	2.49	0.4	22.8	0.6	0.84	2	2.5	3.38	4.48	7	<4 - <8
Benz(a)anthracene	µg/kg	43	23% (10)	2.98	5.81	1.54	0.2	32	0.4	0.42	0.8	2	2.5	3.9	4.9	<4 - <7
Benzo(a)pyrene	µg/kg	43	37% (16)	2.98	4.09	2	0.4	24.2	0.51	0.64	1	2	2.88	4	5	<4 - <8
Benzo(b)fluoranthene	µg/kg	43	42% (18)	3.98	6.43	2.48	0.2	38	0.7	0.92	2	2.5	3.38	5	7.8	<4 - <8
Benzo(g,h,i)perylene	µg/kg	43	42% (18)	2.73	3.69	1.68	0.2	23.8	0.4	0.42	0.775	2.5	3.5	4.8	5.45	<4 - <11
Benzo(k)fluoranthene	µg/kg	43	49% (21)	3.63	5.47	2.26	0.2	30	0.51	0.6	2	2.5	3	4.9	6.4	<4 - <13
Carbazole	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Chrysene	µg/kg	43	12% (5)	4.73	12	1.9	0.2	77	0.4	0.42	0.9	2	3.75	6.8	9.7	<5 - <8
Dibenz(a,h)anthracene	µg/kg	43	58% (25)	2.57	3.32	1.76	0.2	22.8	0.22	0.44	1	2.5	3	3.5	3.68	<3.2 - <8
Dibenzofuran	µg/kg	43	58% (25)	2.7	3.42	1.86	0.2	23.1	0.41	0.54	1	2.5	3	3.5	5.35	<4 - <11
Fluoranthene	µg/kg	43	16% (7)	8.52	30.3	2.56	0.2	200	0.4	0.54	1	2.5	5	9	13.7	<5 - <7
Fluorene	µg/kg	43	79% (34)	3.97	9.6	2.34	0.2	<130	0.7	0.92	2	2.5	3.13	3.9	5.35	<4 - <130
Indeno(1,2,3-c,d)pyrene	µg/kg	43	40% (17)	2.95	4	1.93	0.2	24.8	0.41	0.62	0.95	2.5	3	3.9	6.7	<4 - <8
Naphthalene	µg/kg	43	0% (0)	3.68	3.52	2.81	0.6	23.4	1	1	2	3.6	4.3	5.16	6.83	NA
Nitrobenzene	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
Phenanthrene	µg/kg	43	12% (5)	4.67	11.2	1.98	0.4	72	0.41	0.5	0.9	2	4	6.8	9.8	<5 - <7
Pyrene	µg/kg	43	16% (7)	16.2	73.8	2.36	0.2	477	0.4	0.7	1	2	3.75	7.6	9.8	<4 - <7
Total HMW-PAHs[4]	µg/kg	43	9% (4)	38	110	14.4	2	604	5.43	7.14	8.15	11.6	20.5	31.6	41.2	<30 - <42
Total LMW-PAHs[5]	µg/kg	43	0% (0)	37.3	116	19.8	12.3	778	12.4	12.8	14.6	17.7	22.5	25.9	26.9	NA
Total PAHs[6]	µg/kg	43	0% (0)	75.3	218	35.6	18.2	1380	19.8	21.2	23.1	29.2	39.8	52.7	64.3	NA
Polychlorinated Biphenyls (PCBs)																
Aroclor 1016	µg/kg	43	98% (42)	0.734	1.15	0.587	<0.87	8.08	0.441	0.446	0.488	0.55	0.638	0.7	0.7	<0.87 - <1.8
Aroclor 1221	µg/kg	43	100% (43)	2.27	0.401	2.24	<3.5	<7.3	1.8	1.8	1.98	2.2	2.55	2.73	2.85	<3.5 - <7.3
Aroclor 1232	µg/kg	43	100% (43)	2.27	0.401	2.24	<3.5	<7.3	1.8	1.8	1.98	2.2	2.55	2.73	2.85	<3.5 - <7.3
Aroclor 1242	µg/kg	43	100% (43)	0.562	0.099	0.554	<0.87	<1.8	0.441	0.446	0.488	0.55	0.638	0.69	0.7	<0.87 - <1.8
Aroclor 1248	µg/kg	43	100% (43)	0.562	0.099	0.554	<0.87	<1.8	0.441	0.446	0.488	0.55	0.638	0.69	0.7	<0.87 - <1.8
Aroclor 1254	µg/kg	43	100% (43)	0.562	0.099	0.554	<0.87	<1.8	0.441	0.446	0.488	0.55	0.638	0.69	0.7	<0.87 - <1.8
Aroclor 1260	µg/kg	43	98% (42)	0.699	0.923	0.584	<0.87	6.58	0.441	0.446	0.488	0.55	0.638	0.7	0.7	<0.87 - <1.8
Total PCBs[7]	µg/kg	43	98% (42)	7.66	2.57	7.4	<11.4	<23.6	5.8	5.83	6.39	7.15	8.34	9.08	9.29	<11.4 - <23.6
Organochlorine Pesticides																
Aldrin	µg/kg	43	95% (41)	0.233	0.084	0.224	0.17	<0.72	0.175	0.175	0.193	0.215	0.253	0.278	0.285	<0.35 - <0.72
Chlordane, total[8]	µg/kg	43	100% (43)	0.447	0.0792	0.441	<0.7	<1.44	0.35	0.352	0.39	0.43	0.505	0.538	0.56	<0.7 - <1.44
Chlordane, *cis* -	µg/kg	43	100% (43)	0.224	0.0396	0.22	<0.35	<0.72	0.175	0.176	0.195	0.215	0.253	0.269	0.28	<0.35 - <0.72
Chlordane, *trans* -	µg/kg	43	100% (43)	0.224	0.0396	0.22	<0.35	<0.72	0.175	0.176	0.195	0.215	0.253	0.269	0.28	<0.35 - <0.72
Dieldrin	µg/kg	43	98% (42)	0.484	0.228	0.46	<0.7	1.85	0.356	0.36	0.395	0.44	0.5	0.55	0.595	<0.7 - <1.5
Endosulfan sulfate	µg/kg	43	100% (43)	0.453	0.082	0.447	<0.7	<1.5	0.356	0.36	0.395	0.44	0.5	0.55	0.55	<0.7 - <1.5
Endosulfan-alpha	µg/kg	43	100% (43)	0.224	0.0396	0.22	<0.35	<0.72	0.175	0.176	0.195	0.215	0.253	0.269	0.28	<0.35 - <0.72
Endosulfan-beta	µg/kg	43	100% (43)	0.453	0.082	0.447	<0.7	<1.5	0.356	0.36	0.395	0.44	0.5	0.55	0.55	<0.7 - <1.5
Endrin	µg/kg	43	98% (42)	0.49	0.268	0.461	<0.7	2.13	0.356	0.36	0.395	0.44	0.5	0.55	0.595	<0.7 - <1.5

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Endrin aldehyde	µg/kg	43	100% (43)	0.453	0.082	0.447	<0.7	<1.5	0.356	0.36	0.395	0.44	0.5	0.55	0.55	<0.7 - <1.5
Endrin ketone	µg/kg	43	100% (43)	0.453	0.082	0.447	<0.7	<1.5	0.356	0.36	0.395	0.44	0.5	0.55	0.55	<0.7 - <1.5
gamma-HCH (Lindane)	µg/kg	43	98% (42)	0.236	0.0937	0.226	<0.35	0.781	0.175	0.176	0.195	0.215	0.253	0.278	0.285	<0.35 - <0.72
Heptachlor	µg/kg	43	98% (42)	0.24	0.119	0.227	<0.35	0.956	0.175	0.176	0.195	0.215	0.253	0.278	0.285	<0.35 - <0.72
Heptachlor epoxide	µg/kg	43	100% (43)	0.224	0.0396	0.22	<0.35	<0.72	0.175	0.176	0.195	0.215	0.253	0.269	0.28	<0.35 - <0.72
Hexachlorobenzene	µg/kg	43	98% (42)	1.73	9.88	0.252	0.3	<130	0.175	0.176	0.195	0.215	0.255	0.28	0.299	<0.35 - <130
Hexachlorocyclohexane-alpha	µg/kg	43	93% (40)	0.24	0.0734	0.231	<0.35	<0.72	0.175	0.176	0.195	0.22	0.255	0.284	0.396	<0.35 - <0.72
Hexachlorocyclohexane-beta	µg/kg	43	100% (43)	0.224	0.0396	0.22	<0.35	<0.72	0.175	0.176	0.195	0.215	0.253	0.269	0.28	<0.35 - <0.72
Hexachlorocyclohexane-delta	µg/kg	43	100% (43)	0.224	0.0396	0.22	<0.35	<0.72	0.175	0.176	0.195	0.215	0.253	0.269	0.28	<0.35 - <0.72
Hexachlorocyclopentadiene	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
Isophorone	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
Methoxychlor	µg/kg	43	95% (41)	2.29	0.466	2.24	3.4	<7.2	1.8	1.8	1.95	2.15	2.55	2.8	3.35	<3.5 - <7.2
Nonachlor, *cis-*	µg/kg	43	100% (43)	0.224	0.0396	0.22	<0.35	<0.72	0.175	0.176	0.195	0.215	0.253	0.269	0.28	<0.35 - <0.72
Nonachlor, *trans-*	µg/kg	43	100% (43)	0.224	0.0396	0.22	<0.35	<0.72	0.175	0.176	0.195	0.215	0.253	0.269	0.28	<0.35 - <0.72
o,p' -DDD	µg/kg	43	100% (43)	0.453	0.082	0.447	<0.7	<1.5	0.356	0.36	0.395	0.44	0.5	0.55	0.55	<0.7 - <1.5
p,p' -DDD	µg/kg	43	100% (43)	0.453	0.082	0.447	<0.7	<1.5	0.356	0.36	0.395	0.44	0.5	0.55	0.55	<0.7 - <1.5
Sum DDDs (*o,p'* + *p,p'*)	µg/kg	43	100% (43)	0.907	0.164	0.893	<1.4	<3	0.711	0.72	0.79	0.88	1	1.1	1.1	<1.4 - <3
o,p' -DDE	µg/kg	43	98% (42)	0.445	0.0913	0.435	0.17	<1.5	0.355	0.36	0.39	0.435	0.5	0.55	0.55	<0.7 - <1.5
Sum DDEs (*o,p'* + *p,p'*)	µg/kg	43	81% (35)	0.888	0.186	0.871	0.55	<3	0.701	0.712	0.75	0.87	1	1.1	1.21	<1.4 - <3
p,p' -DDE	µg/kg	43	84% (36)	0.444	0.144	0.419	0.115	<1.5	0.191	0.351	0.375	0.435	0.5	0.55	0.732	<0.7 - <1.5
o,p' -DDT	µg/kg	43	93% (40)	0.455	0.102	0.445	0.27	<1.5	0.351	0.356	0.38	0.44	0.5	0.55	0.595	<0.7 - <1.5
p,p' -DDT	µg/kg	43	67% (29)	0.493	0.259	0.46	0.23	1.98	0.296	0.36	0.383	0.445	0.513	0.66	0.744	<0.7 - <1.5
Sum DDTs (*o,p'* + *p,p'*)	µg/kg	43	67% (29)	0.949	0.307	0.916	0.63	<3	0.72	0.72	0.775	0.89	1.01	1.21	1.25	<1.4 - <3
Total DDTs	µg/kg	43	60% (26)	2.74	0.555	2.7	1.99	<9	2.16	2.16	2.36	2.67	3	3.25	3.3	<4.2 - <9
Oxychlordane	µg/kg	43	100% (43)	0.224	0.0396	0.22	<0.35	<0.72	0.175	0.176	0.195	0.215	0.253	0.269	0.28	<0.35 - <0.72
Toxaphene	µg/kg	43	100% (43)	22.4	3.96	22	<35	<72	17.5	17.6	19.5	21.5	25.3	26.9	28	<35 - <72
Semi-Volatile Compounds																
1,2,4-Trichlorobenzene	µg/kg	43	98% (42)	75	112	59.8	<88	783	44.5	44.6	49	55	63.8	70	79	<88 - <330
1,2-Dichlorobenzene	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
1,3-Dichlorobenzene	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
1,4-Dichlorobenzene	µg/kg	43	98% (42)	69.2	88.4	58.3	<88	633	44.5	44.6	49	55	63.8	70	70	<88 - <160
2,2'-oxybis(1-chloropropane)	µg/kg	43	100% (43)	58.3	18.9	56.5	<88	<330	44.5	44.6	49	55	63.8	70	70	<88 - <330
2,4,5-Trichlorophenol	µg/kg	43	100% (43)	142	23.2	141	<220	<410	115	115	125	140	163	170	180	<220 - <410
2,4,6-Trichlorophenol	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
2,4-Dichlorophenol	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
2,4-Dimethylphenol	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
2,4-Dinitrophenol	µg/kg	43	100% (43)	142	23.2	141	<220	<410	115	115	125	140	163	170	180	<220 - <410
2,4-Dinitrotoluene	µg/kg	43	98% (42)	76.7	138	58.8	<88	958	44.5	44.6	49	55	63.8	70	70	<88 - <160
2,6-Dinitrotoluene	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
2-Chloronaphthalene	µg/kg	43	100% (43)	58.3	18.9	56.5	<88	<330	44.5	44.6	49	55	63.8	70	70	<88 - <330
2-Chlorophenol	µg/kg	43	98% (42)	77.3	142	58.9	<88	983	44.5	44.6	49	55	63.8	70	70	<88 - <160
2-Fluorobiphenyl	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
2-Methylphenol	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
2-Nitroaniline	µg/kg	43	100% (43)	142	23.2	141	<220	<410	115	115	125	140	163	170	180	<220 - <410
2-Nitrophenol	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
3,3'-Dichlorobenzidine	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
3-Nitroaniline	µg/kg	43	100% (43)	142	23.2	141	<220	<410	115	115	125	140	163	170	180	<220 - <410
4-Bromophenyl phenyl ether	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
4-Chloro-3-methylphenol	µg/kg	43	98% (42)	86	199	59.3	<88	1360	44.5	44.6	49	55	63.8	70	70	<88 - <160
4-Chloroaniline	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
4-Chlorophenyl phenyl ether	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
4-Methylphenol	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
4-Nitroaniline	µg/kg	43	100% (43)	142	23.2	141	<220	<410	115	115	125	140	163	170	180	<220 - <410
4-Nitrophenol	µg/kg	43	98% (42)	173	206	148	<220	1480	115	115	125	140	163	174	180	<220 - <410
Acetophenone	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
Atrazine	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
Benzaldehyde	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
Benzoic acid	µg/kg	43	100% (43)	69.2	31.1	64.4	<88	<330	44.5	45	50	60	70	124	139	<88 - <330
Benzyl alcohol	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
bis(2-chloroethoxy)methane	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
bis(2-chloroethyl)ether	µg/kg	43	98% (42)	57.5	14.5	56.2	<88	<160	44.5	44.6	49	55	63.8	70	70	<88 - <160
bis(2-ethylhexyl) phthalate	µg/kg	43	81% (35)	66.4	31.2	61.3	25	<330	44	44.5	49	55	65	96.9	140	<88 - <330
Butyl benzyl phthalate	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
Caprolactam	µg/kg	43	98% (42)	56.5	9.61	55.7	76	<160	44.5	44.6	49	55	65	70	70	<88 - <160
Diethyl phthalate	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
Dimethyl phthalate	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
Di-n-butyl phthalate	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
Dinitro-o-cresol	µg/kg	43	100% (43)	142	23.2	141	<220	<410	115	115	125	140	163	170	180	<220 - <410
Di-N-octyl phthalate	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Hexachlorobutadiene	µg/kg	43	100% (43)	1.73	9.88	0.251	<0.35	<130	0.175	0.176	0.195	0.215	0.253	0.278	0.285	<0.35 - <130
Hexachloroethane	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
N-Nitrosodi-n-propylamine	µg/kg	43	98% (42)	71.5	104	58.5	<88	733	44.5	44.6	49	55	63.8	70	70	<88 - <160
N-Nitrosodiphenylamine	µg/kg	43	100% (43)	56	9.11	55.3	<88	<160	44.5	44.6	49	55	63.8	69	70	<88 - <160
Pentachlorophenol	µg/kg	43	98% (42)	190	320	149	<220	2230	115	115	125	140	163	174	180	<220 - <410
Phenol	µg/kg	43	98% (42)	80.2	161	59	<88	1110	44.5	44.6	49	55	63.8	70	70	<88 - <160
Dioxins/Furans																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	6	0% (0)	0.834	0.681	0.588	0.15	1.92	0.183	0.215	0.312	0.728	1.16	1.56	1.74	NA
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	6	0% (0)	3.53	3.86	2.01	0.472	10.1	0.52	0.567	0.947	1.81	5.19	8.21	9.15	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	6	17% (1)	0.0784	0.0591	0.0617	0.034	0.184	0.0244	0.0276	0.0388	0.0656	0.0945	0.142	0.163	<0.0425
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	6	17% (1)	0.103	0.0896	0.0703	<0.0288	0.248	0.0214	0.0285	0.0459	0.0689	0.15	0.211	0.229	<0.0288
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	6	17% (1)	0.085	0.0579	0.0677	<0.0366	0.178	0.0275	0.0367	0.0564	0.0648	0.114	0.154	0.166	<0.0366
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg	6	0% (0)	0.0851	0.06	0.0707	0.0351	0.19	0.037	0.0388	0.0452	0.0606	0.108	0.156	0.173	NA
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	6	17% (1)	0.248	0.256	0.136	<0.0378	0.667	0.0269	0.035	0.071	0.15	0.38	0.559	0.613	<0.0378
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	6	50% (3)	0.0543	0.0384	0.0436	<0.0418	0.116	0.0211	0.0213	0.0229	0.0449	0.0741	0.0969	0.106	<0.0418 - <0.0532
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	6	0% (0)	0.175	0.173	0.113	0.036	0.478	0.0365	0.0369	0.0528	0.109	0.239	0.379	0.428	NA
1,2,3,7,8-Pentachlorodibenzo- p-dioxin	ng/kg	6	17% (1)	0.0672	0.0583	0.0473	0.0219	0.168	0.0148	0.0172	0.0265	0.051	0.0897	0.133	0.151	<0.0248
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg	6	0% (0)	0.104	0.101	0.0701	0.0259	0.267	0.0283	0.0306	0.0355	0.053	0.161	0.23	0.248	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	6	0% (0)	0.101	0.0736	0.081	0.0312	0.228	0.037	0.0429	0.0548	0.0738	0.13	0.186	0.207	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	6	0% (0)	0.182	0.165	0.127	0.0504	0.433	0.053	0.0557	0.0618	0.104	0.292	0.387	0.41	NA
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	6	50% (3)	0.0849	0.0828	0.0506	<0.0343	0.189	0.0173	0.0174	0.0181	0.0505	0.159	0.187	0.188	<0.0343 - <0.0395
2,3,7,8-Tetrachlorodibenzofuran	ng/kg	6	0% (0)	5.88	7.04	2.38	0.564	15.4	0.567	0.57	0.599	2.26	11.6	14.8	15.1	NA
Total Tetrachlorodibenzo-p-dioxins	ng/kg	6	33% (2)	0.267	0.376	0.0948	<0.0395	0.914	0.0228	0.0258	0.035	0.0485	0.418	0.727	0.821	<0.0395 - <0.0636
Total Pentachlorodibenzo-p-dioxins	ng/kg	6	0% (0)	0.357	0.463	0.153	0.0219	1.2	0.0264	0.0309	0.0647	0.144	0.482	0.897	1.05	NA
Total Hexachlorodibenzo-p-dioxins	ng/kg	6	0% (0)	1.92	2.08	1.07	0.226	5.46	0.261	0.296	0.457	1.03	2.87	4.42	4.94	NA
Total Heptachlorodibenzo-p-dioxins	ng/kg	6	0% (0)	7.45	8.28	4.22	0.919	22.1	1.06	1.2	2.08	3.89	10.3	17.3	19.7	NA
Total Octachlorodibenzo-p-dioxins	ng/kg	6	0% (0)	24.8	28.9	12.9	2.19	77.2	2.68	3.17	6.21	12.9	33	58.4	67.8	NA
Total Tetrachlorodibenzofurans	ng/kg	6	0% (0)	11.7	14.2	4.62	1.04	31.7	1.06	1.08	1.17	4.28	22.5	29.7	30.7	NA
Total Pentachlorodibenzofurans	ng/kg	6	0% (0)	0.94	1.03	0.59	0.219	2.85	0.222	0.226	0.257	0.489	1.18	2.11	2.48	NA
Total Hexachlorodibenzofurans	ng/kg	6	0% (0)	1.17	1.03	0.828	0.225	2.94	0.266	0.308	0.472	0.841	1.6	2.38	2.66	NA
Total Heptachlorodibenzofurans	ng/kg	6	0% (0)	1.88	1.65	1.27	0.331	4.65	0.366	0.402	0.592	1.66	2.48	3.59	4.12	NA
Total Octachlorodibenzofurans	ng/kg	6	0% (0)	1.66	1.78	1	0.263	4.87	0.279	0.296	0.479	0.959	2.19	3.73	4.3	NA
Toxic Equivalency (TEQ)[9]	ng/kg	6	0% (0)	0.875	1	0.399	0.06	2.3	0.0769	0.0938	0.146	0.389	1.63	2.14	2.22	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
COPC Mixtures/Slag Indicators[10]																
Cu:Al	No Units	8	0% (0)	0.0338	0.0298	0.0191	0.0021	0.0788	0.00291	0.00372	0.00818	0.0262	0.0606	0.0684	0.0736	NA
Mean PEC-Q	No Units	8	0% (0)	0.427	0.435	0.267	0.0635	1.34	0.0637	0.064	0.162	0.272	0.518	0.943	1.14	NA
Mean PEC-Q_{METALS}	No Units	47	0% (0)	2.23	2.63	1.23	0.153	9.93	0.19	0.23	0.582	1.13	2.75	5.79	9.09	NA
Mean PEC-$Q_{METALS(1\%OC)}$	No Units	47	0% (0)	2.69	5.51	0.425	0.0168	24	0.0209	0.0312	0.102	0.207	1.83	8.22	16.3	NA
Mean PEC-$Q_{EXTMETALS}$	No Units	12	0% (0)	1.52	1.14	1.04	0.181	3.34	0.195	0.234	0.581	1.3	2.43	3.02	3.18	NA
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	No Units	12	0% (0)	2.3	3.37	1.22	0.193	12.1	0.353	0.489	0.667	1.08	1.73	4.99	8.35	NA
ΣPEC-Q_{METALS}	No Units	47	0% (0)	15.2	18.4	8.39	1.07	69.5	1.33	1.61	4.08	7.93	15.7	40.5	63.6	NA
ΣPEC-$Q_{METALS(1\%OC)}$	No Units	47	0% (0)	18.6	38.6	2.89	0.117	168	0.146	0.219	0.714	1.45	12.2	57.5	113	NA
ΣPEC-$Q_{METALS(Cu,Pb,Zn)}$	No Units	47	0% (0)	13.8	17.9	6.58	0.46	66.2	0.798	1.02	2.97	6.41	14.3	38.5	60.6	NA
ΣPEC-$Q_{EXTMETALS}$	No Units	12	0% (0)	11.1	8.74	8.27	1.81	33.4	1.95	2.34	5.81	9.12	14.6	18.4	25.3	NA
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	No Units	12	0% (0)	21	34.5	9.66	1.93	121	2.82	3.68	5.15	7.48	14.2	49.9	83.5	NA
Zn:Cd	No Units	12	0% (0)	903	981	643	189	3820	241	289	405	640	921	1320	2460	NA
Nutrients/Inorganics/Conventionals																
Moisture, percent	%	7	0% (0)	20.1	18.9	13.6	5	55	5.06	5.12	6.25	9.9	29.3	42.2	48.6	NA
Organic carbon, total	%	47	0% (0)	7.31	11	2.91	0.154	54.5	0.381	0.474	1.01	2.2	7.77	21	27.8	NA
Grainsize Fraction <75µm	%	43	0% (0)	21.5	19.9	13.1	1.3	72.2	1.53	2.89	7	14.6	31.1	51.5	64.7	NA
Clay, percent	%	44	0% (0)	1.5	2.7	NC	0	12	0	0	0.017	0.173	1.54	4.75	7	NA
Colloid, percent	%	43	0% (0)	0.439	0.808	NC	0	3.42	0	0	0	0.04	0.494	1.13	2.6	NA
Fines, percent (silt+clay)	%	47	0% (0)	21.7	18.9	13.7	1.3	70	1.59	3.24	7.18	18	31.7	48.6	61.9	NA
Gravel, percent	%	43	0% (0)	1.95	5.43	NC	0	33.9	0	0	0	0	1.75	4.46	6.46	NA
Sand - coarse, percent	%	43	0% (0)	2.17	4.06	NC	0	17.9	0	0	0.114	0.455	1.91	6.68	8.19	NA
Sand - fine, percent	%	43	0% (0)	53.5	23.2	47	7.1	91.6	16.2	20.5	36.9	52.1	74.3	82.6	84.1	NA
Sand - medium, percent	%	43	0% (0)	20.9	26.3	8.21	0.6	90.6	1.15	1.2	2.17	7.8	35.2	65.9	81.9	NA
Sand, percent	%	44	0% (0)	76.6	19.8	73.3	27.8	98.7	35.3	45.9	65.8	82.6	91.9	96.5	98.5	NA
Silt, percent	%	44	0% (0)	19.5	17	12.4	1.3	60.5	1.55	2.97	6.83	14.3	26.7	47.7	56.4	NA
Reach 3																
Metals																
Aluminum, total	mg/kg	44	0% (0)	10400	5270	9180	2530	23600	4620	4740	5850	9700	14000	16600	21800	NA
Antimony, total	mg/kg	44	20% (9)	6.72	9.79	3.03	0.3	42.5	0.353	0.54	1.4	2.9	5.65	18.6	27.5	<5.3 - <14
Arsenic, total	mg/kg	45	0% (0)	7.46	6.98	4.86	0.95	26.7	1.06	1.4	1.8	5.8	8.8	19.4	21.3	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Barium, total	mg/kg	44	0% (0)	351	397	190	29.6	1610	38.4	39.7	75.5	173	536	808	1210	NA
Beryllium, total	mg/kg	44	0% (0)	0.88	0.577	0.731	0.22	2.95	0.312	0.333	0.448	0.723	1.2	1.4	1.89	NA
Cadmium, total	mg/kg	45	2% (1)	1.73	1.85	0.838	0.11	7.3	0.14	0.15	0.23	1	2.3	4.4	4.74	<0.57
Calcium, total	mg/kg	44	0% (0)	18200	19600	10200	1900	76500	2030	2300	4860	8700	31200	41700	65200	NA
Chromium, total	mg/kg	44	0% (0)	30.3	24.3	23.5	5.2	109	9.18	9.62	15.6	22.2	39.9	52.5	85.2	NA
Cobalt, total	mg/kg	44	0% (0)	11.7	9.89	8.7	2.8	41.6	3.2	3.4	4.78	7.7	15.8	23.3	31.9	NA
Copper, total	mg/kg	45	0% (0)	303	558	61	5.8	2240	9.22	9.42	14.4	39.2	151	886	1510	NA
Iron, total	mg/kg	44	0% (0)	49400	64800	26900	5140	266000	8640	9330	12700	19800	43600	128000	173000	NA
Lead, total	mg/kg	45	0% (0)	190	280	58.2	4	1150	5.24	5.76	9.6	72.4	235	400	882	NA
Magnesium, total	mg/kg	44	0% (0)	6750	4150	5800	1760	21800	2710	2830	3810	5950	7510	10300	14400	NA
Manganese, total	mg/kg	44	0% (0)	892	1190	450	91.9	4690	139	145	204	329	1090	2290	3400	NA
Mercury, total	mg/kg	45	18% (8)	0.159	0.214	0.0721	0.005	0.81	0.00772	0.0144	0.035	0.055	0.15	0.466	0.658	<0.098 - <0.11
Nickel, total	mg/kg	44	0% (0)	15.4	10.3	13.1	4.9	52.8	7.23	7.45	8.25	12.7	18.3	22.1	37.9	NA
Potassium, total	mg/kg	44	0% (0)	1720	1220	1380	523	5260	559	584	893	1360	2150	3390	4440	NA
Selenium, total	mg/kg	44	75% (33)	3.17	3.53	2.49	0.63	23.4	1.41	1.52	1.79	2.1	3.29	5.04	6.51	<2.8 - <9.3
Silver, total	mg/kg	44	98% (43)	0.674	0.331	0.628	<0.8	<2.7	0.436	0.448	0.5	0.6	0.663	1.04	1.19	<0.8 - <2.7
Sodium, total	mg/kg	44	0% (0)	419	544	224	19.5	2270	86.4	92.4	109	172	444	1260	1350	NA
Thallium, total	mg/kg	44	93% (41)	1.62	0.626	1.52	0.69	<6.6	1.01	1.1	1.25	1.45	1.66	2.59	2.99	<2 - <6.6
Uranium, total	mg/kg	44	70% (31)	19.3	19	14.5	5.6	78.4	7.58	8.42	9.88	11.7	16.6	48.4	71.7	<16 - <53.1
Vanadium, total	mg/kg	44	0% (0)	31.1	11.6	29	7.7	71.4	17.7	19.1	23.3	29.8	37.7	47.4	48.8	NA
Zinc, total	mg/kg	45	0% (0)	3500	6490	424	26.7	24800	32.9	35.6	51.6	204	1340	11700	18300	NA
Simultaneously Extracted (SE) Metals																
Acid volatile sulfides	µmol/g	5	20% (1)	0.541	0.565	0.231	<0.0248	1.4	0.0353	0.0582	0.127	0.375	0.79	1.16	1.28	<0.0248
SE antimony	µmol/g	4	75% (3)	0.0013	0.000463	0.00124	<0.00148	<0.003044	0.000801	0.000862	0.00105	0.00133	0.00159	0.00172	0.00176	<0.001 - <0.003
SE arsenic	µmol/g	1	0% (0)	0.0414	NA	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	NA
SE cadmium	µmol/g	5	0% (0)	0.0171	0.0119	0.0122	0.00205	0.0302	0.00359	0.00514	0.00979	0.016	0.0276	0.0292	0.0297	NA
SE chromium	µmol/g	4	0% (0)	0.0644	0.0274	0.0593	0.0308	0.0904	0.0342	0.0377	0.0481	0.0683	0.0846	0.0881	0.0892	NA
SE copper	µmol/g	5	0% (0)	0.618	0.384	0.495	0.197	1.02	0.201	0.205	0.217	0.787	0.87	0.959	0.989	NA
SE lead	µmol/g	5	0% (0)	0.628	0.489	0.395	0.0569	1.17	0.0864	0.116	0.204	0.695	1.01	1.11	1.14	NA
SE mercury	nmol/g	4	0% (0)	0.00629	0.00231	0.00598	0.00429	0.00897	0.00431	0.00433	0.0044	0.00596	0.00785	0.00852	0.00875	NA
SE nickel	µmol/g	5	0% (0)	0.0838	0.0275	0.0801	0.0511	0.119	0.0545	0.0579	0.0681	0.0766	0.104	0.113	0.116	NA
SE zinc	µmol/g	5	0% (0)	7.01	5.52	4.03	0.558	11.8	0.732	0.906	1.43	10.4	10.9	11.4	11.6	NA
∑SEM-AVS[1]	µmol/g	5	0% (0)	7.82	6.34	3.06	0.0752	14	0.445	0.814	1.92	11.4	11.7	13.1	13.5	NA
(∑SEM-AVS)/f_{OC}[2]	µmol/g	5	0% (0)	493	351	191	2.58	793	50.1	97.7	240	714	715	762	778	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
$\sum$ESB-TU_{FCV}[3]	No Units	210	0% (0)	0.0313	0.0827	0.00786	0.000424	0.425	0.000628	0.00102	0.00268	0.0076	0.0231	0.029	0.0794	NA
Polycyclic Aromatic Hydrocarbons (PAHs)																
2-Methylnaphthalene	µg/kg	45	53% (24)	4.52	8.23	1.83	0.2	<85	0.2	0.28	0.7	2	4	6.6	21.6	<4 - <85
Acenaphthene	µg/kg	46	89% (41)	25.6	93.4	3.91	1	545	2	2	2.13	3	4	5.75	182	<2.5 - <12
Acenaphthylene	µg/kg	46	93% (43)	5.72	9.48	3.39	0.2	<96	2	2	2.13	3	4.38	6	23.6	<4 - <96
Anthracene	µg/kg	46	83% (38)	5.26	9.39	2.91	0.4	<96	0.625	1.08	2	3	3.88	5.75	21.3	<4 - <96
Benz(a)anthracene	µg/kg	46	52% (24)	4.38	8.03	2.01	0.2	<85	0.5	0.5	0.925	2	3	7	21.8	<4 - <85
Benzo(a)pyrene	µg/kg	45	69% (31)	4.75	9.41	2.4	0.2	<96	0.52	0.64	2	2.5	3	5.3	18.7	<4 - <96
Benzo(b)fluoranthene	µg/kg	45	67% (30)	5	9.42	2.56	0.2	<96	0.7	0.7	2	2.5	4	6	19.5	<4 - <96
Benzo(g,h,i)perylene	µg/kg	45	58% (26)	4.48	9.49	1.97	0.2	<96	0.4	0.5	1	2	3	5.3	18.7	<4 - <96
Benzo(k)fluoranthene	µg/kg	45	71% (32)	4.97	9.48	2.48	0.2	<96	0.5	0.58	2	2.5	4	5.8	20.3	<4 - <96
Carbazole	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Chrysene	µg/kg	46	24% (11)	4.5	9.45	1.42	0.2	<85	0.2	0.2	0.7	1	3	12	21.9	<4 - <85
Dibenz(a,h)anthracene	µg/kg	45	82% (37)	5.03	9.39	2.68	0.2	<96	0.42	0.76	2	3	3	5.5	19.6	<4 - <96
Dibenzofuran	µg/kg	45	76% (34)	5.15	9.44	2.56	0.2	<96	0.42	0.5	2	2.5	4	6	20.3	<4 - <96
Fluoranthene	µg/kg	46	41% (19)	5.36	10.1	2.29	0.2	<96	0.25	0.7	1.09	2	3	9	26.4	<4 - <96
Fluorene	µg/kg	46	87% (40)	5.33	9.3	3.05	0.2	<96	0.7	2	2	3	4	6	20.3	<4 - <96
Indeno(1,2,3-c,d)pyrene	µg/kg	45	60% (27)	4.58	9.47	2.05	0.2	<96	0.26	0.5	1	2	3	5.3	18.8	<4 - <96
Naphthalene	µg/kg	46	4% (2)	7.84	12.2	4.31	1	<120	1	1	3.51	3.95	4.7	22.2	38.6	<85 - <120
Nitrobenzene	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Phenanthrene	µg/kg	46	41% (19)	5.84	12.2	2.05	0.2	<120	0.4	0.5	0.913	2	3	16.3	35.9	<4 - <120
Pyrene	µg/kg	46	28% (13)	19.8	72.8	1.95	0.2	430	0.2	0.2	0.9	2	3	10	143	<4 - <29
Total HMW-PAHs[4]	µg/kg	46	20% (9)	43.6	114	15.8	3.2	643	6.23	7.35	8.88	12	18	43	254	<24 - <222
Total LMW-PAHs[5]	µg/kg	46	2% (1)	60	141	26.2	13.6	800	14.8	15.3	15.6	18.2	26.9	86.4	342	<323.5
Total PAHs[6]	µg/kg	46	2% (1)	104	254	42.7	21.3	1440	23.5	24	25.8	30.5	43.1	129	595	<545.5
Polychlorinated Biphenyls (PCBs)																
Aroclor 1016	µg/kg	45	93% (42)	1.46	4.76	0.669	<0.85	32	0.43	0.432	0.45	0.55	0.6	1.01	2	<0.85 - <2.4
Aroclor 1221	µg/kg	45	100% (45)	2.35	0.694	2.27	<3.4	<9.6	1.71	1.75	1.8	2.25	2.35	3.32	3.73	<3.4 - <9.6
Aroclor 1232	µg/kg	45	100% (45)	2.35	0.694	2.27	<3.4	<9.6	1.71	1.75	1.8	2.25	2.35	3.32	3.73	<3.4 - <9.6
Aroclor 1242	µg/kg	45	100% (45)	0.586	0.174	0.566	<0.85	<2.4	0.43	0.432	0.45	0.55	0.6	0.83	0.93	<0.85 - <2.4
Aroclor 1248	µg/kg	45	100% (45)	0.586	0.174	0.566	<0.85	<2.4	0.43	0.432	0.45	0.55	0.6	0.83	0.93	<0.85 - <2.4
Aroclor 1254	µg/kg	45	100% (45)	0.586	0.174	0.566	<0.85	<2.4	0.43	0.432	0.45	0.55	0.6	0.83	0.93	<0.85 - <2.4

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Aroclor 1260	µg/kg	45	91% (41)	1.3	3.61	0.673	0.825	24	0.43	0.432	0.45	0.55	0.65	1.01	2.34	<0.85 - <2.4
Total PCBs[7]	µg/kg	45	91% (41)	9.21	9.05	7.93	7.53	65.5	5.55	5.66	5.85	7.25	7.8	12.2	15.3	<11.1 - <31.2
Organochlorine Pesticides																
Aldrin	µg/kg	45	93% (42)	0.295	0.268	0.248	<0.34	1.6	0.17	0.17	0.18	0.22	0.235	0.402	0.83	<0.34 - <0.94
Chlordane, total[8]	µg/kg	45	100% (45)	0.455	0.133	0.44	<0.68	<1.88	0.34	0.34	0.36	0.43	0.46	0.618	0.734	<0.68 - <1.88
Chlordane, *cis* -	µg/kg	45	100% (45)	0.228	0.0666	0.22	<0.34	<0.94	0.17	0.17	0.18	0.215	0.23	0.309	0.367	<0.34 - <0.94
Chlordane, *trans* -	µg/kg	45	100% (45)	0.228	0.0666	0.22	<0.34	<0.94	0.17	0.17	0.18	0.215	0.23	0.309	0.367	<0.34 - <0.94
Dieldrin	µg/kg	45	93% (42)	0.622	0.618	0.509	<0.69	3.5	0.345	0.35	0.365	0.445	0.48	0.83	1.96	<0.69 - <1.9
Endosulfan sulfate	µg/kg	45	100% (45)	0.463	0.138	0.448	<0.69	<1.9	0.345	0.347	0.365	0.43	0.47	0.63	0.78	<0.69 - <1.9
Endosulfan-alpha	µg/kg	45	100% (45)	0.228	0.0666	0.22	<0.34	<0.94	0.17	0.17	0.18	0.215	0.23	0.309	0.367	<0.34 - <0.94
Endosulfan-beta	µg/kg	45	100% (45)	0.463	0.138	0.448	<0.69	<1.9	0.345	0.347	0.365	0.43	0.47	0.63	0.78	<0.69 - <1.9
Endrin	µg/kg	45	93% (42)	0.636	0.672	0.511	<0.69	3.5	0.345	0.35	0.365	0.445	0.48	0.83	1.94	<0.69 - <1.9
Endrin aldehyde	µg/kg	45	100% (45)	0.463	0.138	0.448	<0.69	<1.9	0.345	0.347	0.365	0.43	0.47	0.63	0.78	<0.69 - <1.9
Endrin ketone	µg/kg	45	100% (45)	0.463	0.138	0.448	<0.69	<1.9	0.345	0.347	0.365	0.43	0.47	0.63	0.78	<0.69 - <1.9
gamma-HCH (Lindane)	µg/kg	45	93% (42)	0.297	0.274	0.248	<0.34	1.6	0.17	0.17	0.18	0.22	0.235	0.402	0.91	<0.34 - <0.94
Heptachlor	µg/kg	45	93% (42)	0.303	0.295	0.249	<0.34	1.65	0.17	0.17	0.18	0.22	0.235	0.402	0.85	<0.34 - <0.94
Heptachlor epoxide	µg/kg	45	100% (45)	0.228	0.0666	0.22	<0.34	<0.94	0.17	0.17	0.18	0.215	0.23	0.309	0.367	<0.34 - <0.94
Hexachlorobenzene	µg/kg	45	98% (44)	3.67	13.3	0.323	<0.34	<130	0.17	0.17	0.18	0.22	0.26	0.408	34.1	<0.34 - <130
Hexachlorocyclohexane-alpha	µg/kg	45	98% (44)	0.232	0.0706	0.224	<0.34	<0.94	0.17	0.17	0.18	0.22	0.235	0.327	0.387	<0.34 - <0.94
Hexachlorocyclohexane-beta	µg/kg	45	100% (45)	0.228	0.0666	0.22	<0.34	<0.94	0.17	0.17	0.18	0.215	0.23	0.309	0.367	<0.34 - <0.94
Hexachlorocyclohexane-delta	µg/kg	45	100% (45)	0.228	0.0666	0.22	<0.34	<0.94	0.17	0.17	0.18	0.215	0.23	0.309	0.367	<0.34 - <0.94
Hexachlorocyclopentadiene	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Isophorone	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Methoxychlor	µg/kg	45	93% (42)	2.27	0.741	2.16	0.75	<9.4	1.7	1.7	1.8	2.2	2.35	3.27	3.68	<3.4 - <9.4
Nonachlor, *cis-*	µg/kg	45	100% (45)	0.228	0.0666	0.22	<0.34	<0.94	0.17	0.17	0.18	0.215	0.23	0.309	0.367	<0.34 - <0.94
Nonachlor, *trans-*	µg/kg	45	100% (45)	0.228	0.0666	0.22	<0.34	<0.94	0.17	0.17	0.18	0.215	0.23	0.309	0.367	<0.34 - <0.94
o,p' -DDD	µg/kg	45	100% (45)	0.463	0.138	0.448	<0.69	<1.9	0.345	0.347	0.365	0.43	0.47	0.63	0.78	<0.69 - <1.9
p,p' -DDD	µg/kg	45	100% (45)	0.463	0.138	0.448	<0.69	<1.9	0.345	0.347	0.365	0.43	0.47	0.63	0.78	<0.69 - <1.9
Sum DDDs (*o,p'* + *p,p'*)	µg/kg	45	100% (45)	0.926	0.276	0.895	<1.38	<3.8	0.69	0.694	0.73	0.86	0.94	1.26	1.56	<1.38 - <3.8
o,p' -DDE	µg/kg	45	100% (45)	0.463	0.138	0.448	<0.69	<1.9	0.345	0.347	0.365	0.43	0.47	0.63	0.78	<0.69 - <1.9
p,p' -DDE	µg/kg	45	91% (41)	0.447	0.143	0.428	0.16	<1.9	0.345	0.345	0.36	0.43	0.465	0.61	0.78	<0.69 - <1.9
Sum DDEs (*o,p'* + *p,p'*)	µg/kg	45	91% (41)	0.91	0.274	0.879	0.505	<3.8	0.69	0.694	0.73	0.86	0.94	1.22	1.56	<1.38 - <3.8
o,p' -DDT	µg/kg	45	96% (43)	0.462	0.144	0.445	0.28	<1.9	0.345	0.345	0.36	0.43	0.47	0.68	0.78	<0.69 - <1.9
p,p' -DDT	µg/kg	45	73% (33)	0.759	1.11	0.492	0.14	5.7	0.152	0.258	0.35	0.42	0.47	1.16	2.55	<0.69 - <1.9

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Sum DDTs (*o,p'* + *p,p'*)	µg/kg	45	73% (33)	1.22	1.14	1	0.55	6.4	0.65	0.69	0.71	0.86	0.94	1.82	2.96	<1.38 - <3.8
Total DDTs	µg/kg	45	69% (31)	3.06	1.35	2.86	1.89	<11.4	2.07	2.1	2.19	2.58	3.26	4.85	5.58	<4.14 - <11.4
Oxychlordane	µg/kg	45	100% (45)	0.228	0.0666	0.22	<0.34	<0.94	0.17	0.17	0.18	0.215	0.23	0.309	0.367	<0.34 - <0.94
Toxaphene	µg/kg	45	100% (45)	22.8	6.66	22	<34	<94	17	17	18	21.5	23	30.9	36.7	<34 - <94
Semi-Volatile Compounds																
1,2,4-Trichlorobenzene	µg/kg	45	93% (42)	81.3	92.5	64	<85	535	42.6	43	47.5	55	60	101	255	<85 - <240
1,2-Dichlorobenzene	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
1,3-Dichlorobenzene	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
1,4-Dichlorobenzene	µg/kg	45	93% (42)	76	79.7	62.6	<85	485	42.6	43	47.5	55	60	101	122	<85 - <240
2,2'-oxybis(1-chloropropane)	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
2,3,4,6-Tetrachlorophenol	µg/kg	1	100% (1)	0.1	NA	0.1	<0.2	<0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	<0.2
2,3,5,6-Tetrachlorophenol	µg/kg	1	100% (1)	0.1	NA	0.1	<0.2	<0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	<0.2
2,3,6-Trichlorophenol	µg/kg	1	100% (1)	0.1	NA	0.1	<0.2	<0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	<0.2
2,4,5-Trichlorophenol	µg/kg	46	100% (46)	143	47.8	120	<0.2	<610	106	110	111	138	150	198	234	<0.2 - <610
2,4,6-Trichlorophenol	µg/kg	46	100% (46)	56.6	18.8	48.7	<0.2	<240	42.5	42.8	44.3	55	60	77.5	92.5	<0.2 - <240
2,4-Dichlorophenol	µg/kg	46	100% (46)	56.6	18.8	48.7	<0.2	<240	42.5	42.8	44.3	55	60	77.5	92.5	<0.2 - <240
2,4-Dimethylphenol	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
2,4-Dinitrophenol	µg/kg	46	100% (46)	143	47.2	133	<18	<610	106	110	111	138	150	198	234	<18 - <610
2,4-Dinitrotoluene	µg/kg	45	93% (42)	85.4	106	64.7	<85	565	42.6	43	47.5	55	60	101	343	<85 - <240
2,6-Dichlorophenol	µg/kg	1	100% (1)	0.1	NA	0.1	<0.2	<0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	<0.2
2,6-Dinitrotoluene	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
2-Chloronaphthalene	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
2-Chlorophenol	µg/kg	45	93% (42)	91.7	137	65.3	<85	810	42.6	43	47.5	55	60	101	298	<85 - <240
2-Fluorobiphenyl	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
2-Methylphenol	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
2-Nitroaniline	µg/kg	45	100% (45)	146	43.2	141	<210	<610	110	110	115	140	150	199	235	<210 - <610
2-Nitrophenol	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
3,3'-Dichlorobenzidine	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
3-Nitroaniline	µg/kg	45	100% (45)	146	43.2	141	<210	<610	110	110	115	140	150	199	235	<210 - <610
4-Bromophenyl phenyl ether	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
4-Chloro-3-methylphenol	µg/kg	45	93% (42)	99	159	66.3	<85	860	42.6	43	47.5	55	60	101	443	<85 - <240
4-Chloroaniline	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
4-Chlorophenyl phenyl ether	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
4-Methylphenol	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
4-Nitroaniline	µg/kg	45	100% (45)	146	43.2	141	<210	<610	110	110	115	140	150	199	235	<210 - <610
4-Nitrophenol	µg/kg	45	93% (42)	180	133	157	<210	690	110	110	120	140	150	258	560	<210 - <610
Acetophenone	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Atrazine	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Benzaldehyde	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Benzoic acid	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Benzyl alcohol	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
bis(2-chloroethoxy)methane	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
bis(2-chloroethyl)ether	µg/kg	45	98% (44)	57.1	16	55.4	63	<240	42.5	43	45	55	60	75	84	<85 - <240
bis(2-ethylhexyl) phthalate	µg/kg	46	85% (39)	64.3	21.4	61.3	82.5	<240	42.5	43	48.3	57.5	78.8	91.5	109	<84 - <240
Butyl benzyl phthalate	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Caprolactam	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Diethyl phthalate	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Dimethyl phthalate	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Di-n-butyl phthalate	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Dinitro-o-cresol	µg/kg	45	100% (45)	146	43.2	141	<210	<610	110	110	115	140	150	199	235	<210 - <610
Di-N-octyl phthalate	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Hexachlorobutadiene	µg/kg	45	100% (45)	3.67	13.3	0.318	<0.34	<130	0.17	0.17	0.18	0.22	0.235	0.402	34.1	<0.34 - <130
Hexachloroethane	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
N-Nitrosodi-n-propylamine	µg/kg	45	93% (42)	85.1	105	64.7	<85	565	42.6	43	47.5	55	60	101	346	<85 - <240
N-Nitrosodiphenylamine	µg/kg	45	100% (45)	57.8	16.9	55.9	<85	<240	42.5	43	45	55	60	78	93	<85 - <240
Pentachlorophenol	µg/kg	46	93% (43)	191	191	136	<0.2	1080	110	110	116	140	150	255	626	<0.2 - <610
Phenol	µg/kg	46	93% (43)	95.7	154	65.2	<74	895	42.5	43	45.6	55	60	100	399	<74 - <240
Dioxins/Furans																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	10	10% (1)	0.504	0.708	0.226	<0.0778	2.05	0.0567	0.0745	0.0873	0.171	0.393	1.62	1.83	<0.0778
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	10	0% (0)	2.7	3.86	1.13	0.157	11.4	0.215	0.273	0.476	1.04	2.25	8.4	9.9	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	10	80% (8)	0.0676	0.048	0.0542	<0.0471	<0.196	0.0243	0.025	0.0281	0.0588	0.0904	0.123	0.146	<0.0471 - <0.196
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	10	20% (2)	0.0775	0.0911	0.0472	0.0217	0.284	0.0172	0.0209	0.0241	0.0379	0.072	0.209	0.247	<0.0272 - <0.0475
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	10	40% (4)	0.0824	0.0613	0.0643	<0.0462	0.208	0.0239	0.0246	0.0407	0.0582	0.121	0.153	0.181	<0.0462 - <0.0993
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg	10	30% (3)	0.0644	0.0615	0.045	<0.0257	0.203	0.0174	0.0219	0.0245	0.0379	0.0836	0.141	0.172	<0.0257 - <0.0472
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	10	40% (4)	0.193	0.282	0.0876	<0.0509	0.838	0.0255	0.0255	0.0324	0.0688	0.129	0.611	0.725	<0.0509 - <0.101
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	10	70% (7)	0.041	0.0224	0.0359	0.0244	<0.131	0.019	0.0201	0.0235	0.0344	0.0592	0.0729	0.0748	<0.0357 - <0.131
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	10	50% (5)	0.146	0.204	0.0718	<0.0489	0.598	0.025	0.0256	0.028	0.0545	0.109	0.464	0.531	<0.0489 - <0.101
1,2,3,7,8-Pentachlorodibenzo- p-dioxin	ng/kg	10	70% (7)	0.0634	0.0674	0.0435	0.0337	0.212	0.0213	0.0214	0.0225	0.0336	0.0576	0.167	0.19	<0.0425 - <0.125

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg	10	30% (3)	0.0849	0.111	0.0431	0.021	0.326	0.0138	0.0152	0.021	0.0266	0.0974	0.251	0.289	<0.025 - <0.0447
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	10	50% (5)	0.0646	0.0789	0.0368	0.0184	0.241	0.0135	0.0139	0.0159	0.0238	0.0631	0.18	0.21	<0.0264 - <0.049
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	10	10% (1)	0.144	0.208	0.069	0.0312	0.605	0.0251	0.0301	0.0346	0.0373	0.0969	0.471	0.538	<0.0403
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	10	70% (7)	0.0749	0.1	0.0399	<0.0263	0.28	0.0145	0.0159	0.0184	0.0295	0.0532	0.249	0.264	<0.0263 - <0.114
2,3,7,8-Tetrachlorodibenzofuran	ng/kg	10	0% (0)	4.47	8.84	0.486	0.0723	23.7	0.0747	0.0772	0.0823	0.316	0.983	18.9	21.3	NA
Total Tetrachlorodibenzo-p-dioxins	ng/kg	10	70% (7)	0.194	0.349	0.0491	<0.0263	0.927	0.0145	0.0159	0.0184	0.024	0.0749	0.788	0.858	<0.0263 - <0.0627
Total Pentachlorodibenzo-p-dioxins	ng/kg	10	70% (7)	0.314	0.612	0.0652	0.0337	1.76	0.0213	0.0214	0.0225	0.0336	0.0576	1.18	1.47	<0.0425 - <0.125
Total Hexachlorodibenzo-p-dioxins	ng/kg	10	20% (2)	1.46	2.64	0.302	<0.0487	7.21	0.0361	0.0479	0.108	0.18	0.579	5.78	6.49	<0.0487 - <0.101
Total Heptachlorodibenzo-p-dioxins	ng/kg	10	0% (0)	5.55	8.32	2.07	0.157	24.7	0.319	0.48	0.917	2.07	3.94	17.6	21.1	NA
Total Octachlorodibenzo-p-dioxins	ng/kg	10	0% (0)	21.1	28.3	9.78	1.16	87.1	1.84	2.53	5.09	8.11	21.7	58.4	72.7	NA
Total Tetrachlorodibenzofurans	ng/kg	10	0% (0)	8.86	17.7	0.846	0.127	47.2	0.13	0.133	0.173	0.405	1.91	37.9	42.6	NA
Total Pentachlorodibenzofurans	ng/kg	10	30% (3)	0.807	1.49	0.124	<0.0169	4.18	0.0104	0.0124	0.0306	0.078	0.427	3.08	3.63	<0.0169 - <0.0424
Total Hexachlorodibenzofurans	ng/kg	10	10% (1)	0.733	1.14	0.215	0.0184	3.15	0.0221	0.0258	0.0609	0.211	0.541	2.59	2.87	<0.0532
Total Heptachlorodibenzofurans	ng/kg	10	10% (1)	1.27	1.85	0.5	<0.101	5.35	0.0984	0.146	0.215	0.372	1.08	4.11	4.73	<0.101
Total Octachlorodibenzofurans	ng/kg	10	10% (1)	1.28	1.84	0.561	0.147	5.51	0.135	0.145	0.239	0.5	0.936	3.95	4.73	<0.249
Toxic Equivalency (TEQ)[9]	ng/kg	10	0% (0)	0.649	1.26	0.0962	0.0065	3.49	0.0117	0.0169	0.0403	0.047	0.192	2.59	3.04	NA
COPC Mixtures/Slag Indicators[10]																
Cu:Al	No Units	4	0% (0)	0.00726	0.00558	0.00548	0.00245	0.0133	0.00247	0.00249	0.00256	0.00665	0.0114	0.0125	0.0129	NA
Mean PEC-Q	No Units	4	0% (0)	0.19	0.122	0.157	0.0631	0.329	0.071	0.0789	0.103	0.183	0.27	0.305	0.317	NA
Mean PEC-Q_{METALS}	No Units	45	0% (0)	1.76	2.89	0.509	0.0493	11.5	0.0692	0.073	0.136	0.425	1.08	4.99	8.06	NA
Mean PEC-$Q_{METALS(1\%OC)}$	No Units	52	0% (0)	2.22	4.09	0.334	0.00577	19	0.021	0.0339	0.0782	0.168	1.9	9.09	10.6	NA
Mean PEC-$Q_{EXTMETALS}$	No Units	5	0% (0)	0.6	0.349	0.512	0.216	1.08	0.237	0.259	0.323	0.601	0.78	0.96	1.02	NA
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	No Units	5	0% (0)	0.4	0.232	0.319	0.074	0.686	0.12	0.166	0.303	0.405	0.53	0.624	0.655	NA
ΣPEC-Q_{METALS}	No Units	45	0% (0)	12.3	20.2	3.54	0.345	80.4	0.484	0.511	0.951	2.98	6.83	34.9	56.4	NA
ΣPEC-$Q_{METALS(1\%OC)}$	No Units	45	0% (0)	11.1	27.2	1.5	0.0404	133	0.2	0.233	0.484	0.988	4.62	30.2	77.8	NA
ΣPEC-$Q_{METALS(Cu,Pb,Zn)}$	No Units	50	0% (0)	14.2	21.1	2.63	0.141	78	0.175	0.19	0.432	2	31	42.6	56.8	NA
ΣPEC-$Q_{EXTMETALS}$	No Units	5	0% (0)	4.92	2.25	4.46	2.16	7.8	2.37	2.59	3.23	5.42	6.01	7.08	7.44	NA
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	No Units	5	0% (0)	3.31	1.67	2.78	0.74	5.3	1.2	1.66	3.03	3.43	4.05	4.8	5.05	NA
Zn:Cd	No Units	5	0% (0)	207	65.2	196	102	279	122	142	201	219	232	260	270	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Nutrients/Inorganics/Conventionals																
Moisture, percent	%	8	0% (0)	16.7	18.2	8.09	0.7	52	1.65	2.59	3.63	8.23	28.4	35.9	44	NA
Organic carbon, total	%	48	0% (0)	5.59	8.32	2.37	0.261	33.7	0.439	0.476	0.783	2.05	5.03	20.4	22.5	NA
Grainsize Fraction <75µm	%	44	0% (0)	29.2	29	14.6	1.5	99.6	1.75	2.4	4.4	15.1	50.4	67.2	80.5	NA
Clay, percent	%	45	0% (0)	4.88	10.8	NC	0	49.8	0	0	0.019	0.544	4.81	9.14	29.2	NA
Colloid, percent	%	44	0% (0)	2.98	7.19	NC	0	38.8	0	0	0	0.032	3.1	5.34	17.6	NA
Fines, percent (silt+clay)	%	47	0% (0)	29.2	27	15.3	1.47	82	1.79	2.41	5.15	14.8	52.2	67.7	79.8	NA
Gravel, percent	%	44	0% (0)	4.6	7.73	NC	0	30.2	0	0	0	0.05	8.65	14.9	20.5	NA
Sand - coarse, percent	%	44	0% (0)	3.29	5.61	NC	0	24.6	0	0	0.1	0.5	4.98	8.16	13.3	NA
Sand - fine, percent	%	44	0% (0)	37.6	18.7	NC	0	79.2	14.6	15.9	25	32.8	48.6	64.7	69.4	NA
Sand - medium, percent	%	44	0% (0)	25.3	24.2	NC	0	76.9	0.4	0.6	2.65	17.8	41.1	66.4	72.4	NA
Sand, percent	%	45	0% (0)	65.7	27.1	51.4	0.4	98.5	19.2	32.7	49	73.2	86.2	96.9	98.1	NA
Silt, percent	%	45	0% (0)	22	20	12.6	1.46	68.9	1.75	2.41	4.53	13.6	34.3	53.6	57.7	NA
Reach 4																
Metals																
Aluminum, total	mg/kg	122	0% (0)	10900	4900	9820	2760	24200	4340	5820	7210	10400	14000	18000	20800	NA
Antimony, total	mg/kg	122	43% (52)	2.97	2.07	2.2	0.27	<17.2	0.462	0.681	1.1	3	3.8	6.23	6.79	<5.1 - <17.2
Arsenic, total	mg/kg	125	2% (2)	6.14	4.02	4.83	0.76	20.2	1.32	1.9	3.2	5.4	8.3	12.1	13.6	<0.89 - <1.9
Barium, total	mg/kg	122	0% (0)	172	156	122	20.6	1040	36.4	43.3	66.1	113	254	368	398	NA
Beryllium, total	mg/kg	122	0% (0)	1.2	1.31	0.911	0.21	10.9	0.321	0.431	0.59	0.915	1.3	1.89	2.74	NA
Cadmium, total	mg/kg	125	7% (9)	2.38	3.2	0.841	0.052	14.2	0.0804	0.124	0.24	0.52	3.6	6.65	9.14	<0.43 - <0.58
Calcium, total	mg/kg	122	0% (0)	7460	5680	5660	879	38200	1680	2040	2870	5960	11000	14300	16700	NA
Chromium, total	mg/kg	122	0% (0)	25	13.8	21.4	4.6	87.5	8.4	9.76	14.1	22.9	33.6	41.4	50.8	NA
Cobalt, total	mg/kg	122	0% (0)	11.5	12.7	8.85	2.1	106	3.31	4.31	6.1	9.25	12	15.7	27.1	NA
Copper, total	mg/kg	125	0% (0)	40.9	42.4	25.1	3	200	6.12	8.64	11.8	20.1	67.6	109	129	NA
Iron, total	mg/kg	122	0% (0)	20200	8180	18500	4930	41300	8110	11000	14000	19400	26500	30500	35100	NA
Lead, total	mg/kg	125	0% (0)	98.8	145	33.2	2.6	841	4.52	5.76	9	20.7	151	294	356	NA
Magnesium, total	mg/kg	122	0% (0)	6490	3470	5650	1390	22400	2390	2760	3730	5790	8480	11100	12200	NA
Manganese, total	mg/kg	122	0% (0)	398	244	332	95.3	1250	118	137	214	338	525	734	818	NA
Mercury, total	mg/kg	125	20% (25)	0.373	0.558	0.101	0.005	2.4	0.00758	0.012	0.03	0.055	0.51	1.3	1.54	<0.096 - <0.13
Nickel, total	mg/kg	122	0% (0)	22.5	15.8	18.7	2.8	129	6.62	9.04	12.3	20.9	27.3	35.4	43.1	NA
Potassium, total	mg/kg	122	0% (0)	1740	851	1520	317	4060	523	719	1070	1650	2330	2850	3070	NA
Selenium, total	mg/kg	122	64% (78)	3.1	1.73	2.75	1	12.7	1.65	1.71	1.9	2.2	4.19	5.05	5.4	<3 - <10.4
Silver, total	mg/kg	122	95% (116)	0.827	0.583	0.721	<0.78	4.57	0.446	0.481	0.5	0.6	1	1.3	1.5	<0.78 - <3

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Sodium, total	mg/kg	122	0% (0)	198	119	167	42.1	558	70	74.9	112	161	268	368	450	NA
Thallium, total	mg/kg	122	94% (115)	2.03	1.26	1.81	<2.1	9.73	1.15	1.2	1.3	1.5	2.55	3.3	3.7	<2.1 - <7.4
Uranium, total	mg/kg	121	83% (100)	13.9	5.72	12.9	4.75	<59.5	8.5	8.95	10.1	11.6	17.2	23.6	26.1	<16.9 - <59.5
Vanadium, total	mg/kg	122	0% (0)	32.9	17.7	29.3	8.7	145	14.3	17.3	21.4	29.9	40.6	50.6	59.6	NA
Zinc, total	mg/kg	125	0% (0)	292	335	150	16	1710	33.3	36.9	55.2	127	439	798	976	NA
Simultaneously Extracted (SE) Metals																
Acid volatile sulfides	µmol/g	17	59% (10)	0.0588	0.142	0.0216	0.0078	0.6	0.00894	0.00945	0.01	0.0127	0.0243	0.078	0.19	<0.0184 - <0.0486
SE antimony	µmol/g	15	87% (13)	0.000904	0.000557	0.000816	0.00076	0.00279	0.000563	0.000575	0.000667	0.000698	0.000924	0.00116	0.00171	<0.001 - <0.003
SE arsenic	µmol/g	2	0% (0)	0.0414	0.0434	0.0277	0.0107	0.0721	0.0137	0.0168	0.026	0.0414	0.0567	0.0659	0.069	NA
SE cadmium	µmol/g	17	0% (0)	0.0125	0.0176	0.00461	0.000823	0.0578	0.00102	0.00107	0.0016	0.0024	0.0214	0.037	0.0429	NA
SE chromium	µmol/g	15	0% (0)	0.0359	0.024	0.0291	0.00558	0.106	0.0076	0.0128	0.026	0.0288	0.0404	0.0562	0.0748	NA
SE copper	µmol/g	17	0% (0)	0.296	0.473	0.149	0.0205	2.01	0.0343	0.0387	0.0747	0.156	0.274	0.542	0.881	NA
SE lead	µmol/g	17	0% (0)	0.386	0.675	0.105	0.0138	2.17	0.0194	0.0228	0.041	0.063	0.341	1.43	1.9	NA
SE mercury	nmol/g	15	20% (3)	0.00398	0.00332	0.00316	0.00174	0.0135	0.00164	0.00167	0.00187	0.00264	0.00469	0.00764	0.0103	<0.003
SE nickel	µmol/g	17	0% (0)	0.222	0.357	0.0993	0.00869	1.38	0.0115	0.0253	0.0647	0.0954	0.128	0.594	0.923	NA
SE zinc	µmol/g	17	0% (0)	2.43	3.64	0.771	0.139	10.3	0.16	0.179	0.245	0.431	4.07	9.12	9.56	NA
∑SEM-AVS[1]	µmol/g	17	0% (0)	3.29	4.55	1.28	0.173	13.6	0.217	0.296	0.39	0.892	4.83	11.6	12.1	NA
(∑SEM-AVS)/f_{OC}[2]	µmol/g	17	0% (0)	485	284	405	121	1020	143	198	265	364	675	867	1010	NA
Polycyclic Aromatic Hydrocarbons (PAHs)																
∑ESB-TU_{FCV}[3]	No Units	551	0% (0)	0.0179	0.0427	0.00583	0.000569	0.398	0.000764	0.00105	0.0021	0.00402	0.0179	0.033	0.0565	NA
2-Methylnaphthalene	µg/kg	122	43% (53)	3.33	7.35	1.49	0.2	<98	0.2	0.3	0.7	2	2.5	4	5.47	<4 - <98
Acenaphthene	µg/kg	122	93% (113)	16.1	62.1	3.68	0.4	472	2	2	2.5	2.5	4.5	5.5	9.35	<2.9 - <13
Acenaphthylene	µg/kg	123	100% (123)	6.34	13.6	3.55	<4	<170	2	2	2.5	2.5	4.5	5.5	23.6	<4 - <170
Anthracene	µg/kg	123	97% (119)	6.19	13.6	3.39	0.6	<170	2	2	2	2.5	4.5	5.5	19.1	<4 - <170
Benz(a)anthracene	µg/kg	123	58% (71)	4.21	8.89	1.95	0.2	<98	0.31	0.42	1	2	3	5	22.6	<4 - <98
Benzo(a)pyrene	µg/kg	122	80% (97)	4.53	8.06	2.78	0.4	<98	0.8	2	2	2.5	3.5	5.5	10.8	<4 - <98
Benzo(b)fluoranthene	µg/kg	122	80% (98)	4.66	8.04	2.89	0.2	<98	0.8	2	2	2.5	4	5.5	11.7	<4 - <98
Benzo(g,h,i)perylene	µg/kg	122	76% (93)	4.65	9.9	2.51	0.2	<140	0.505	0.9	2	2.5	3	5	5.97	<4 - <140
Benzo(k)fluoranthene	µg/kg	122	82% (100)	4.6	8.02	2.87	0.4	<98	0.7	2	2	2.5	4	5.5	9.82	<4 - <98
Carbazole	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Chrysene	µg/kg	123	42% (52)	4.28	9.5	1.88	0.2	<140	0.3	0.4	0.95	2	3	5.4	18.1	<4 - <140
Dibenz(a,h)anthracene	µg/kg	122	90% (110)	5.45	12	2.96	0.3	<170	0.805	2	2	2.5	4	5.5	6	<4 - <170

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Dibenzofuran	µg/kg	122	81% (99)	4.79	10.6	2.62	0.2	<170	0.7	0.9	2	2.5	3	5	5.97	<4 - <170
Fluoranthene	µg/kg	123	41% (51)	4.29	8.96	1.77	0.2	<98	0.21	0.4	0.95	2	2.88	5	26.7	<4 - <98
Fluorene	µg/kg	123	95% (117)	5.73	11.9	3.31	0.4	<170	2	2	2.25	2.5	4.5	5.5	14.6	<4 - <170
Indeno(1,2,3-c,d)pyrene	µg/kg	122	80% (98)	4.83	9.84	2.78	0.2	<140	0.805	1.47	2	2.5	3.5	5.45	6.95	<4 - <140
Naphthalene	µg/kg	123	2% (2)	4.76	7.64	3.04	0.4	<140	0.51	1	2	3.6	4.2	6.08	16.7	<4 - <140
Nitrobenzene	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Phenanthrene	µg/kg	123	49% (60)	4.49	9.83	2.05	0.2	<150	0.3	0.4	2	2	2.5	6	18.9	<4 - <150
Pyrene	µg/kg	123	46% (57)	13.1	52.1	2.14	0.2	355	0.4	0.42	1	2	2.88	4.9	21.7	<4 - <38
Total HMW-PAHs[4]	µg/kg	123	35% (43)	35.8	91.3	15.9	4.6	555	6.71	7.72	11.2	13.8	16.7	25.5	160	<24 - <337
Total LMW-PAHs[5]	µg/kg	123	2% (2)	46.8	117	22.8	9	755	11.8	13.6	15.6	18.8	24	33.8	191	<28 - <413
Total PAHs[6]	µg/kg	123	2% (2)	82.6	208	39.3	16.4	1280	20.7	22.2	26.3	33.4	40.8	60.9	348	<52 - <750
Polychlorinated Biphenyls (PCBs)																
Aroclor 1016	µg/kg	120	93% (112)	1.32	3.02	0.741	<0.83	25	0.425	0.43	0.459	0.55	1	1.15	4.14	<0.83 - <6.3
Aroclor 1221	µg/kg	120	100% (120)	2.74	1.35	2.52	<3.4	<25	1.7	1.75	1.84	2.16	3.48	4.31	4.6	<3.4 - <25
Aroclor 1232	µg/kg	120	100% (120)	2.74	1.35	2.52	<3.4	<25	1.7	1.75	1.84	2.16	3.48	4.31	4.6	<3.4 - <25
Aroclor 1242	µg/kg	120	100% (120)	0.682	0.34	0.628	<0.83	<6.3	0.425	0.43	0.459	0.55	0.863	1.06	1.15	<0.83 - <6.3
Aroclor 1248	µg/kg	120	100% (120)	0.682	0.34	0.628	<0.83	<6.3	0.425	0.43	0.459	0.55	0.863	1.06	1.15	<0.83 - <6.3
Aroclor 1254	µg/kg	120	100% (120)	0.682	0.34	0.628	<0.83	<6.3	0.425	0.43	0.459	0.55	0.863	1.06	1.15	<0.83 - <6.3
Aroclor 1260	µg/kg	120	93% (112)	1.13	1.94	0.732	<0.83	13.7	0.425	0.43	0.459	0.55	1	1.15	4.59	<0.83 - <6.3
Total PCBs[7]	µg/kg	120	93% (112)	9.99	6.53	8.76	8.25	<81.5	5.53	5.65	5.97	7.15	12.9	15	17.2	<11 - <81.5
Organochlorine Pesticides																
Aldrin	µg/kg	121	95% (115)	0.299	0.185	0.265	<0.33	<2.6	0.17	0.17	0.18	0.218	0.38	0.455	0.583	<0.33 - <2.6
Chlordane, total[8]	µg/kg	121	98% (118)	0.557	0.301	0.508	0.435	<5.2	0.34	0.34	0.37	0.435	0.7	0.87	0.91	<0.66 - <5.2
Chlordane, *cis* -	µg/kg	121	98% (118)	0.281	0.156	0.255	0.248	<2.6	0.17	0.17	0.185	0.218	0.36	0.435	0.455	<0.33 - <2.6
Chlordane, *trans* -	µg/kg	121	98% (118)	0.276	0.147	0.251	0.075	<2.6	0.17	0.17	0.185	0.215	0.35	0.435	0.455	<0.33 - <2.6
Dieldrin	µg/kg	121	95% (115)	0.615	0.394	0.54	<0.67	<5.1	0.345	0.345	0.37	0.44	0.8	0.95	1.23	<0.67 - <5.1
Endosulfan sulfate	µg/kg	121	100% (121)	0.551	0.274	0.507	<0.67	<5.1	0.345	0.345	0.37	0.435	0.7	0.85	0.95	<0.67 - <5.1
Endosulfan-alpha	µg/kg	121	100% (121)	0.271	0.137	0.25	<0.33	<2.6	0.17	0.17	0.18	0.215	0.34	0.425	0.455	<0.33 - <2.6
Endosulfan-beta	µg/kg	121	100% (121)	0.551	0.274	0.507	<0.67	<5.1	0.345	0.345	0.37	0.435	0.7	0.85	0.95	<0.67 - <5.1
Endrin	µg/kg	121	95% (115)	0.624	0.426	0.542	<0.67	<5.1	0.345	0.345	0.37	0.44	0.8	0.95	1.33	<0.67 - <5.1
Endrin aldehyde	µg/kg	121	98% (119)	0.55	0.274	0.507	0.513	<5.1	0.345	0.345	0.37	0.435	0.7	0.85	0.95	<0.67 - <5.1
Endrin ketone	µg/kg	121	100% (121)	0.551	0.274	0.507	<0.67	<5.1	0.345	0.345	0.37	0.435	0.7	0.85	0.95	<0.67 - <5.1

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
gamma-HCH (Lindane)	µg/kg	121	94% (114)	0.303	0.194	0.267	<0.33	<2.6	0.17	0.17	0.185	0.22	0.38	0.455	0.535	<0.33 - <2.6
Heptachlor	µg/kg	121	93% (112)	0.314	0.218	0.272	0.33	<2.6	0.17	0.17	0.185	0.22	0.39	0.455	0.672	<0.33 - <2.6
Heptachlor epoxide	µg/kg	121	100% (121)	0.271	0.137	0.25	<0.33	<2.6	0.17	0.17	0.18	0.215	0.34	0.425	0.455	<0.33 - <2.6
Hexachlorobenzene	µg/kg	121	96% (116)	3.48	14.2	0.344	0.092	<170	0.17	0.17	0.185	0.22	0.395	0.46	8.5	<0.33 - <170
Hexachlorocyclohexane-alpha	µg/kg	121	99% (120)	0.273	0.139	0.251	<0.33	<2.6	0.17	0.17	0.18	0.215	0.35	0.435	0.455	<0.33 - <2.6
Hexachlorocyclohexane-beta	µg/kg	121	100% (121)	0.271	0.137	0.25	<0.33	<2.6	0.17	0.17	0.18	0.215	0.34	0.425	0.455	<0.33 - <2.6
Hexachlorocyclohexane-delta	µg/kg	121	99% (120)	0.273	0.137	0.251	<0.33	<2.6	0.17	0.17	0.185	0.215	0.35	0.425	0.455	<0.33 - <2.6
Hexachlorocyclopentadiene	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Isophorone	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Methoxychlor	µg/kg	121	99% (120)	2.71	1.34	2.5	2.4	<25	1.7	1.7	1.8	2.15	3.4	4.3	4.55	<3.3 - <25
Nonachlor, *cis-*	µg/kg	121	100% (121)	0.271	0.137	0.25	<0.33	<2.6	0.17	0.17	0.18	0.215	0.34	0.425	0.455	<0.33 - <2.6
Nonachlor, *trans-*	µg/kg	121	98% (119)	0.282	0.158	0.255	<0.33	<2.6	0.17	0.17	0.18	0.215	0.36	0.435	0.46	<0.33 - <2.6
o,p' -DDD	µg/kg	121	100% (121)	0.551	0.274	0.507	<0.67	<5.1	0.345	0.345	0.37	0.435	0.7	0.85	0.95	<0.67 - <5.1
p,p' -DDD	µg/kg	121	98% (119)	0.551	0.25	0.51	<0.67	2.1	0.345	0.345	0.37	0.435	0.7	0.89	0.95	<0.67 - <2
Sum DDDs (*o,p'* + *p,p'*)	µg/kg	121	98% (119)	1.1	0.522	1.02	1.34	4.65	0.69	0.69	0.74	0.87	1.4	1.7	1.9	<1.34 - <4
o,p' -DDE	µg/kg	121	95% (115)	0.672	1.51	0.513	0.09	17	0.345	0.345	0.365	0.44	0.7	0.85	0.95	<0.67 - <2
p,p' -DDE	µg/kg	121	82% (99)	1.13	5.69	0.541	0.072	63	0.312	0.345	0.36	0.46	0.8	0.9	0.95	<0.67 - <2
Sum DDEs (*o,p'* + *p,p'*)	µg/kg	121	82% (99)	1.8	7.19	1.08	0.412	80	0.68	0.69	0.73	0.92	1.5	1.8	1.9	<1.34 - <4
o,p' -DDT	µg/kg	121	88% (107)	1.03	5.14	0.54	0.19	57	0.345	0.345	0.365	0.46	0.8	0.9	0.95	<0.67 - <2
p,p' -DDT	µg/kg	121	66% (80)	2.62	18.2	0.653	0.1	200	0.19	0.27	0.36	0.55	0.9	2	3.2	<0.68 - <2
Sum DDTs (*o,p'* + *p,p'*)	µg/kg	121	66% (80)	3.65	23.3	1.26	0.44	257	0.57	0.69	0.73	1.1	1.7	2.8	3.79	<1.36 - <4
Total DDTs	µg/kg	121	64% (77)	6.56	30.8	3.47	1.53	342	1.94	2.07	2.22	2.97	5.1	5.7	6.41	<4.08 - <12
Oxychlordane	µg/kg	121	100% (121)	0.271	0.137	0.25	<0.33	<2.6	0.17	0.17	0.18	0.215	0.34	0.425	0.455	<0.33 - <2.6
Toxaphene	µg/kg	121	100% (121)	27.1	13.4	25	<33	<250	17	17	18	21.5	34	42.5	45.5	<33 - <250
Semi-Volatile Compounds																
1,2,4-Trichlorobenzene	µg/kg	121	95% (115)	82	87.3	66.8	<83	760	42.5	43	45.5	55	90	115	125	<83 - <250
1,2-Dichlorobenzene	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
1,3-Dichlorobenzene	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
1,4-Dichlorobenzene	µg/kg	121	95% (115)	80	77.9	66.5	<83	685	42.5	43	45.5	55	90	115	125	<83 - <250
2,2'-oxybis(1-chloropropane)	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
2,3,4,6-Tetrachlorophenol	µg/kg	1	100% (1)	0.1	NA	0.1	<0.2	<0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	<0.2
2,3,5,6-Tetrachlorophenol	µg/kg	1	100% (1)	0.1	NA	0.1	<0.2	<0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	<0.2
2,3,6-Trichlorophenol	µg/kg	1	100% (1)	0.1	NA	0.1	<0.2	<0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	<0.2
2,4,5-Trichlorophenol	µg/kg	122	100% (122)	163	63.1	146	<0.2	<640	105	110	115	135	210	265	285	<0.2 - <640

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
2,4,6-Trichlorophenol	µg/kg	122	100% (122)	64.6	25.3	58	<0.2	<250	42.5	43	45.5	55	85	105	115	<0.2 - <250
2,4-Dichlorophenol	µg/kg	122	100% (122)	64.6	25.3	58	<0.2	<250	42.5	43	45.5	55	85	105	115	<0.2 - <250
2,4-Dimethylphenol	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
2,4-Dinitrophenol	µg/kg	121	100% (121)	164	61.5	155	<210	<640	110	110	115	135	210	265	285	<210 - <640
2,4-Dinitrotoluene	µg/kg	121	95% (115)	84.8	100	67.2	<83	810	42.5	43	45.5	55	90	115	125	<83 - <250
2,6-Dichlorophenol	µg/kg	1	100% (1)	0.1	NA	0.1	<0.2	<0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	<0.2
2,6-Dinitrotoluene	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
2-Chloronaphthalene	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
2-Chlorophenol	µg/kg	121	95% (115)	89.1	117	67.9	<83	960	42.5	43	45.5	55	90	115	125	<83 - <250
2-Fluorobiphenyl	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
2-Methylphenol	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
2-Nitroaniline	µg/kg	121	100% (121)	164	61.5	155	<210	<640	110	110	115	135	210	265	285	<210 - <640
2-Nitrophenol	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
3,3'-Dichlorobenzidine	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
3-Nitroaniline	µg/kg	121	100% (121)	164	61.5	155	<210	<640	110	110	115	135	210	265	285	<210 - <640
4-Bromophenyl phenyl ether	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
4-Chloro-3-methylphenol	µg/kg	121	95% (115)	95.1	148	68.5	<83	1190	42.5	43	45.5	55	90	115	125	<83 - <250
4-Chloroaniline	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
4-Chlorophenyl phenyl ether	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
4-Methylphenol	µg/kg	121	99% (120)	65.2	24.8	61.2	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
4-Nitroaniline	µg/kg	121	100% (121)	164	61.5	155	<210	<640	110	110	115	135	210	265	285	<210 - <640
4-Nitrophenol	µg/kg	121	95% (115)	193	153	166	<210	1220	110	110	115	135	230	285	320	<210 - <640
Acetophenone	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Atrazine	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Benzaldehyde	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Benzoic acid	µg/kg	121	100% (121)	76.9	47.5	68	<83	<600	42.5	43	46.5	55	100	115	125	<83 - <600
Benzyl alcohol	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
bis(2-chloroethoxy)methane	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
bis(2-chloroethyl)ether	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
bis(2-ethylhexyl) phthalate	µg/kg	121	94% (114)	67.9	33.7	62.2	34	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Butyl benzyl phthalate	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Caprolactam	µg/kg	121	97% (117)	65.7	25.9	61.4	43	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Diethyl phthalate	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Dimethyl phthalate	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Di-n-butyl phthalate	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Dinitro-o-cresol	µg/kg	121	100% (121)	164	61.5	155	<210	<640	110	110	115	135	210	265	285	<210 - <640
Di-N-octyl phthalate	µg/kg	121	99% (120)	66	27.7	61.5	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Hexachlorobutadiene	µg/kg	121	100% (121)	3.39	14.2	0.328	<0.33	<170	0.17	0.17	0.18	0.218	0.38	0.455	1.3	<0.33 - <170
Hexachloroethane	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
N-Nitrosodi-n-propylamine	µg/kg	121	95% (115)	82.8	90.9	66.9	<83	785	42.5	43	45.5	55	90	115	125	<83 - <250
N-Nitrosodiphenylamine	µg/kg	121	100% (121)	65.1	24.7	61.1	<83	<250	42.5	43	45.5	55	85	105	115	<83 - <250
Pentachlorophenol	µg/kg	122	95% (116)	199	209	157	<0.2	1790	105	110	115	135	229	285	319	<0.2 - <640
Phenol	µg/kg	122	95% (116)	90.6	126	67.9	<83	1010	42.5	43	45.5	55	90	115	125	<83 - <250
Dioxins/Furans																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	24	0% (0)	0.757	0.966	0.37	0.0465	3.85	0.0786	0.0829	0.113	0.369	0.803	1.96	2.51	NA
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	24	0% (0)	4.24	5.09	2.07	0.18	19.7	0.298	0.418	0.805	2.12	5.74	10.1	14.1	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	24	75% (18)	0.0746	0.053	0.0623	<0.0536	0.224	0.0354	0.0372	0.0408	0.053	0.0758	0.165	0.175	<0.0536 - <0.156
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	24	46% (11)	0.106	0.129	0.0594	0.0181	0.513	0.0183	0.0204	0.0258	0.0434	0.111	0.298	0.314	<0.0341 - <0.104
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	24	46% (11)	0.11	0.0892	0.082	<0.0481	0.354	0.0342	0.0349	0.0391	0.0743	0.146	0.239	0.258	<0.0481 - <0.163
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg	24	50% (12)	0.0783	0.0895	0.0492	0.019	0.364	0.0193	0.0211	0.0232	0.0398	0.0738	0.206	0.232	<0.0283 - <0.105
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	24	29% (7)	0.312	0.343	0.166	<0.0519	1.25	0.0335	0.035	0.0571	0.185	0.402	0.821	0.86	<0.0519 - <0.123
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	24	75% (18)	0.0602	0.037	0.0522	0.0282	<0.213	0.0287	0.0322	0.0354	0.0456	0.0775	0.105	0.107	<0.0471 - <0.213
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	24	38% (9)	0.205	0.21	0.123	<0.0503	0.779	0.0348	0.0356	0.0457	0.109	0.277	0.515	0.54	<0.0503 - <0.163
1,2,3,7,8-Pentachlorodibenzo- p-dioxin	ng/kg	24	54% (13)	0.0898	0.0875	0.0584	<0.0386	0.328	0.0207	0.0227	0.026	0.0383	0.149	0.193	0.259	<0.0386 - <0.101
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg	24	29% (7)	0.1	0.119	0.0544	<0.0204	0.465	0.0106	0.0133	0.0277	0.0441	0.132	0.267	0.286	<0.0204 - <0.0574
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	24	42% (10)	0.0931	0.107	0.0564	0.0164	0.45	0.017	0.0206	0.0231	0.0459	0.111	0.22	0.272	<0.0277 - <0.105
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	24	4% (1)	0.181	0.209	0.101	0.0275	0.819	0.0275	0.0282	0.0407	0.0889	0.203	0.471	0.494	<0.0386
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	24	67% (16)	0.0944	0.121	0.0531	<0.0352	0.503	0.0198	0.0216	0.0268	0.0326	0.113	0.246	0.277	<0.0352 - <0.103
2,3,7,8-Tetrachlorodibenzofuran	ng/kg	24	0% (0)	5.09	7.74	1.4	0.0665	28	0.0894	0.109	0.565	1.32	5.17	16.9	18.3	NA
Total Tetrachlorodibenzo-p-dioxins	ng/kg	24	33% (8)	0.343	0.45	0.151	<0.0352	2.05	0.0198	0.0216	0.0345	0.188	0.433	0.604	0.992	<0.0352 - <0.0755
Total Pentachlorodibenzo-p-dioxins	ng/kg	24	33% (8)	0.482	0.696	0.155	<0.0386	2.98	0.0207	0.0227	0.0288	0.151	0.713	1.2	1.31	<0.0386 - <0.0611
Total Hexachlorodibenzo-p-dioxins	ng/kg	24	17% (4)	2.4	3.33	0.636	<0.0501	12.4	0.0347	0.0362	0.0868	0.713	3.36	7.34	8.13	<0.0501 - <0.0763
Total Heptachlorodibenzo-p-dioxins	ng/kg	24	0% (0)	9.23	11.2	4.37	0.281	43.1	0.455	0.901	1.88	4.38	12.2	21.6	32.8	NA
Total Octachlorodibenzo-p-dioxins	ng/kg	24	0% (0)	33.8	41.1	16.9	1.74	160	3.22	3.32	7.45	16.2	45.6	77	118	NA
Total Tetrachlorodibenzofurans	ng/kg	24	0% (0)	10.7	17	2.59	0.109	63.4	0.159	0.249	0.844	2.03	10.7	36.3	39.6	NA
Total Pentachlorodibenzofurans	ng/kg	24	0% (0)	1.16	1.75	0.343	0.0275	6.99	0.0337	0.0447	0.0645	0.381	1.09	3.42	3.8	NA
Total Hexachlorodibenzofurans	ng/kg	24	4% (1)	1.19	1.78	0.388	0.0346	7.28	0.0347	0.0378	0.0977	0.479	1.55	3.05	4.38	<0.0607
Total Heptachlorodibenzofurans	ng/kg	24	4% (1)	1.86	2.67	0.671	<0.0557	10.5	0.0794	0.0962	0.214	0.767	1.91	5.1	7.01	<0.0557
Total Octachlorodibenzofurans	ng/kg	24	4% (1)	1.98	2.79	0.87	0.0973	11.1	0.107	0.172	0.316	0.933	1.72	5.19	7.67	<0.14

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Toxic Equivalency (TEQ)[9]	ng/kg	24	0% (0)	0.825	1.26	NC	0	4.71	0.00247	0.00403	0.0583	0.252	0.684	2.66	2.79	NA
COPC Mixtures/Slag Indicators[10]																
Cu:Al	No Units	15	0% (0)	0.00252	0.00255	0.00208	0.00144	0.0117	0.00152	0.00157	0.00166	0.00195	0.00204	0.00232	0.00522	NA
Mean PEC-Q	No Units	16	0% (0)	0.158	0.268	0.0871	0.0243	1.11	0.0287	0.0371	0.0511	0.0712	0.124	0.271	0.559	NA
Mean $PEC\text{-}Q_{METALS}$	No Units	125	0% (0)	0.44	0.45	0.274	0.0403	2.21	0.072	0.0839	0.129	0.224	0.616	1.1	1.25	NA
Mean $PEC\text{-}Q_{METALS(1\%OC)}$	No Units	136	0% (0)	0.222	0.31	0.119	0.00984	1.72	0.0285	0.0375	0.0534	0.0991	0.248	0.508	0.861	NA
Mean $PEC\text{-}Q_{EXTMETALS}$	No Units	18	0% (0)	0.473	0.559	0.297	0.0737	2.2	0.078	0.101	0.167	0.265	0.382	1.07	1.59	NA
Mean $PEC\text{-}Q_{EXTMETALS(1\%OC)}$	No Units	18	0% (0)	1.1	0.82	0.832	0.226	3.21	0.26	0.319	0.435	0.916	1.52	2.07	2.32	NA
$\Sigma PEC\text{-}Q_{METALS}$	No Units	125	0% (0)	3.02	2.99	1.9	0.282	13.8	0.478	0.587	0.903	1.57	4.31	7.61	8.43	NA
$\Sigma PEC\text{-}Q_{METALS(1\%OC)}$	No Units	125	0% (0)	1.5	2.2	0.792	0.0689	12	0.197	0.253	0.359	0.621	1.69	3.49	6.2	NA
$\Sigma PEC\text{-}Q_{METALS(Cu,Pb,Zn)}$	No Units	137	0% (0)	2.08	2.92	0.878	0.0854	14.5	0.18	0.194	0.283	0.545	3.21	5.49	7.39	NA
$\Sigma PEC\text{-}Q_{EXTMETALS}$	No Units	18	0% (0)	3.69	3.09	2.64	0.394	11	0.686	0.991	1.67	2.65	3.82	8.49	9.23	NA
$\Sigma PEC\text{-}Q_{EXTMETALS(1\%OC)}$	No Units	18	0% (0)	10.4	8.56	7.42	1.71	32.1	2.18	2.54	4.16	7.22	15.2	20.7	23.2	NA
Zn:Cd	No Units	18	0% (0)	238	111	215	109	482	110	123	141	218	291	387	435	NA
Nutrients/Inorganics/Conventionals																
Moisture, percent	%	11	0% (0)	32.5	17.4	25.3	1.95	56.9	9.83	17.7	21.4	31	46.2	56	56.5	NA
Organic carbon, total	%	126	1% (1)	5.98	7.2	2.39	0.0372	32.2	0.223	0.355	0.718	2.67	9.66	16.4	22.3	<0.376
Grainsize Fraction <75µm	%	121	0% (0)	52.1	35.6	34.4	2.6	99.8	3.6	5.6	16	44.8	90.2	98	99	NA
Clay, percent	%	123	0% (0)	10.1	12.3	NC	0	54	0	0.046	0.445	3	18.8	28.3	33.9	NA
Colloid, percent	%	121	0% (0)	5.75	7	NC	0	24.9	0	0	0.194	1.79	10.5	15.2	20.2	NA
Fines, percent (silt+clay)	%	125	0% (0)	47.3	30.5	32.6	2.6	97	3.65	5.82	17	44.5	77.3	83.6	85.8	NA
Gravel, percent	%	121	0% (0)	2.19	4.12	NC	0	20.2	0	0	0	0.2	2	7.3	12	NA
Sand - coarse, percent	%	121	0% (0)	2.83	4.68	NC	0	24	0	0	0	0.5	4	7.2	11.1	NA
Sand - fine, percent	%	121	0% (0)	29.9	23	16.1	0.2	91.9	0.8	1.4	8.2	29.2	46.5	61.7	67.1	NA
Sand - medium, percent	%	121	0% (0)	12.9	16.5	NC	0	68	0	0	0.2	2.4	21.9	37	45.3	NA
Sand, percent	%	123	0% (0)	45.6	33.9	23	0.2	97.4	0.9	1.68	9.4	50.6	75.8	89.9	93.1	NA
Silt, percent	%	123	0% (0)	36.5	21.4	27	2.6	80.8	3.6	5.68	14.7	38.4	53.4	65.1	67.9	NA
Reach 5																
Metals																
Aluminum, total	mg/kg	34	0% (0)	12700	7150	11000	5070	29900	5470	6160	7180	8960	19300	23200	24600	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Antimony, total	mg/kg	34	79% (27)	4.36	2.48	3.63	0.71	<18.6	0.875	1.74	2.9	3.18	6.36	7.92	8.59	<5.5 - <18.6
Arsenic, total	mg/kg	36	0% (0)	9.09	4.6	7.85	1.08	22	2.85	3.8	5.98	8.85	11	13.7	15.6	NA
Barium, total	mg/kg	34	0% (0)	158	125	115	33.6	429	37.4	45	61.3	83.8	252	334	402	NA
Beryllium, total	mg/kg	34	0% (0)	1.54	1.81	1.02	0.32	7.28	0.437	0.463	0.563	0.69	1.88	2.38	6.61	NA
Cadmium, total	mg/kg	36	19% (7)	3.45	4.29	0.807	0.044	16.2	0.058	0.066	0.155	0.325	7.29	9.35	10.2	<0.46 - <0.58
Calcium, total	mg/kg	34	0% (0)	8460	7250	6560	1590	40800	2160	2270	4860	5970	11100	15200	17300	NA
Chromium, total	mg/kg	34	0% (0)	22.6	15.8	17.9	6.2	53.1	7.85	8.54	10.1	13.6	36.6	48.2	50.2	NA
Cobalt, total	mg/kg	34	0% (0)	13.9	17.5	9	3	69.5	3.57	4.26	4.85	6.3	15	18.2	64.5	NA
Copper, total	mg/kg	36	0% (0)	33.9	28.9	22.4	7	89.7	7.3	8.15	9.88	13.2	63.6	75.5	82.1	NA
Iron, total	mg/kg	34	0% (0)	21500	9750	19600	10200	43300	12100	12500	13900	16200	30100	34800	39300	NA
Lead, total	mg/kg	36	0% (0)	92.4	126	30.4	4.4	583	5.08	5.55	6.78	14.9	163	252	273	NA
Magnesium, total	mg/kg	34	0% (0)	6930	2100	6610	3280	10900	3850	4170	5370	6730	8850	9710	10200	NA
Manganese, total	mg/kg	34	0% (0)	535	368	434	180	1530	190	215	260	339	816	958	1210	NA
Mercury, total	mg/kg	36	17% (6)	0.328	0.394	0.0843	0.004	1.06	0.00575	0.007	0.011	0.05	0.749	0.985	1	<0.096 - <0.11
Nickel, total	mg/kg	34	0% (0)	21.9	20.5	15.9	6.1	81.7	6.79	7.31	8.73	11.5	29.3	38.7	75.6	NA
Potassium, total	mg/kg	34	0% (0)	2140	1030	1920	881	4640	1020	1140	1250	1760	2900	3620	3830	NA
Selenium, total	mg/kg	34	9% (3)	4.05	2.22	3.58	1.6	10.8	1.65	1.82	2.63	3.45	4.85	7.29	8.35	<3.3 - <3.4
Silver, total	mg/kg	34	91% (31)	0.943	0.784	0.766	<0.91	4.16	0.462	0.467	0.488	0.575	1.25	1.54	2.08	<0.91 - <3.1
Sodium, total	mg/kg	34	0% (0)	173	104	146	57.2	463	63.7	74.5	83.2	137	258	299	342	NA
Thallium, total	mg/kg	34	91% (31)	2.28	1.6	1.91	<2.3	<7.8	1.15	1.15	1.21	1.4	3.15	3.86	6.12	<2.3 - <7.8
Uranium, total	mg/kg	34	88% (30)	15.5	7.9	13.7	6.3	<62	6.73	9.1	9.7	10.9	22	27.2	28.7	<18.2 - <62
Vanadium, total	mg/kg	34	0% (0)	32.2	24.8	25.1	8.4	102	10.2	12.6	14.5	20	47.2	58.8	88.1	NA
Zinc, total	mg/kg	36	0% (0)	335	364	148	26.5	1250	30.7	35.8	40.2	75	628	863	955	NA
Simultaneously Extracted (SE) Metals																
Acid volatile sulfides	µmol/g	5	40% (2)	0.633	1.38	0.043	0.019	3.1	0.00956	0.00959	0.00968	0.019	0.027	1.87	2.49	<0.0191 - <0.0194
SE antimony	µmol/g	4	75% (3)	0.000604	0.0000871	0.000599	0.000731	<0.00115	0.00054	0.000546	0.000565	0.000575	0.000614	0.000684	0.000708	<0.001
SE arsenic	µmol/g	1	0% (0)	0.0814	NA	0.0814	0.0814	0.0814	0.0814	0.0814	0.0814	0.0814	0.0814	0.0814	0.0814	NA
SE cadmium	µmol/g	5	0% (0)	0.0126	0.0253	0.00228	0.000391	0.0578	0.000448	0.000505	0.000676	0.0016	0.00249	0.0357	0.0468	NA
SE chromium	µmol/g	4	0% (0)	0.011	0.00423	0.0104	0.00769	0.0167	0.00772	0.00775	0.00784	0.00971	0.0128	0.0152	0.016	NA
SE copper	µmol/g	5	0% (0)	0.176	0.307	0.0644	0.022	0.724	0.0233	0.0245	0.0283	0.0346	0.0708	0.463	0.593	NA
SE lead	µmol/g	5	0% (0)	0.25	0.508	0.0451	0.0101	1.16	0.0117	0.0132	0.0179	0.0188	0.0473	0.714	0.936	NA
SE mercury	nmol/g	4	50% (2)	0.00164	0.000442	0.0016	0.0014	<0.00299	0.00138	0.00138	0.00139	0.00145	0.0017	0.00206	0.00218	<0.003
SE nickel	µmol/g	5	0% (0)	0.0852	0.143	0.0335	0.01	0.341	0.0105	0.011	0.0124	0.0307	0.0324	0.217	0.279	NA
SE zinc	µmol/g	5	0% (0)	2.34	4.79	0.367	0.0811	10.9	0.0841	0.0872	0.0964	0.194	0.401	6.7	8.8	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
∑SEM-AVS[1]	µmol/g	5	0% (0)	2.23	4.41	0.468	0.105	10.1	0.118	0.131	0.172	0.228	0.544	6.29	8.2	NA
(∑SEM-AVS)/f_{OC}[2]	µmol/g	5	0% (0)	313	104	299	188	457	203	217	261	286	375	424	441	NA
Polycyclic Aromatic Hydrocarbons (PAHs)																
∑ESB-TU_{FCV}[3]	No Units	154	0% (0)	0.0273	0.0518	0.00842	0.000977	0.353	0.00133	0.0014	0.0018	0.00648	0.0291	0.0531	0.122	NA
2-Methylnaphthalene	µg/kg	34	9% (3)	4.18	9.61	0.981	0.267	33.9	0.3	0.3	0.4	0.75	1.75	14.4	31.7	<4 - <5
Acenaphthene	µg/kg	34	85% (29)	46.5	126	5.48	<4	476	2	2	2	2.75	5.92	133	396	<4 - <15
Acenaphthylene	µg/kg	34	97% (33)	12.9	27.6	4.37	0.9	<200	2	2	2	2.5	5.75	36.2	93.5	<4 - <200
Anthracene	µg/kg	34	97% (33)	12.9	27.6	4.41	1.5	<200	2	2	2	2.5	5.75	36.2	93.5	<4 - <200
Benz(a)anthracene	µg/kg	34	76% (26)	8.65	19.3	3.17	0.5	<200	0.695	0.93	2	2.5	4.88	24.5	39	<4 - <200
Benzo(a)pyrene	µg/kg	34	91% (31)	13	27.6	4.49	2	<200	2	2	2	2.5	6	36.5	93.5	<4 - <200
Benzo(b)fluoranthene	µg/kg	34	94% (32)	13.3	27.6	4.47	0.3	<200	2	2	2	2.75	6	38.6	93.5	<4 - <200
Benzo(g,h,i)perylene	µg/kg	34	74% (25)	10.6	24.5	3.08	0.2	<200	0.465	0.9	2	2.5	4.88	24.7	66.5	<4 - <200
Benzo(k)fluoranthene	µg/kg	34	94% (32)	13.1	27.6	4.41	0.3	<200	2	2	2	2.75	6	37	93.5	<4 - <200
Carbazole	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Chrysene	µg/kg	34	53% (18)	6.57	12	2.35	0.2	<97	0.33	0.49	1.1	2	2.88	27.2	34.7	<4 - <97
Dibenz(a,h)anthracene	µg/kg	34	94% (32)	11.1	23.4	4.34	2.5	<200	2	2	2	2.5	5.75	27.4	63	<4 - <200
Dibenzofuran	µg/kg	34	100% (34)	12.9	27.6	4.48	<4	<200	2	2	2	2.5	5.75	36.2	93.5	<4 - <200
Fluoranthene	µg/kg	34	53% (18)	6.43	11.7	2.53	0.2	<97	0.4	0.73	2	2	2.88	25.4	34	<4 - <97
Fluorene	µg/kg	34	100% (34)	12.9	27.6	4.48	<4	<200	2	2	2	2.5	5.75	36.2	93.5	<4 - <200
Indeno(1,2,3-c,d)pyrene	µg/kg	34	79% (27)	10.9	24.4	3.57	0.3	<200	0.965	1.3	2	2.5	5	25.1	66.5	<4 - <200
Naphthalene	µg/kg	34	0% (0)	5.64	9.48	2.68	1	34.8	1	1	1	2	3.83	16.9	32.5	NA
Nitrobenzene	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Phenanthrene	µg/kg	34	41% (14)	5.77	11.8	1.77	0.2	<97	0.2	0.2	0.825	2	2.5	22.3	34.1	<4 - <97
Pyrene	µg/kg	34	47% (16)	33.8	91.7	3.28	0.4	338	0.4	0.8	2	2	3	99.4	293	<4 - <12
Total HMW-PAHs[4]	µg/kg	34	41% (14)	79.6	179	23.4	8.3	697	10.6	12	12	15.3	18.7	284	558	<24 - <72
Total LMW-PAHs[5]	µg/kg	34	0% (0)	101	238	26.3	9.5	879	11.3	11.3	11.7	17.7	27.1	306	773	NA
Total PAHs[6]	µg/kg	34	0% (0)	180	416	50.6	19.9	1540	22.1	23.3	26.2	34	44	583	1340	NA
Polychlorinated Biphenyls (PCBs)																
Aroclor 1016	µg/kg	34	88% (30)	1.93	3.63	0.898	<0.84	16.5	0.42	0.422	0.43	0.55	1.14	5.44	9.47	<0.84 - <3.9
Aroclor 1221	µg/kg	34	100% (34)	3.04	1.52	2.74	<3.4	<16	1.7	1.7	1.71	2.23	4.04	4.6	5.15	<3.4 - <16
Aroclor 1232	µg/kg	34	100% (34)	3.04	1.52	2.74	<3.4	<16	1.7	1.7	1.71	2.23	4.04	4.6	5.15	<3.4 - <16

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Aroclor 1242	µg/kg	34	100% (34)	0.757	0.373	0.682	<0.84	<3.9	0.42	0.422	0.43	0.55	1	1.15	1.27	<0.84 - <3.9
Aroclor 1248	µg/kg	34	100% (34)	0.757	0.373	0.682	<0.84	<3.9	0.42	0.422	0.43	0.55	1	1.15	1.27	<0.84 - <3.9
Aroclor 1254	µg/kg	34	100% (34)	0.757	0.373	0.682	<0.84	<3.9	0.42	0.422	0.43	0.55	1	1.15	1.27	<0.84 - <3.9
Aroclor 1260	µg/kg	34	88% (30)	1.8	3.18	0.889	<0.84	14.3	0.42	0.422	0.43	0.55	1.14	5.39	8.53	<0.84 - <3.9
Total PCBs[7]	µg/kg	34	88% (30)	12.1	9.01	9.86	<11	<51.5	5.5	5.51	5.58	7.2	14.8	25.5	28.7	<11 - <51.5
Organochlorine Pesticides																
Aldrin	µg/kg	34	88% (30)	0.419	0.468	0.304	<0.33	2.29	0.17	0.17	0.171	0.215	0.404	0.928	1.32	<0.33 - <1.2
Chlordane, total[8]	µg/kg	34	100% (34)	0.555	0.241	0.51	<0.66	<2.4	0.34	0.34	0.343	0.43	0.77	0.883	0.917	<0.66 - <2.4
Chlordane, *cis* -	µg/kg	34	100% (34)	0.278	0.121	0.255	<0.33	<1.2	0.17	0.17	0.171	0.215	0.385	0.442	0.459	<0.33 - <1.2
Chlordane, *trans* -	µg/kg	34	100% (34)	0.278	0.121	0.255	<0.33	<1.2	0.17	0.17	0.171	0.215	0.385	0.442	0.459	<0.33 - <1.2
Dieldrin	µg/kg	34	88% (30)	0.864	0.974	0.621	<0.68	4.5	0.34	0.34	0.351	0.438	0.8	1.78	3.01	<0.68 - <2.4
Endosulfan sulfate	µg/kg	34	100% (34)	0.566	0.248	0.519	<0.68	<2.4	0.34	0.34	0.351	0.433	0.8	0.92	0.95	<0.68 - <2.4
Endosulfan-alpha	µg/kg	34	100% (34)	0.278	0.121	0.255	<0.33	<1.2	0.17	0.17	0.171	0.215	0.385	0.442	0.459	<0.33 - <1.2
Endosulfan-beta	µg/kg	34	100% (34)	0.566	0.248	0.519	<0.68	<2.4	0.34	0.34	0.351	0.433	0.8	0.92	0.95	<0.68 - <2.4
Endrin	µg/kg	34	88% (30)	0.885	1.02	0.626	<0.68	4.75	0.34	0.34	0.351	0.438	0.8	1.95	3.14	<0.68 - <2.4
Endrin aldehyde	µg/kg	34	85% (29)	0.588	0.326	0.527	0.42	<2.4	0.34	0.34	0.351	0.433	0.798	0.807	1.04	<0.68 - <2.4
Endrin ketone	µg/kg	34	100% (34)	0.566	0.248	0.519	<0.68	<2.4	0.34	0.34	0.351	0.433	0.8	0.92	0.95	<0.68 - <2.4
gamma-HCH (Lindane)	µg/kg	34	88% (30)	0.411	0.452	0.302	<0.33	2.24	0.17	0.17	0.171	0.215	0.404	0.841	1.25	<0.33 - <1.2
Heptachlor	µg/kg	34	88% (30)	0.449	0.539	0.31	<0.33	2.39	0.17	0.17	0.171	0.215	0.404	1.07	1.65	<0.33 - <1.2
Heptachlor epoxide	µg/kg	34	100% (34)	0.278	0.121	0.255	<0.33	<1.2	0.17	0.17	0.171	0.215	0.385	0.442	0.459	<0.33 - <1.2
Hexachlorobenzene	µg/kg	34	100% (34)	10.2	28.6	0.488	<0.33	<200	0.17	0.17	0.171	0.215	0.404	34.1	93.5	<0.33 - <200
Hexachlorocyclohexane-alpha	µg/kg	34	97% (33)	0.279	0.12	0.257	0.23	<1.2	0.17	0.17	0.179	0.215	0.385	0.442	0.459	<0.33 - <1.2
Hexachlorocyclohexane-beta	µg/kg	34	100% (34)	0.278	0.121	0.255	<0.33	<1.2	0.17	0.17	0.171	0.215	0.385	0.442	0.459	<0.33 - <1.2
Hexachlorocyclohexane-delta	µg/kg	34	100% (34)	0.278	0.121	0.255	<0.33	<1.2	0.17	0.17	0.171	0.215	0.385	0.442	0.459	<0.33 - <1.2
Hexachlorocyclopentadiene	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Isophorone	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Methoxychlor	µg/kg	34	100% (34)	2.78	1.21	2.55	<3.3	<12	1.7	1.7	1.71	2.15	3.85	4.42	4.59	<3.3 - <12
Nonachlor, *cis*-	µg/kg	34	100% (34)	0.278	0.121	0.255	<0.33	<1.2	0.17	0.17	0.171	0.215	0.385	0.442	0.459	<0.33 - <1.2
Nonachlor, *trans*-	µg/kg	34	100% (34)	0.278	0.121	0.255	<0.33	<1.2	0.17	0.17	0.171	0.215	0.385	0.442	0.459	<0.33 - <1.2
o,p' -DDD	µg/kg	34	100% (34)	0.566	0.248	0.519	<0.68	<2.4	0.34	0.34	0.351	0.433	0.8	0.92	0.95	<0.68 - <2.4
p,p' -DDD	µg/kg	34	97% (33)	0.553	0.247	0.507	0.35	<2.4	0.34	0.34	0.35	0.43	0.8	0.92	0.95	<0.68 - <2.4
Sum DDDs (*o,p'* + *p,p'*)	µg/kg	34	97% (33)	1.12	0.489	1.03	1.15	<4.8	0.68	0.68	0.703	0.865	1.6	1.84	1.9	<1.36 - <4.8
o,p' -DDE	µg/kg	34	100% (34)	0.566	0.248	0.519	<0.68	<2.4	0.34	0.34	0.351	0.433	0.8	0.92	0.95	<0.68 - <2.4
p,p' -DDE	µg/kg	34	82% (28)	0.518	0.227	0.481	0.37	<2.4	0.34	0.34	0.351	0.43	0.644	0.8	0.95	<0.68 - <2.4

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Sum DDEs (*o,p'* + *p,p'*)	µg/kg	34	82% (28)	1.08	0.452	1.01	1.09	<4.8	0.68	0.68	0.703	0.865	1.45	1.6	1.9	<1.36 - <4.8
o,p' -DDT	µg/kg	34	100% (34)	0.566	0.248	0.519	<0.68	<2.4	0.34	0.34	0.351	0.433	0.8	0.92	0.95	<0.68 - <2.4
p,p' -DDT	µg/kg	34	71% (24)	0.799	0.952	0.52	0.094	4.46	0.14	0.169	0.341	0.433	0.8	1.78	2.74	<0.68 - <2.4
Sum DDTs (*o,p'* + *p,p'*)	µg/kg	34	71% (24)	1.36	1.09	1.1	0.434	5.21	0.509	0.595	0.693	0.875	1.6	2.6	3.38	<1.36 - <4.8
Total DDTs	µg/kg	34	56% (19)	3.57	1.82	3.19	1.79	<14.4	1.89	2.01	2.11	2.69	4.69	5.93	7.33	<4.08 - <14.4
Oxychlordane	µg/kg	34	100% (34)	0.278	0.121	0.255	<0.33	<1.2	0.17	0.17	0.171	0.215	0.385	0.442	0.459	<0.33 - <1.2
Toxaphene	µg/kg	34	100% (34)	27.8	12.1	25.5	<33	<120	17	17	17.1	21.5	38.5	44.2	45.9	<33 - <120
Semi-Volatile Compounds																
1,2,4-Trichlorobenzene	µg/kg	34	88% (30)	127	179	80.3	<84	799	42	42.5	42.6	55	111	248	581	<84 - <300
1,2-Dichlorobenzene	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
1,3-Dichlorobenzene	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
1,4-Dichlorobenzene	µg/kg	34	88% (30)	122	162	79.5	<84	724	42	42.5	42.6	55	111	236	531	<84 - <300
2,2'-oxybis(1-chloropropane)	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
2,4,5-Trichlorophenol	µg/kg	34	100% (34)	178	79.1	163	<210	<750	105	105	110	135	249	290	297	<210 - <750
2,4,6-Trichlorophenol	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
2,4-Dichlorophenol	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
2,4-Dimethylphenol	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
2,4-Dinitrophenol	µg/kg	34	100% (34)	178	79.1	163	<210	<750	105	105	110	135	249	290	297	<210 - <750
2,4-Dinitrotoluene	µg/kg	34	88% (30)	132	191	81	<84	824	42	42.5	42.6	55	111	271	631	<84 - <300
2,6-Dinitrotoluene	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
2-Chloronaphthalene	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
2-Chlorophenol	µg/kg	34	88% (30)	162	278	84.3	<84	1200	42	42.5	42.6	55	111	367	866	<84 - <300
2-Fluorobiphenyl	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
2-Methylphenol	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
2-Nitroaniline	µg/kg	34	100% (34)	178	79.1	163	<210	<750	105	105	110	135	249	290	297	<210 - <750
2-Nitrophenol	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
3,3'-Dichlorobenzidine	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
3-Nitroaniline	µg/kg	34	100% (34)	178	79.1	163	<210	<750	105	105	110	135	249	290	297	<210 - <750
4-Bromophenyl phenyl ether	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
4-Chloro-3-methylphenol	µg/kg	34	88% (30)	170	300	85.2	<84	1200	42	42.5	42.6	55	111	404	967	<84 - <300
4-Chloroaniline	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
4-Chlorophenyl phenyl ether	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
4-Methylphenol	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
4-Nitroaniline	µg/kg	34	100% (34)	178	79.1	163	<210	<750	105	105	110	135	249	290	297	<210 - <750

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
4-Nitrophenol	µg/kg	34	88% (30)	267	295	193	<210	1350	105	105	110	138	281	438	1020	<210 - <750
Acetophenone	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Atrazine	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Benzaldehyde	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Benzoic acid	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Benzyl alcohol	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
bis(2-chloroethoxy)methane	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
bis(2-chloroethyl)ether	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
bis(2-ethylhexyl) phthalate	µg/kg	34	97% (33)	69.8	31	64	71	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Butyl benzyl phthalate	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Caprolactam	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Diethyl phthalate	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Dimethyl phthalate	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Di-n-butyl phthalate	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Dinitro-o-cresol	µg/kg	34	100% (34)	178	79.1	163	<210	<750	105	105	110	135	249	290	297	<210 - <750
Di-N-octyl phthalate	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Hexachlorobutadiene	µg/kg	34	100% (34)	10.2	28.6	0.488	<0.33	<200	0.17	0.17	0.171	0.215	0.404	34.1	93.5	<0.33 - <200
Hexachloroethane	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
N-Nitrosodi-n-propylamine	µg/kg	34	88% (30)	133	192	81.1	<84	849	42	42.5	42.6	55	111	285	614	<84 - <300
N-Nitrosodiphenylamine	µg/kg	34	100% (34)	70.4	31.2	64.4	<84	<300	42	42.5	42.6	55	98.8	115	117	<84 - <300
Pentachlorophenol	µg/kg	34	88% (30)	280	335	196	<210	1430	105	105	110	138	281	457	1160	<210 - <750
Phenol	µg/kg	34	88% (30)	168	295	84.9	<84	1250	42	42.5	42.6	55	111	385	924	<84 - <300
Dioxins/Furans																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	5	0% (0)	5.61	5.65	1.81	0.161	12.2	0.166	0.172	0.188	4.92	10.6	11.6	11.9	NA
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	5	20% (1)	13.9	19	2.2	<0.102	44.5	0.093	0.135	0.261	4.35	20.2	34.8	39.6	<0.102
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	5	60% (3)	0.177	0.197	0.11	<0.079	0.506	0.0419	0.0443	0.0515	0.0725	0.215	0.39	0.448	<0.079 - <0.145
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	5	40% (2)	0.315	0.386	0.121	<0.0341	0.93	0.0183	0.0195	0.0232	0.156	0.449	0.738	0.834	<0.0341 - <0.0463
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	5	60% (3)	0.229	0.279	0.107	<0.0548	0.659	0.0304	0.0334	0.0424	0.0493	0.369	0.543	0.601	<0.0548 - <0.0985
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg	5	40% (2)	0.23	0.26	0.101	<0.0324	0.626	0.0174	0.0186	0.0223	0.133	0.353	0.517	0.571	<0.0324 - <0.0445
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	5	40% (2)	1.07	1.21	0.337	<0.0568	2.56	0.0327	0.037	0.05	0.553	2.17	2.4	2.48	<0.0568 - <0.1
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	5	80% (4)	0.0955	0.0821	0.0715	<0.0545	0.232	0.0289	0.0305	0.0353	0.088	0.095	0.177	0.205	<0.0545 - <0.19
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	5	40% (2)	0.706	0.838	0.246	<0.0561	1.86	0.0324	0.0368	0.05	0.261	1.33	1.65	1.75	<0.0561 - <0.1
1,2,3,7,8-Pentachlorodibenzo- p-dioxin	ng/kg	5	60% (3)	0.203	0.241	0.0876	<0.0519	0.52	0.0263	0.0267	0.0278	0.0338	0.408	0.475	0.498	<0.0519 - <0.0675
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg	5	60% (3)	0.251	0.325	0.0612	<0.0213	0.626	0.0109	0.0112	0.012	0.0185	0.586	0.61	0.618	<0.0213 - <0.0369

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	5	40% (2)	0.293	0.35	0.121	<0.0356	0.856	0.0192	0.0206	0.0249	0.17	0.397	0.672	0.764	<0.0356 - <0.0498
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	5	20% (1)	0.536	0.673	0.148	<0.0242	1.4	0.0171	0.0222	0.0373	0.1	1.13	1.29	1.35	<0.0242
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	5	60% (3)	0.215	0.266	0.0858	<0.0515	0.592	0.0259	0.026	0.0263	0.0287	0.403	0.516	0.554	<0.0515 - <0.0574
2,3,7,8-Tetrachlorodibenzofuran	ng/kg	5	0% (0)	14.4	22.9	0.852	0.0569	52.5	0.06	0.0631	0.0725	0.106	19.5	39.3	45.9	NA
Total Tetrachlorodibenzo-p-dioxins	ng/kg	5	40% (2)	1.56	1.83	0.373	<0.0515	4.16	0.0263	0.0269	0.0287	0.859	2.75	3.6	3.88	<0.0515 - <0.0574
Total Pentachlorodibenzo-p-dioxins	ng/kg	5	40% (2)	1.89	2.31	0.388	<0.0519	4.83	0.0263	0.0267	0.0278	0.639	3.94	4.47	4.65	<0.0519 - <0.0555
Total Hexachlorodibenzo-p-dioxins	ng/kg	5	20% (1)	9.71	12	1.22	0.0556	25.8	0.0335	0.039	0.0556	3.48	19.2	23.2	24.5	<0.0559
Total Heptachlorodibenzo-p-dioxins	ng/kg	5	0% (0)	29.5	40.3	5.72	0.326	94	0.368	0.41	0.536	8.46	44.1	74	84	NA
Total Octachlorodibenzo-p-dioxins	ng/kg	5	0% (0)	102	143	22.1	1.58	338	1.72	1.86	2.28	31.4	138	258	298	NA
Total Tetrachlorodibenzofurans	ng/kg	5	20% (1)	32.8	47.2	1.5	<0.0524	104	0.0323	0.0385	0.0569	0.825	58.9	86	95	<0.0524
Total Pentachlorodibenzofurans	ng/kg	5	20% (1)	4.19	5.71	0.539	<0.0241	13.2	0.0171	0.0222	0.0373	1.17	6.54	10.5	11.9	<0.0241
Total Hexachlorodibenzofurans	ng/kg	5	0% (0)	5.39	5.99	1.4	0.0874	14.7	0.0929	0.0984	0.115	5.83	6.23	11.3	13	NA
Total Heptachlorodibenzofurans	ng/kg	5	0% (0)	11.2	11.8	3.1	0.161	28.1	0.199	0.238	0.353	10.4	17.1	23.7	25.9	NA
Total Octachlorodibenzofurans	ng/kg	5	20% (1)	6.62	9	1.62	0.2	21.7	0.12	0.14	0.2	3.23	7.88	16.2	18.9	<0.201
Toxic Equivalency (TEQ)[9]	ng/kg	5	0% (0)	2.54	3.51	0.129	0.002	7.59	0.002	0.002	0.002	0.236	4.89	6.51	7.05	NA
COPC Mixtures/Slag Indicators[10]																
Cu:Al	No Units	4	0% (0)	0.00138	0.000186	0.00137	0.0012	0.00159	0.00121	0.00122	0.00124	0.00137	0.00151	0.00156	0.00157	NA
Mean PEC-Q	No Units	4	0% (0)	0.0451	0.0157	0.043	0.0293	0.062	0.0298	0.0308	0.0331	0.0446	0.0566	0.0598	0.0609	NA
Mean PEC-Q_{METALS}	No Units	36	0% (0)	0.489	0.485	0.279	0.0774	1.78	0.082	0.09	0.102	0.163	0.84	1.06	1.39	NA
Mean PEC-$Q_{METALS(1\%OC)}$	No Units	42	0% (0)	0.288	0.539	0.117	0.0103	2.64	0.0261	0.0411	0.0542	0.076	0.218	0.733	1.25	NA
Mean PEC-$Q_{EXTMETALS}$	No Units	6	0% (0)	0.577	0.635	0.332	0.116	1.4	0.12	0.123	0.147	0.214	1.1	1.4	1.4	NA
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	No Units	6	0% (0)	1.81	1.26	1.45	0.532	3.53	0.619	0.705	0.926	1.36	2.79	3.35	3.44	NA
ΣPEC-Q_{METALS}	No Units	36	0% (0)	3.27	3.16	1.92	0.542	12.5	0.581	0.63	0.712	1.14	5.88	7.37	7.39	NA
ΣPEC-$Q_{METALS(1\%OC)}$	No Units	36	0% (0)	2.2	3.98	0.926	0.072	18.5	0.29	0.341	0.404	0.583	2.03	4.82	10.4	NA
ΣPEC-$Q_{METALS(Cu,Pb,Zn)}$	No Units	42	0% (0)	1.47	1.84	0.623	0.141	7.71	0.168	0.175	0.203	0.289	2.8	4.14	4.68	NA
ΣPEC-$Q_{EXTMETALS}$	No Units	6	0% (0)	3.45	2.76	2.63	1.16	7	1.2	1.23	1.47	2.14	5.78	6.97	6.98	NA
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	No Units	6	0% (0)	16.9	13.8	11.5	2.66	35.3	3.09	3.53	5.97	13.6	27.9	33.5	34.4	NA
Zn:Cd	No Units	6	0% (0)	329	258	243	101	702	103	104	112	259	507	624	663	NA
Nutrients/Inorganics/Conventionals																
Moisture, percent	%	6	0% (0)	32.2	33	13	2.4	73	2.43	2.45	2.78	27	58.6	67.2	70.1	NA
Organic carbon, total	%	37	0% (0)	6.1	7.55	2.01	0.0366	34.6	0.108	0.206	0.562	1.75	11.9	14.9	15.6	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Grainsize Fraction <75µm	%	34	0% (0)	46.2	41.1	25.3	2.2	99.6	2.9	4.02	12.2	23.3	96.6	99.3	99.4	NA
Clay, percent	%	35	0% (0)	13.1	16.1	1.83	0.03	41.8	0.0383	0.0492	0.21	1.21	28.5	37.3	40.1	NA
Colloid, percent	%	34	0% (0)	10.3	13.1	NC	0	34.6	0	0.0153	0.225	0.564	26.4	29.1	30.9	NA
Fines, percent (silt+clay)	%	37	0% (0)	38.8	29.9	24.2	2.2	99	2.94	4.11	12.6	23.8	69.1	72.4	74.6	NA
Gravel, percent	%	34	0% (0)	1.15	2.96	NC	0	14.7	0	0	0	0	0.2	2.68	6.56	NA
Sand - coarse, percent	%	34	0% (0)	2.19	3.52	NC	0	13.7	0	0	0	0.1	2.58	6.19	8.61	NA
Sand - fine, percent	%	33	0% (0)	25.5	24	11.1	0.6	73.3	0.6	0.68	3.8	21.7	45.2	55.9	69.4	NA
Sand - medium, percent	%	34	0% (0)	25.7	27.7	NC	0	82.7	0	0	0.1	19.7	43.5	71.8	73.9	NA
Sand, percent	%	35	0% (0)	52.1	39.7	19.2	0.2	96.1	0.6	0.68	3.6	75.6	85.7	92	95.8	NA
Silt, percent	%	35	0% (0)	23.7	15.5	17.4	2.17	58.5	2.87	3.98	11.7	21.3	35.9	42.7	48.6	NA
Reach 6																
Metals																
Aluminum, total	mg/kg	42	0% (0)	13200	7600	11300	4100	31400	5660	6290	7070	9810	21000	22900	25100	NA
Antimony, total	mg/kg	42	86% (36)	5.08	3.65	3.8	0.58	<25.3	0.893	1.01	2.76	3.08	8.31	10.5	11.8	<4.4 - <25.3
Arsenic, total	mg/kg	44	5% (2)	7.44	3.59	6.15	<0.73	15.5	1.98	3.19	4.58	7.55	10.3	11.5	12.5	<0.73 - <0.89
Barium, total	mg/kg	42	0% (0)	137	106	101	35.5	371	38.5	42.5	49.1	75	244	279	324	NA
Beryllium, total	mg/kg	42	0% (0)	1.14	0.651	0.97	0.35	2.5	0.51	0.51	0.545	0.85	1.8	2	2.1	NA
Cadmium, total	mg/kg	44	30% (13)	2.43	3.19	0.723	0.036	11.3	0.0515	0.101	0.24	0.29	4.18	6.98	9.5	<0.45 - <1.4
Calcium, total	mg/kg	42	0% (0)	5550	3330	4600	1430	13200	1580	1820	2820	5030	6670	10600	12800	NA
Chromium, total	mg/kg	42	0% (0)	19.7	13.1	15.3	1.2	45.7	6.5	8.64	9.73	12.6	34.1	39.9	41.2	NA
Cobalt, total	mg/kg	42	0% (0)	8.67	4.89	7.38	2.7	18.5	3.71	4.1	4.5	6.15	13.2	15.1	15.9	NA
Copper, total	mg/kg	44	0% (0)	29.9	28.3	18	3.4	86.1	5.58	6.15	7.83	10.8	60.5	68.9	79.1	NA
Iron, total	mg/kg	42	0% (0)	21700	9520	19800	9830	44300	11700	12200	14200	16500	30000	34000	34800	NA
Lead, total	mg/kg	44	0% (0)	74.3	100	24.2	3.2	462	4.62	5.73	6.25	10.4	136	207	242	NA
Magnesium, total	mg/kg	42	0% (0)	6560	2040	6220	1840	10700	4010	4210	4780	6600	8080	8760	10100	NA
Manganese, total	mg/kg	42	0% (0)	622	553	435	102	2220	139	174	226	332	964	1220	1670	NA
Mercury, total	mg/kg	44	27% (12)	0.293	0.443	0.069	0.003	1.8	0.004	0.0053	0.0125	0.055	0.429	0.952	1.2	<0.098 - <0.14
Nickel, total	mg/kg	42	0% (0)	16.2	10.3	12.8	0.68	37.2	5.78	7.41	8.35	10.7	27	30.6	31.2	NA
Potassium, total	mg/kg	42	0% (0)	2190	1080	1940	747	4430	1020	1090	1260	1750	3150	3640	4080	NA
Selenium, total	mg/kg	42	14% (6)	3.63	2.02	3.14	0.76	8.6	1.7	1.75	1.9	3.05	4.58	6.5	7.8	<3.4 - <3.6
Silver, total	mg/kg	42	100% (42)	0.897	0.562	0.755	<0.73	<4.2	0.44	0.456	0.485	0.525	1.39	1.74	2	<0.73 - <4.2
Sodium, total	mg/kg	42	0% (0)	206	146	160	49.3	534	58	66.3	90.3	145	317	426	461	NA
Thallium, total	mg/kg	42	100% (42)	2.25	1.4	1.89	<1.8	<10.5	1.1	1.15	1.2	1.3	3.48	4.36	4.95	<1.8 - <10.5
Uranium, total	mg/kg	42	93% (39)	17.6	11.5	14.4	4.6	<84.3	5.49	8.22	9.45	10.5	27.7	34.9	39.5	<14.5 - <84.3

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Vanadium, total	mg/kg	42	0% (0)	27.9	14.9	24.2	8.9	59.8	13.1	13.6	14.4	20.6	43.4	47.9	49	NA
Zinc, total	mg/kg	44	0% (0)	294	325	142	27.9	1210	34.3	37.5	45.5	97.6	565	779	872	NA
Simultaneously Extracted (SE) Metals																
Acid volatile sulfides	µmol/g	6	67% (4)	0.0154	0.0122	0.0129	0.0069	0.04	0.00775	0.00859	0.0105	0.0114	0.0123	0.0263	0.0331	<0.02056 - <0.0251
SE antimony	µmol/g	5	60% (3)	0.000896	0.000686	0.00075	0.000411	0.0021	0.000435	0.00046	0.000534	0.000698	0.000739	0.00156	0.00183	<0.001
SE arsenic	µmol/g	1	0% (0)	0.02	NA	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	NA
SE cadmium	µmol/g	6	0% (0)	0.00255	0.0016	0.00221	0.000979	0.0056	0.00118	0.00138	0.00185	0.00209	0.0026	0.00418	0.00489	NA
SE chromium	µmol/g	5	0% (0)	0.00969	0.00233	0.00944	0.00615	0.0123	0.00669	0.00723	0.00885	0.0106	0.0106	0.0116	0.012	NA
SE copper	µmol/g	6	0% (0)	0.043	0.0138	0.0413	0.0268	0.0677	0.0291	0.0315	0.0366	0.0409	0.0452	0.0567	0.0622	NA
SE lead	µmol/g	6	0% (0)	0.0293	0.016	0.0255	0.00965	0.055	0.0125	0.0154	0.022	0.0246	0.0367	0.0478	0.0514	NA
SE mercury	nmol/g	5	40% (2)	0.00345	0.00324	0.00258	0.0015	0.00897	0.00136	0.00139	0.0015	0.00169	0.00379	0.0069	0.00794	<0.003
SE nickel	µmol/g	6	0% (0)	0.0358	0.0331	0.0282	0.017	0.102	0.0179	0.0187	0.0204	0.0204	0.0307	0.0681	0.0852	NA
SE zinc	µmol/g	6	0% (0)	0.484	0.398	0.359	0.136	1.11	0.14	0.143	0.193	0.336	0.719	0.974	1.04	NA
∑SEM-AVS[1]	µmol/g	6	0% (0)	0.579	0.4	0.482	0.263	1.22	0.267	0.271	0.297	0.391	0.805	1.08	1.15	NA
(∑SEM-AVS)/f_{OC}[2]	µmol/g	6	0% (0)	300	112	276	106	437	145	185	272	318	353	397	417	NA
Polycyclic Aromatic Hydrocarbons (PAHs)																
∑ESB-TU_{FCV}[3]	No Units	190	0% (0)	0.0173	0.0266	0.00725	0.00105	0.202	0.0013	0.00162	0.00188	0.0108	0.0213	0.0321	0.0858	NA
2-Methylnaphthalene	µg/kg	42	21% (9)	3.24	14.3	0.878	0.2	93.7	0.3	0.3	0.4	0.95	2	2	2.48	<4 - <5
Acenaphthene	µg/kg	42	98% (41)	28.4	159	3.74	<4	1040	2	2	2	2.5	6	8	8.48	<4 - <18
Acenaphthylene	µg/kg	42	100% (42)	7.1	21.1	3.57	<4	<280	2	2	2	2.5	6	8	8.48	<4 - <280
Anthracene	µg/kg	42	100% (42)	7.1	21.1	3.57	<4	<280	2	2	2	2.5	6	8	8.48	<4 - <280
Benz(a)anthracene	µg/kg	42	76% (32)	6.11	21.3	2.35	0.2	<280	0.6	0.91	2	2	2.88	7.95	8	<4 - <280
Benzo(a)pyrene	µg/kg	42	95% (40)	7.05	21.2	3.47	1	<280	2	2	2	2.5	6	8	8.48	<4 - <280
Benzo(b)fluoranthene	µg/kg	42	95% (40)	7.12	21.1	3.6	3	<280	2	2	2	2.5	6	8	8.48	<4 - <280
Benzo(g,h,i)perylene	µg/kg	42	83% (35)	6.2	21.3	2.5	0.5	<280	0.505	0.63	2	2	3	7.95	8.48	<4 - <280
Benzo(k)fluoranthene	µg/kg	42	93% (39)	6.99	21.2	3.27	0.2	<280	2	2	2	2.5	6	8	8.48	<4 - <280
Carbazole	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Chrysene	µg/kg	42	67% (28)	5.67	21.3	2.17	0.2	<280	1	1	2	2	2.5	5.25	7.98	<4 - <280
Dibenz(a,h)anthracene	µg/kg	42	100% (42)	7.1	21.1	3.57	<4	<280	2	2	2	2.5	6	8	8.48	<4 - <280
Dibenzofuran	µg/kg	42	93% (39)	6.75	21.2	2.97	0.3	<280	0.575	2	2	2.5	5.88	8	8.48	<4 - <280
Fluoranthene	µg/kg	42	60% (25)	5.17	21.3	1.92	0.6	<280	0.705	1	1.63	2	2.38	2.95	3	<4 - <280
Fluorene	µg/kg	42	100% (42)	7.1	21.1	3.57	<4	<280	2	2	2	2.5	6	8	8.48	<4 - <280

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Indeno(1,2,3-c,d)pyrene	µg/kg	42	79% (33)	6.23	21.2	2.63	0.5	<280	0.9	1	2	2	3	7.4	8	<4 - <280
Naphthalene	µg/kg	42	5% (2)	4.7	14.2	2.38	0.5	94	0.715	1	2	2.75	3.58	4	4	<4 - <5
Nitrobenzene	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Phenanthrene	µg/kg	42	52% (22)	4.94	21.4	1.56	0.2	<280	0.22	0.71	1	2	2	2.5	2.98	<4 - <280
Pyrene	µg/kg	42	67% (28)	18.3	103	2.3	0.7	669	1	1	2	2	2.5	5.25	7.98	<4 - <16
Total HMW-PAHs[4]	µg/kg	42	55% (23)	49.4	209	17.5	8.1	1370	11	12	12	15	20	28.5	40.5	<24 - <36
Total LMW-PAHs[5]	µg/kg	42	5% (2)	62.5	272	20.7	10.7	1780	11.3	11.3	13.8	15.6	29.5	37.7	41.8	<28 - <35
Total PAHs[6]	µg/kg	42	5% (2)	112	481	38.5	21.5	3150	22.7	23.3	25.9	28.9	52.1	70.5	77.3	<52 - <65
Polychlorinated Biphenyls (PCBs)																
Aroclor 1016	µg/kg	42	98% (41)	1.37	3.38	0.769	<0.83	22.5	0.42	0.42	0.425	0.525	1.41	1.65	2.18	<0.83 - <4.8
Aroclor 1221	µg/kg	42	100% (42)	3.48	2.27	2.89	<3.3	<19	1.7	1.7	1.7	2.1	5.38	6.5	6.98	<3.3 - <19
Aroclor 1232	µg/kg	42	100% (42)	3.48	2.27	2.89	<3.3	<19	1.7	1.7	1.7	2.1	5.38	6.5	6.98	<3.3 - <19
Aroclor 1242	µg/kg	42	100% (42)	0.87	0.573	0.72	<0.83	<4.8	0.42	0.42	0.425	0.525	1.38	1.6	1.75	<0.83 - <4.8
Aroclor 1248	µg/kg	42	100% (42)	0.87	0.573	0.72	<0.83	<4.8	0.42	0.42	0.425	0.525	1.38	1.6	1.75	<0.83 - <4.8
Aroclor 1254	µg/kg	42	100% (42)	0.87	0.573	0.72	<0.83	<4.8	0.42	0.42	0.425	0.525	1.38	1.6	1.75	<0.83 - <4.8
Aroclor 1260	µg/kg	42	98% (41)	1.32	3.03	0.767	<0.83	20.1	0.42	0.42	0.425	0.525	1.41	1.65	2.18	<0.83 - <4.8
Total PCBs[7]	µg/kg	42	98% (41)	12.3	10.3	9.66	<10.8	<62	5.5	5.5	5.53	6.83	18.6	21.3	28.7	<10.8 - <62
Organochlorine Pesticides																
Aldrin	µg/kg	42	98% (41)	0.493	1.23	0.285	<0.33	8.18	0.165	0.165	0.17	0.208	0.473	0.6	0.65	<0.33 - <1.4
Chlordane, total[8]	µg/kg	42	100% (42)	0.622	0.366	0.535	<0.66	<2.8	0.33	0.33	0.34	0.415	0.945	1.2	1.3	<0.66 - <2.8
Chlordane, *cis* -	µg/kg	42	100% (42)	0.311	0.183	0.268	<0.33	<1.4	0.165	0.165	0.17	0.208	0.473	0.6	0.648	<0.33 - <1.4
Chlordane, *trans* -	µg/kg	42	100% (42)	0.311	0.183	0.268	<0.33	<1.4	0.165	0.165	0.17	0.208	0.473	0.6	0.648	<0.33 - <1.4
Dieldrin	µg/kg	42	98% (41)	1.01	2.56	0.58	<0.67	17	0.335	0.34	0.345	0.42	0.95	1.25	1.35	<0.67 - <2.8
Endosulfan sulfate	µg/kg	42	100% (42)	0.632	0.373	0.543	<0.67	<2.8	0.335	0.34	0.345	0.42	0.95	1.25	1.3	<0.67 - <2.8
Endosulfan-alpha	µg/kg	42	100% (42)	0.311	0.183	0.268	<0.33	<1.4	0.165	0.165	0.17	0.208	0.473	0.6	0.648	<0.33 - <1.4
Endosulfan-beta	µg/kg	42	100% (42)	0.632	0.373	0.543	<0.67	<2.8	0.335	0.34	0.345	0.42	0.95	1.25	1.3	<0.67 - <2.8
Endrin	µg/kg	42	98% (41)	1.1	3.12	0.583	<0.67	20.7	0.335	0.34	0.345	0.42	0.95	1.25	1.35	<0.67 - <2.8
Endrin aldehyde	µg/kg	42	100% (42)	0.632	0.373	0.543	<0.67	<2.8	0.335	0.34	0.345	0.42	0.95	1.25	1.3	<0.67 - <2.8
Endrin ketone	µg/kg	42	100% (42)	0.632	0.373	0.543	<0.67	<2.8	0.335	0.34	0.345	0.42	0.95	1.25	1.3	<0.67 - <2.8
gamma-HCH (Lindane)	µg/kg	42	98% (41)	0.501	1.28	0.286	<0.33	8.52	0.165	0.165	0.17	0.208	0.473	0.6	0.65	<0.33 - <1.4
Heptachlor	µg/kg	42	95% (40)	0.521	1.38	0.291	<0.33	9.18	0.165	0.165	0.17	0.21	0.473	0.6	0.65	<0.33 - <1.4
Heptachlor epoxide	µg/kg	42	100% (42)	0.311	0.183	0.268	<0.33	<1.4	0.165	0.165	0.17	0.208	0.473	0.6	0.648	<0.33 - <1.4

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Hexachlorobenzene	µg/kg	42	100% (42)	3.63	21.6	0.305	<0.33	<280	0.165	0.165	0.17	0.208	0.473	0.6	0.65	<0.33 - <280
Hexachlorocyclohexane-alpha	µg/kg	42	98% (41)	0.315	0.182	0.272	<0.33	<1.4	0.165	0.165	0.17	0.21	0.473	0.6	0.648	<0.33 - <1.4
Hexachlorocyclohexane-beta	µg/kg	42	100% (42)	0.311	0.183	0.268	<0.33	<1.4	0.165	0.165	0.17	0.208	0.473	0.6	0.648	<0.33 - <1.4
Hexachlorocyclohexane-delta	µg/kg	42	100% (42)	0.311	0.183	0.268	<0.33	<1.4	0.165	0.165	0.17	0.208	0.473	0.6	0.648	<0.33 - <1.4
Hexachlorocyclopentadiene	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Isophorone	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Methoxychlor	µg/kg	42	100% (42)	3.11	1.83	2.68	<3.3	<14	1.65	1.65	1.7	2.08	4.76	6	6.48	<3.3 - <14
Nonachlor, *cis-*	µg/kg	42	100% (42)	0.311	0.183	0.268	<0.33	<1.4	0.165	0.165	0.17	0.208	0.473	0.6	0.648	<0.33 - <1.4
Nonachlor, *trans-*	µg/kg	42	100% (42)	0.311	0.183	0.268	<0.33	<1.4	0.165	0.165	0.17	0.208	0.473	0.6	0.648	<0.33 - <1.4
o,p' -DDD	µg/kg	42	100% (42)	0.632	0.373	0.543	<0.67	<2.8	0.335	0.34	0.345	0.42	0.95	1.25	1.3	<0.67 - <2.8
p,p' -DDD	µg/kg	42	98% (41)	0.661	0.435	0.554	<0.67	<2.8	0.335	0.34	0.345	0.42	0.988	1.25	1.35	<0.67 - <2.8
Sum DDDs (*o,p'* + *p,p'*)	µg/kg	42	98% (41)	1.29	0.789	1.1	<1.34	<5.6	0.67	0.68	0.69	0.84	1.98	2.5	2.7	<1.34 - <5.6
o,p' -DDE	µg/kg	42	100% (42)	0.632	0.373	0.543	<0.67	<2.8	0.335	0.34	0.345	0.42	0.95	1.25	1.3	<0.67 - <2.8
p,p' -DDE	µg/kg	42	93% (39)	0.652	0.366	0.566	0.5	<2.8	0.335	0.34	0.345	0.448	0.95	1.25	1.3	<0.67 - <2.8
Sum DDEs (*o,p'* + *p,p'*)	µg/kg	42	93% (39)	1.28	0.735	1.11	0.855	<5.6	0.67	0.68	0.69	0.868	1.9	2.5	2.6	<1.34 - <5.6
o,p' -DDT	µg/kg	42	90% (38)	0.762	0.982	0.554	0.09	6.5	0.335	0.336	0.345	0.425	0.988	1.25	1.35	<0.67 - <2.8
p,p' -DDT	µg/kg	42	76% (32)	1.55	3.98	0.651	0.08	20	0.292	0.336	0.345	0.463	1.15	1.35	1.5	<0.67 - <2.8
Sum DDTs (*o,p'* + *p,p'*)	µg/kg	42	76% (32)	2.31	4.77	1.26	0.42	26.5	0.493	0.67	0.69	0.925	1.98	2.59	2.8	<1.34 - <5.6
Total DDTs	µg/kg	42	76% (32)	4.88	5.6	3.59	1.77	31.3	1.84	2.01	2.07	2.62	5.93	7.77	8.39	<4.02 - <16.8
Oxychlordane	µg/kg	42	100% (42)	0.311	0.183	0.268	<0.33	<1.4	0.165	0.165	0.17	0.208	0.473	0.6	0.648	<0.33 - <1.4
Toxaphene	µg/kg	42	100% (42)	31.1	18.3	26.8	<33	<140	16.5	16.5	17	20.8	47.3	60	64.8	<33 - <140
Semi-Volatile Compounds																
1,2,4-Trichlorobenzene	µg/kg	42	98% (41)	103	176	70.8	<84	1180	42	42	42.5	50	120	155	165	<84 - <350
1,2-Dichlorobenzene	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
1,3-Dichlorobenzene	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
1,4-Dichlorobenzene	µg/kg	42	98% (41)	98.3	147	70.5	<84	980	42	42	42.5	50	120	155	165	<84 - <350
2,2'-oxybis(1-chloropropane)	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
2,4,5-Trichlorophenol	µg/kg	42	100% (42)	198	117	170	<210	<880	105	105	110	133	300	390	404	<210 - <880
2,4,6-Trichlorophenol	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
2,4-Dichlorophenol	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
2,4-Dimethylphenol	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
2,4-Dinitrophenol	µg/kg	42	100% (42)	198	117	170	<210	<880	105	105	110	133	300	390	404	<210 - <880
2,4-Dinitrotoluene	µg/kg	42	98% (41)	99.9	156	70.6	<84	1050	42	42	42.5	50	120	155	165	<84 - <350

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
2,6-Dinitrotoluene	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
2-Chloronaphthalene	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
2-Chlorophenol	µg/kg	42	98% (41)	117	262	71.4	<84	1750	42	42	42.5	50	120	155	165	<84 - <350
2-Fluorobiphenyl	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
2-Methylphenol	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
2-Nitroaniline	µg/kg	42	100% (42)	198	117	170	<210	<880	105	105	110	133	300	390	404	<210 - <880
2-Nitrophenol	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
3,3'-Dichlorobenzidine	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
3-Nitroaniline	µg/kg	42	100% (42)	198	117	170	<210	<880	105	105	110	133	300	390	404	<210 - <880
4-Bromophenyl phenyl ether	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
4-Chloro-3-methylphenol	µg/kg	42	98% (41)	121	287	71.6	<84	1910	42	42	42.5	50	120	155	165	<84 - <350
4-Chloroaniline	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
4-Chlorophenyl phenyl ether	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
4-Methylphenol	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
4-Nitroaniline	µg/kg	42	100% (42)	198	117	170	<210	<880	105	105	110	133	300	390	404	<210 - <880
4-Nitrophenol	µg/kg	42	98% (41)	236	294	177	<210	1950	105	105	110	133	300	390	419	<210 - <880
Acetophenone	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Atrazine	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Benzaldehyde	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Benzoic acid	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Benzyl alcohol	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
bis(2-chloroethoxy)methane	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
bis(2-chloroethyl)ether	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
bis(2-ethylhexyl) phthalate	µg/kg	42	98% (41)	78	46.5	66.8	37	<350	42	42	42.5	50	120	155	160	<84 - <350
Butyl benzyl phthalate	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Caprolactam	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Diethyl phthalate	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Dimethyl phthalate	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Di-n-butyl phthalate	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Dinitro-o-cresol	µg/kg	42	100% (42)	198	117	170	<210	<880	105	105	110	133	300	390	404	<210 - <880
Di-N-octyl phthalate	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
Hexachlorobutadiene	µg/kg	42	100% (42)	3.63	21.6	0.305	<0.33	<280	0.165	0.165	0.17	0.208	0.473	0.6	0.65	<0.33 - <280
Hexachloroethane	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350
N-Nitrosodi-n-propylamine	µg/kg	42	98% (41)	99.9	156	70.6	<84	1050	42	42	42.5	50	120	155	165	<84 - <350
N-Nitrosodiphenylamine	µg/kg	42	100% (42)	78.3	46.3	67.3	<84	<350	42	42	42.5	50	120	155	160	<84 - <350

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Pentachlorophenol	µg/kg	42	98% (41)	239	313	178	<210	2080	105	105	110	133	300	390	419	<210 - <880
Phenol	µg/kg	42	98% (41)	119	277	71.5	<84	1850	42	42	42.5	50	120	155	165	<84 - <350
Dioxins/Furans																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	7	14% (1)	1.42	3.43	0.19	<0.0545	9.19	0.042	0.0567	0.0825	0.143	0.199	3.83	6.51	<0.0545
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	7	0% (0)	5.78	13.3	1.19	0.249	35.9	0.351	0.454	0.602	0.892	1.1	15.1	25.5	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	7	86% (6)	0.117	0.193	0.0616	<0.0615	0.555	0.0334	0.0361	0.0398	0.041	0.0555	0.259	0.407	<0.0615 - <0.122
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	7	71% (5)	0.153	0.345	0.0382	0.0312	0.936	0.018	0.0189	0.0204	0.0219	0.0286	0.393	0.665	<0.0341 - <0.0519
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	7	43% (3)	0.149	0.228	0.0821	<0.063	0.662	0.0344	0.0373	0.0434	0.0651	0.1	0.332	0.497	<0.063 - <0.0914
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg	7	86% (6)	0.112	0.241	0.0339	<0.0341	0.658	0.0178	0.0185	0.0199	0.0218	0.0232	0.278	0.468	<0.0341 - <0.0488
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	7	43% (3)	0.401	0.908	0.0937	<0.0658	2.46	0.0354	0.0379	0.0425	0.0722	0.0777	1.03	1.75	<0.0658 - <0.0875
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	7	86% (6)	0.0781	0.116	0.0475	<0.0558	0.34	0.0291	0.0302	0.0325	0.0364	0.0388	0.161	0.25	<0.0558 - <0.0819
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	7	57% (4)	0.28	0.609	0.08	<0.0648	1.66	0.0351	0.0378	0.0431	0.0454	0.068	0.705	1.18	<0.0648 - <0.0907
1,2,3,7,8-Pentachlorodibenzo- p-dioxin	ng/kg	7	86% (6)	0.123	0.24	0.0496	<0.0537	0.668	0.0275	0.0282	0.0294	0.0318	0.039	0.293	0.481	<0.0537 - <0.0864
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg	7	57% (4)	0.122	0.265	0.0347	<0.0278	0.722	0.0141	0.0144	0.0161	0.0208	0.0335	0.309	0.516	<0.0278 - <0.0416
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	7	71% (5)	0.157	0.346	0.0411	<0.0346	0.94	0.0185	0.0197	0.0215	0.022	0.0377	0.408	0.674	<0.0346 - <0.0453
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	7	43% (3)	0.239	0.56	0.0447	<0.0269	1.51	0.0139	0.0144	0.0189	0.0286	0.0433	0.635	1.07	<0.0269 - <0.0455
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	7	86% (6)	0.0945	0.177	0.0413	<0.0467	0.497	0.0239	0.0244	0.0257	0.0285	0.0307	0.219	0.358	<0.0467 - <0.0658
2,3,7,8-Tetrachlorodibenzofuran	ng/kg	7	0% (0)	3.96	10.2	0.258	0.0917	27	0.0928	0.0938	0.0957	0.101	0.183	10.9	19	NA
Total Tetrachlorodibenzo-p-dioxins	ng/kg	7	86% (6)	0.344	0.836	0.0512	<0.0467	2.24	0.0239	0.0244	0.0257	0.0285	0.0307	0.916	1.58	<0.0467 - <0.0658
Total Pentachlorodibenzo-p-dioxins	ng/kg	7	57% (4)	0.584	1.37	0.0972	<0.0595	3.7	0.0304	0.031	0.0333	0.0432	0.125	1.56	2.63	<0.0595 - <0.0864
Total Hexachlorodibenzo-p-dioxins	ng/kg	7	14% (1)	3.34	8.36	0.307	<0.0825	22.3	0.0604	0.0795	0.119	0.237	0.29	9.1	15.7	<0.0825
Total Heptachlorodibenzo-p-dioxins	ng/kg	7	0% (0)	12.4	28.9	2.34	0.521	77.8	0.713	0.904	1.18	1.6	2.09	32.5	55.2	NA
Total Octachlorodibenzo-p-dioxins	ng/kg	7	0% (0)	41.1	91.4	8.73	1.88	248	2.42	2.95	3.85	5.33	12.3	111	179	NA
Total Tetrachlorodibenzofurans	ng/kg	7	0% (0)	9.9	25.8	0.357	0.0952	68.3	0.0955	0.0957	0.0986	0.138	0.294	27.5	47.9	NA
Total Pentachlorodibenzofurans	ng/kg	7	29% (2)	1.88	4.77	0.122	<0.0273	12.7	0.0161	0.0185	0.0434	0.0655	0.159	5.19	8.94	<0.0273 - <0.0434
Total Hexachlorodibenzofurans	ng/kg	7	14% (1)	1.95	4.7	0.22	<0.0457	12.6	0.0317	0.0406	0.0568	0.231	0.357	5.31	8.96	<0.0457
Total Heptachlorodibenzofurans	ng/kg	7	14% (1)	3.12	7.49	0.396	<0.0654	20.1	0.0715	0.11	0.173	0.323	0.506	8.42	14.3	<0.0654
Total Octachlorodibenzofurans	ng/kg	7	29% (2)	2.63	6.34	0.378	0.155	17	0.0949	0.105	0.137	0.252	0.417	7.1	12.1	<0.17 - <0.236
Toxic Equivalency (TEQ)[9]	ng/kg	7	0% (0)	0.855	2.22	NC	0	5.9	0.0003	0.0006	0.00135	0.025	0.028	2.38	4.14	NA
COPC Mixtures/Slag Indicators[10]																
Cu:Al	No Units	5	0% (0)	0.0841	0.186	0.0038	0.000985	0.416	0.00101	0.00103	0.0011	0.00128	0.00138	0.25	0.333	NA
Mean PEC-Q	No Units	5	0% (0)	0.0428	0.0124	0.0412	0.0256	0.0575	0.0267	0.03	0.0366	0.0433	0.0508	0.0548	0.0562	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Mean PEC-Q_{METALS}	No Units	44	0% (0)	0.381	0.384	0.224	0.029	1.48	0.0782	0.0863	0.101	0.131	0.701	0.976	1.06	NA
Mean PEC-$Q_{METALS(1\%OC)}$	No Units	46	0% (0)	0.22	0.287	0.12	0.0139	1.42	0.0221	0.0354	0.0512	0.126	0.212	0.552	0.784	NA
Mean PEC-$Q_{EXTMETALS}$	No Units	7	0% (0)	0.254	0.276	0.188	0.0957	0.873	0.105	0.115	0.13	0.153	0.198	0.474	0.674	NA
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	No Units	7	0% (0)	0.962	0.632	0.807	0.388	2.09	0.408	0.429	0.509	0.67	1.29	1.73	1.91	NA
ΣPEC-Q_{METALS}	No Units	44	0% (0)	2.62	2.64	1.54	0.203	10.3	0.472	0.604	0.7	0.886	4.48	6.69	7.41	NA
ΣPEC-$Q_{METALS(1\%OC)}$	No Units	44	0% (0)	1.53	2	0.845	0.097	9.91	0.156	0.256	0.412	0.878	1.5	3.26	5.54	NA
ΣPEC-$Q_{METALS(Cu,Pb,Zn)}$	No Units	46	0% (0)	1.38	1.63	0.63	0.112	6.65	0.165	0.181	0.207	0.35	2.65	3.57	4.28	NA
ΣPEC-$Q_{EXTMETALS}$	No Units	7	0% (0)	1.82	1.23	1.55	0.642	4.37	0.737	0.831	1.13	1.53	1.98	3	3.68	NA
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	No Units	7	0% (0)	8.87	6.98	6.62	1.94	20.9	2.36	2.79	3.96	5.61	12.9	17.3	19.1	NA
Zn:Cd	No Units	7	0% (0)	199	139	76.1	0.208	364	27.1	54.1	99.5	209	312	358	361	NA
Nutrients/Inorganics/Conventionals																
Moisture, percent	%	8	0% (0)	15.2	21.7	7.85	2.5	65.2	2.64	2.78	3.58	5.95	13.1	38.5	51.8	NA
Organic carbon, total	%	44	2% (1)	6.05	7.15	1.83	0.0641	17.9	0.124	0.29	0.445	1.11	14.7	16.7	17.6	<0.286
Grainsize Fraction <75µm	%	42	0% (0)	44.1	40.8	22.9	2.2	99.5	3.16	4.45	6.83	24.3	96.5	99.2	99.4	NA
Clay, percent	%	43	0% (0)	12	15.7	NC	0	41.6	0.0229	0.0343	0.12	1.1	27.5	38.5	39.2	NA
Colloid, percent	%	42	0% (0)	11.5	15.3	NC	0	38.8	0	0.0113	0.0956	0.977	29	34.8	36.8	NA
Fines, percent (silt+clay)	%	44	0% (0)	33.7	27.9	20.2	2.19	95	3.14	4.5	6.8	23.7	62.8	68.8	70.2	NA
Gravel, percent	%	42	0% (0)	1.51	3.29	NC	0	19.5	0	0	0	0.2	1.7	3.58	5.23	NA
Sand - coarse, percent	%	42	0% (0)	2.2	3.34	NC	0	12.9	0	0	0	1.1	2.33	7.29	8.67	NA
Sand - fine, percent	%	42	0% (0)	28.1	23.5	11.2	0.3	70.2	0.4	0.51	3.2	27.2	44.1	62	63.7	NA
Sand - medium, percent	%	42	0% (0)	24.1	25	NC	0	84.7	0	0	0.2	25	42.5	58.5	71.8	NA
Sand, percent	%	43	0% (0)	55	39.5	20.2	0.3	96.9	0.6	0.6	3.8	74.2	88.7	94.9	95.7	NA
Silt, percent	%	43	0% (0)	20.3	14.4	14.7	2.17	62.8	3.04	4.41	6.71	21.9	30.1	38.5	42.1	NA
Reference Envelope Stations[11]																
Metals																
Aluminum, total	mg/kg	7	0% (0)	6780	2610	6300	3170	10700	3430	3690	5170	6900	8160	9580	10100	NA
Antimony, total	mg/kg	7	100% (7)	5.53	0.873	5.47	<8.2	<14	4.42	4.73	5.2	5.65	5.79	6.28	6.64	<8.2 - <14
Arsenic, total	mg/kg	10	30% (3)	2.59	2.33	1.92	1.1	8.4	0.79	0.88	0.988	1.83	3.33	4.17	6.28	<1.4 - <1.9
Barium, total	mg/kg	7	0% (0)	123	74.5	105	45.4	234	50.2	55.1	79.1	101	162	226	230	NA
Beryllium, total	mg/kg	7	0% (0)	0.609	0.371	0.478	0.075	1.3	0.179	0.282	0.465	0.555	0.7	0.94	1.12	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Cadmium, total	mg/kg	10	20% (2)	0.53	0.352	0.432	0.16	<1.4	0.174	0.187	0.254	0.45	0.67	0.895	1.1	<0.4 - <1.4
Calcium, total	mg/kg	7	0% (0)	54400	80400	20100	3450	229000	3460	3470	4390	31400	54200	129000	179000	NA
Chromium, total	mg/kg	7	0% (0)	16.9	8.59	14.6	6.9	24.9	7.05	7.2	8.15	22.2	23.9	24.3	24.6	NA
Cobalt, total	mg/kg	7	0% (0)	5.29	2.2	4.83	2.1	7.7	2.49	2.88	3.6	5.8	7.13	7.58	7.64	NA
Copper, total	mg/kg	10	0% (0)	14.9	7.78	12.9	5.5	26.2	6	6.49	7.68	15.7	20.7	25.1	25.7	NA
Iron, total	mg/kg	7	0% (0)	12000	5430	10900	5090	19500	5670	6240	7290	14400	15400	17200	18300	NA
Lead, total	mg/kg	10	0% (0)	13.6	6.1	12.1	3.8	25.5	4.88	5.96	10.7	14.6	15.8	18.8	22.1	NA
Magnesium, total	mg/kg	7	0% (0)	3950	1310	3720	2070	5150	2120	2160	3030	4530	4920	5140	5140	NA
Manganese, total	mg/kg	7	0% (0)	295	130	271	138	483	155	173	203	276	382	461	472	NA
Mercury, total	mg/kg	10	10% (1)	0.0311	0.0253	0.0241	0.008	<0.19	0.008	0.008	0.0163	0.028	0.0338	0.0491	0.072	<0.19
Nickel, total	mg/kg	7	0% (0)	12.3	7.26	10.4	4.9	24.3	5.02	5.14	5.55	14.5	15.6	19.3	21.8	NA
Potassium, total	mg/kg	7	0% (0)	996	309	960	675	1590	709	743	810	880	1110	1340	1470	NA
Selenium, total	mg/kg	7	0% (0)	4.53	2.71	4.02	2.2	10.3	2.32	2.44	3	4.1	4.55	7.06	8.68	NA
Silver, total	mg/kg	7	100% (7)	0.925	0.136	0.916	<1.4	<2.3	0.745	0.79	0.875	0.95	0.963	1.05	1.1	<1.4 - <2.3
Sodium, total	mg/kg	7	0% (0)	157	59.8	144	60.8	229	70	79.3	127	173	191	211	220	NA
Thallium, total	mg/kg	7	100% (7)	2.3	0.359	2.28	<3.4	<5.8	1.84	1.97	2.18	2.35	2.4	2.6	2.75	<3.4 - <5.8
Uranium, total	mg/kg	7	100% (7)	19.4	4.17	19.1	<27.3	<52.5	14.7	15.8	17.4	18.8	21.4	24.5	25.4	<27.3 - <52.5
Vanadium, total	mg/kg	7	0% (0)	22.7	11.3	20	8.5	36.9	9.79	11.1	12.9	25	31.5	35.1	36	NA
Zinc, total	mg/kg	10	0% (0)	67.8	34.1	60.1	26.1	120	28.4	30.6	46.8	57.6	91.3	120	120	NA
Simultaneously Extracted (SE) Metals																
Acid volatile sulfides	µmol/g	8	50% (4)	0.82	1.83	0.0739	0.012	5.3	0.0116	0.0117	0.0119	0.0181	0.498	2.14	3.72	<0.023 - <0.0393
SE antimony	µmol/g	7	86% (6)	0.000967	0.000318	0.000921	0.000526	<0.00304	0.000577	0.000629	0.000821	0.000945	0.00107	0.0013	0.00141	<0.001 - <0.003
SE arsenic	µmol/g	1	0% (0)	0.04	NA	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	NA
SE cadmium	µmol/g	8	0% (0)	0.00436	0.00408	0.00312	0.00107	0.0133	0.00108	0.00109	0.00181	0.00316	0.00482	0.0088	0.0111	NA
SE chromium	µmol/g	7	0% (0)	0.0308	0.0191	0.0254	0.0106	0.0539	0.0114	0.0122	0.0144	0.025	0.0486	0.0539	0.0539	NA
SE copper	µmol/g	8	0% (0)	0.132	0.107	0.1	0.0315	0.354	0.0381	0.0447	0.0539	0.101	0.176	0.244	0.299	NA
SE lead	µmol/g	8	0% (0)	0.0564	0.0393	0.0416	0.00917	0.107	0.0119	0.0146	0.0198	0.0545	0.0881	0.106	0.107	NA
SE mercury	nmol/g	7	14% (1)	0.00514	0.00275	0.00452	0.00229	0.00897	0.00239	0.0025	0.00306	0.00364	0.00748	0.00838	0.00867	<0.005
SE nickel	µmol/g	8	0% (0)	0.192	0.273	0.0808	0.0138	0.799	0.0167	0.0196	0.026	0.0766	0.199	0.506	0.652	NA
SE zinc	µmol/g	8	0% (0)	0.37	0.178	0.321	0.101	0.581	0.122	0.144	0.239	0.403	0.506	0.565	0.573	NA
∑SEM-AVS[1]	µmol/g	8	0% (0)	-0.0658	1.78	NC	-4.29	1.65	-2.77	-1.24	0.127	0.313	0.559	1.04	1.35	NA
(∑SEM-AVS)/f_{OC}[2]	µmol/g	8	0% (0)	-4.95	70.4	NC	-176	42.3	-114	-51	6.59	13.5	26.9	34.5	38.4	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Polycyclic Aromatic Hydrocarbons (PAHs)																
$\sum ESB\text{-}TU_{FCV}$[3]	No Units	8	0% (0)	0.00777	0.00334	0.0069	0.00189	0.0128	0.00306	0.00423	0.00679	0.00765	0.00919	0.0117	0.0122	NA
2-Methylnaphthalene	µg/kg	7	14% (1)	1.11	1.5	0.701	0.3	<9	0.3	0.3	0.45	0.7	0.7	2.22	3.36	<9
Acenaphthene	µg/kg	7	100% (7)	4.14	0.476	4.12	<7	<9	3.5	3.5	3.75	4.5	4.5	4.5	4.5	<7 - <9
Acenaphthylene	µg/kg	7	100% (7)	4.14	0.476	4.12	<7	<9	3.5	3.5	3.75	4.5	4.5	4.5	4.5	<7 - <9
Anthracene	µg/kg	7	100% (7)	4.14	0.476	4.12	<7	<9	3.5	3.5	3.75	4.5	4.5	4.5	4.5	<7 - <9
Benz(a)anthracene	µg/kg	7	57% (4)	2.57	1.84	1.76	0.3	<9	0.42	0.54	0.85	3.5	4	4.5	4.5	<7 - <9
Benzo(a)pyrene	µg/kg	7	100% (7)	4.14	0.476	4.12	<7	<9	3.5	3.5	3.75	4.5	4.5	4.5	4.5	<7 - <9
Benzo(b)fluoranthene	µg/kg	7	100% (7)	4.14	0.476	4.12	<7	<9	3.5	3.5	3.75	4.5	4.5	4.5	4.5	<7 - <9
Benzo(g,h,i)perylene	µg/kg	7	100% (7)	4.14	0.476	4.12	<7	<9	3.5	3.5	3.75	4.5	4.5	4.5	4.5	<7 - <9
Benzo(k)fluoranthene	µg/kg	7	100% (7)	4.14	0.476	4.12	<7	<9	3.5	3.5	3.75	4.5	4.5	4.5	4.5	<7 - <9
Carbazole	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Chrysene	µg/kg	7	57% (4)	2.79	1.44	2.39	1	<9	1	1	1.5	3.5	3.75	4.2	4.35	<7 - <9
Dibenz(a,h)anthracene	µg/kg	7	100% (7)	4.14	0.476	4.12	<7	<9	3.5	3.5	3.75	4.5	4.5	4.5	4.5	<7 - <9
Dibenzofuran	µg/kg	7	100% (7)	4.14	0.476	4.12	<7	<9	3.5	3.5	3.75	4.5	4.5	4.5	4.5	<7 - <9
Fluoranthene	µg/kg	8	38% (3)	4.31	5.08	2.74	0.6	16.5	0.74	0.88	1.75	3.23	3.75	8.09	12.3	<6.9 - <9
Fluorene	µg/kg	7	100% (7)	4.14	0.476	4.12	<7	<9	3.5	3.5	3.75	4.5	4.5	4.5	4.5	<7 - <9
Indeno(1,2,3-c,d)pyrene	µg/kg	7	100% (7)	4.14	0.476	4.12	<7	<9	3.5	3.5	3.75	4.5	4.5	4.5	4.5	<7 - <9
Naphthalene	µg/kg	7	0% (0)	2.66	2.33	2.08	0.9	7.7	0.93	0.96	1.5	2	2.5	4.88	6.29	NA
Nitrobenzene	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Phenanthrene	µg/kg	8	25% (2)	4.4	7.22	1.7	0.3	21.5	0.405	0.51	0.75	1	4.25	11	16.3	<7 - <13
Pyrene	µg/kg	7	43% (3)	7.36	11.8	3.79	1	34	1.3	1.6	2.5	3.5	4	16.3	25.2	<7 - <9
Total HMW-PAHs[4]	µg/kg	8	38% (3)	22.7	17.6	17.6	<6.9	62.8	6.69	9.93	16.7	18.3	22.5	37.7	50.3	<6.9 - <54
Total LMW-PAHs[5]	µg/kg	8	13% (1)	22.2	9.52	20	<13	38.7	10.2	14	18.4	21.4	24.8	33.3	36	<13
Total PAHs[6]	µg/kg	8	13% (1)	44.9	25.9	38.4	<19.9	101	18.5	27.1	35.1	40.3	48.4	65.1	83.3	<19.9
Polychlorinated Biphenyls (PCBs)																
Aroclor 1016	µg/kg	7	100% (7)	0.821	0.0951	0.817	<1.4	<1.9	0.7	0.7	0.75	0.85	0.875	0.92	0.935	<1.4 - <1.9
Aroclor 1221	µg/kg	7	100% (7)	3.29	0.379	3.27	<5.6	<7.6	2.83	2.86	2.98	3.4	3.55	3.68	3.74	<5.6 - <7.6
Aroclor 1232	µg/kg	7	100% (7)	3.29	0.379	3.27	<5.6	<7.6	2.83	2.86	2.98	3.4	3.55	3.68	3.74	<5.6 - <7.6
Aroclor 1242	µg/kg	7	100% (7)	0.821	0.0951	0.817	<1.4	<1.9	0.7	0.7	0.75	0.85	0.875	0.92	0.935	<1.4 - <1.9
Aroclor 1248	µg/kg	7	100% (7)	0.821	0.0951	0.817	<1.4	<1.9	0.7	0.7	0.75	0.85	0.875	0.92	0.935	<1.4 - <1.9
Aroclor 1254	µg/kg	7	100% (7)	0.821	0.0951	0.817	<1.4	<1.9	0.7	0.7	0.75	0.85	0.875	0.92	0.935	<1.4 - <1.9
Aroclor 1260	µg/kg	7	100% (7)	0.821	0.0951	0.817	<1.4	<1.9	0.7	0.7	0.75	0.85	0.875	0.92	0.935	<1.4 - <1.9

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Total PCBs[7]	µg/kg	7	100% (7)	10.7	1.23	10.6	<18.2	<24.7	9.16	9.22	9.7	11.1	11.5	12	12.2	<18.2 - <24.7
Organochlorine Pesticides																
Aldrin	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Chlordane, total[8]	µg/kg	7	100% (7)	0.649	0.0775	0.645	<1.09	<1.5	0.553	0.56	0.585	0.68	0.7	0.726	0.738	<1.09 - <1.5
Chlordane, *cis* -	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Chlordane, *trans* -	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Dieldrin	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
Endosulfan sulfate	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
Endosulfan-alpha	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Endosulfan-beta	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
Endrin	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
Endrin aldehyde	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
Endrin ketone	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
gamma-HCH (Lindane)	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Heptachlor	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Heptachlor epoxide	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Hexachlorobenzene	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Hexachlorocyclohexane-alpha	µg/kg	7	86% (6)	0.374	0.144	0.356	<0.545	<0.75	0.276	0.28	0.293	0.34	0.365	0.501	0.596	<0.545 - <0.75
Hexachlorocyclohexane-beta	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Hexachlorocyclohexane-delta	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Hexachlorocyclopentadiene	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Isophorone	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Methoxychlor	µg/kg	7	100% (7)	3.25	0.387	3.23	<5.45	<7.5	2.76	2.8	2.93	3.4	3.5	3.63	3.69	<5.45 - <7.5
Nonachlor, *cis*-	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Nonachlor, *trans*-	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
o,p' -DDD	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
p,p' -DDD	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
Sum DDDs (*o,p'* + *p,p'*)	µg/kg	7	100% (7)	1.33	0.17	1.32	<2.2	<3.2	1.13	1.16	1.2	1.4	1.4	1.48	1.54	<2.2 - <3.2
o,p' -DDE	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
p,p' -DDE	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
Sum DDEs (*o,p'* + *p,p'*)	µg/kg	7	100% (7)	1.33	0.17	1.32	<2.2	<3.2	1.13	1.16	1.2	1.4	1.4	1.48	1.54	<2.2 - <3.2
o,p' -DDT	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
p,p' -DDT	µg/kg	7	100% (7)	0.664	0.0852	0.66	<1.1	<1.6	0.565	0.58	0.6	0.7	0.7	0.74	0.77	<1.1 - <1.6
Sum DDTs (*o,p'* + *p,p'*)	µg/kg	7	100% (7)	1.33	0.17	1.32	<2.2	<3.2	1.13	1.16	1.2	1.4	1.4	1.48	1.54	<2.2 - <3.2

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Total DDTs	µg/kg	7	100% (7)	3.99	0.511	3.96	<6.6	<9.6	3.39	3.48	3.6	4.2	4.2	4.44	4.62	<6.6 - <9.6
Oxychlordane	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Toxaphene	µg/kg	7	100% (7)	32.5	3.87	32.3	<54.5	<75	27.6	28	29.3	34	35	36.3	36.9	<54.5 - <75
Semi-Volatile Compounds																
1,2,4-Trichlorobenzene	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
1,2-Dichlorobenzene	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
1,3-Dichlorobenzene	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
1,4-Dichlorobenzene	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
2,2'-oxybis(1-chloropropane)	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
2,4,5-Trichlorophenol	µg/kg	7	100% (7)	206	25.3	205	<345	<480	175	177	185	215	223	231	236	<345 - <480
2,4,6-Trichlorophenol	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
2,4-Dichlorophenol	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
2,4-Dimethylphenol	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
2,4-Dinitrophenol	µg/kg	7	100% (7)	206	25.3	205	<345	<480	175	177	185	215	223	231	236	<345 - <480
2,4-Dinitrotoluene	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
2,6-Dinitrotoluene	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
2-Chloronaphthalene	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
2-Chlorophenol	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
2-Fluorobiphenyl	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
2-Methylphenol	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
2-Nitroaniline	µg/kg	7	100% (7)	206	25.3	205	<345	<480	175	177	185	215	223	231	236	<345 - <480
2-Nitrophenol	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
3,3'-Dichlorobenzidine	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
3-Nitroaniline	µg/kg	7	100% (7)	206	25.3	205	<345	<480	175	177	185	215	223	231	236	<345 - <480
4-Bromophenyl phenyl ether	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
4-Chloro-3-methylphenol	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
4-Chloroaniline	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
4-Chlorophenyl phenyl ether	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
4-Methylphenol	µg/kg	7	86% (6)	97.9	46.1	91.4	<140	200	70	70	72.5	85	92.5	137	169	<140 - <190
4-Nitroaniline	µg/kg	7	100% (7)	206	25.3	205	<345	<480	175	177	185	215	223	231	236	<345 - <480
4-Nitrophenol	µg/kg	7	100% (7)	206	25.3	205	<345	<480	175	177	185	215	223	231	236	<345 - <480
Acetophenone	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Atrazine	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Benzaldehyde	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Benzoic acid	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Benzyl alcohol	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
bis(2-chloroethoxy)methane	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
bis(2-chloroethyl)ether	µg/kg	7	86% (6)	76.9	9.96	76.3	63	<180	65.1	67.2	70	75	85	87	88.5	<140 - <180
bis(2-ethylhexyl) phthalate	µg/kg	8	75% (6)	193	318	110	82	980	70	70	73.8	83.5	91.3	361	670	<140 - <190
Butyl benzyl phthalate	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Caprolactam	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Diethyl phthalate	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Dimethyl phthalate	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Di-n-butyl phthalate	µg/kg	8	88% (7)	145	180	104	<140	590	70	70	73.8	85	91.3	244	417	<140 - <190
Dinitro-o-cresol	µg/kg	7	100% (7)	206	25.3	205	<345	<480	175	177	185	215	223	231	236	<345 - <480
Di-N-octyl phthalate	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Hexachlorobutadiene	µg/kg	7	100% (7)	0.325	0.0387	0.323	<0.545	<0.75	0.276	0.28	0.293	0.34	0.35	0.363	0.369	<0.545 - <0.75
Hexachloroethane	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
N-Nitrosodi-n-propylamine	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
N-Nitrosodiphenylamine	µg/kg	7	100% (7)	81.4	9.88	80.9	<140	<190	70	70	72.5	85	87.5	92	93.5	<140 - <190
Pentachlorophenol	µg/kg	7	100% (7)	206	25.3	205	<345	<480	175	177	185	215	223	231	236	<345 - <480
Phenol	µg/kg	8	100% (8)	74.3	22.1	69.7	<49	<190	40.4	56.4	70	80	86.3	91.5	93.3	<49 - <190
COPC Mixtures/Slag Indicators[10]																
Cu:Al	No Units	7	0% (0)	0.00195	0.000527	0.00186	0.000872	0.00245	0.00116	0.00145	0.0019	0.00201	0.00225	0.00243	0.00244	NA
Mean PEC-Q	No Units	8	0% (0)	0.052	0.0197	0.048	0.0237	0.0801	0.024	0.0243	0.0426	0.0549	0.0638	0.0702	0.0752	NA
Mean PEC-Q_{METALS}	No Units	10	0% (0)	0.129	0.0498	0.118	0.0546	0.18	0.0552	0.0558	0.0866	0.147	0.167	0.177	0.179	NA
Mean PEC-$Q_{METALS(1\%OC)}$	No Units	10	0% (0)	0.0578	0.022	0.0539	0.0261	0.0932	0.0305	0.0349	0.0426	0.0566	0.0666	0.0915	0.0924	NA
Mean PEC-$Q_{EXTMETALS}$	No Units	10	0% (0)	0.156	0.0547	0.146	0.0731	0.225	0.0782	0.0833	0.109	0.169	0.194	0.217	0.221	NA
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	No Units	10	0% (0)	0.0687	0.0176	0.0666	0.0449	0.0942	0.0452	0.0455	0.0566	0.0694	0.0791	0.0933	0.0938	NA
ΣPEC-Q_{METALS}	No Units	10	0% (0)	0.808	0.34	0.733	0.365	1.26	0.373	0.38	0.459	0.888	1.07	1.19	1.22	NA
ΣPEC-$Q_{METALS(1\%OC)}$	No Units	10	0% (0)	0.347	0.0933	0.335	0.183	0.466	0.214	0.244	0.283	0.375	0.403	0.457	0.462	NA
ΣPEC-$Q_{METALS(Cu,Pb,Zn)}$	No Units	10	0% (0)	0.354	0.143	0.323	0.123	0.546	0.144	0.164	0.299	0.349	0.467	0.535	0.541	NA
ΣPEC-$Q_{EXTMETALS}$	No Units	10	0% (0)	1.36	0.667	1.19	0.366	2.25	0.561	0.756	0.854	1.24	1.94	2.17	2.21	NA
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	No Units	10	0% (0)	0.559	0.151	0.541	0.34	0.808	0.389	0.438	0.459	0.514	0.679	0.747	0.777	NA
Zn:Cd	No Units	10	0% (0)	157	70.2	139	37.7	250	59.3	80.8	111	154	221	234	242	NA

Table A2.4. Summary of the available whole sediment surficial (i.e., ≤15cm) chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Nutrients/Inorganics/Conventionals																
Moisture, percent	%	1	0% (0)	48	NA	48	48	48	48	48	48	48	48	48	48	NA
Organic carbon, total	%	10	0% (0)	2.36	0.87	2.19	0.8	3.91	1.12	1.45	1.96	2.37	2.81	3.25	3.58	NA
Clay, percent	%	8	0% (0)	8.1	14.7	3.03	0.312	44	0.539	0.766	1.94	2.61	5.52	18.2	31.1	NA
Colloid, percent	%	7	0% (0)	1.74	1.66	1.2	0.234	5.15	0.404	0.574	0.863	1.01	2.03	3.56	4.36	NA
Fines, percent (silt+clay)	%	10	0% (0)	41.2	25	34	9	85	11.9	14.7	25.9	36.2	54.2	76.9	81	NA
Gravel, percent	%	7	0% (0)	4.74	3.4	NC	0	8.4	0.12	0.24	2.4	5.2	7.4	7.8	8.1	NA
Sand - coarse, percent	%	7	0% (0)	3.2	2.12	2.17	0.3	6	0.39	0.48	1.7	3.6	4.55	5.22	5.61	NA
Sand - fine, percent	%	7	0% (0)	43.8	11.7	42.6	32.4	65.9	32.9	33.5	36.1	39.2	48.4	57.1	61.5	NA
Sand - medium, percent	%	7	0% (0)	12	9.34	8.19	1.8	26	1.92	2.04	4.9	9.2	18.7	23	24.5	NA
Sand, percent	%	8	0% (0)	54.6	17.9	51.5	24	77	27.9	31.8	46.3	56.7	68.4	71.8	74.4	NA
Silt, percent	%	8	0% (0)	31.6	10.8	29.9	15.1	52.2	17.5	19.9	28.2	32.1	34.4	40.2	46.2	NA
Grainsize Fraction <75µm	%	7	0% (0)	36.2	15.2	33.5	15.6	64.4	18.5	21.4	28.6	35.9	40.3	50.7	57.6	NA

n = number; SD = standard deviation; Geo Mean = geometric mean; Min = minimum; Max = maximum; NA = not applicable; NC = not calculated; SE = simultaneously extracted; *f* = fraction; OC = organic carbon; AVS = acid volatile sulfides; ESB-TU = equilibrium partitioning sediment benchmark toxic unit; PAHs = polycyclic aromatic hydrocarbons; HMW = high molecular weight; LMW = low molecular weight; PCBs = polychlorinated biphenyls; HCH = hexachlorocyclohexane; TEQ = toxic equivalents; PEC-Q = probable effect concentration-quotient; Cu = copper; Pb = lead; Zn = zinc.

[1] ∑SEM-AVS = the sum of simultaneously extracted metals concentrations (i.e., SE-cadmium, SE-copper, SE-lead, SE-nickel, SE-zinc, and one-half of SE-silver) minus the acid volatile sulfides concentration.

[2] (∑SEM-AVS)/f_{OC} = (∑SEM-AVS) divided by the fraction organic carbon.

[3] $\sum ESB\text{-}TU_{FCV}$ were calculated as the sum of the ESB-TUs for the following 13 PAHs: acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene.

[4] Total HMW-PAHs were calculated if the following mandatory PAHs were measured: benz(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, pyrene.

[5] Total LMW-PAHs were calculated if the following mandatory PAHs were measured: 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, phenanthrene.

[6] Total PAHs were calculated as the sum of LMW- and HMW-PAHs.

[7] Total PCBs were calculated as the sum of the reported concentrations of individual Aroclors (i.e., Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260).

[8] Total chlordane was calculated as the sum of the *cis-* and *trans-* isomers.

[9] The TEQ reported value is based on toxic equivalency values from the World Health Organization (Van den Berg et al. 1998).

[10] PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total PAHs; and, total PCBs (Ingersoll *et al.* 2001).
PEC-Q_{METALS} was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001);
PEC-$Q_{EXTMETALS}$ was calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

[11] Includes all stations selected for the reference envelopes (i.e., includes reference envelope stations on the Upper Columbia River mainstem, as well as reference envelope stations on tributaries, the Sanpoil River, and in Canada).

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit
Reach 3																
Metals																
Aluminum, total	mg/kg	7	0% (0)	16200	2230	16100	13900	19700	14100	14400	14800	15200	17600	19200	19500	NA
Antimony, total	mg/kg	7	0% (0)	20.4	12.8	17.7	11.4	39.1	11.6	11.7	12	13	27.8	38.9	39	NA
Arsenic, total	mg/kg	7	0% (0)	5.59	3.45	4.41	0.95	10.3	1.54	2.12	3.05	5.3	8.25	9.4	9.85	NA
Barium, total	mg/kg	7	0% (0)	912	342	861	599	1430	619	638	668	680	1170	1350	1390	NA
Beryllium, total	mg/kg	7	0% (0)	1.31	0.204	1.3	1.1	1.6	1.13	1.16	1.2	1.2	1.45	1.6	1.6	NA
Cadmium, total	mg/kg	7	29% (2)	1.88	1.94	0.939	0.38	4.4	0.243	0.246	0.315	0.47	3.7	4.1	4.25	<0.48 - <0.5
Calcium, total	mg/kg	7	0% (0)	42800	12400	41300	29900	58100	30900	31900	33500	35500	54600	57400	57700	NA
Chromium, total	mg/kg	7	0% (0)	60.7	25.1	56.6	37.6	99.4	39.1	40.6	42.9	43.9	79.1	92.6	96	NA
Cobalt, total	mg/kg	7	0% (0)	24.2	9.77	22.6	15.5	39.1	16	16.5	17.1	17.5	31.5	36.6	37.8	NA
Copper, total	mg/kg	7	0% (0)	1220	488	1140	789	1950	814	839	874	884	1570	1870	1910	NA
Iron, total	mg/kg	7	0% (0)	157000	43900	152000	119000	227000	121000	123000	127000	128000	187000	214000	221000	NA
Lead, total	mg/kg	7	0% (0)	505	69.7	502	431	633	433	436	455	498	533	578	606	NA
Magnesium, total	mg/kg	7	0% (0)	6370	1530	6220	4850	9230	5030	5210	5460	5520	7030	8100	8670	NA
Manganese, total	mg/kg	7	0% (0)	2860	681	2800	2180	3790	2240	2300	2380	2490	3410	3780	3780	NA
Mercury, total	mg/kg	7	0% (0)	0.018	0.00695	0.017	0.013	0.029	0.013	0.013	0.013	0.015	0.0215	0.0278	0.0284	NA
Nickel, total	mg/kg	7	0% (0)	8.7	1.92	8.53	6.6	12	6.84	7.08	7.5	7.6	9.85	10.9	11.4	NA
Potassium, total	mg/kg	7	0% (0)	3270	545	3230	2790	4060	2800	2810	2850	3060	3640	4020	4040	NA
Selenium, total	mg/kg	7	57% (4)	2.58	1.31	2.33	2.8	4.8	1.55	1.59	1.65	1.75	3.35	4.26	4.53	<3 - <3.5
Silver, total	mg/kg	7	100% (7)	0.493	0.0523	0.491	<0.87	<1.2	0.444	0.453	0.468	0.48	0.5	0.54	0.57	<0.87 - <1.2
Sodium, total	mg/kg	7	0% (0)	1270	394	1220	922	1860	928	934	971	1030	1570	1780	1820	NA
Thallium, total	mg/kg	7	100% (7)	1.24	0.151	1.24	<2.2	<3.1	1.12	1.13	1.15	1.2	1.28	1.4	1.48	<2.2 - <3.1
Uranium, total	mg/kg	7	43% (3)	35.2	31	24.8	<18.7	89.6	9.67	9.98	11.3	20.4	52.2	73	81.3	<18.7 - <24.4
Vanadium, total	mg/kg	7	0% (0)	35.5	4.62	35.3	31	42.4	31.2	31.4	32.2	33.2	38.8	41.6	42	NA
Zinc, total	mg/kg	7	0% (0)	13900	2710	13700	11100	18100	11400	11700	12300	12600	15600	17600	17900	NA
Polycyclic Aromatic Hydrocarbons (PAHs)																
$\sum$ESB-TU_{FCV}[1]	No Units	35	0% (0)	0.0116	0.00563	0.0103	0.00474	0.0226	0.00474	0.00474	0.00588	0.0114	0.0147	0.0226	0.0226	NA
2-Methylnaphthalene	µg/kg	7	0% (0)	0.343	0.14	0.32	0.2	0.6	0.2	0.2	0.25	0.3	0.4	0.48	0.54	NA
Acenaphthene	µg/kg	7	86% (6)	2.06	0.768	1.81	0.4	<5	0.88	1.36	2	2.5	2.5	2.5	2.5	<4 - <5

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Acenaphthylene	µg/kg	7	100% (7)	2.36	0.244	2.35	<4	<5	2	2	2.25	2.5	2.5	2.5	2.5	<4 - <5
Anthracene	µg/kg	7	100% (7)	2.36	0.244	2.35	<4	<5	2	2	2.25	2.5	2.5	2.5	2.5	<4 - <5
Benz(a)anthracene	µg/kg	7	71% (5)	1.84	0.973	1.46	0.3	<5	0.39	0.48	1.3	2.5	2.5	2.5	2.5	<4 - <5
Benzo(a)pyrene	µg/kg	7	100% (7)	2.36	0.244	2.35	<4	<5	2	2	2.25	2.5	2.5	2.5	2.5	<4 - <5
Benzo(b)fluoranthene	µg/kg	7	100% (7)	2.36	0.244	2.35	<4	<5	2	2	2.25	2.5	2.5	2.5	2.5	<4 - <5
Benzo(g,h,i)perylene	µg/kg	7	86% (6)	2.06	0.768	1.81	0.4	<5	0.88	1.36	2	2.5	2.5	2.5	2.5	<4 - <5
Benzo(k)fluoranthene	µg/kg	7	100% (7)	2.36	0.244	2.35	<4	<5	2	2	2.25	2.5	2.5	2.5	2.5	<4 - <5
Carbazole	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Chrysene	µg/kg	7	43% (3)	1.21	1.08	0.739	0.2	<5	0.2	0.2	0.25	0.8	2.25	2.5	2.5	<4 - <5
Dibenz(a,h)anthracene	µg/kg	7	100% (7)	2.36	0.244	2.35	<4	<5	2	2	2.25	2.5	2.5	2.5	2.5	<4 - <5
Dibenzofuran	µg/kg	7	100% (7)	2.36	0.244	2.35	<4	<5	2	2	2.25	2.5	2.5	2.5	2.5	<4 - <5
Fluoranthene	µg/kg	7	57% (4)	1.66	0.929	1.36	0.4	<5	0.49	0.58	0.85	2	2.5	2.5	2.5	<4 - <5
Fluorene	µg/kg	7	100% (7)	2.36	0.244	2.35	<4	<5	2	2	2.25	2.5	2.5	2.5	2.5	<4 - <5
Indeno(1,2,3-c,d)pyrene	µg/kg	7	86% (6)	2.1	0.858	1.69	0.2	<5	0.74	1.28	2.25	2.5	2.5	2.5	2.5	<4 - <5
Naphthalene	µg/kg	7	0% (0)	2.41	1.25	2.1	0.9	3.8	0.93	0.96	1.5	2	3.6	3.68	3.74	NA
Nitrobenzene	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Phenanthrene	µg/kg	7	43% (3)	1.24	1.04	0.842	0.2	<5	0.26	0.32	0.45	0.6	2.25	2.5	2.5	<4 - <5
Pyrene	µg/kg	7	71% (5)	1.9	0.877	1.64	0.5	<5	0.59	0.68	1.4	2.5	2.5	2.5	2.5	<4 - <5
Total HMW-PAHs[2]	µg/kg	7	43% (3)	11.3	3.42	10.8	5.8	<30	6.52	7.24	9.4	12	13.9	15	15	<24 - <30
Total LMW-PAHs[3]	µg/kg	7	0% (0)	13.1	1.08	13.1	11.3	14.4	11.6	12	12.6	13.2	13.9	14.3	14.3	NA
Total PAHs[4]	µg/kg	7	0% (0)	24.5	3.77	24.2	18.2	28.6	19.2	20.1	22.4	24.8	27.5	28.1	28.4	NA
Polychlorinated Biphenyls (PCBs)																
Aroclor 1016	µg/kg	7	100% (7)	0.457	0.0218	0.457	<0.87	<1	0.437	0.438	0.443	0.455	0.463	0.479	0.49	<0.87 - <1
Aroclor 1221	µg/kg	7	100% (7)	1.85	0.0913	1.85	<3.6	<4.1	1.8	1.8	1.8	1.8	1.85	1.93	1.99	<3.6 - <4.1
Aroclor 1232	µg/kg	7	100% (7)	1.85	0.0913	1.85	<3.6	<4.1	1.8	1.8	1.8	1.8	1.85	1.93	1.99	<3.6 - <4.1
Aroclor 1242	µg/kg	7	100% (7)	0.457	0.0218	0.457	<0.87	<1	0.437	0.438	0.443	0.455	0.463	0.479	0.49	<0.87 - <1
Aroclor 1248	µg/kg	7	100% (7)	0.457	0.0218	0.457	<0.87	<1	0.437	0.438	0.443	0.455	0.463	0.479	0.49	<0.87 - <1
Aroclor 1254	µg/kg	7	100% (7)	0.457	0.0218	0.457	<0.87	<1	0.437	0.438	0.443	0.455	0.463	0.479	0.49	<0.87 - <1
Aroclor 1260	µg/kg	7	100% (7)	0.457	0.0218	0.457	<0.87	<1	0.437	0.438	0.443	0.455	0.463	0.479	0.49	<0.87 - <1
Total PCBs[5]	µg/kg	7	100% (7)	5.99	0.286	5.98	<11.6	<13.2	5.79	5.79	5.82	5.88	6.02	6.26	6.43	<11.6 - <13.2

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Organochlorine Pesticides																
Aldrin	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Chlordane, total [6]	µg/kg	7	100% (7)	0.366	0.0215	0.365	<0.7	<0.82	0.35	0.35	0.35	0.36	0.37	0.386	0.398	<0.7 - <0.82
Chlordane, *cis-*	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Chlordane, *trans-*	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Dieldrin	µg/kg	7	100% (7)	0.369	0.0199	0.369	<0.7	<0.82	0.352	0.353	0.358	0.365	0.373	0.389	0.4	<0.7 - <0.82
Endosulfan sulfate	µg/kg	7	100% (7)	0.369	0.0199	0.369	<0.7	<0.82	0.352	0.353	0.358	0.365	0.373	0.389	0.4	<0.7 - <0.82
Endosulfan-alpha	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Endosulfan-beta	µg/kg	7	100% (7)	0.369	0.0199	0.369	<0.7	<0.82	0.352	0.353	0.358	0.365	0.373	0.389	0.4	<0.7 - <0.82
Endrin	µg/kg	7	100% (7)	0.369	0.0199	0.369	<0.7	<0.82	0.352	0.353	0.358	0.365	0.373	0.389	0.4	<0.7 - <0.82
Endrin aldehyde	µg/kg	7	100% (7)	0.369	0.0199	0.369	<0.7	<0.82	0.352	0.353	0.358	0.365	0.373	0.389	0.4	<0.7 - <0.82
Endrin ketone	µg/kg	7	100% (7)	0.369	0.0199	0.369	<0.7	<0.82	0.352	0.353	0.358	0.365	0.373	0.389	0.4	<0.7 - <0.82
gamma-HCH (Lindane)	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Heptachlor	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Heptachlor epoxide	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Hexachlorobenzene	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Hexachlorocyclohexane-alpha	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Hexachlorocyclohexane-beta	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Hexachlorocyclohexane-delta	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Hexachlorocyclopentadiene	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Isophorone	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Methoxychlor	µg/kg	7	100% (7)	1.84	0.103	1.83	<3.5	<4.1	1.75	1.75	1.78	1.8	1.85	1.93	1.99	<3.5 - <4.1
Nonachlor, *cis-*	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Nonachlor, *trans-*	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
o,p' -DDD	µg/kg	7	100% (7)	0.369	0.0199	0.369	<0.7	<0.82	0.352	0.353	0.358	0.365	0.373	0.389	0.4	<0.7 - <0.82
p,p'- DDD	µg/kg	7	100% (7)	0.369	0.0199	0.369	<0.7	<0.82	0.352	0.353	0.358	0.365	0.373	0.389	0.4	<0.7 - <0.82
Sum DDDs (*o,p'* + *p,p'*)	µg/kg	7	100% (7)	0.739	0.0398	0.738	<1.4	<1.64	0.703	0.706	0.715	0.73	0.745	0.778	0.799	<1.4 - <1.64
o,p' -DDE	µg/kg	7	86% (6)	0.364	0.0273	0.363	0.32	<0.82	0.329	0.338	0.353	0.365	0.373	0.389	0.4	<0.7 - <0.82
p,p' -DDE	µg/kg	7	57% (4)	0.539	0.212	0.505	<0.7	<0.82	0.352	0.353	0.363	0.41	0.74	0.774	0.792	<0.7 - <0.82
Sum DDEs (*o,p'* + *p,p'*)	µg/kg	7	57% (4)	0.904	0.206	0.885	1.1	<1.64	0.703	0.706	0.725	0.82	1.12	1.13	1.13	<1.4 - <1.64
o,p'- DDT	µg/kg	7	86% (6)	0.421	0.133	0.407	<0.7	<0.82	0.352	0.353	0.36	0.37	0.393	0.534	0.627	<0.7 - <0.82
p,p' -DDT	µg/kg	7	71% (5)	0.739	0.83	0.54	0.7	2.6	0.358	0.361	0.368	0.375	0.555	1.46	2.03	<0.71 - <0.82

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit
Sum DDTs (*o,p' + p,p'*)	µg/kg	7	71% (5)	1.16	0.96	0.972	1.05	3.32	0.715	0.722	0.735	0.75	0.935	1.96	2.64	<1.42 - <1.64
Total DDTs	µg/kg	7	43% (3)	2.8	1.06	2.68	2.45	5.17	2.16	2.18	2.34	2.46	2.6	3.65	4.41	<4.26 - <4.92
Oxychlordane	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Toxaphene	µg/kg	7	100% (7)	18.3	1.07	18.3	<35	<41	17.5	17.5	17.5	18	18.5	19.3	19.9	<35 - <41
Semi-Volatile Compounds																
1,2,4-Trichlorobenzene	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
1,2-Dichlorobenzene	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
1,3-Dichlorobenzene	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
1,4-Dichlorobenzene	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
2,2'-Oxybis(1-chloropropane)	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
2,4,5-Trichlorophenol	µg/kg	7	100% (7)	116	6.9	116	<220	<260	110	110	113	115	118	124	127	<220 - <260
2,4,6-Trichlorophenol	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
2,4-Dichlorophenol	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
2,4-Dimethylphenol	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
2,4-Dinitrophenol	µg/kg	7	100% (7)	116	6.9	116	<220	<260	110	110	113	115	118	124	127	<220 - <260
2,4-Dinitrotoluene	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
2,6-Dinitrotoluene	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
2-Chloronaphthalene	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
2-Chlorophenol	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
2-Fluorobiphenyl	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
2-Methylphenol	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
2-Nitroaniline	µg/kg	7	100% (7)	116	6.9	116	<220	<260	110	110	113	115	118	124	127	<220 - <260
2-Nitrophenol	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
3,3'-Dichlorobenzidine	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
3-Nitroaniline	µg/kg	7	100% (7)	116	6.9	116	<220	<260	110	110	113	115	118	124	127	<220 - <260
4-Bromophenyl phenyl ether	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
4-Chloro-3-methylphenol	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
4-Chloroaniline	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
4-Chlorophenyl phenyl ether	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
4-Methylphenol	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
4-Nitroaniline	µg/kg	7	100% (7)	116	6.9	116	<220	<260	110	110	113	115	118	124	127	<220 - <260

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
4-Nitrophenol	µg/kg	7	100% (7)	116	6.9	116	<220	<260	110	110	113	115	118	124	127	<220 - <260
Acetophenone	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Atrazine	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Benzaldehyde	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Benzoic acid	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Benzyl alcohol	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Bis(2-chloroethoxy)methane	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Bis(2-chloroethyl)ether	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Bis(2-ethylhexyl) phthalate	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Butyl benzyl phthalate	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Caprolactam	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Diethyl phthalate	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Dimethyl phthalate	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Di-n-butyl phthalate	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Dinitro-o-cresol	µg/kg	7	100% (7)	116	6.9	116	<220	<260	110	110	113	115	118	124	127	<220 - <260
Di-N-octyl phthalate	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Hexachlorobutadiene	µg/kg	7	100% (7)	0.183	0.0107	0.183	<0.35	<0.41	0.175	0.175	0.175	0.18	0.185	0.193	0.199	<0.35 - <0.41
Hexachloroethane	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
N-nitrosodi-N-propylamine	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
N-nitrosodiphenylamine	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Pentachlorophenol	µg/kg	7	100% (7)	116	6.9	116	<220	<260	110	110	113	115	118	124	127	<220 - <260
Phenol	µg/kg	7	100% (7)	45.7	2.16	45.7	<87	<100	43.7	43.8	44.5	45	46.3	47.9	49	<87 - <100
Dioxins/Furans																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	4	0% (0)	0.0555	0.00333	0.0555	0.052	0.0598	0.0523	0.0526	0.0536	0.0552	0.0571	0.0587	0.0593	NA
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	4	0% (0)	0.192	0.0399	0.189	0.164	0.251	0.165	0.166	0.17	0.177	0.199	0.23	0.241	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	4	100% (4)	0.0335	0.00855	0.0326	<0.0447	<0.0863	0.024	0.0257	0.0308	0.0342	0.0369	0.0406	0.0419	<0.0447 - <0.0863
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	4	0% (0)	0.0218	0.00174	0.0217	0.0201	0.0242	0.0203	0.0204	0.0209	0.0214	0.0222	0.0234	0.0238	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	4	100% (4)	0.035	0.00779	0.0344	<0.0553	<0.0915	0.0282	0.0288	0.0305	0.0332	0.0377	0.0425	0.0441	<0.0553 - <0.0915
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg	4	25% (1)	0.0238	0.00479	0.0235	0.0201	<0.0401	0.0201	0.0201	0.0201	0.0226	0.0263	0.0286	0.0293	<0.0401
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	4	100% (4)	0.036	0.00836	0.0353	<0.056	<0.0955	0.0288	0.0297	0.0322	0.0341	0.0379	0.0438	0.0458	<0.056 - <0.0955
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	4	25% (1)	0.0279	0.00656	0.0272	0.0186	<0.0596	0.0202	0.0218	0.0266	0.0295	0.0309	0.0327	0.0334	<0.0596

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	4	100% (4)	0.0357	0.00809	0.035	<0.056	<0.094	0.0287	0.0294	0.0315	0.0339	0.038	0.0434	0.0452	<0.056 - <0.094
1,2,3,7,8-Pentachlorodibenzo- p-dioxin	ng/kg	4	100% (4)	0.0227	0.00721	0.0219	<0.0317	<0.0644	0.0163	0.0167	0.018	0.0214	0.0262	0.0298	0.031	<0.0317 - <0.0644
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg	4	25% (1)	0.0274	0.0132	0.0242	<0.0202	0.0396	0.0122	0.0144	0.0208	0.0299	0.0364	0.0383	0.039	<0.0202
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	4	25% (1)	0.0225	0.00268	0.0224	0.0216	<0.0388	0.0197	0.0201	0.0211	0.0225	0.024	0.025	0.0254	<0.0388
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	4	0% (0)	0.0409	0.00895	0.0402	0.032	0.0516	0.0325	0.033	0.0345	0.0401	0.0465	0.0496	0.0506	NA
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	4	100% (4)	0.02	0.00873	0.0187	<0.0228	<0.0642	0.0123	0.0131	0.0158	0.0183	0.0226	0.0283	0.0302	<0.0228 - <0.0642
2,3,7,8-Tetrachlorodibenzofuran	ng/kg	4	0% (0)	0.429	0.0228	0.429	0.402	0.45	0.405	0.407	0.415	0.433	0.447	0.449	0.449	NA
Total Tetrachlorodibenzo-p-dioxins	ng/kg	4	100% (4)	0.02	0.00873	0.0187	<0.0228	<0.0642	0.0123	0.0131	0.0158	0.0183	0.0226	0.0283	0.0302	<0.0228 - <0.0642
Total Pentachlorodibenzo-p-dioxins	ng/kg	4	75% (3)	0.0804	0.117	0.0395	<0.0317	0.255	0.0163	0.0167	0.018	0.0254	0.0879	0.188	0.222	<0.0317 - <0.0644
Total Hexachlorodibenzo-p-dioxins	ng/kg	4	75% (3)	0.0364	0.00783	0.0358	0.0359	<0.0937	0.029	0.03	0.0332	0.0354	0.0386	0.0436	0.0452	<0.0558 - <0.0937
Total Heptachlorodibenzo-p-dioxins	ng/kg	4	0% (0)	0.303	0.168	0.271	0.164	0.525	0.167	0.169	0.178	0.262	0.388	0.47	0.498	NA
Total Octachlorodibenzo-p-dioxins	ng/kg	4	0% (0)	1.46	0.709	1.35	0.943	2.5	0.967	0.99	1.06	1.2	1.59	2.14	2.32	NA
Total Tetrachlorodibenzofurans	ng/kg	4	0% (0)	0.721	0.0226	0.721	0.703	0.754	0.704	0.705	0.709	0.714	0.726	0.743	0.748	NA
Total Pentachlorodibenzofurans	ng/kg	4	0% (0)	0.117	0.0417	0.111	0.0633	0.164	0.0709	0.0785	0.101	0.121	0.137	0.153	0.159	NA
Total Hexachlorodibenzofurans	ng/kg	4	0% (0)	0.118	0.0364	0.113	0.0828	0.161	0.0843	0.0858	0.0904	0.113	0.141	0.153	0.157	NA
Total Heptachlorodibenzofurans	ng/kg	4	0% (0)	0.0845	0.0264	0.0811	0.052	0.112	0.0555	0.059	0.0695	0.0869	0.102	0.108	0.11	NA
Total Octachlorodibenzofurans	ng/kg	4	50% (2)	0.116	0.0718	0.0985	<0.0944	0.204	0.0504	0.0536	0.0632	0.106	0.158	0.186	0.195	<0.0944 - <0.137
TEQ reported value[7]	ng/kg	4	0% (0)	0.0429	0.00228	0.0429	0.0402	0.045	0.0405	0.0407	0.0415	0.0433	0.0447	0.0449	0.0449	NA
COPC Mixtures[8]																
Mean PEC-Q_{METALS}	No units	7	0% (0)	6.24	1.43	6.11	4.79	8.25	4.92	5.04	5.33	5.47	7.28	8.23	8.24	NA
Mean PEC-$Q_{METALS(1\%OC)}$	No units	7	0% (0)	6.26	3.03	5.49	2.29	9.8	2.37	2.46	4.16	5.96	8.74	9.43	9.61	NA
Mean PEC-Q	No units	7	0% (0)	2.09	0.476	2.0421482	1.6	2.75	1.64	1.68	1.78	1.83	2.43	2.74	2.75	NA
ΣPEC-Q_{METALS}	No units	7	0% (0)	43.7	10	42.8	33.6	57.8	34.5	35.3	37.3	38.3	51	57.6	57.7	NA
ΣPEC-$Q_{METALS(1\%OC)}$	No units	7	0% (0)	43.8	21.2	38.4	16	68.6	16.6	17.2	29.2	41.7	61.2	66	67.3	NA
Nutrients/Inorganics/Conventionals																
Moisture, percent	%	4	0% (0)	7.03	0.922	6.98	6	7.9	6.08	6.15	6.38	7.1	7.75	7.84	7.87	NA
Organic carbon, total	%	7	0% (0)	1.29	0.82	1.11	0.568	2.77	0.648	0.727	0.838	0.918	1.56	2.38	2.58	NA
Grainsize Fraction <75µm	%	7	0% (0)	2.83	1.69	2.47	1.2	6.1	1.35	1.5	1.8	2.1	3.4	4.78	5.44	NA
Clay, percent	%	7	0% (0)	0.0193	0.0195	NC	0	0.061	0.00285	0.0057	0.0108	0.0145	0.019	0.037	0.049	NA

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit
Colloid, percent	%	7	0% (0)	0.0126	0.0091	NC	0	0.021	0	0	0.006	0.017	0.0193	0.0201	0.0206	NA
Fines, percent (silt+clay)	%	7	0% (0)	2.82	1.7	2.45	1.19	6.1	1.34	1.49	1.78	2.08	3.39	4.77	5.43	NA
Gravel, percent	%	7	0% (0)	0.0286	0.0488	NC	0	0.1	0	0	0	0	0.05	0.1	0.1	NA
Sand - coarse, percent	%	7	0% (0)	0.0571	0.0535	NC	0	0.1	0	0	0	0.1	0.1	0.1	0.1	NA
Sand - fine, percent	%	7	0% (0)	37.4	14.3	35	21.1	55.3	21.7	22.3	25.3	35	50	53.8	54.6	NA
Sand - medium, percent	%	7	0% (0)	59.7	15.8	57.8	38.5	77.6	40.2	42	46.5	62.9	72.8	76	76.8	NA
Sand, percent	%	7	0% (0)	97.1	1.73	97.1	93.8	98.8	94.5	95.1	96.6	97.9	98.2	98.5	98.7	NA
Silt, percent	%	7	0% (0)	2.8	1.68	2.44	1.18	6.04	1.32	1.47	1.77	2.06	3.38	4.74	5.39	NA
Reach 4																
Metals																
Aluminum, total	mg/kg	12	0% (0)	10700	3030	10400	6460	16400	7570	8500	8810	9660	12100	14800	15500	NA
Antimony, total	mg/kg	12	75% (9)	3.99	1.88	3.55	0.82	<10.8	2.02	3	3.11	3.63	4.85	5.35	6.86	<6 - <10.8
Arsenic, total	mg/kg	12	0% (0)	8.46	5.69	6.1	1.2	17.8	1.2	1.24	5.73	7.77	10.4	17	17.5	NA
Barium, total	mg/kg	12	0% (0)	291	199	221	69.4	600	79.3	87.7	104	275	446	535	566	NA
Beryllium, total	mg/kg	12	0% (0)	1.45	1.54	1.15	0.71	6.24	0.71	0.719	0.815	0.968	1.4	1.58	3.69	NA
Cadmium, total	mg/kg	12	8% (1)	6.45	6.5	2.09	0.058	17.9	0.0811	0.116	0.41	4.15	12.1	14	15.8	<0.52
Calcium, total	mg/kg	12	0% (0)	19700	14800	13100	2000	55700	2150	2290	12800	19000	25100	28600	40900	NA
Chromium, total	mg/kg	12	0% (0)	26.3	9.6	24.7	14.7	44.7	14.8	15	18.3	26.1	32.8	37.2	40.8	NA
Cobalt, total	mg/kg	12	0% (0)	13.8	15.1	10.7	6.2	61.1	6.2	6.24	7.05	9.48	12.4	13.1	34.7	NA
Copper, total	mg/kg	12	0% (0)	80.1	87.3	47	11.3	315	11.4	11.4	19.2	57.4	101	146	223	NA
Iron, total	mg/kg	12	0% (0)	24500	8110	23200	12500	39900	13500	14400	19000	24000	30100	31100	35100	NA
Lead, total	mg/kg	12	0% (0)	402	451	113	4.4	1230	4.9	5.31	18.3	261	637	1050	1130	NA
Magnesium, total	mg/kg	12	0% (0)	10400	6450	8460	2930	23100	3050	3160	6090	8900	15100	18300	20600	NA
Manganese, total	mg/kg	12	0% (0)	474	215	425	189	822	202	212	315	464	643	727	770	NA
Mercury, total	mg/kg	12	0% (0)	0.987	1.16	0.199	0.005	3.2	0.00555	0.0061	0.0385	0.525	1.7	2.66	2.93	NA
Nickel, total	mg/kg	12	0% (0)	24.3	15.9	21	10.2	69.8	11.1	11.9	12.6	23.2	26.8	29.3	47.7	NA
Potassium, total	mg/kg	12	0% (0)	1980	731	1870	1400	3280	1410	1410	1460	1610	2390	3210	3260	NA
Selenium, total	mg/kg	12	0% (0)	5.28	3.17	4.48	2	11.7	2.22	2.41	2.65	4.15	7.35	9.3	10.5	NA
Silver, total	mg/kg	12	92% (11)	0.878	0.816	0.728	<1	3.43	0.5	0.5	0.538	0.6	0.8	0.89	2.04	<1 - <1.8
Sodium, total	mg/kg	12	0% (0)	357	258	297	133	1050	151	166	204	251	445	577	793	NA
Thallium, total	mg/kg	12	92% (11)	2.03	1.48	1.78	<2.5	6.6	1.25	1.26	1.34	1.5	2	2.23	4.21	<2.5 - <4.5

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Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Uranium, total	mg/kg	12	100% (12)	13.3	2.95	13	<20	<36.1	10	10.1	10.6	12.1	16.2	16.7	17.4	<20 - <36.1
Vanadium, total	mg/kg	12	0% (0)	37.6	16.6	35.1	21.3	82.9	23.3	25.1	29.3	31.7	43.3	49	64.5	NA
Zinc, total	mg/kg	12	0% (0)	1170	1200	412	30.9	3800	31.9	33.1	65.4	1040	1910	2100	2870	NA
Polycyclic Aromatic Hydrocarbons (PAHs)																
$\sum$ESB-TU$_{FCV}$[1]	No Units	60	0% (0)	0.00855	0.00716	0.00585	0.00119	0.0223	0.00119	0.00152	0.00316	0.00576	0.0128	0.022	0.0223	NA
2-Methylnaphthalene	µg/kg	12	0% (0)	3.2	3.83	1.66	0.4	11	0.51	0.6	0.675	1.18	4.25	8.9	9.9	NA
Acenaphthene	µg/kg	12	100% (12)	3.13	0.569	3.08	<5	<8	2.5	2.5	2.5	3	3.5	3.95	4	<5 - <8
Acenaphthylene	µg/kg	12	100% (12)	3.13	0.569	3.08	<5	<8	2.5	2.5	2.5	3	3.5	3.95	4	<5 - <8
Anthracene	µg/kg	12	92% (11)	2.88	0.772	2.74	1	<8	1.83	2.5	2.5	3	3.5	3.5	3.73	<5 - <8
Benz(a)anthracene	µg/kg	12	50% (6)	2.6	0.91	2.36	0.5	<7	1.13	1.69	2.38	2.75	3	3.45	3.73	<5 - <7
Benzo(a)pyrene	µg/kg	12	42% (5)	3.75	1.44	3.55	3	<7	2.78	3	3	3	3.88	5.9	6.45	<5 - <7
Benzo(b)fluoranthene	µg/kg	12	92% (11)	3.08	0.557	3.04	3	<8	2.5	2.5	2.5	3	3.5	3.95	4	<5 - <8
Benzo(g,h,i)perylene	µg/kg	12	50% (6)	2.91	1.21	2.52	0.35	<7	1.01	1.65	2.5	3	3.63	4	4.45	<5 - <7
Benzo(k)fluoranthene	µg/kg	12	92% (11)	3	0.64	2.94	2	<8	2.28	2.5	2.5	3	3.5	3.95	4	<5 - <8
Carbazole	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Chrysene	µg/kg	12	33% (4)	3.51	2.45	2.71	0.5	8	0.693	0.99	2.44	2.75	4	7	7.45	<5 - <6
Dibenz(a,h)anthracene	µg/kg	12	83% (10)	2.71	0.722	2.59	1	<7	1.55	2.05	2.5	2.75	3.13	3.5	3.5	<5 - <7
Dibenzofuran	µg/kg	12	50% (6)	2.73	1.52	2.16	0.2	<8	0.64	1.06	1.89	2.75	3.25	4	4.9	<5 - <8
Fluoranthene	µg/kg	12	33% (4)	4.05	3.28	2.66	0.2	10	0.558	0.875	2.15	2.75	5.75	8.9	9.45	<5 - <6
Fluorene	µg/kg	12	100% (12)	3.13	0.569	3.08	<5	<8	2.5	2.5	2.5	3	3.5	3.95	4	<5 - <8
Indeno(1,2,3-c,d)pyrene	µg/kg	12	67% (8)	2.77	0.962	2.51	0.5	<8	1.19	1.83	2.5	3	3.13	3.95	4	<5 - <8
Naphthalene	µg/kg	12	0% (0)	4.72	3.81	3.39	1	10	1	1.1	2	2.83	9.25	10	10	NA
Nitrobenzene	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Phenanthrene	µg/kg	12	17% (2)	5.53	6.46	2.42	0.2	19	0.2	0.25	1.3	2.5	7.75	14.8	16.8	<5
Pyrene	µg/kg	12	42% (5)	3.47	1.52	3.11	0.85	<6	1.62	2.28	2.5	3	5	5	5.45	<5 - <6
Total HMW-PAHs[2]	µg/kg	12	8% (1)	20.1	7.22	18.9	9.05	<36	12.5	12.3	16.3	19	24.9	29.5	30.6	<36
Total LMW-PAHs[3]	µg/kg	12	0% (0)	25.7	15.3	22.3	12.8	56	13.4	13.9	14.7	16.6	35	46.7	51.1	NA
Total PAHs[4]	µg/kg	12	0% (0)	45.8	21.9	41.7	26.5	88	27.2	27.9	30.8	32.7	60	75.8	81.4	NA
Polychlorinated Biphenyls (PCBs)																
Aroclor 1016	µg/kg	12	100% (12)	0.625	0.114	0.616	<1	<1.6	0.5	0.5	0.538	0.6	0.713	0.795	0.8	<1 - <1.6

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit
Aroclor 1221	µg/kg	12	100% (12)	2.52	0.445	2.48	<4.1	<6.6	2.08	2.1	2.14	2.38	2.8	3.18	3.25	<4.1 - <6.6
Aroclor 1232	µg/kg	12	100% (12)	2.52	0.445	2.48	<4.1	<6.6	2.08	2.1	2.14	2.38	2.8	3.18	3.25	<4.1 - <6.6
Aroclor 1242	µg/kg	12	100% (12)	0.625	0.114	0.616	<1	<1.6	0.5	0.5	0.538	0.6	0.713	0.795	0.8	<1 - <1.6
Aroclor 1248	µg/kg	12	100% (12)	0.625	0.114	0.616	<1	<1.6	0.5	0.5	0.538	0.6	0.713	0.795	0.8	<1 - <1.6
Aroclor 1254	µg/kg	12	100% (12)	0.625	0.114	0.616	<1	<1.6	0.5	0.5	0.538	0.6	0.713	0.795	0.8	<1 - <1.6
Aroclor 1260	µg/kg	12	100% (12)	0.625	0.114	0.616	<1	<1.6	0.5	0.5	0.538	0.6	0.713	0.795	0.8	<1 - <1.6
Total PCBs[5]	µg/kg	12	100% (12)	8.16	1.46	8.04	<13.2	<21.2	6.65	6.7	6.96	7.75	9.16	10.3	10.5	<13.2 - <21.2
Organochlorine Pesticides																
Aldrin	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Chlordane, total [6]	µg/kg	12	100% (12)	0.495	0.0873	0.488	<0.82	<1.3	0.41	0.411	0.42	0.465	0.55	0.625	0.639	<0.82 - <1.3
Chlordane, *cis-*	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Chlordane, *trans-*	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Dieldrin	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
Endosulfan sulfate	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
Endosulfan-alpha	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Endosulfan-beta	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
Endrin	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
Endrin aldehyde	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
Endrin ketone	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
gamma-HCH (Lindane)	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Heptachlor	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Heptachlor epoxide	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Hexachlorobenzene	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Hexachlorocyclohexane-alpha	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Hexachlorocyclohexane-beta	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Hexachlorocyclohexane-delta	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Hexachlorocyclopentadiene	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Isophorone	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Methoxychlor	µg/kg	12	100% (12)	2.48	0.445	2.44	<4.1	<6.6	2.05	2.06	2.1	2.33	2.75	3.13	3.22	<4.1 - <6.6
Nonachlor, *cis-*	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit
Nonachlor, *trans-*	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
o,p' -DDD	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
p,p'- DDD	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
Sum DDDs (*o,p'* + *p,p'*)	µg/kg	12	100% (12)	1.01	0.18	0.998	<1.66	<2.6	0.836	0.841	0.85	0.95	1.13	1.29	1.3	<1.66 - <2.6
o,p' -DDE	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
p,p' -DDE	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
Sum DDEs (*o,p'* + *p,p'*)	µg/kg	12	100% (12)	1.01	0.18	0.998	<1.66	<2.6	0.836	0.841	0.85	0.95	1.13	1.29	1.3	<1.66 - <2.6
o,p'- DDT	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
p,p' -DDT	µg/kg	12	100% (12)	0.506	0.0901	0.499	<0.83	<1.3	0.418	0.421	0.425	0.475	0.563	0.645	0.65	<0.83 - <1.3
Sum DDTs (*o,p'* + *p,p'*)	µg/kg	12	100% (12)	1.01	0.18	0.998	<1.66	<2.6	0.836	0.841	0.85	0.95	1.13	1.29	1.3	<1.66 - <2.6
Total DDTs	µg/kg	12	100% (12)	3.04	0.541	3	<4.98	<7.8	2.51	2.52	2.55	2.85	3.38	3.87	3.9	<4.98 - <7.8
Oxychlordane	µg/kg	12	92% (11)	0.259	0.0508	0.255	0.35	<0.65	0.205	0.206	0.214	0.248	0.296	0.324	0.336	<0.41 - <0.65
Toxaphene	µg/kg	12	100% (12)	24.8	4.37	24.4	<41	<65	20.5	20.6	21	23.3	27.5	31.3	32	<41 - <65
Semi-Volatile Compounds																
1,2,4-Trichlorobenzene	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
1,2-Dichlorobenzene	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
1,3-Dichlorobenzene	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
1,4-Dichlorobenzene	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
2,2'-Oxybis(1-chloropropane)	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
2,4,5-Trichlorophenol	µg/kg	12	100% (12)	158	26.9	156	<260	<410	130	131	135	150	174	199	202	<260 - <410
2,4,6-Trichlorophenol	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
2,4-Dichlorophenol	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
2,4-Dimethylphenol	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
2,4-Dinitrophenol	µg/kg	12	100% (12)	158	26.9	156	<260	<410	130	131	135	150	174	199	202	<260 - <410
2,4-Dinitrotoluene	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
2,6-Dinitrotoluene	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
2-Chloronaphthalene	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
2-Chlorophenol	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
2-Fluorobiphenyl	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
2-Methylphenol	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
2-Nitroaniline	µg/kg	12	100% (12)	158	26.9	156	<260	<410	130	131	135	150	174	199	202	<260 - <410

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
2-Nitrophenol	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
3,3'-Dichlorobenzidine	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
3-Nitroaniline	µg/kg	12	100% (12)	158	26.9	156	<260	<410	130	131	135	150	174	199	202	<260 - <410
4-Bromophenyl phenyl ether	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
4-Chloro-3-methylphenol	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
4-Chloroaniline	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
4-Chlorophenyl phenyl ether	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
4-Methylphenol	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
4-Nitroaniline	µg/kg	12	100% (12)	158	26.9	156	<260	<410	130	131	135	150	174	199	202	<260 - <410
4-Nitrophenol	µg/kg	12	100% (12)	158	26.9	156	<260	<410	130	131	135	150	174	199	202	<260 - <410
Acetophenone	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Atrazine	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Benzaldehyde	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Benzoic acid	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Benzyl alcohol	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Bis(2-chloroethoxy)methane	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Bis(2-chloroethyl)ether	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Bis(2-ethylhexyl) phthalate	µg/kg	12	83% (10)	70.4	24.5	67.5	75	<160	50	50.5	55	62.5	76.3	80	107	<100 - <160
Butyl benzyl phthalate	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Caprolactam	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Diethyl phthalate	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Dimethyl phthalate	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Di-n-butyl phthalate	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Dinitro-o-cresol	µg/kg	12	100% (12)	158	26.9	156	<260	<410	130	131	135	150	174	199	202	<260 - <410
Di-N-octyl phthalate	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Hexachlorobutadiene	µg/kg	12	100% (12)	0.248	0.0437	0.244	<0.41	<0.65	0.205	0.206	0.21	0.233	0.275	0.313	0.32	<0.41 - <0.65
Hexachloroethane	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
N-nitrosodi-N-propylamine	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
N-nitrosodiphenylamine	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160
Pentachlorophenol	µg/kg	12	100% (12)	158	26.9	156	<260	<410	130	131	135	150	174	199	202	<260 - <410
Phenol	µg/kg	12	100% (12)	62.5	11.4	61.6	<100	<160	50	50	53.8	60	71.3	79.5	80	<100 - <160

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Dioxins/Furans																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	6	0% (0)	1.9	1.92	1.19	0.327	5.39	0.378	0.428	0.548	1.39	2.31	3.87	4.63	NA
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	6	0% (0)	8.66	9.39	4.21	0.63	24.9	0.717	0.804	1.46	6.19	12.2	19	22	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	6	0% (0)	0.172	0.141	0.135	0.0532	0.44	0.0608	0.0684	0.0879	0.134	0.182	0.314	0.377	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	6	0% (0)	0.258	0.2	0.201	0.0854	0.608	0.0915	0.0977	0.112	0.212	0.319	0.466	0.537	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	6	17% (1)	0.171	0.12	0.133	0.0711	0.354	0.0497	0.0568	0.0779	0.161	0.234	0.296	0.325	<0.0852
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg	6	0% (0)	0.179	0.127	0.146	0.0565	0.399	0.0666	0.0766	0.0998	0.136	0.228	0.325	0.362	NA
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	6	17% (1)	0.432	0.444	0.267	<0.0873	1.26	0.0752	0.107	0.174	0.282	0.512	0.908	1.08	<0.0873
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	6	0% (0)	0.1	0.0639	0.0868	0.0406	0.222	0.0482	0.0558	0.0714	0.0779	0.104	0.167	0.194	NA
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	6	0% (0)	0.298	0.229	0.226	0.0906	0.669	0.0912	0.0917	0.108	0.254	0.41	0.549	0.609	NA
1,2,3,7,8-Pentachlorodibenzo- p-dioxin	ng/kg	6	17% (1)	0.156	0.134	0.112	0.0532	0.364	0.0448	0.0476	0.0549	0.102	0.24	0.318	0.341	<0.084
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg	6	0% (0)	0.207	0.191	0.144	0.0612	0.514	0.0633	0.0653	0.07	0.111	0.317	0.443	0.479	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	6	0% (0)	0.184	0.151	0.14	0.0566	0.455	0.0596	0.0626	0.0756	0.14	0.229	0.35	0.402	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	6	0% (0)	0.35	0.337	0.235	0.071	0.943	0.0823	0.0935	0.122	0.215	0.48	0.743	0.843	NA
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	6	33% (2)	0.188	0.198	0.105	<0.0415	0.527	0.0227	0.0247	0.0474	0.117	0.272	0.423	0.475	<0.0415 - <0.0574
2,3,7,8-Tetrachlorodibenzofuran	ng/kg	6	0% (0)	10.2	20.7	1.62	0.102	52.3	0.114	0.126	0.624	2.53	3.5	28	40.1	NA
Total Tetrachlorodibenzo-p-dioxins	ng/kg	6	33% (2)	0.513	0.622	0.191	<0.0415	1.58	0.0227	0.0247	0.0598	0.261	0.787	1.25	1.42	<0.0415 - <0.0574
Total Pentachlorodibenzo-p-dioxins	ng/kg	6	17% (1)	3.13	5.82	0.719	<0.084	14.9	0.103	0.165	0.303	0.66	1.94	8.58	11.7	<0.084
Total Hexachlorodibenzo-p-dioxins	ng/kg	6	0% (0)	5.25	5.44	2.6	0.331	13.1	0.479	0.626	1.05	3.26	9.22	11.9	12.5	NA
Total Heptachlorodibenzo-p-dioxins	ng/kg	6	0% (0)	18.4	19.9	8.76	1.25	52.4	1.43	1.61	3	12.9	26.8	40.8	46.6	NA
Total Octachlorodibenzo-p-dioxins	ng/kg	6	0% (0)	68.1	75.7	32.6	4.46	201	5.37	6.29	12	44.9	95.3	153	177	NA
Total Tetrachlorodibenzofurans	ng/kg	6	0% (0)	24.5	40.9	5.06	0.146	106	0.3	0.453	2.34	7.57	20.8	65.6	85.8	NA
Total Pentachlorodibenzofurans	ng/kg	6	0% (0)	2.82	2.78	1.58	0.218	7.13	0.33	0.442	0.764	1.89	4.54	6.14	6.64	NA
Total Hexachlorodibenzofurans	ng/kg	6	0% (0)	3	2.85	1.92	0.474	7.9	0.579	0.684	0.921	2.21	4.1	6.11	7.01	NA
Total Heptachlorodibenzofurans	ng/kg	6	0% (0)	5.4	6.26	2.93	0.569	17.2	0.692	0.815	1.23	3.59	6.17	11.8	14.5	NA
Total Octachlorodibenzofurans	ng/kg	6	0% (0)	5.45	5.64	3.65	1.23	16.2	1.36	1.5	1.84	3.65	5.95	11.2	13.7	NA
TEQ reported value[7]	ng/kg	6	0% (0)	1.74	2.66	0.641	0.0927	7	0.104	0.114	0.246	0.64	1.63	4.47	5.74	NA
COPC Mixtures[8]																
Mean $PEC\text{-}Q_{METALS}$	No units	12	0% (0)	1.22	1.07	0.633	0.0883	2.8	0.0884	0.0896	0.185	1.06	2.27	2.53	2.66	NA

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Mean PEC-$Q_{METALS(1\%OC)}$	No units	12	0% (0)	0.242	0.159	0.2	0.0785	0.538	0.086	0.0931	0.131	0.19	0.346	0.493	0.52	NA
Mean PEC-Q	No units	12	0% (0)	0.410	0.357	0.2200316	0.0332	0.939	0.0333	0.0338	0.0655	0.359	0.761	0.850	0.893	NA
ΣPEC-Q_{METALS}	No units	12	0% (0)	8.51	7.47	4.43	0.618	19.6	0.619	0.627	1.29	7.43	15.9	17.7	18.6	NA
ΣPEC-$Q_{METALS(1\%OC)}$	No units	12	0% (0)	1.7	1.11	1.4	0.55	3.77	0.602	0.652	0.913	1.33	2.42	3.45	3.64	NA
Nutrients/Inorganics/Conventionals																
Moisture, percent	%	6	0% (0)	31.1	8.64	30.2	22.8	46	23.1	23.4	24.9	29.4	34.2	40.6	43.3	NA
Organic carbon, total	%	12	0% (0)	5.52	5.75	3.17	0.611	17.4	0.622	0.678	1.11	4.07	6.65	15.2	16.7	NA
Grainsize Fraction <75µm	%	12	0% (0)	64.5	31.5	53.6	8.7	98.4	19.5	28.4	32	79.6	89.8	94.8	96.6	NA
Clay, percent	%	12	0% (0)	11.2	11.1	4.53	0.113	29.5	0.376	0.615	0.948	9.54	16.7	28.8	29.3	NA
Colloid, percent	%	12	0% (0)	5.8	5.69	2.59	0.061	16.1	0.339	0.569	0.763	4.24	9.53	14.3	15.2	NA
Fines, percent (silt+clay)	%	12	0% (0)	58.7	27.4	49.7	8.64	89.5	19.1	27.9	31.2	72.1	76.8	88.3	89.5	NA
Gravel, percent	%	12	0% (0)	1.25	2.87	NC	0	8.4	0	0	0	0	0.1	5.62	7.19	NA
Sand - coarse, percent	%	12	0% (0)	0.513	0.9	NC	0	3	0	0	0	0.1	0.55	1.32	2.09	NA
Sand - fine, percent	%	12	0% (0)	30.7	29.4	15.4	1.6	71.3	2.15	2.76	4.5	17.8	65.1	69.7	70.6	NA
Sand - medium, percent	%	12	0% (0)	2.99	6.55	NC	0	23.5	0.11	0.2	0.275	0.6	2.08	3.65	12.6	NA
Sand, percent	%	12	0% (0)	34.2	32.4	18.3	1.6	90.9	3.14	4.44	7.95	20	68	71.6	80.3	NA
Silt, percent	%	12	0% (0)	47.5	21.6	41.4	8.53	80	18.5	26.9	30.5	46.3	64.3	75	77.7	NA
Reach 5																
Metals																
Aluminum, total	mg/kg	6	0% (0)	7700	794	7660	6390	8680	6620	6840	7380	7840	8130	8420	8550	NA
Antimony, total	mg/kg	6	83% (5)	3.45	1.13	3.33	<5.1	<6.9	2.63	2.7	2.9	3.1	3.38	4.56	5.11	<5.1 - <6.9
Arsenic, total	mg/kg	6	0% (0)	5.7	1.69	5.4	2.45	7.4	3.29	4.13	5.85	6.13	6.29	6.85	7.13	NA
Barium, total	mg/kg	6	0% (0)	90.6	81	72.6	39.4	254	42.6	45.9	53.6	59.2	75.1	167	210	NA
Beryllium, total	mg/kg	6	0% (0)	1.34	1.77	0.864	0.49	4.94	0.51	0.53	0.575	0.63	0.741	2.85	3.89	NA
Cadmium, total	mg/kg	6	17% (1)	0.829	1.78	0.159	0.05	4.46	0.0503	0.0505	0.0515	0.079	0.218	2.36	3.41	<0.51
Calcium, total	mg/kg	6	0% (0)	3850	3130	3190	2060	10100	2110	2170	2280	2410	3510	6980	8540	NA
Chromium, total	mg/kg	6	0% (0)	13.2	7.48	12.1	9	28.4	9.2	9.4	9.85	10.1	11.6	20.2	24.3	NA
Cobalt, total	mg/kg	6	0% (0)	12	17.5	7.09	4.1	47.7	4.28	4.45	4.83	5	5.33	26.5	37.1	NA
Copper, total	mg/kg	6	0% (0)	12.9	8.62	11.4	9.2	30.5	9.2	9.2	9.2	9.25	9.75	20.2	25.3	NA

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Iron, total	mg/kg	6	0% (0)	14200	626	14200	13400	15300	13500	13700	13900	14100	14200	14800	15000	NA
Lead, total	mg/kg	6	0% (0)	6.79	0.933	6.74	5.2	7.77	5.53	5.85	6.53	6.85	7.48	7.68	7.73	NA
Magnesium, total	mg/kg	6	0% (0)	4850	1060	4740	3510	5800	3520	3530	3920	5230	5690	5790	5790	NA
Manganese, total	mg/kg	6	0% (0)	253	31.6	252	201	283	208	216	238	265	275	280	281	NA
Mercury, total	mg/kg	6	0% (0)	0.0431	0.084	0.0139	0.004	0.214	0.00475	0.0055	0.00725	0.009	0.0138	0.115	0.165	NA
Nickel, total	mg/kg	6	0% (0)	15.9	17.5	11.7	8.3	51.6	8.38	8.45	8.63	8.75	9.18	30.5	41.1	NA
Potassium, total	mg/kg	6	0% (0)	1520	245	1510	1150	1810	1210	1280	1410	1510	1710	1790	1800	NA
Selenium, total	mg/kg	6	0% (0)	2.83	1.48	2.56	1.27	5.63	1.52	1.78	2.3	2.4	2.88	4.32	4.98	NA
Silver, total	mg/kg	6	83% (5)	0.726	0.53	0.627	<0.86	1.8	0.441	0.453	0.481	0.525	0.588	1.2	1.5	<0.86 - <1.2
Sodium, total	mg/kg	6	0% (0)	83	26.6	79.8	62.2	125	62.3	62.5	64.2	70.1	98.9	116	121	NA
Thallium, total	mg/kg	6	83% (5)	1.89	1.55	1.58	<2.1	5.03	1.09	1.13	1.23	1.3	1.41	3.24	4.14	<2.1 - <2.9
Uranium, total	mg/kg	6	100% (6)	10.4	1.31	10.4	<17.2	<24.3	8.81	9.03	9.65	10.4	11.3	11.9	12	<17.2 - <24.3
Vanadium, total	mg/kg	6	0% (0)	23	19.2	19	12.6	61.7	12.9	13.2	13.8	14.7	19.4	41.2	51.5	NA
Zinc, total	mg/kg	6	0% (0)	44.1	17.7	41.8	30	78.6	31.3	32.7	35.4	37.7	43.9	61.9	70.2	NA
Polycyclic Aromatic Hydrocarbons (PAHs)																
$\sum$ESB-TU$_{FCV}$[1]	No Units	30	0% (0)	0.00674	0.00356	0.00602	0.00368	0.0138	0.00368	0.00368	0.00396	0.00534	0.00834	0.0138	0.0138	NA
2-Methylnaphthalene	µg/kg	6	0% (0)	0.333	0.103	0.317	0.2	0.4	0.2	0.2	0.25	0.4	0.4	0.4	0.4	NA
Acenaphthene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Acenaphthylene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Anthracene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Benz(a)anthracene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Benzo(a)pyrene	µg/kg	6	50% (3)	2.29	0.679	2.17	1	<5	1.31	1.63	2.31	2.5	2.5	2.75	2.88	<5
Benzo(b)fluoranthene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Benzo(g,h,i)perylene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Benzo(k)fluoranthene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Carbazole	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Chrysene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Dibenz(a,h)anthracene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Dibenzofuran	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Fluoranthene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Fluorene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Indeno(1,2,3-c,d)pyrene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Naphthalene	µg/kg	6	0% (0)	2.98	1.54	2.5	1	4.25	1	1	1.7	3.85	3.9	4.08	4.16	NA
Nitrobenzene	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Phenanthrene	µg/kg	6	83% (5)	2.31	0.469	2.26	1.35	<5	1.64	1.93	2.5	2.5	2.5	2.5	2.5	<5
Pyrene	µg/kg	6	100% (6)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Total HMW-PAHs[2]	µg/kg	6	50% (3)	14.8	0.678	14.8	13.5	<30	13.8	14.2	14.9	15	15	15.3	15.4	<30
Total LMW-PAHs[3]	µg/kg	6	0% (0)	15.6	1.35	15.6	13.9	16.7	13.9	13.9	14.4	16.3	16.6	16.7	16.7	NA
Total PAHs[4]	µg/kg	6	0% (0)	30.4	1.37	30.4	28.9	32.1	28.9	28.9	29.2	30.5	31.5	31.9	32	NA
Polychlorinated Biphenyls (PCBs)																
Aroclor 1016	µg/kg	6	100% (6)	0.808	0.22	0.779	<1	<1.9	0.513	0.525	0.65	0.95	0.95	0.95	0.95	<1 - <1.9
Aroclor 1221	µg/kg	6	100% (6)	3.24	0.886	3.12	<4.1	<7.8	2.08	2.1	2.55	3.78	3.8	3.85	3.88	<4.1 - <7.8
Aroclor 1232	µg/kg	6	100% (6)	3.24	0.886	3.12	<4.1	<7.8	2.08	2.1	2.55	3.78	3.8	3.85	3.88	<4.1 - <7.8
Aroclor 1242	µg/kg	6	100% (6)	0.808	0.22	0.779	<1	<1.9	0.513	0.525	0.65	0.95	0.95	0.95	0.95	<1 - <1.9
Aroclor 1248	µg/kg	6	100% (6)	0.808	0.22	0.779	<1	<1.9	0.513	0.525	0.65	0.95	0.95	0.95	0.95	<1 - <1.9
Aroclor 1254	µg/kg	6	100% (6)	0.808	0.22	0.779	<1	<1.9	0.513	0.525	0.65	0.95	0.95	0.95	0.95	<1 - <1.9
Aroclor 1260	µg/kg	6	100% (6)	0.808	0.22	0.779	<1	<1.9	0.513	0.525	0.65	0.95	0.95	0.95	0.95	<1 - <1.9
Total PCBs[5]	µg/kg	6	100% (6)	10.6	2.9	10.2	<13.2	<25.1	7.74	6.83	8.36	12.4	12.4	12.5	12.6	<13.2 - <25.1
Organochlorine Pesticides																
Aldrin	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Chlordane, total [6]	µg/kg	6	100% (6)	0.387	0.0197	0.386	<0.74	<0.84	0.37	0.37	0.373	0.38	0.395	0.41	0.415	<0.74 - <0.84
Chlordane, *cis-*	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Chlordane, *trans-*	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Dieldrin	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85
Endosulfan sulfate	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85
Endosulfan-alpha	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Endosulfan-beta	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85
Endrin	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85
Endrin aldehyde	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85
Endrin ketone	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
gamma-HCH (Lindane)	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Heptachlor	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Heptachlor epoxide	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Hexachlorobenzene	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Hexachlorocyclohexane-alpha	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Hexachlorocyclohexane-beta	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Hexachlorocyclohexane-delta	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Hexachlorocyclopentadiene	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Isophorone	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Methoxychlor	µg/kg	6	100% (6)	1.93	0.0983	1.93	<3.7	<4.2	1.85	1.85	1.86	1.9	1.98	2.05	2.08	<3.7 - <4.2
Nonachlor, *cis-*	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Nonachlor, *trans-*	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
o,p' -DDD	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85
p,p'- DDD	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85
Sum DDDs (*o,p'* + *p,p'*)	µg/kg	6	100% (6)	0.788	0.0387	0.788	<1.5	<1.7	0.753	0.755	0.763	0.775	0.81	0.835	0.843	<1.5 - <1.7
o,p' -DDE	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85
p,p' -DDE	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85
Sum DDEs (*o,p'* + *p,p'*)	µg/kg	6	100% (6)	0.788	0.0387	0.788	<1.5	<1.7	0.753	0.755	0.763	0.775	0.81	0.835	0.843	<1.5 - <1.7
o,p'- DDT	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85
p,p' -DDT	µg/kg	6	100% (6)	0.394	0.0193	0.394	<0.75	<0.85	0.376	0.378	0.381	0.388	0.405	0.418	0.421	<0.75 - <0.85
Sum DDTs (*o,p'* + *p,p'*)	µg/kg	6	100% (6)	0.788	0.0387	0.788	<1.5	<1.7	0.753	0.755	0.763	0.775	0.81	0.835	0.843	<1.5 - <1.7
Total DDTs	µg/kg	6	100% (6)	2.37	0.116	2.36	<4.5	<5.1	2.26	2.27	2.29	2.33	2.43	2.51	2.53	<4.5 - <5.1
Oxychlordane	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Toxaphene	µg/kg	6	100% (6)	19.3	0.983	19.3	<37	<42	18.5	18.5	18.6	19	19.8	20.5	20.8	<37 - <42
Semi-Volatile Compounds																
1,2,4-Trichlorobenzene	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
1,2-Dichlorobenzene	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
1,3-Dichlorobenzene	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
1,4-Dichlorobenzene	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
2,2'-Oxybis(1-chloropropane)	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
2,4,5-Trichlorophenol	µg/kg	6	100% (6)	123	7.53	123	<230	<270	116	118	120	120	128	133	134	<230 - <270

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit
2,4,6-Trichlorophenol	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
2,4-Dichlorophenol	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
2,4-Dimethylphenol	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
2,4-Dinitrophenol	µg/kg	6	100% (6)	123	7.53	123	<230	<270	116	118	120	120	128	133	134	<230 - <270
2,4-Dinitrotoluene	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
2,6-Dinitrotoluene	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
2-Chloronaphthalene	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
2-Chlorophenol	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
2-Fluorobiphenyl	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
2-Methylphenol	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
2-Nitroaniline	µg/kg	6	100% (6)	123	7.53	123	<230	<270	116	118	120	120	128	133	134	<230 - <270
2-Nitrophenol	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
3,3'-Dichlorobenzidine	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
3-Nitroaniline	µg/kg	6	100% (6)	123	7.53	123	<230	<270	116	118	120	120	128	133	134	<230 - <270
4-Bromophenyl phenyl ether	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
4-Chloro-3-methylphenol	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
4-Chloroaniline	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
4-Chlorophenyl phenyl ether	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
4-Methylphenol	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
4-Nitroaniline	µg/kg	6	100% (6)	123	7.53	123	<230	<270	116	118	120	120	128	133	134	<230 - <270
4-Nitrophenol	µg/kg	6	100% (6)	123	7.53	123	<230	<270	116	118	120	120	128	133	134	<230 - <270
Acetophenone	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Atrazine	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Benzaldehyde	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Benzoic acid	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Benzyl alcohol	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Bis(2-chloroethoxy)methane	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Bis(2-chloroethyl)ether	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Bis(2-ethylhexyl) phthalate	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Butyl benzyl phthalate	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Caprolactam	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Diethyl phthalate	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit
Dimethyl phthalate	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Di-n-butyl phthalate	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Dinitro-o-cresol	µg/kg	6	100% (6)	123	7.53	123	<230	<270	116	118	120	120	128	133	134	<230 - <270
Di-N-octyl phthalate	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Hexachlorobutadiene	µg/kg	6	100% (6)	0.193	0.00983	0.193	<0.37	<0.42	0.185	0.185	0.186	0.19	0.198	0.205	0.208	<0.37 - <0.42
Hexachloroethane	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
N-nitrosodi-N-propylamine	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
N-nitrosodiphenylamine	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Pentachlorophenol	µg/kg	6	100% (6)	123	7.53	123	<230	<270	116	118	120	120	128	133	134	<230 - <270
Phenol	µg/kg	6	100% (6)	48.9	3.25	48.8	<93	<110	46.5	46.5	46.8	47.8	49.5	52.5	53.8	<93 - <110
Dioxins/Furans																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	2	0% (0)	1.66	2.22	0.543	0.0911	3.24	0.248	0.405	0.877	1.66	2.45	2.92	3.08	NA
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	2	0% (0)	0.468	0.28	0.424	0.27	0.666	0.29	0.31	0.369	0.468	0.567	0.626	0.646	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	2	50% (1)	0.0336	0.00633	0.0333	0.0381	<0.0583	0.0296	0.03	0.0314	0.0336	0.0359	0.0372	0.0377	<0.0583
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	2	0% (0)	0.0545	0.0444	0.0445	0.0231	0.0859	0.0262	0.0294	0.0388	0.0545	0.0702	0.0796	0.0828	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	2	50% (1)	0.0321	0.00596	0.0318	0.0363	<0.0557	0.0283	0.0287	0.03	0.0321	0.0342	0.0354	0.0359	<0.0557
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg	2	0% (0)	0.0668	0.0646	0.0487	0.0211	0.112	0.0257	0.0302	0.0439	0.0668	0.0896	0.103	0.108	NA
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	2	50% (1)	0.071	0.0594	0.0572	<0.0579	0.113	0.0332	0.0374	0.05	0.071	0.092	0.105	0.109	<0.0579
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	2	100% (2)	0.0245	0.00647	0.0241	<0.0399	<0.0582	0.0204	0.0209	0.0222	0.0245	0.0268	0.0282	0.0286	<0.0399 - <0.0582
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	2	50% (1)	0.0477	0.027	0.0437	<0.0571	0.0668	0.0305	0.0324	0.0381	0.0477	0.0572	0.063	0.0649	<0.0571
1,2,3,7,8-Pentachlorodibenzo- p-dioxin	ng/kg	2	50% (1)	0.0302	0.00813	0.0296	0.0359	<0.0488	0.025	0.0256	0.0273	0.0302	0.033	0.0348	0.0353	<0.0488
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg	2	0% (0)	0.0253	0.0059	0.0249	0.0211	0.0295	0.0215	0.0219	0.0232	0.0253	0.0274	0.0286	0.029	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	2	0% (0)	0.0496	0.0412	0.0402	0.0205	0.0788	0.0234	0.0263	0.0351	0.0496	0.0642	0.0729	0.0758	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	2	0% (0)	0.0387	0.022	0.0354	0.0231	0.0542	0.0247	0.0262	0.0309	0.0387	0.0464	0.0511	0.0526	NA
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	2	100% (2)	0.0181	0.00148	0.018	<0.034	<0.0382	0.0171	0.0172	0.0175	0.0181	0.0186	0.0189	0.019	<0.034 - <0.0382
2,3,7,8-Tetrachlorodibenzofuran	ng/kg	2	0% (0)	0.121	0.0644	0.113	0.0759	0.167	0.0805	0.085	0.0987	0.121	0.144	0.158	0.162	NA
Total Tetrachlorodibenzo-p-dioxins	ng/kg	2	100% (2)	0.0181	0.00148	0.018	<0.034	<0.0382	0.0171	0.0172	0.0175	0.0181	0.0186	0.0189	0.019	<0.034 - <0.0382
Total Pentachlorodibenzo-p-dioxins	ng/kg	2	50% (1)	0.108	0.118	0.0684	<0.0488	0.192	0.0328	0.0411	0.0663	0.108	0.15	0.175	0.183	<0.0488
Total Hexachlorodibenzo-p-dioxins	ng/kg	2	50% (1)	0.317	0.408	0.131	<0.0569	0.605	0.0573	0.0861	0.173	0.317	0.461	0.547	0.576	<0.0569
Total Heptachlorodibenzo-p-dioxins	ng/kg	2	0% (0)	0.81	0.544	0.713	0.425	1.2	0.464	0.502	0.618	0.81	1	1.12	1.16	NA
Total Octachlorodibenzo-p-dioxins	ng/kg	2	0% (0)	2.59	1.61	2.32	1.45	3.73	1.56	1.68	2.02	2.59	3.16	3.5	3.61	NA

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit
Total Tetrachlorodibenzofurans	ng/kg	2	0% (0)	0.324	0.181	0.297	0.196	0.452	0.209	0.222	0.26	0.324	0.388	0.426	0.439	NA
Total Pentachlorodibenzofurans	ng/kg	2	0% (0)	0.216	0.275	0.0931	0.0211	0.411	0.0406	0.06	0.118	0.216	0.313	0.372	0.391	NA
Total Hexachlorodibenzofurans	ng/kg	2	0% (0)	1.01	1.27	0.465	0.113	1.91	0.203	0.293	0.562	1.01	1.46	1.73	1.82	NA
Total Heptachlorodibenzofurans	ng/kg	2	0% (0)	2.62	3.51	0.842	0.139	5.1	0.387	0.635	1.38	2.62	3.86	4.6	4.85	NA
Total Octachlorodibenzofurans	ng/kg	2	0% (0)	0.576	0.641	0.356	0.123	1.03	0.168	0.214	0.35	0.576	0.803	0.938	0.984	NA
TEQ reported value[7]	ng/kg	2	0% (0)	0.0452	0.0449	0.0321	0.0134	0.077	0.0166	0.0198	0.0293	0.0452	0.0611	0.0706	0.0738	NA
COPC Mixtures[8]																
Mean PEC-Q_{METALS}	No units	6	0% (0)	0.146	0.127	0.12	0.0878	0.406	0.0889	0.0901	0.0925	0.0938	0.1	0.254	0.33	NA
Mean PEC-$Q_{METALS(1\%OC)}$	No units	6	0% (0)	0.0662	0.0546	0.0509	0.0238	0.161	0.0242	0.0248	0.0278	0.0428	0.0886	0.131	0.146	NA
Mean PEC-Q	No units	6	0% (0)	0.0543	0.0416	0.0464263	0.0332	0.139	0.0342	0.0353	0.0374	0.0379	0.0399	0.0898	0.114	NA
ΣPEC-Q_{METALS}	No units	6	0% (0)	1.02	0.892	0.838	0.614	2.84	0.622	0.63	0.647	0.657	0.7	1.78	2.31	NA
ΣPEC-$Q_{METALS(1\%OC)}$	No units	6	0% (0)	0.464	0.383	0.356	0.166	1.13	0.17	0.173	0.195	0.3	0.621	0.919	1.02	NA
Nutrients/Inorganics/Conventionals																
Moisture, percent	%	2	0% (0)	19.9	1.63	19.8	18.7	21	18.8	18.9	19.3	19.9	20.4	20.8	20.9	NA
Organic carbon, total	%	6	0% (0)	2.61	1.14	2.35	0.937	3.96	1.15	1.36	1.97	2.63	3.45	3.83	3.89	NA
Grainsize Fraction <75µm	%	6	0% (0)	16.2	4.43	15.6	9.8	19.8	10.2	10.6	13.1	18.2	19.4	19.8	19.8	NA
Clay, percent	%	6	0% (0)	0.252	0.0871	0.241	0.171	0.396	0.174	0.176	0.185	0.235	0.291	0.347	0.371	NA
Colloid, percent	%	6	0% (0)	0.559	0.189	0.53	0.294	0.792	0.32	0.347	0.437	0.573	0.692	0.758	0.775	NA
Fines, percent (silt+clay)	%	6	0% (0)	15.6	4.26	15.1	9.51	19.2	9.88	10.3	12.6	17.6	18.7	19.1	19.2	NA
Gravel, percent	%	6	0% (0)	3.37	3.56	NC	0	8.8	0	0	0.35	2.7	5.5	7.4	8.1	NA
Sand - coarse, percent	%	6	0% (0)	6.48	5.06	NC	0	10.7	0	0	2.18	9.15	9.83	10.3	10.5	NA
Sand - fine, percent	%	6	0% (0)	40.2	31.4	31.7	17.1	81.3	17.9	18.8	20.4	21.2	65.4	80.6	81	NA
Sand - medium, percent	%	6	0% (0)	33.8	25.9	9.38	0.3	51.9	0.313	0.325	12.5	49.3	51	51.7	51.8	NA
Sand, percent	%	6	0% (0)	80.4	2.93	80.4	75.9	84.6	76.6	77.4	79.2	80.8	81.6	83.1	83.9	NA
Silt, percent	%	6	0% (0)	15.4	4.2	14.8	9.31	18.9	9.69	10.1	12.4	17.4	18.3	18.8	18.8	NA
Reach 6																
Metals																
Aluminum, total	mg/kg	2	0% (0)	13900	2590	13700	12000	15700	12200	12400	13000	13900	14800	15300	15500	NA

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Antimony, total	mg/kg	2	50% (1)	4.55	0.495	4.54	4.9	<8.4	4.24	4.27	4.38	4.55	4.73	4.83	4.87	<8.4
Arsenic, total	mg/kg	2	0% (0)	5.76	2.27	5.53	4.15	7.37	4.31	4.47	4.95	5.76	6.56	7.05	7.21	NA
Barium, total	mg/kg	2	0% (0)	195	45.1	193	164	227	167	170	179	195	211	221	224	NA
Beryllium, total	mg/kg	2	0% (0)	2.68	2.09	2.23	1.2	4.16	1.35	1.5	1.94	2.68	3.42	3.86	4.01	NA
Cadmium, total	mg/kg	2	0% (0)	1.9	2.12	1.16	0.395	3.4	0.545	0.695	1.15	1.9	2.65	3.1	3.25	NA
Calcium, total	mg/kg	2	0% (0)	3220	609	3200	2790	3660	2840	2880	3010	3220	3440	3570	3610	NA
Chromium, total	mg/kg	2	0% (0)	22.7	10.7	21.4	15.1	30.3	15.9	16.6	18.9	22.7	26.5	28.8	29.5	NA
Cobalt, total	mg/kg	2	0% (0)	23.7	22	17.8	8.1	39.2	9.66	11.2	15.9	23.7	31.5	36.1	37.7	NA
Copper, total	mg/kg	2	0% (0)	25.6	8.66	24.8	19.5	31.7	20.1	20.7	22.5	25.6	28.6	30.5	31.1	NA
Iron, total	mg/kg	2	0% (0)	17500	672	17500	17100	18000	17100	17100	17300	17500	17800	17900	18000	NA
Lead, total	mg/kg	2	0% (0)	14	5.13	13.5	10.4	17.7	10.8	11.1	12.2	14	15.8	16.9	17.3	NA
Magnesium, total	mg/kg	2	0% (0)	5120	467	5110	4790	5450	4820	4860	4960	5120	5290	5380	5420	NA
Manganese, total	mg/kg	2	0% (0)	409	44.9	408	377	441	380	383	393	409	425	434	437	NA
Mercury, total	mg/kg	2	0% (0)	0.128	0.123	0.0933	0.0405	0.215	0.0492	0.058	0.0841	0.128	0.171	0.198	0.206	NA
Nickel, total	mg/kg	2	0% (0)	29.4	23.2	24.5	13.1	45.8	14.7	16.3	21.2	29.4	37.6	42.6	44.2	NA
Potassium, total	mg/kg	2	0% (0)	3230	187	3230	3100	3370	3110	3130	3170	3230	3300	3340	3350	NA
Selenium, total	mg/kg	2	0% (0)	3.96	2.84	3.41	1.95	5.97	2.15	2.35	2.95	3.96	4.96	5.57	5.77	NA
Silver, total	mg/kg	2	100% (2)	0.625	0.106	0.62	<1.1	<1.4	0.558	0.565	0.588	0.625	0.663	0.685	0.693	<1.1 - <1.4
Sodium, total	mg/kg	2	0% (0)	430	134	420	336	525	345	355	383	430	477	506	515	NA
Thallium, total	mg/kg	2	50% (1)	2.46	1	2.35	3.17	<3.5	1.82	1.89	2.1	2.46	2.81	3.03	3.1	<3.5
Uranium, total	mg/kg	2	100% (2)	12.3	2.51	12.2	<21.1	<28.2	10.7	10.9	11.4	12.3	13.2	13.7	13.9	<21.1 - <28.2
Vanadium, total	mg/kg	2	0% (0)	44	24.6	40.4	26.6	61.4	28.3	30.1	35.3	44	52.7	58	59.7	NA
Zinc, total	mg/kg	2	0% (0)	74.6	5.55	74.5	70.7	78.5	71	71.4	72.6	74.6	76.5	77.7	78.1	NA
Polycyclic Aromatic Hydrocarbons (PAHs)																
$\sum$ESB-TU_{FCV}[1]	No Units	10	0% (0)	0.00594	0.00281	0.0053	0.00327	0.0086	0.00327	0.00327	0.00327	0.00594	0.0086	0.0086	0.0086	NA
2-Methylnaphthalene	µg/kg	2	0% (0)	0.425	0.0354	0.424	0.4	0.45	0.403	0.405	0.413	0.425	0.438	0.445	0.448	NA
Acenaphthene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Acenaphthylene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Anthracene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Benz(a)anthracene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Benzo(a)pyrene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit
Benzo(b)fluoranthene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Benzo(g,h,i)perylene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Benzo(k)fluoranthene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Carbazole	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Chrysene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Dibenz(a,h)anthracene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Dibenzofuran	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Fluoranthene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Fluorene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Indeno(1,2,3-c,d)pyrene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Naphthalene	µg/kg	2	0% (0)	4.35	0.212	4.35	4.2	4.5	4.22	4.23	4.28	4.35	4.43	4.47	4.49	NA
Nitrobenzene	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Phenanthrene	µg/kg	2	50% (1)	2.05	0.636	2	1.6	<5	1.65	1.69	1.83	2.05	2.28	2.41	2.46	<5
Pyrene	µg/kg	2	100% (2)	2.75	0.354	2.74	<5	<6	2.53	2.55	2.63	2.75	2.88	2.95	2.98	<5 - <6
Total HMW-PAHs[2]	µg/kg	2	100% (2)	16.5	2.12	16.4	<30	<36	15.2	15.3	15.8	16.5	17.3	17.7	17.9	<30 - <36
Total LMW-PAHs[3]	µg/kg	2	0% (0)	17.9	1.06	17.8	17.1	18.6	17.2	17.3	17.5	17.9	18.2	18.5	18.5	NA
Total PAHs[4]	µg/kg	2	0% (0)	34.4	3.18	34.3	32.1	36.6	32.3	32.6	33.2	34.4	35.5	36.2	36.4	NA
Polychlorinated Biphenyls (PCBs)																
Aroclor 1016	µg/kg	2	100% (2)	1.08	0.106	1.07	<2	<2.3	1.01	1.02	1.04	1.08	1.11	1.14	1.14	<2 - <2.3
Aroclor 1221	µg/kg	2	100% (2)	4.35	0.424	4.34	<8.1	<9.3	4.08	4.11	4.2	4.35	4.5	4.59	4.62	<8.1 - <9.3
Aroclor 1232	µg/kg	2	100% (2)	4.35	0.424	4.34	<8.1	<9.3	4.08	4.11	4.2	4.35	4.5	4.59	4.62	<8.1 - <9.3
Aroclor 1242	µg/kg	2	100% (2)	1.08	0.106	1.07	<2	<2.3	1.01	1.02	1.04	1.08	1.11	1.14	1.14	<2 - <2.3
Aroclor 1248	µg/kg	2	100% (2)	1.08	0.106	1.07	<2	<2.3	1.01	1.02	1.04	1.08	1.11	1.14	1.14	<2 - <2.3
Aroclor 1254	µg/kg	2	100% (2)	1.08	0.106	1.07	<2	<2.3	1.01	1.02	1.04	1.08	1.11	1.14	1.14	<2 - <2.3
Aroclor 1260	µg/kg	2	100% (2)	1.08	0.106	1.07	<2	<2.3	1.01	1.02	1.04	1.08	1.11	1.14	1.14	<2 - <2.3
Total PCBs[5]	µg/kg	2	100% (2)	14.1	1.41	14.1	<26.2	<30.1	13.2	13.3	13.6	14.1	14.6	14.9	15	<26.2 - <30.1
Organochlorine Pesticides																
Aldrin	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Chlordane, total [6]	µg/kg	2	100% (2)	0.43	0.0424	0.429	<0.8	<0.92	0.403	0.406	0.415	0.43	0.445	0.454	0.457	<0.8 - <0.92

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Chlordane, *cis-*	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Chlordane, *trans-*	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Dieldrin	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
Endosulfan sulfate	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
Endosulfan-alpha	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Endosulfan-beta	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
Endrin	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
Endrin aldehyde	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
Endrin ketone	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
gamma-HCH (Lindane)	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Heptachlor	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Heptachlor epoxide	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Hexachlorobenzene	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Hexachlorocyclohexane-alpha	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Hexachlorocyclohexane-beta	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Hexachlorocyclohexane-delta	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Hexachlorocyclopentadiene	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Isophorone	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Methoxychlor	µg/kg	2	100% (2)	2.15	0.212	2.14	<4	<4.6	2.02	2.03	2.08	2.15	2.23	2.27	2.29	<4 - <4.6
Nonachlor, *cis-*	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Nonachlor, *trans-*	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
o,p' -DDD	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
p,p'- DDD	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
Sum DDDs (*o,p'* + *p,p'*)	µg/kg	2	100% (2)	0.87	0.0849	0.868	<1.62	<1.86	0.816	0.822	0.84	0.87	0.9	0.918	0.924	<1.62 - <1.86
o,p' -DDE	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
p,p' -DDE	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
Sum DDEs (*o,p'* + *p,p'*)	µg/kg	2	100% (2)	0.87	0.0849	0.868	<1.62	<1.86	0.816	0.822	0.84	0.87	0.9	0.918	0.924	<1.62 - <1.86
o,p'- DDT	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
p,p' -DDT	µg/kg	2	100% (2)	0.435	0.0424	0.434	<0.81	<0.93	0.408	0.411	0.42	0.435	0.45	0.459	0.462	<0.81 - <0.93
Sum DDTs (*o,p'* + *p,p'*)	µg/kg	2	100% (2)	0.87	0.0849	0.868	<1.62	<1.86	0.816	0.822	0.84	0.87	0.9	0.918	0.924	<1.62 - <1.86
Total DDTs (Sum DDDs + Sum DDEs + Sun	µg/kg	2	100% (2)	2.61	0.255	2.6	<4.86	<5.58	2.45	2.47	2.52	2.61	2.7	2.75	2.77	<4.86 - <5.58
Oxychlordane	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Toxaphene	µg/kg	2	100% (2)	21.5	2.12	21.4	<40	<46	20.2	20.3	20.8	21.5	22.3	22.7	22.9	<40 - <46
Semi-Volatile Compounds																
1,2,4-Trichlorobenzene	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
1,2-Dichlorobenzene	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
1,3-Dichlorobenzene	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
1,4-Dichlorobenzene	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
2,2'-Oxybis(1-chloropropane)	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
2,4,5-Trichlorophenol	µg/kg	2	100% (2)	138	10.6	137	<260	<290	131	132	134	138	141	144	144	<260 - <290
2,4,6-Trichlorophenol	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
2,4-Dichlorophenol	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
2,4-Dimethylphenol	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
2,4-Dinitrophenol	µg/kg	2	100% (2)	138	10.6	137	<260	<290	131	132	134	138	141	144	144	<260 - <290
2,4-Dinitrotoluene	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
2,6-Dinitrotoluene	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
2-Chloronaphthalene	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
2-Chlorophenol	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
2-Fluorobiphenyl	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
2-Methylphenol	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
2-Nitroaniline	µg/kg	2	100% (2)	138	10.6	137	<260	<290	131	132	134	138	141	144	144	<260 - <290
2-Nitrophenol	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
3,3'-Dichlorobenzidine	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
3-Nitroaniline	µg/kg	2	100% (2)	138	10.6	137	<260	<290	131	132	134	138	141	144	144	<260 - <290
4-Bromophenyl phenyl ether	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
4-Chloro-3-methylphenol	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
4-Chloroaniline	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
4-Chlorophenyl phenyl ether	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
4-Methylphenol	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
4-Nitroaniline	µg/kg	2	100% (2)	138	10.6	137	<260	<290	131	132	134	138	141	144	144	<260 - <290
4-Nitrophenol	µg/kg	2	100% (2)	138	10.6	137	<260	<290	131	132	134	138	141	144	144	<260 - <290
Acetophenone	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Atrazine	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Benzaldehyde	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Benzoic acid	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Benzyl alcohol	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Bis(2-chloroethoxy)methane	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Bis(2-chloroethyl)ether	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Bis(2-ethylhexyl) phthalate	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Butyl benzyl phthalate	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Caprolactam	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Diethyl phthalate	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Dimethyl phthalate	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Di-n-butyl phthalate	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Dinitro-o-cresol	µg/kg	2	100% (2)	138	10.6	137	<260	<290	131	132	134	138	141	144	144	<260 - <290
Di-N-octyl phthalate	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Hexachlorobutadiene	µg/kg	2	100% (2)	0.215	0.0212	0.214	<0.4	<0.46	0.202	0.203	0.208	0.215	0.223	0.227	0.229	<0.4 - <0.46
Hexachloroethane	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
N-nitrosodi-N-propylamine	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
N-nitrosodiphenylamine	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Pentachlorophenol	µg/kg	2	100% (2)	138	10.6	137	<260	<290	131	132	134	138	141	144	144	<260 - <290
Phenol	µg/kg	2	100% (2)	52.5	3.54	52.4	<100	<110	50.3	50.5	51.3	52.5	53.8	54.5	54.8	<100 - <110
Dioxins/Furans																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	2	0% (0)	0.147	0.101	0.128	0.0756	0.218	0.0827	0.0898	0.111	0.147	0.182	0.204	0.211	NA
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	2	0% (0)	0.796	0.231	0.779	0.633	0.959	0.649	0.666	0.715	0.796	0.878	0.926	0.943	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	2	100% (2)	0.0507	0.00251	0.0507	<0.0979	<0.105	0.0491	0.0493	0.0498	0.0507	0.0516	0.0521	0.0523	<0.0979 - <0.105
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	2	50% (1)	0.0244	0.004	0.0242	0.0272	<0.0431	0.0218	0.0221	0.023	0.0244	0.0258	0.0266	0.0269	<0.0431
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	2	50% (1)	0.0347	0.00818	0.0343	0.0405	<0.0579	0.0295	0.0301	0.0318	0.0347	0.0376	0.0394	0.0399	<0.0579
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg	2	50% (1)	0.0324	0.0211	0.0288	<0.035	0.0473	0.019	0.0205	0.025	0.0324	0.0399	0.0443	0.0458	<0.035
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	2	100% (2)	0.0334	0.0064	0.0331	<0.0578	<0.0759	0.0294	0.0298	0.0312	0.0334	0.0357	0.037	0.0375	<0.0578 - <0.0759
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	2	100% (2)	0.0301	0.0064	0.0298	<0.0512	<0.0693	0.0261	0.0265	0.0279	0.0301	0.0324	0.0337	0.0342	<0.0512 - <0.0693
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	2	0% (0)	0.0675	0.0227	0.0655	0.0514	0.0835	0.053	0.0546	0.0594	0.0675	0.0755	0.0803	0.0819	NA
1,2,3,7,8-Pentachlorodibenzo- p-dioxin	ng/kg	2	50% (1)	0.0341	0.0105	0.0333	0.0416	<0.0534	0.0274	0.0282	0.0304	0.0341	0.0378	0.0401	0.0408	<0.0534
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg	2	50% (1)	0.0311	0.02	0.0277	<0.034	0.0453	0.0184	0.0198	0.0241	0.0311	0.0382	0.0424	0.0438	<0.034

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	2	50% (1)	0.0276	0.0145	0.0256	<0.0347	0.0379	0.0184	0.0194	0.0225	0.0276	0.0327	0.0358	0.0368	<0.0347
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	2	0% (0)	0.0456	0.0164	0.0441	0.034	0.0573	0.0352	0.0363	0.0398	0.0456	0.0514	0.0549	0.0561	NA
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	2	100% (2)	0.0202	0.000813	0.0202	<0.0393	<0.0416	0.0197	0.0198	0.0199	0.0202	0.0205	0.0207	0.0207	<0.0393 - <0.0416
2,3,7,8-Tetrachlorodibenzofuran	ng/kg	2	0% (0)	0.115	0.0363	0.112	0.0892	0.141	0.0918	0.0943	0.102	0.115	0.128	0.135	0.138	NA
Total Tetrachlorodibenzo-p-dioxins	ng/kg	2	100% (2)	0.0202	0.000813	0.0202	<0.0393	<0.0416	0.0197	0.0198	0.0199	0.0202	0.0205	0.0207	0.0207	<0.0393 - <0.0416
Total Pentachlorodibenzo-p-dioxins	ng/kg	2	50% (1)	0.0366	0.014	0.0352	0.0465	<0.0534	0.0277	0.0287	0.0317	0.0366	0.0416	0.0445	0.0455	<0.0534
Total Hexachlorodibenzo-p-dioxins	ng/kg	2	0% (0)	0.121	0.0632	0.113	0.0766	0.166	0.0811	0.0856	0.099	0.121	0.144	0.157	0.162	NA
Total Heptachlorodibenzo-p-dioxins	ng/kg	2	0% (0)	1.67	0.177	1.66	1.54	1.79	1.55	1.57	1.6	1.67	1.73	1.77	1.78	NA
Total Octachlorodibenzo-p-dioxins	ng/kg	2	0% (0)	6.08	0.0354	6.07	6.05	6.1	6.05	6.06	6.06	6.08	6.09	6.1	6.1	NA
Total Tetrachlorodibenzofurans	ng/kg	2	50% (1)	0.176	0.215	0.0895	<0.0488	0.328	0.0396	0.0548	0.1	0.176	0.252	0.298	0.313	<0.0488
Total Pentachlorodibenzofurans	ng/kg	2	0% (0)	0.0735	0.0559	0.062	0.034	0.113	0.038	0.0419	0.0538	0.0735	0.0933	0.105	0.109	NA
Total Hexachlorodibenzofurans	ng/kg	2	0% (0)	0.125	0.112	0.097	0.0461	0.204	0.054	0.0619	0.0856	0.125	0.165	0.188	0.196	NA
Total Heptachlorodibenzofurans	ng/kg	2	0% (0)	0.296	0.133	0.28	0.202	0.39	0.211	0.221	0.249	0.296	0.343	0.371	0.38	NA
Total Octachlorodibenzofurans	ng/kg	2	0% (0)	0.324	0.0269	0.323	0.305	0.343	0.307	0.309	0.315	0.324	0.334	0.339	0.341	NA
TEQ reported value[7]	ng/kg	2	0% (0)	0.0504	0.0192	0.0486	0.0369	0.064	0.0382	0.0396	0.0436	0.0504	0.0572	0.0613	0.0626	NA
COPC Mixtures[8]																
Mean PEC-Q_{METALS}	No units	2	0% (0)	0.258	0.157	0.233	0.147	0.369	0.158	0.169	0.203	0.258	0.314	0.347	0.358	NA
Mean PEC-$Q_{METALS(1\%OC)}$	No units	2	0% (0)	0.119	0.128	0.0765	0.028	0.209	0.0371	0.0461	0.0733	0.119	0.164	0.191	0.2	NA
Mean PEC-Q	No units	2	0% (0)	0.0935	0.0516	0.0860814	0.057	0.13	0.0607	0.0643	0.0753	0.0935	0.112	0.123	0.126	NA
ΣPEC-Q_{METALS}	No units	2	0% (0)	1.81	1.1	1.63	1.03	2.59	1.11	1.19	1.42	1.81	2.2	2.43	2.51	NA
ΣPEC-$Q_{METALS(1\%OC)}$	No units	2	0% (0)	0.828	0.894	0.535	0.196	1.46	0.259	0.322	0.512	0.828	1.14	1.33	1.4	NA
Nutrients/Inorganics/Conventionals																
Moisture, percent	%	2	0% (0)	19.5	4.6	19.2	16.2	22.7	16.5	16.9	17.8	19.5	21.1	22.1	22.4	NA
Organic carbon, total	%	2	0% (0)	3.52	2.47	3.05	1.77	5.27	1.95	2.12	2.65	3.52	4.4	4.92	5.1	NA
Nutrients/Inorganics/Conventionals																
Grainsize Fraction <75µm	%	2	0% (0)	68.6	9.05	68.3	62.2	75	62.8	63.5	65.4	68.6	71.8	73.7	74.4	NA
Clay, percent	%	2	0% (0)	9.48	0.673	9.46	9	9.95	9.05	9.1	9.24	9.48	9.71	9.86	9.9	NA
Colloid, percent	%	2	0% (0)	7.3	2.41	7.1	5.6	9	5.77	5.94	6.45	7.3	8.15	8.66	8.83	NA

Table A2.5. Summary of the available whole sediment sub-surficial (i.e., ≥15cm) sediment chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit
									5th	10th	25th	50th	75th	90th	95th	
Fines, percent (silt+clay)	%	2	0% (0)	61.3	6.65	61.1	56.6	66	57.1	57.5	59	61.3	63.7	65.1	65.5	NA
Gravel, percent	%	2	0% (0)	3	4.24	NC	0	6	0.3	0.6	1.5	3	4.5	5.4	5.7	NA
Sand - coarse, percent	%	2	0% (0)	1.25	1.63	0.49	0.1	2.4	0.215	0.33	0.675	1.25	1.83	2.17	2.29	NA
Sand - fine, percent	%	2	0% (0)	22.1	1.56	22.1	21	23.2	21.1	21.2	21.6	22.1	22.7	23	23.1	NA
Sand - medium, percent	%	2	0% (0)	5.05	4.74	3.78	1.7	8.4	2.04	2.37	3.38	5.05	6.73	7.73	8.07	NA
Sand, percent	%	2	0% (0)	28.4	4.81	28.2	25	31.8	25.3	25.7	26.7	28.4	30.1	31.1	31.5	NA
Silt, percent	%	2	0% (0)	51.8	7.32	51.6	46.7	57	47.2	47.7	49.2	51.8	54.4	56	56.5	NA

n = number; SD = standard deviation; Geo Mean = geometric mean; Min = minimum; Max = maximum; NA = not applicable; NC = not calculated; *f* = fraction; OC = organic carbon; ESBTU = equilibrium partitioning sediment benchmark toxic unit; PAHs = polycyclic aromatic hydrocarbons; HMW = high molecular weight; LMW = low molecular weight; PCBs = polychlorinated biphenyls; HCH = hexachlorocyclohexane; TEQ = toxic equivalents; PEC-Q = probable effect concentration-quotient.

[1] $\sum$ESB-TU_{FCV} were calculated as the sum of the equilibrium partitioning sediment benchmark toxic units for the following 13 PAHs: acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene.

[2] Total HMW-PAHs were calculated if the following mandatory PAHs were measured: benz(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, pyrene.

[3] Total LMW-PAHs were calculated if the following mandatory PAHs were measured: 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, phenanthrene

[4] Total PAHs were calculated as the sum of LMW- and HMW-PAHs.

[5] Total PCBs were calculated as the sum of the reported concentrations of individual Aroclors (i.e., Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260).

[6] Total chlordane was calculated as the sum of the *cis-* and *trans-* isomers.

[7] The TEQ reported value is based on toxic equivalency values from the World Health Organization (Van den Berg et al. 1998).

[8] PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total PAHs; and, total PCBs (Ingersoll *et al.* 2001).
PEC-Q_{METALS} was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001);
PEC-$Q_{EXTMETALS}$ was calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

Table A2.6. Summary of the available centrifuge pore-water chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Reach 1																
Metals																
Aluminum, total	µg/L	14	14% (2)	78.6	15.1	77.2	55.2	<200	60.1	63.1	66.1	80	86.5	100	101	<200
Antimony, total	µg/L	14	50% (7)	24.4	8.48	22.4	7.1	<60	8.73	11.5	19	30	30	30	30.8	<60
Arsenic, total	µg/L	15	93% (14)	4.78	0.852	4.65	1.7	<10	4.01	5	5	5	5	5	5	<10
Barium, total	µg/L	14	0% (0)	324	173	280	77.8	694	125	157	190	283	440	516	589	NA
Beryllium, total	µg/L	14	100% (14)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Cadmium, total	µg/L	15	53% (8)	1.49	1.02	1.01	<0.17	<5	0.229	0.322	0.515	1.4	2.5	2.5	2.5	<0.17 - <5
Calcium, total	µg/L	14	0% (0)	64400	41500	53900	22900	164000	23300	24400	37300	49300	90400	112000	131000	NA
Chromium, total	µg/L	14	57% (8)	12.2	30.2	4.87	1.1	117	1.69	2.03	4.43	5	5	5	44.2	<10
Cobalt, total	µg/L	14	50% (7)	14.4	11.1	9.49	2.6	<50	2.67	2.76	3.75	15.2	25	25	25	<50
Copper, total	µg/L	15	0% (0)	21	14.1	16.2	2.2	58.1	3.11	6.9	13.4	20.4	23.6	36.1	44.4	NA
Iron, total	µg/L	15	0% (0)	286	405	177	52.2	1660	81.5	95.5	112	121	281	484	848	NA
Lead, total	µg/L	15	67% (10)	4.86	1.63	4.58	2.3	<10	2.37	2.44	5	5	5	6.26	7.55	<10
Magnesium, total	µg/L	14	0% (0)	13700	10400	11000	5060	41100	5230	5340	7010	8890	16300	26000	33000	NA
Manganese, total	µg/L	15	0% (0)	1070	1710	99.6	4.1	6060	4.17	4.48	9.75	30	1660	2740	3830	NA
Mercury, total	µg/L	14	36% (5)	0.0545	0.0393	0.0408	0.015	<0.2	0.0157	0.016	0.0203	0.0315	0.1	0.1	0.1	<0.2
Nickel, total	µg/L	14	71% (10)	20.9	18.6	15.5	3.4	81.1	3.66	4.01	20	20	20	20	41.4	<40
Potassium, total	µg/L	14	0% (0)	2890	2190	2290	799	8830	878	941	1510	2210	3650	5050	6490	NA
Selenium, total	µg/L	14	86% (12)	17.3	1.99	17.1	11	<35	15.2	17.5	17.5	17.5	17.5	17.5	18.6	<35
Silver, total	µg/L	14	100% (14)	5	0	5	<10	<10	5	5	5	5	5	5	5	<10
Sodium, total	µg/L	14	0% (0)	4350	1350	4170	2730	7400	2840	2950	3280	4150	4850	6130	6710	NA
Thallium, total	µg/L	14	100% (14)	12.5	0	12.5	<25	<25	12.5	12.5	12.5	12.5	12.5	12.5	12.5	<25
Uranium, total	µg/L	14	93% (13)	95.9	15.4	94	42.2	<200	79.8	100	100	100	100	100	100	<200
Vanadium, total	µg/L	14	93% (13)	23.8	4.65	23	7.6	<50	18.9	25	25	25	25	25	25	<50
Zinc, total	µg/L	15	7% (1)	143	120	107	<44	492	41.8	50.9	60.3	112	175	253	339	<44
$\sum$PW-TU$_{DIVALENT\ METALS}$ [1]	No Units	15	0% (0)	3.89	2.17	3.18	0.495	8.8	0.781	1.33	2.7	4.21	4.87	6.24	7.22	NA
Nutrients/Inorganics/Conventionals																
Dissolved organic carbon	mg/L	1	0% (0)	15	NA	15	15	15	15	15	15	15	15	15	15	NA
Alkalinity, Carbonate total	mg/L as $CaCO_3$	1	0% (0)	110	NA	110	110	110	110	110	110	110	110	110	110	NA

Table A2.6. Summary of the available centrifuge pore-water chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Conductivity	mS/cm	1	0% (0)	250	NA	250	250	250	250	250	250	250	250	250	250	NA
Hardness	mg/L as $CaCO_3$	15	0% (0)	202	135	169	74.7	552	76.4	80.3	118	149	261	361	424	NA
Ammonia	mg N/L	1	0% (0)	0.2	NA	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	NA
Sulfide, total (S_2)	mg/L	1	100% (1)	0.002	NA	0.002	<0.004	<0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	<0.004
Reach 2																
Metals																
Aluminum, total	µg/L	8	25% (2)	78.5	21	75.9	47.7	<200	53.5	59.3	64.6	72.5	100	102	104	<200
Antimony, total	µg/L	8	75% (6)	24.5	10.3	21.5	7.7	<60	7.81	7.91	24.5	30	30	30	30	<60
Arsenic, total	µg/L	9	78% (7)	5.89	1.79	5.69	8.4	<10	5	5	5	5	5	8.64	9.12	<10
Barium, total	µg/L	8	0% (0)	451	177	413	152	734	201	250	384	461	547	605	670	NA
Beryllium, total	µg/L	8	100% (8)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Cadmium, total	µg/L	9	44% (4)	1.7	0.982	1.38	0.465	<5	0.479	0.493	0.84	2.5	2.5	2.52	2.56	<5
Calcium, total	µg/L	8	0% (0)	89900	36300	83500	42300	153000	48100	53900	67000	82100	113000	130000	141000	NA
Chromium, total	µg/L	8	0% (0)	2.94	1.37	2.6	1.1	4.7	1.21	1.31	1.63	3.25	3.98	4.35	4.53	NA
Cobalt, total	µg/L	8	38% (3)	10.7	11.9	5.22	1.5	<50	1.61	1.71	1.91	2.6	25	25	25	<50
Copper, total	µg/L	9	0% (0)	26.7	37.6	13	4.15	110	4.61	5.07	5.9	7.5	19.4	78.2	94.1	NA
Iron, total	µg/L	9	0% (0)	492	1130	159	79.3	3500	80.3	81.3	87.4	101	155	886	2190	NA
Lead, total	µg/L	9	33% (3)	32	81.8	7.18	3.1	250	3.32	3.54	4.8	5	5	55	152	<10
Magnesium, total	µg/L	8	0% (0)	20400	8980	18500	8580	31000	9690	10800	13100	21200	27700	29600	30300	NA
Manganese, total	µg/L	9	0% (0)	1550	1350	818	22.2	4140	164	305	470	1370	2140	3050	3600	NA
Mercury, total	µg/L	8	50% (4)	0.06	0.0428	0.0447	0.019	<0.2	0.0194	0.0197	0.02	0.0605	0.1	0.1	0.1	<0.2
Nickel, total	µg/L	8	75% (6)	16.2	7.13	13.8	4.1	<40	4.45	4.8	16.3	20	20	20	20	<40
Potassium, total	µg/L	8	0% (0)	3190	1680	2730	880	5260	1230	1590	1960	2920	4790	4980	5120	NA
Selenium, total	µg/L	8	63% (5)	15.2	3.27	14.9	9.5	<35	10.5	11.5	12.5	17.5	17.5	17.5	17.5	<35
Silver, total	µg/L	8	100% (8)	5	0	5	<10	<10	5	5	5	5	5	5	5	<10
Sodium, total	µg/L	8	0% (0)	6340	2880	5740	2780	10900	2870	2970	4350	6410	7540	9980	10400	NA
Thallium, total	µg/L	8	100% (8)	12.5	0	12.5	<25	<25	12.5	12.5	12.5	12.5	12.5	12.5	12.5	<25
Uranium, total	µg/L	8	88% (7)	91	25.6	85.2	27.7	<200	53	78.3	100	100	100	100	100	<200
Vanadium, total	µg/L	8	25% (2)	8.94	10.1	5.18	1.5	<50	1.64	1.78	2.05	4.48	11.6	25	25	<50
Zinc, total	µg/L	9	0% (0)	103	80.6	83.8	34.2	300	39.3	44.4	54.7	94.7	103	166	233	NA

Table A2.6. Summary of the available centrifuge pore-water chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
$\sum$PW-TU$_{DIVALENT\ METALS}$ [1]	No Units	9	0% (0)	8.78	19.3	2.86	0.824	60	0.83	0.837	1.13	2.97	3.71	15.6	37.8	NA
Nutrients/Inorganics/Conventionals																
Dissolved organic carbon	mg/L	1	0% (0)	44	NA	44	44	44	44	44	44	44	44	44	44	NA
Alkalinity, Carbonate total	mg/L as $CaCO_3$	1	0% (0)	110	NA	110	110	110	110	110	110	110	110	110	110	NA
Conductivity	mS/cm	1	0% (0)	240	NA	240	240	240	240	240	240	240	240	240	240	NA
Hardness	mg/L as $CaCO_3$	9	0% (0)	276	126	250	120	490	126	132	200	226	371	418	454	NA
Ammonia	mg N/L	1	0% (0)	1.6	NA	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	NA
Sulfide, total (S_2)	mg/L	1	0% (0)	0.13	NA	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	NA
Reach 3																
Metals																
Aluminum, total	µg/L	4	0% (0)	109	62.2	94.6	43.6	184	48.3	53.1	67.3	104	146	169	176	NA
Antimony, total	µg/L	4	100% (4)	30	0	30	<60	<60	30	30	30	30	30	30	30	<60
Arsenic, total	µg/L	5	40% (2)	6.68	1.89	6.48	6.7	<10	5	5	5	6.7	7.1	8.6	9.1	<10
Barium, total	µg/L	4	0% (0)	384	251	324	136	732	163	189	269	333	448	618	675	NA
Beryllium, total	µg/L	4	75% (3)	1.9	1.2	1.14	0.11	<5	0.469	0.827	1.9	2.5	2.5	2.5	2.5	<5
Cadmium, total	µg/L	5	40% (2)	2.24	0.923	2.02	0.78	<5	1.04	1.31	2.1	2.5	2.5	2.98	3.14	<5
Calcium, total	µg/L	4	0% (0)	80000	55500	68800	39200	162000	41800	44400	52200	59500	87300	132000	147000	NA
Chromium, total	µg/L	4	0% (0)	2.15	1.3	1.9	1.2	4	1.22	1.23	1.28	1.7	2.58	3.43	3.72	NA
Cobalt, total	µg/L	4	50% (2)	12.9	13.9	4.6	0.65	<50	0.718	0.785	0.988	13.1	25	25	25	<50
Copper, total	µg/L	5	0% (0)	15.7	19.3	7.83	1.9	48	2	2.1	2.4	7.1	18.9	36.4	42.2	NA
Iron, total	µg/L	5	0% (0)	1360	1200	900	239	2950	271	304	401	907	2300	2690	2820	NA
Lead, total	µg/L	5	40% (2)	49	75.9	15.9	4.4	180	4.52	4.64	5	5	50.8	128	154	<10
Magnesium, total	µg/L	4	0% (0)	10300	1940	10100	8360	12400	8450	8530	8790	10200	11700	12100	12300	NA
Manganese, total	µg/L	5	0% (0)	1690	664	1590	1000	2690	1060	1130	1320	1440	1990	2410	2550	NA
Mercury, total	µg/L	4	50% (2)	0.063	0.0428	0.0508	0.023	<0.2	0.0239	0.0248	0.0275	0.0645	0.1	0.1	0.1	<0.2
Nickel, total	µg/L	4	75% (3)	18	4.1	17.5	11.8	<40	13	14.3	18	20	20	20	20	<40
Potassium, total	µg/L	4	0% (0)	2330	677	2250	1580	3170	1650	1720	1930	2280	2670	2970	3070	NA
Selenium, total	µg/L	4	100% (4)	17.5	0	17.5	<35	<35	17.5	17.5	17.5	17.5	17.5	17.5	17.5	<35

Table A2.6. Summary of the available centrifuge pore-water chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Silver, total	µg/L	4	100% (4)	5	0	5	<10	<10	5	5	5	5	5	5	5	<10
Sodium, total	µg/L	4	25% (1)	3880	1610	3520	<3070	4980	1920	2300	3450	4500	4930	4960	4970	<3070
Thallium, total	µg/L	4	100% (4)	12.5	0	12.5	<25	<25	12.5	12.5	12.5	12.5	12.5	12.5	12.5	<25
Uranium, total	µg/L	4	100% (4)	100	0	100	<200	<200	100	100	100	100	100	100	100	<200
Vanadium, total	µg/L	4	100% (4)	25	0	25	<50	<50	25	25	25	25	25	25	25	<50
Zinc, total	µg/L	5	20% (1)	71	76.5	46.2	16.9	200	17.9	18.9	22	34.7	81.2	152	176	<44
$\sum$PW-TU$_{DIVALENT\ METALS}$ [1]	No Units	5	0% (0)	14.5	19.5	4.79	0.601	46	0.715	0.829	1.17	3.7	21.1	36	41	NA
Nutrients/Inorganics/Conventionals																
Dissolved organic carbon	mg/L	1	0% (0)	120	NA	120	120	120	120	120	120	120	120	120	120	NA
Alkalinity, Carbonate total	mg/L as $CaCO_3$	1	0% (0)	110	NA	110	110	110	110	110	110	110	110	110	110	NA
Conductivity	mS/cm	1	0% (0)	280	NA	280	280	280	280	280	280	280	280	280	280	NA
Hardness	mg/L as $CaCO_3$	5	0% (0)	214	126	192	129	434	129	129	130	184	195	338	386	NA
Ammonia	mg N/L	1	0% (0)	1.9	NA	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	NA
Sulfide, total (S_2)	mg/L	1	0% (0)	0.04	NA	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	NA
Reach 4																
Metals																
Aluminum, total	µg/L	14	0% (0)	226	181	166	45	595	64	75.7	95.9	116	353	481	550	NA
Antimony, total	µg/L	14	100% (14)	30	0	30	<60	<60	30	30	30	30	30	30	30	<60
Arsenic, total	µg/L	16	50% (8)	9.36	14.7	6.17	1.4	64	4.1	5	5	5	6.68	10.1	25	<10
Barium, total	µg/L	14	0% (0)	234	74.7	221	86.2	350	126	154	183	235	284	320	334	NA
Beryllium, total	µg/L	14	100% (14)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Cadmium, total	µg/L	16	50% (8)	9.92	32	1.66	<0.17	130	0.235	0.285	0.458	2.5	2.5	3.95	35.5	<0.17 - <5
Calcium, total	µg/L	14	0% (0)	51600	14700	49900	31300	93800	32600	36200	45800	50200	55400	59700	72200	NA
Chromium, total	µg/L	14	14% (2)	3.51	2.74	2.62	0.99	<10	0.99	1.05	1.28	1.95	5	7.41	8.29	<10
Cobalt, total	µg/L	14	50% (7)	13.7	11.8	6.92	0.86	<50	0.951	1.04	1.8	15.5	25	25	25	<50
Copper, total	µg/L	16	25% (4)	46.7	148	9.5	2.5	600	2.39	2.9	4.83	7.3	12.5	28.7	177	<4.1 - <25
Iron, total	µg/L	16	0% (0)	5680	20600	314	43.8	83000	59	65.4	84.5	205	494	2610	23300	NA
Lead, total	µg/L	16	44% (7)	248	947	9.98	1	3800	1.75	3.5	5	5	14.5	45.6	984	<10

Table A2.6. Summary of the available centrifuge pore-water chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Magnesium, total	µg/L	14	0% (0)	11000	3700	10500	6300	22000	7330	8060	9250	10300	11600	13500	16800	NA
Manganese, total	µg/L	16	0% (0)	2080	2220	956	7.8	7400	115	224	621	968	2510	5490	6170	NA
Mercury, total	µg/L	14	43% (6)	0.105	0.0916	0.073	0.015	0.34	0.0163	0.0176	0.0458	0.1	0.1	0.218	0.288	<0.2
Nickel, total	µg/L	14	57% (8)	13.4	7.96	10.5	3.5	<40	3.5	3.59	5.21	20	20	20	20	<40
Potassium, total	µg/L	14	0% (0)	1690	502	1610	600	2600	927	1160	1460	1680	2070	2140	2310	NA
Selenium, total	µg/L	14	100% (14)	17.5	0	17.5	<35	<35	17.5	17.5	17.5	17.5	17.5	17.5	17.5	<35
Silver, total	µg/L	14	100% (14)	5	0	5	<10	<10	5	5	5	5	5	5	5	<10
Sodium, total	µg/L	14	0% (0)	4840	1870	4580	3080	9780	3180	3310	3600	4420	5160	7100	8520	NA
Thallium, total	µg/L	14	100% (14)	12.5	0	12.5	<25	<25	12.5	12.5	12.5	12.5	12.5	12.5	12.5	<25
Uranium, total	µg/L	14	100% (14)	100	0	100	<200	<200	100	100	100	100	100	100	100	<200
Vanadium, total	µg/L	14	43% (6)	13.6	10.7	8.63	1.7	<50	1.96	2.1	2.71	10.7	25	25	25	<50
Zinc, total	µg/L	16	6% (1)	213	637	61.8	18.1	2600	21	24.4	39.2	53.5	69.5	103	737	<44
$\sum$PW-$TU_{DIVALENT\ METALS}$ [1]	No Units	16	0% (0)	74	274	3.03	0.389	1100	0.524	0.585	0.833	1.46	8.81	22.9	293	NA
Nutrients/Inorganics/Conventionals																
Dissolved organic carbon	mg/L	2	0% (0)	23	5.66	22.6	19	27	19.4	19.8	21	23	25	26.2	26.6	NA
Alkalinity, Carbonate total	mg/L as $CaCO_3$	2	0% (0)	105	7.07	105	100	110	101	101	103	105	108	109	110	NA
Conductivity	mS/cm	2	0% (0)	260	156	236	150	370	161	172	205	260	315	348	359	NA
Hardness	mg/L as $CaCO_3$	16	0% (0)	166	44.9	161	106	310	114	128	145	165	175	187	219	NA
Ammonia	mg N/L	2	0% (0)	0.35	0.0707	0.346	0.3	0.4	0.305	0.31	0.325	0.35	0.375	0.39	0.395	NA
Sulfide, total (S_2)	mg/L	2	50% (1)	0.071	0.0976	0.0167	<0.004	0.14	0.0089	0.0158	0.0365	0.071	0.106	0.126	0.133	<0.004
Reach 5																
Metals																
Aluminum, total	µg/L	4	0% (0)	87.2	20	85.7	69.7	116	71.3	72.9	77.7	81.6	91.2	106	111	NA
Antimony, total	µg/L	4	100% (4)	30	0	30	<60	<60	30	30	30	30	30	30	30	<60
Arsenic, total	µg/L	5	60% (3)	28.1	38.6	13	<10	94	5	5	5	5	31.5	69	81.5	<10
Barium, total	µg/L	4	0% (0)	202	158	141	34.5	350	44.6	54.8	85.1	213	330	342	346	NA
Beryllium, total	µg/L	4	100% (4)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Cadmium, total	µg/L	5	20% (1)	6.45	12.1	1.57	0.25	28	0.33	0.41	0.65	0.85	2.5	17.8	22.9	<5

Table A2.6. Summary of the available centrifuge pore-water chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Calcium, total	µg/L	4	0% (0)	56400	29400	50100	23600	93000	26900	30100	39900	54400	70900	84200	88600	NA
Chromium, total	µg/L	4	0% (0)	20.4	18.5	12.4	3.1	36.5	3.51	3.91	5.13	21.1	36.4	36.4	36.5	NA
Cobalt, total	µg/L	4	25% (1)	7.8	11.5	3.45	1.1	<50	1.15	1.19	1.33	2.55	9.03	18.6	21.8	<50
Copper, total	µg/L	5	20% (1)	73.6	155	7.49	1.6	350	1.6	1.6	1.6	2.1	12.5	215	283	<25
Iron, total	µg/L	5	0% (0)	14500	32100	470	93.2	72000	96.8	100	111	165	187	43300	57600	NA
Lead, total	µg/L	5	80% (4)	284	624	15.4	<10	1400	5	5	5	5	5	842	1120	<10
Magnesium, total	µg/L	4	0% (0)	11800	6140	10500	4730	19600	5600	6460	9060	11500	14300	17500	18500	NA
Manganese, total	µg/L	5	0% (0)	3590	4530	468	4.8	11000	11.5	18.3	38.5	2510	4380	8350	9680	NA
Mercury, total	µg/L	4	75% (3)	0.0803	0.0395	0.0677	0.021	<0.2	0.0329	0.0447	0.0803	0.1	0.1	0.1	0.1	<0.2
Nickel, total	µg/L	4	25% (1)	19.5	10.4	16.1	4.7	<40	7	9.29	16.2	23.1	26.4	26.9	27	<40
Potassium, total	µg/L	4	0% (0)	1980	856	1850	1200	3010	1220	1250	1320	1860	2520	2820	2910	NA
Selenium, total	µg/L	4	100% (4)	17.5	0	17.5	<35	<35	17.5	17.5	17.5	17.5	17.5	17.5	17.5	<35
Silver, total	µg/L	4	100% (4)	5	0	5	<10	<10	5	5	5	5	5	5	5	<10
Sodium, total	µg/L	4	0% (0)	3530	1040	3410	2380	4680	2470	2550	2820	3520	4230	4500	4590	NA
Thallium, total	µg/L	4	100% (4)	12.5	0	12.5	<25	<25	12.5	12.5	12.5	12.5	12.5	12.5	12.5	<25
Uranium, total	µg/L	4	100% (4)	100	0	100	<200	<200	100	100	100	100	100	100	100	<200
Vanadium, total	µg/L	4	0% (0)	7.7	4.47	6.61	2.7	13.4	3.24	3.78	5.4	7.35	9.65	11.9	12.7	NA
Zinc, total	µg/L	5	0% (0)	415	721	118	9.5	1700	20.1	30.7	62.6	142	160	1080	1390	NA
$\sum$PW-TU$_{\text{DIVALENT METALS}}$ [1]	No Units	5	0% (0)	49.6	106	4.45	0.588	240	0.744	0.901	1.37	2.47	3.64	145	193	NA
Nutrients/Inorganics/Conventionals																
Dissolved organic carbon	mg/L	1	0% (0)	32	NA	32	32	32	32	32	32	32	32	32	32	NA
Alkalinity, Carbonate total	mg/L as $CaCO_3$	1	0% (0)	120	NA	120	120	120	120	120	120	120	120	120	120	NA
Conductivity	mS/cm	1	0% (0)	210	NA	210	210	210	210	210	210	210	210	210	210	NA
Hardness	mg/L as $CaCO_3$	5	0% (0)	175	83	159	75.3	300	90.2	105	150	150	202	261	280	NA
Ammonia	mg N/L	1	0% (0)	1.1	NA	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	NA
Sulfide, total (S_2)	mg/L	1	0% (0)	0.22	NA	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	NA

Table A2.6. Summary of the available centrifuge pore-water chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution 5th	10th	25th	50th	75th	90th	95th	Detection Limit Range
Reach 6																
Metals																
Aluminum, total	µg/L	5	0% (0)	90.7	32.2	85.9	53.6	125	55.6	57.6	63.6	91.4	120	123	124	NA
Antimony, total	µg/L	5	100% (5)	30	0	30	<60	<60	30	30	30	30	30	30	30	<60
Arsenic, total	µg/L	6	67% (4)	6.33	4.6	5.38	2.5	15.5	3.13	3.75	5	5	5	10.3	12.9	<10
Barium, total	µg/L	5	0% (0)	249	70.5	240	159	311	165	171	189	278	308	310	310	NA
Beryllium, total	µg/L	5	100% (5)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Cadmium, total	µg/L	6	17% (1)	0.688	0.9	0.385	0.06	<5	0.123	0.185	0.313	0.375	0.49	1.51	2	<5
Calcium, total	µg/L	5	0% (0)	49200	19200	46000	27100	70700	28200	29300	32500	50700	65000	68400	69600	NA
Chromium, total	µg/L	5	0% (0)	8.8	5.22	7.52	3.2	15.7	3.64	4.08	5.4	7	12.7	14.5	15.1	NA
Cobalt, total	µg/L	5	20% (1)	7.39	10.1	3.55	0.76	<50	0.948	1.14	1.7	2.5	7	17.8	21.4	<50
Copper, total	µg/L	6	83% (5)	9.06	5.33	6.97	2.3	<25	2.11	2.18	4.85	12.5	12.5	12.5	12.5	<4.1 - <25
Iron, total	µg/L	6	0% (0)	1840	4000	337	85.4	9990	93.6	102	121	177	431	5250	7620	NA
Lead, total	µg/L	6	50% (3)	4.02	1.63	3.64	1.5	<10	1.73	1.95	3.05	5	5	5.1	5.15	<10
Magnesium, total	µg/L	5	0% (0)	11700	4170	11100	6570	16600	7000	7430	8710	11700	14900	15900	16300	NA
Manganese, total	µg/L	6	0% (0)	3750	4890	508	6	12800	7.7	9.4	242	2290	4750	8960	10900	NA
Mercury, total	µg/L	5	80% (4)	0.0838	0.0362	0.0717	0.019	<0.2	0.0352	0.0514	0.1	0.1	0.1	0.1	0.1	<0.2
Nickel, total	µg/L	5	20% (1)	9.74	5.99	8.61	5	<40	5.36	5.72	6.8	7.1	9.8	15.9	18	<40
Potassium, total	µg/L	5	0% (0)	1760	726	1620	730	2560	894	1060	1550	1630	2350	2480	2520	NA
Selenium, total	µg/L	5	80% (4)	16.1	3.09	15.8	10.6	<35	12	13.4	17.5	17.5	17.5	17.5	17.5	<35
Silver, total	µg/L	5	100% (5)	5	0	5	<10	<10	5	5	5	5	5	5	5	<10
Sodium, total	µg/L	5	0% (0)	5030	1190	4910	3400	6750	3710	4010	4930	4980	5070	6080	6410	NA
Thallium, total	µg/L	5	80% (4)	11.4	2.55	11.1	6.8	<25	7.94	9.08	12.5	12.5	12.5	12.5	12.5	<25
Uranium, total	µg/L	5	100% (5)	100	0	100	<200	<200	100	100	100	100	100	100	100	<200
Vanadium, total	µg/L	5	0% (0)	8.66	2.94	8.27	5.4	12.7	5.72	6.04	7	7.6	10.6	11.9	12.3	NA
Zinc, total	µg/L	6	17% (1)	53.6	24	48.3	29.2	84.2	23.8	25.6	35.2	58.4	67.9	76.8	80.5	<44
$\sum$PW-TU$_{DIVALENT\ METALS}$ [1]	No Units	6	0% (0)	1.53	0.533	1.42	0.574	2.02	0.781	0.987	1.43	1.6	1.93	2.01	2.02	NA
Nutrients/Inorganics/Conventionals																
Alkalinity, Carbonate total	mg/L as $CaCO_3$	1	0% (0)	120	NA	120	120	120	120	120	120	120	120	120	120	NA
Conductivity	mS/cm	1	0% (0)	270	NA	270	270	270	270	270	270	270	270	270	270	NA

Table A2.6. Summary of the available centrifuge pore-water chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Hardness	mg/L as $CaCO_3$	6	0% (0)	163	55.9	154	90.5	234	95.6	101	123	164	202	224	229	NA
Ammonia	mg N/L	1	0% (0)	0.3	NA	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	NA
Sulfide, total (S_2)	mg/L	1	100% (1)	0.002	NA	0.002	<0.004	<0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	<0.004
Reference Envelope Stations [2]																
Metals																
Aluminum, total	µg/L	7	14% (1)	82.4	14.2	81.3	67	<200	67.8	68.5	71.7	75.2	95.5	99.9	100	<200
Antimony, total	µg/L	7	100% (7)	30	0	30	<60	<60	30	30	30	30	30	30	30	<60
Arsenic, total	µg/L	8	88% (7)	8.88	11	6.4	<10	36	5	5	5	5	5	14.3	25.2	<10
Barium, total	µg/L	7	0% (0)	284	53.2	280	232	384	233	233	248	268	305	341	363	NA
Beryllium, total	µg/L	7	100% (7)	2.5	0	2.5	<5	<5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<5
Cadmium, total	µg/L	8	75% (6)	1.96	0.994	1.52	0.26	<5	0.327	0.393	1.99	2.5	2.5	2.5	2.5	<5
Calcium, total	µg/L	7	0% (0)	89800	29600	86000	61300	142000	61600	62000	68600	75700	106000	121000	131000	NA
Chromium, total	µg/L	7	14% (1)	10.8	15.3	4.43	1	40.7	1.09	1.18	1.68	2.7	14	30	35.4	<10
Cobalt, total	µg/L	7	14% (1)	4.93	8.9	2.04	0.65	<50	0.662	0.674	0.945	1.4	2.8	11.9	18.5	<50
Copper, total	µg/L	8	0% (0)	2.95	0.769	2.85	1.7	4	1.95	2.19	2.48	2.95	3.53	3.72	3.86	NA
Iron, total	µg/L	8	0% (0)	744	1330	291	67.9	4000	72.2	76.6	103	239	596	1650	2820	NA
Lead, total	µg/L	8	88% (7)	5.49	1.38	5.37	8.9	<10	5	5	5	5	5	6.17	7.54	<10
Magnesium, total	µg/L	7	0% (0)	21600	8750	19900	10900	32500	11100	11200	15100	22500	27500	32300	32400	NA
Manganese, total	µg/L	8	0% (0)	1580	1090	1150	199	3410	287	374	662	1690	2090	2770	3090	NA
Mercury, total	µg/L	7	86% (6)	0.089	0.0291	0.0811	0.023	<0.2	0.0461	0.0692	0.1	0.1	0.1	0.1	0.1	<0.2
Nickel, total	µg/L	7	71% (5)	20.6	2.6	20.5	18.1	<40	18.7	19.2	20	20	20	22.5	24.4	<40
Potassium, total	µg/L	7	0% (0)	4170	1540	3950	2500	6990	2530	2550	3200	3910	4710	5800	6390	NA
Selenium, total	µg/L	7	57% (4)	16.9	2.93	16.6	10.5	<35	12.6	14.7	17.5	17.5	17.6	18.5	19.2	<35
Silver, total	µg/L	7	100% (7)	5	0	5	<10	<10	5	5	5	5	5	5	5	<10
Sodium, total	µg/L	7	0% (0)	6890	2920	6460	4130	12800	4360	4600	5190	6290	7330	10100	11400	NA
Thallium, total	µg/L	7	100% (7)	12.5	0	12.5	<25	<25	12.5	12.5	12.5	12.5	12.5	12.5	12.5	<25
Uranium, total	µg/L	7	86% (6)	89.1	28.8	81.5	23.8	<200	46.7	69.5	100	100	100	100	100	<200
Vanadium, total	µg/L	7	100% (7)	25	0	25	<50	<50	25	25	25	25	25	25	25	<50
Zinc, total	µg/L	8	13% (1)	62.7	37.4	53.3	24.4	132	22.8	23.7	41.2	50.7	84.4	105	119	<44
$\sum$PW-$TU_{DIVALENT\ METALS}$ [1]	No Units	8	0% (0)	1.28	0.617	1.17	0.722	2.3	0.769	0.815	0.879	1.03	1.45	2.22	2.26	NA

Table A2.6. Summary of the available centrifuge pore-water chemistry data for the Upper Columbia River study area.

Reach/Chemical Class/Analyte	Units	n	% Non-Detects (n)	Mean	SD	Geo Mean	Min	Max	Distribution							Detection Limit Range
									5th	10th	25th	50th	75th	90th	95th	
Nutrients/Inorganics/Conventionals																
Dissolved organic carbon	mg/L	1	0% (0)	25	NA	25	25	25	25	25	25	25	25	25	25	NA
Alkalinity, Carbonate total	mg/L as $CaCO_3$	1	0% (0)	130	NA	130	130	130	130	130	130	130	130	130	130	NA
Conductivity	mS/cm	1	0% (0)	290	NA	290	290	290	290	290	290	290	290	290	290	NA
Hardness	mg/L as $CaCO_3$	8	0% (0)	278	107	259	130	467	151	173	194	283	334	382	424	NA
Ammonia	mg N/L	1	0% (0)	0.7	NA	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	NA
Sulfide, total (S_2)	mg/L	1	0% (0)	0.01	NA	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	NA

n = number; SD = standard deviation; Geo Mean = geometric mean; Min = minimum; Max = maximum; NA = not applicable.

[1] $\sum$PW-$TU_{DIVALENT\ METALS}$ = sum of pore-water toxic units for divalent metals (divalent metals include cadmium, copper, lead, nickel, silver, and zinc).

[2] Includes all stations selected for the reference envelopes (i.e., includes reference envelope stations on the Upper Columbia River mainstem, as well as reference envelope stations on tributaries, the Sanpoil River, and in Canada).

Table A2.7. Summary of the raw toxicity data from the 2005 USEPA sampling program (Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

Station[1]	Analysis Batch	Endpoint: *C. dubia* % Survival	*C. dubia* # of Offspring	*C. dilutus* % Survival	*C. dilutus* Growth - Weight	*H. azteca* % Survival	*H. azteca* Growth - Weight
Reference Sites							
RM685R1	1	ND	ND	72.5	2.03	98.8	0.53
RM685R1	2	100	21.6	88.8	1.91	95	0.468
RM686R1	1	80	20.2	70	1.94	96.3	0.413
RM686R1	2	100	26.5	75	2.15	93.8	0.42
RM705R1	1	100	23.5	70	2.12	96.3	0.577
RM705R1	2	90	25.3	75	2.2	97.5	0.534
RM721R1	1	100	23.6	66.3	1.93	100	0.432
RM721R1	2	80	19.7	81.3	1.94	97.5	0.391
RM726R1	1	100	23.8	67.5	2.00	96.3	0.577
RM726R1	2	90	21.7	81.3	1.98	97.5	0.52
RM732R1	1	100	22.1	70	1.95	96.3	0.583
RM732R1	2	90	22.2	78.8	1.96	95	0.497
Test Sites							
RM603A1(X1)	2	100	12	71.3	1.9	96.3	0.324
RM605A1(X1)	2	100	25.8	77.5	1.81	92.5	0.486
RM605A2(X8)	2	90	23.3	81.3	1.85	93.8	0.334
RM606A1(X3)	2	100	25.4	72.5	2.04	93.8	0.421
RM616A1(X3)	2	100	25.3	83.8	2.22	96.3	0.484
RM622A1(X3)	2	100	23.5	77.5	1.82	95	0.516
RM628A1(X1)	2	70	18.6	87.5	1.93	83.8	0.524
RM634A1(X1)	2	60	8.2	80	1.92	91.3	0.371
RM637A1(X1)	2	100	28.5	77.5	1.79	96.3	0.451
RM640A1(X3)	2	90	13.2	60	2.52	96.3	0.401
RM641A1(X1)	2	100	25.6	86.3	1.93	95	0.348
RM642A1(X1)	2	100	20.8	66.3	1.97	96.3	0.301
RM644A1(X3)	2	100	16.1	70	1.82	92.5	0.341
RM658A1(X3)	2	100	18	80	1.78	98.8	0.412
RM661A1(X1)	2	100	23.3	81.3	1.84	97.5	0.345
RM676A1(X3)	1	100	19.2	46.3	2.1	92.5	0.347
RM677A1(X3)	1	100	22.9	42.5	1.99	90	0.276
RM678A1(X1)	1	100	26.9	71.3	1.93	97.5	0.334
RM680A1(X1)	1	90	20.7	38.8	2.17	96.3	0.326
RM686A1(X3)	1	80	20.5	72.5	1.83	93.8	0.592
RM687A1	1	90	20.1	73.8	1.62	93.8	0.268
RM689A1(X3)	1	90	22	50	2.37	93.8	0.368
RM692A1(X1)	1	100	27	72.5	1.8	95	0.412
RM698A1(X1)	1	80	19.8	67.5	1.75	96.3	0.285
RM704A1(X1)	1	100	25	62.5	2.02	96.3	0.383
RM706A1(X1)	1	80	18.7	68.8	1.69	95	0.312

Table A2.7. Summary of the raw toxicity data from the 2005 USEPA sampling program (Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

Station[1]	Analysis Batch	Endpoint					
		C. dubia		*C. dilutus*		*H. azteca*	
		% Survival	# of Offspring	% Survival	Growth - Weight	% Survival	Growth - Weight
RM706A2(X7)	1	80	23	55	2.05	95	0.335
RM708A1(X3)	1	70	23.8	70	1.65	92.5	0.339
RM713A1(X3)	2	100	21.4	75	2.23	100	0.334
RM723A1(X1)	1	100	27.5	NA	NA	NA	NA
RM723A1(X1)	2	NA	NA	83.8	2.14	96.3	0.652
RM723A2(X3)	2	100	25	83.8	1.96	95	0.423
RM724A1(X1)	1	100	26.8	56.3	2.13	98.8	0.371
RM724A2(X3)	1	100	25.8	65	2.44	95	0.642
RM727A1(X1)	2	90	22.2	92.5	1.74	97.5	0.412
RM729A1(X1)	2	100	25.8	90	2.01	92.5	0.449
RM730A1	2	100	23.1	82.5	1.96	86.3	0.336
RM733A1(X1)	2	100	26.8	83.8	1.76	91.3	0.499
RM734A1	2	90	22.5	81.3	1.61	86.3	0.227
RM736A1(X1)	1	70	18.9	NA	NA	NA	NA
RM736A1(X1)	2	NA	NA	81.3	1.94	88.8	0.336
RM737A1(X3)	1	50	3.7	NA	NA	NA	NA
RM737A1(X3)	2	NA	NA	82.5	1.47	90	0.194
RM738A1(X3)	1	0	0	67.5	1.14	86.3	0.178
RM739A1(X3)	1	100	21.6	72.5	2.04	91.3	0.461
RM740A1(X1)	1	100	23	75	2.08	97.5	0.515
RM741A1(X3)	1	100	24.8	67.5	2.18	80	0.46
RM742A1(X1)	1	100	10	82.5	1.18	88.8	0.273
RM742A2(X5)	1	90	19	73.8	1.31	95	0.32
RM743A1(X1)	1	90	25.8	82.5	1.6	91.3	0.486
RM743A2(X3)	1	100	20	80	1.43	81.3	0.321
RM744A1(X1)	1	80	22.6	61.3	1.98	83.8	0.349
RM744A2(X3)	1	80	18.5	76.3	1.31	75	0.166

ND = no data; NA = not applicable.

[1] Shaded stations are selected reference stations: see text for description of reference station selection criteria.

Table A2.8. Summary of the raw toxicity data for Besser *et al.* (2008).

Station[1]	Endpoint			
	C. dilutus		*H. azteca*	
	% Survival	Growth - Weight	% Survival	Growth - Length
Reference Sites				
SA8	81	1.02	98	3.2
Test Sites				
LR7	90	0.64	71	3.2
LR6	89	1.27	98	3.6
LR5	89	0.96	90	3.2
LR4	95	0.76	84	3.7
LR3	88	0.82	90	3.4
LR2	90	0.87	99	3.6
LR1	96	1	94	3.6

[1] Shaded stations are selected reference stations: see text for description of reference station selection criteria.

Table A2.9. Summary of the raw toxicity data for Bortleson *et al.* (1994).

Station[1]	Endpoint	
	C. dubia (% Survival)	*C. dubia* (Number of Offspring)
1 [2]	100	31.2
2	90	30.8
4 [2]	80	30.9
6 [2]	90	36
8	0	0
10	40	1.8
11	80	18.4
14	80	29
15	90	33.3
17	100	38.7
19	90	29.2
20	90	33.2
22	70	23.2
25 [2]	50	19.4
29 [2]	70	31.9
38	70	27.7
46	100	35.63
53 [2]	100	22.1
57	100	23.6
61	100	17.3
62	90	22.3
71	80	13.6

[1] Shaded stations are selected reference stations: see text for description of reference station selection criteria.
[2] This station was outside of the study area, and therefore not included in the analysis.

Appendix 3

Selection Criteria for Candidate Data Sets

Appendix 3 Selection Criteria for Candidate Data Sets

A3.1 Introduction

A substantial quantity of data and information has been generated on the condition of aquatic habitats within Upper Columbia River watershed. To support the current analysis, the available data on sediment quality conditions in the study area were compiled for possible inclusion in the project database. Subsequently, the data were screened to ensure they were comparable and that adequate quality assurance was performed. A description of each of the studies that were considered in this evaluation is provided in Table A2.1. This appendix describes the criteria that were used to screen the candidate data sets.

A3.2 Selection Criteria

To ensure that the most relevant data sets were compiled into the project database, selection criteria were formulated to guide the database development process. The following lists describe these data set selection criteria:

Geographic Scope of Study Area:

- Focus on data sets that included sampling stations within the Upper Columbia River Basin study area (i.e., the Upper Columbia River mainstem from the Canada-U.S. border to the Grand Coulee Dam); and,
- Focus on data sets that included sampling stations within potential reference areas relevant to the Upper Columbia River study area (e.g., Sanpoil River, in Canada upstream of key impacts, and other tributaries to the Upper Columbia River).

Sample Collection:

- Acceptable procedures for collecting, handling and storing samples must have been employed. If standard procedures (i.e., those developed by ASTM or USEPA) are not utilized, the alternative methods must be clearly stated and may be evaluated using best professional judgement. The rationale for decisions regarding procedure acceptability must be documented.
- Surficial (i.e., $\leq$15cm) whole sediment samples must have been collected.

Whole Sediment Chemistry Data:

- The sediment chemical analytical methods used in the study must be reported, must meet minimum data quality requirements/objectives, and detection limits must be reported. Data quality is considered acceptable if the author has stated that QA/QC procedures were followed and data quality objectives were met. If the author has not stated this clearly, data quality may be evaluated using various protocols and best professional judgement. The rationale for decisions regarding data acceptability must be documented;

- Data acceptability for sediment chemistry data must be further assessed by screening laboratory qualifier codes after all data have been incorporated. Each result is categorized as detected, undetected, undetected (detection limit not specified), and unacceptable; and,
- Focus on sediment chemistry data that included concentration data for relevant COPCs (i.e., metals and other substances that may have been released into aquatic habitats within the study area).

Sediment Toxicity Data:

- Focus on data sets that reported matching whole sediment chemistry and toxicity data;
- Focus on data sets that included toxicity tests with endpoints, durations, and species that were comparable to those measured during the USEPA 2005 program;
- Toxicity test protocol and methodology (e.g., organism life-stage at the start of the test) met acceptable standards (e.g., ASTM International), and were comparable to protocol and methodology used during the USEPA 2005 testing program. If procedures other than those developed by ASTM or USEPA were utilized, the acceptability of the test procedure may be evaluated using best professional judgement. Preference will be given to novel test procedures that have been published in the peer-reviewed literature;
- Acceptable environmental conditions must be maintained throughout the toxicity tests (as defined in the protocols for the toxicity test). Consequently, the temperature, pH, alkalinity, hardness, conductivity, and DO of the overlying water should have been measured during the test. Acceptable conditions are considered to be achieved if the author states that standard methods were employed and that acceptable environmental conditions were maintained in the bioassay chambers. Alternatively, if the authors have not explicitly assessed the overlying water quality conditions, and the raw overlying water quality data is provided in the report, the data should be assessed for acceptable conditions. Subsequently, any toxicity results associated with environmental conditions outside the acceptable ranges should be flagged; and,

- The responses of the test organisms exposed to negative controls must be reported to satisfy test acceptability criteria (i.e., as defined in ASTM or USEPA test methods).

Pore-water Chemistry Data:

- Focus on pore-water chemistry data that had matching sediment chemistry and toxicity data;
- Focus on pore-water chemistry data that included concentration data for relevant COPCs (i.e., metals and other substances that may have been released into aquatic habitats within the study area); and,
- The pore-water analytical methods used in the study must be reported, must meet minimum data quality requirements/objectives, and detection limits must be reported. Data quality is considered acceptable if the author has stated that QA/QC procedures were followed and data quality objectives were met. If the author has not stated this clearly, data quality may be evaluated using various protocols and best professional judgement.

All of the candidate data sets that were retrieved during the course of the study were critically reviewed according to these criteria to determine their applicability to the development and evaluation of thresholds for predicting sediment toxicity for the study area.

A3.3 Screening of Candidate Data Sets

Table A2.1 reports the results from the screening step for each candidate data set. In total, 17 additional candidate data sets were screened for possible inclusion in the project database and development of thresholds for predicting sediment toxicity. Nine of the candidate data sets provided data on locations outside of the study area. Six of the candidate data sets provided data on locations within the study area, but had incompatible toxicity tests (e.g., incompatible test duration or life-stage of the starting organism) and, therefore, were excluded. The remaining two candidate data sets contained data that met all selection criteria, and are described in the following section of this appendix.

A3.4 Selection of Data Sets for Development of Thresholds for Predicting Sediment Toxicity

The following two additional independent data sets met all of the established selection criteria, and were included in the project database for development of thresholds for predicting sediment toxicity:

- Besser *et al.* (2008); and,
- Bortleson *et al.* (1994).

All sediment chemistry data from these two additional independent data sets, as well as all sediment chemistry data from the USEPA 2005 data set (CEE 2006a; Stefanoff *et al.* 2006; Schut and Stefanoff 2007) were incorporated into the project database. However, surficial sediment chemistry data (i.e., in the top 15cm of sediment) were preferentially focused on in the analysis. In addition, whole sediment chemistry data were preferentially focused on in the analysis, and analytical results for other grain size fractions (e.g., greater than 75µm) were excluded from the analysis.

Pore-water data available from Besser *et al.* (2008) included concentrations of metals, conductivity, alkalinity, hardness, dissolved organic carbon, sulfide, and ammonia, and were incorporated into the project database. There were no pore-water data available for Bortleson *et al.* (1994).

Sediment toxicity data from these two additional independent data sets that met selection criteria included *Hyalella azteca* survival and growth (length) and *Chironomus dilutus* survival and growth (weight) from Besser *et al.* (2008); and, *Ceriodaphnia dubia* survival and reproduction from Bortleson *et al.* (1994).

A3.5 Description of the Data Sets Selected for Development of Thresholds for Predicting Sediment Toxicity

A3.5.1 CEE 2006a; Stefanoff *et al.* (2006); Schut and Stefanoff (2007)

Title: Phase 1 sediment sampling data evaluation. Upper Columbia River Site CERCLA RI/FS.

Authors: CH2M Hill and Ecology and Environment, Inc.

Abstract: (Note: The following is an excerpt from the introduction of the report).

Title: Upper Columbia River Site CERCLA RI/FS Summary and Evaluation of 2005 Sediment Toxicity Test Results (August 10, 2006)

Authors: Stefanoff, J, Schut, J. and Shelton, D.

Abstract: This is an earlier draft of the summary and evaluation of the 2005 sediment toxicity test results. The scope of data evaluation presented in this report includes preliminary identification of constituents of interest (COIs) for UCR sediments, and presentation of the results of the Phase I sediment sampling program that pertain to the nature and extent and fate and transport of these COIs in the UCR.

Title: Upper Columbia River Site CERCLA RI/FS Summary and Evaluation of 2005 Sediment Toxicity Test Results (August 10, 2007)

Authors: Schut, J. and Stefanoff, J.

Abstract: (Note: The following is an excerpt from the introduction of the technical memorandum) The purpose of this technical memorandum is to summarize the information obtained during sediment toxicity testing and pore water analyses conducted as part of the Upper Columbia River (UCR) Phase I Remedial Investigation (RI). A sediment sampling program was conducted by the U.S. Environmental Protection Agency (USEPA) in April and May 2005 as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial Investigation / Feasibility Study for the UCR. Sediment samples were collected along a stretch of the Columbia River between the U.S.-Canada border and Grand Coulee Dam, an area referred to as the Upper Columbia River. Whole sediment toxicity tests were conducted on a subset of the RI sediment samples, and the resulting data will be used for characterizing the potential for risk to benthic infaunal communities that exist in the UCR.

A3.5.2 Besser *et al.* (2008)

Title: Biological and chemical characterization of metal bioavailability in sediments from Lake Roosevelt, Columbia River, Washington, USA.

Authors: Besser, J.M., W.G. Brumbaugh, C.D. Ivey, C.G. Ingersoll, and P.W. Moran.

Abstract: We studied the bioavailability and toxicity of copper, zinc, arsenic, cadmium, and lead in sediments from Lake Roosevelt (LR), a reservoir on the Columbia River in Washington, USA that receives inputs of metals from an upstream smelter facility. We characterized chronic sediment toxicity, metal bioaccumulation, and metal concentrations in sediment and pore water from eight study sites: one site upstream in the Columbia River, six sites in the reservoir, and a reference site in an uncontaminated tributary. Total recoverable metal concentrations in LR sediments generally decreased from upstream to downstream in the study area, but sediments from two sites in the reservoir had metal concentrations much lower than adjacent reservoir sites and similar to the reference site, apparently due to erosion of uncontaminated bank soils. Concentrations of acid-volatile sulfide in LR sediments were too low to provide strong controls on metal bioavailability, and selective sediment extractions indicated that metals in most LR sediments were primarily associated with iron and manganese oxides. Oligochaetes (*Lumbriculus variegatus*) accumulated greatest concentrations of copper from the river sediment, and greatest concentrations of arsenic, cadmium, and lead from reservoir sediments. Chronic toxic effects on amphipods (*Hyalella azteca*; reduced survival) and midge larvae (*Chironomus dilutus*; reduced growth) in whole-sediment exposures were generally consistent with predictions of metal toxicity based on empirical and equilibrium partitioning-based sediment quality guidelines. Elevated metal concentrations in pore waters of some LR sediments suggested that metals released from iron and manganese oxides under anoxic conditions contributed to metal bioaccumulation and toxicity. Results of both chemical and biological assays indicate that metals in sediments from both riverine and reservoir habitats of Lake Roosevelt are available to benthic invertebrates. These findings will be used as part of an ongoing ecological risk assessment to determine remedial actions for contaminated sediments in Lake Roosevelt.

A3.5.3 Bortleson *et al.* (1994)

Title: Sediment-Quality Assessment of Franklin D. Roosevelt Lake and the Upstream Reach of the Columbia River, Washington, 1992.

Authors: Bortleson, G.C., S.E. Cox, M.D. Munn, R.J. Schumaker, E.K. Block, L.R. Bucy, and S.B. Cornelius

Abstract: Concentrations of arsenic, cadmium, copper, lead, mercury, and zinc were elevated relative to background reference sites in samples of bed sediments collected from Lake Roosevelt and the Columbia River, its principal source of inflow. The trace elements that most often exceeded the sediment-quality guidelines developed by the Ontario Ministry of Environment and Energy for benthic organisms were copper, lead, and zinc. Median concentrations of copper, lead, and zinc in the bed sediments of lake Roosevelt were 85, 310, and 970 milligrams per kilogram, respectively. Trace-element concentrations in suspended sediment in the Columbia River were larger than concentrations in bed sediment; however, trace-element concentrations in whole-water samples (suspended-sediment and water phases) did not exceed criteria for fresh-water organisms. Trace-element concentrations in whole-water samples were relatively small, reflecting the small suspended-sediment concentrations and the large water-diluting capacity of the Columbia River. The paucity of suspended sediment in the extensively dam-controlled Columbia River is indicated by the small concentration of suspended sediment of only 2 to 19 milligrams per liter measured for river discharges at high flows since completion of the last major reservoir in 1976. Elevated concentrations of trace elements in sediments of Lake Roosevelt and the upstream reach of the Columbia River are largely attributable to the transport of metallurgical waste and slag from a smelter discharging to the Columbia River in Canada.

Dioxins and furans were in both the suspended sediment and water of the Columbia River, but only a few of the 17 targeted isomers were detected. The dioxin isomer 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, the most toxic to some laboratory animals, was not detected. The furan isomer 2,3,7,8-tetrachlorodibenzofuran, commonly found in effluent from pulp and paper mills that use chlorine in the bleaching process, was found in suspended sediment but not in the water phase. Octachlorodibenzo-*p*-dioxin was detected in suspended sediment and water phases, suggesting that atmospheric deposition contributes to dioxins found in Lake Roosevelt. Aside from dioxins and furans, few of the many other organic compounds associated with wood-pulp waste, urban runoff, and industrial activities were detected in the bed sediments of Lake Roosevelt and its major tributaries.

An analysis of benthic invertebrate communities in the Columbia River showed evidence of environmental stress, most likely due to the presence of trace elements in bed sediments or from the loss of physical habitat from slag deposition. Lethal and sublethal effects were observed in laboratory toxicity tests of selected aquatic organisms exposed to bed sediments collected from the Columbia River near the international boundary and from some sites in other reaches of Lake Roosevelt.

A3.6 Compilation of Data into a Relational Database

Development of a project database represents an essential element of the analysis process. The project database is likely to represent a useful tool for all of the partners in the RI and for the natural resources trustees. Once additional independent data sets were identified using the criteria described in Section A3.2, they were incorporated into the relational project database, (in MS Access format), and included in the database verification and auditing process (as described in Appendix 4).

A3.8 References

Besser, J.M., W.G. Brumbaugh, C.D. Ivey, C.G. Ingersoll, and P.W. Moran. 2008. Biological and chemical characterization of metal bioavailability in sediments from Lake Roosevelt, Columbia River, Washington, USA. Archives of Environmental Contamination and Toxicology 54(4): 557-570.

Bortleson, G.C., S.E. Cox, M.D. Munn, R.J. Schumaker, E.K. Block, L.R. Lucy, and S.B. Cornelius. 1994. Sediment quality assessment of Franklin D. Roosevelt Lake and upstream reach of the Columbia River, Washington, 1992. Open-file Report 94-315. U.S. Geological Survey. Tacoma, Washington. 130 pp.

CEE (CH2M Hill and Ecology and Environment, Inc.). 2006a. Phase 1 sediment sampling data evaluation. Upper Columbia River Site CERCLA RI/FS. Contract No. 65-S7-04-01. Draft Final. Prepared for USEPA Region 10. Seattle, WA.

Era, B. and D. Serdar. 2001. Reassessment of toxicity of Lake Roosevelt sediments. Environmental Assessment Program. Washington State Department of Ecology. Olympia, Washington. 10 pp. + app.

Johnson, A. 1991. Review of metals, bioassay, and macroinvertebrate data from Lake Roosevelt benthic samples collected in 1989. Washington State Department of Ecology. Olympia, Washington.

Johnson, A., D. Norton, and B. Yake. 1989. An assessment of metals contamination in Lake Roosevelt. WA-CR-9010. Washington State Department of Ecology. Toxics Investigations/Ground Water Monitoring Section. Olympia, Washington. 71 pp.

Schut, J. and Stefanoff, J. 2007. Upper Columbia River Site CERCLA RI/FS: Summary and evaluation of 2005 sediment toxicity test results. August 24, 2007 draft. Prepared for USEPA. Region 10. Seattle, Washington.

Stefanoff, J., J. Schut, and D. Shelton. 2006. Upper Columbia River Site CERCLA RI/FS: Summary and evaluation of 2005 sediment toxicity test results. August 10, 2006 draft. Prepared for USEPA. Region 10. Seattle, Washington.

Appendix 4

Data Auditing and Treatment Procedures

Appendix 4 Data Auditing and Treatment Procedures

A4.1 Compilation of Data into the Relational Database

Development of a project database represents an essential element of the data evaluation and threshold development process. The data sets that contained information on the study area and met the selection criteria were incorporated into a relational database in MS Access format. The data sets were received in either Excel, Access, pdf, or hard copy formats. From these formats, they were translated into one master database. This translation process included ensuring the vital information from the multiple data sets was collected, captured and organized in the same order so that the data from all data sets would be comparable within a single database. The compiled data sets are listed in Appendix 3. This appendix describes the data treatment procedures used in this study.

A4.2 Verification and Auditing of the Project Database

Auditing of the MS Access database was conducted to ensure that the underlying data were accurate and complete for use in the assessment. Following translation into database format, the data were verified to ensure that any potential translation errors had not occurred. Data verification involved an initial confirmation of data in the database against data in the translated MS Excel sheets as well as in the original Access database, Excel workbooks, or hard copy. Data auditing involved 10% number-for-number checks against the primary data source initially, increasing to 100% number-for-number checks if significant errors were detected in the initial auditing step. For the 10% check, the data for a randomly selected ten out of a hundred analytes were verified against the original data. All data for ten out of a hundred samples were verified against the original source. Discrepancies in the data (i.e., minor differences in sample names and values) were rectified using hard-copy reports and laboratory bench-sheets. Additional steps were taken in verifying that the database included cross-checking the complete list and number of samples in the database against the originally supplied data sets, checking unit consistencies (i.e., all sediment measurements in dry weight basis), ensuring spatial coordinates were all expressed in the same coordinate system, and standardizing chemical names.

Subsequently, database auditing was conducted to assure data quality in the project database. The auditing process involved analyses of outliers (i.e., to identify inconsistencies with units) and completeness (i.e., to identify missing samples or missing data), examination of data qualifier fields (i.e., to assure internal consistency in the project database), and, checking of sample identification numbers (i.e., to ensure that data were not duplicated or missing). Anomalous data points that appeared to fall out from the trend of the majority of the data were identified based on reviews of summary tables (i.e., maximum and minimum values per analyte, and hazard quotients). If the identified issue was not resolved at that stage of the process, the data were checked against the original data. In some cases, this process necessitated communication with the original contributors of the data in order to resolve data quality issues. Statistical analyses of resultant data were conducted to evaluate data distributions, identify the appropriate summary statistics to generate, and evaluate the variability in the observations. This ongoing iterative process throughout the data analysis phase helped to ensure overall completeness and accuracy of the database. The results of the data verification and auditing procedures indicated that the compiled information represents a reliable basis for conducting an evaluation of the available environmental quality data collected in 2005.

A4.3 Data Treatment Procedures

Analysis of the data compiled for the Upper Columbia River necessitated a number of decisions on the treatment of various types of information. These data treatment procedures are described in the following sections of this appendix.

A4.3.1 Treatment of Spatial Data

To support the compilation and subsequent analysis of the information on environmental quality conditions, a geographic information system (GIS)-compatible, relational project database was developed in MS Access format. All of the data compiled in the database were georeferenced to facilitate mapping and spatial analysis using GIS-based applications [i.e., Environmental Systems Research Institute (ESRI's) ArcMap and Spatial Analyst programs]. The database structure made it possible to retrieve data in several ways, including by data type (i.e., chemistry vs. toxicity), by sediment horizon (i.e., surficial vs. sub-surface sediments), by reach, and by date. As such, the database facilitated a variety of data analyses to support the analysis.

Spatial data were obtained from multiple sources in various coordinate systems. Many of the spatial datasets required formatting and conversion in order to accurately and efficiently use the data, information, and maps. To standardize the spatial data into a consistent format, data were converted into ESRI shapefiles and projected using the Clarke 1866 Albers coordinate system.

A4.3.2 Treatment of Environmental Data

A substantial quantity of data and information has been generated on the condition of aquatic habitats within the Upper Columbia River basin. To support the current assessment, the available data on sediment quality, and pore-water quality conditions in the study area were assembled in the project database. Furthermore, specific decisions regarding treatment of sediment chemistry and pore-water chemistry data were made.

A4.3.3 Treatment of Replicate Samples/Duplicate Samples

In a number of studies, additional samples were collected and/or analyzed as part of the quality assurance program. In this report, field replicate samples were treated as unique samples in the data analyses (i.e., by providing information on the small scale spatial variability in sediment quality conditions). By comparison, laboratory split samples were treated as duplicates and averaged to support subsequent data analysis, except if all duplicate measurements were less than detection limit, in which case only the maximum detection limit was used in the analysis. Duplicate samples prepared in the field were also treated the same as laboratory splits to support subsequent data analysis. Laboratory spiked sample results and laboratory blank sample results, where available, were included in the project database, but excluded from the analysis.

A4.3.4 Treatment of Less-Than-Detection Limit Samples

The treatment of environmental data has the potential to influence the results of the assessment. In particular, the treatment of less than detection limit data can affect the preliminary screen on contaminants of concern, the results of the reference envelope development, the concentration-response model development, and the preliminary toxicity threshold development and evaluation. A number of investigators have evaluated the implications of applying various procedures for estimating the concentrations of contaminants of potential concern from less than detection limit data (Gaskin *et al.* 1990; Porter and Ward 1991; El-Shaawari and Esterby 1992; Clarke and Brandon 1994). While there is no consensus on which data censoring methods should be used in various applications, the simplest methods tend to be used most frequently, including deletion of non-detect values or substitution of a constant, such as zero, the detection limit, or one-half the detection limit (USACE 1995).

To address the need for guidelines for statistical treatment of less than detection limit data, the USACE (1995) conducted a simulation study to assess the performance of ten methods for censoring data. The results of that investigation indicated that no single data censoring methods works best in all situations. Accordingly, USACE (1995) recommended a variety of methods depending on the proportion of the data that requires censoring, the distribution and variance of the data, and the type of data transformation. For data sets for which a low to moderate proportion of the data require censoring, substitution of the detection limit is generally the preferred method (i.e., to optimize statistical power and control type I error rates). However, as the proportion of the data that requires censoring and the coefficient of variation of the data increases, statistical power is better maintained by substituting one-half the detection limit for the less than detection limit data, particularly for log-normally distributed and transformed data. Substitution of zero or other constants was also recommended for a variety of circumstances. Overall, it was concluded that simple substitution methods work best to maintain power and control error rates in statistical comparisons of chemical concentration data (USACE 1995).

In this analysis, decisions regarding the treatment of less than detection limit data were taken by considering the recommendations that have emerged from previous investigations in the context of their potential effects on the results of this assessment. Including all of the pore-water, and sediment data that were compiled in the project database, over half of the data were less than detection limits, and therefore required censoring prior to data analysis. Consistent with the guidance developed by USACE (1995), one-half of the detection limit was substituted for all less than detection limit data in all analyses (e.g., the calculation of summary statistics; Tables A2.4-A2.6). In addition, to minimize the potential effects of the less than detection limit data on the screening of chemicals of potential concern (COPCs), none of the less than detection limit data for which the detection limits were greater than the corresponding toxicity screening value for pore-water or whole sediment chemistry (i.e., high non-detects) were used in the screening step (see Section A4.6 for more details). For all subsequent analyses [i.e., designation of slag samples (Chapter 5); development of concentration response models (Section 6.8); and, derivation and evaluation of thresholds for predicting sediment toxicity (Chapter 7)] all less-than-detect data, including high non-detects, were included (using the one-half of the detection limit substitution). This procedure facilitated the estimation of distributions of the concentrations of chemicals of potential concern for analysis of the data, while eliminating the potential for identifying significant risks based on less than detection limit data.

Selection of an alternate procedure for treating the less than detection limit data has the potential for influencing the results of the analysis. For example, substitution of zero for less than detection limit data would have skewed the distributions of the chemicals of potential concern concentration data for the 6 reaches, and for the study area as a whole (i.e., the estimated 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentile concentrations would likely have been lower than the estimates developed for the assessments). Likewise, substitution of the detection limit for the less than detection limit data would have also skewed the distributions of the chemicals of potential concern concentration data (i.e., the estimated 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentile concentrations would likely have been higher than the estimates developed for the assessments). Although the influence of these alternate methods on the estimate of the 75th or 95th percentile concentration would likely have been relatively minor, their selection could have influenced the identification of contaminants of concern. Nevertheless, it is unlikely that the development of thresholds for predicting sediment toxicity and subsequent evaluation was affected by the selection of data treatment methods. As such, the potential impact of the methods that were selected for treating less than detection limit data on the results of the assessment are considered to be minor.

A4.3.5 Calculation of Total Concentrations by Chemical Class

To support subsequent interpretation of the sediment chemistry data, the total concentrations of several chemical classes were determined for each sediment sample, where sufficient data were available.

The concentrations of total PAHs were calculated by summing the concentrations of at minimum ten of the recommended individual PAHs, including acenaphthene, anthracene, fluorene, naphthalene, phenanthrene, benz(a)anthracene, benzo(a)pyrene, chrysene, fluoranthene, and pyrene. If concentrations for up to three additional individual PAHs, including 2-methylnaphthalene, acenaphthylene, and dibenz(a,h)anthracene, were available, they were also included in the total PAHs calculation. An exception to this method was made for those studies where total PAHs were reported (i.e., Bortleson *et al.* 1994), but were not calculated using all 13 or even the 10 required individual PAHs. For example, total PAHs at Station 1 in Bortleson *et al.* (1994)was calculated from available individual PAHs on the list of 13 for which data were available (i.e., 6 individual PAHs).

The concentrations of total PCBs were calculated as the sum of the concentrations of the various Aroclors (i.e., Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260) that were reported.

For DDTs, the concentrations of p,p'-DDD and o,p'-DDD, p,p'-DDE and o,p'-DDE, and p,p'-DDT and o,p'-DDT were summed to calculate the concentrations of sum DDD, sum DDE, and, sum DDT, respectively. Total DDTs were calculated by summing the concentrations of sum DDD, sum DDE, and, sum DDT. Finally, the concentrations of total chlordane were determined by summing the concentrations of alpha- and gamma-chlordane isomers. If only the concentration of total chlordane was reported in the study, then those values were used directly.

Pore-water hardness was calculated for samples collected by the USEPA in 2005 (i.e., Study 01), as the sum of the concentration of calcium carbonate and magnesium carbonate in the pore-water. Calcium carbonate concentration was calculated as the concentration of calcium, multiplied by the molecular weight of calcium carbonate (100.089 g/mol) and divided by the molecular weight of calcium (40.078 g/mol). Similarly, the magnesium carbonate concentration was calculated as the concentration of magnesium, multiplied by the molecular weight of magnesium carbonate (84.316 g/mol) and divided by the molecular weight of magnesium (24.3051 g/mol).

A4.4 Calculation of Additional Measures of Sediment Quality

A number of additional COPC mixtures and slag indicators were calculated from the compiled data for the selected data sets:

- $\sum$ESB-TU_{FCV}
- $\sum$PW-$TU_{DIVALENT\ METALS}$
- $\sum$SEM-AVS
- $\sum$SEM-AVS)/f_{OC}
- $\sum$PEC-Q_{METALS}
- $\sum$PEC-$Q_{EXTMETALS}$
- Mean PEC-Q_{METALS}
- Mean PEC-$Q_{EXTMETALS}$
- Mean PEC-Q
- Mean PEC-$Q_{METALS(1\%OC)}$
- Mean PEC-$Q_{EXTMETALS(1\%OC)}$
- $\sum$PEC-$Q_{METALS(1\%OC)}$
- $\sum$PEC-$Q_{METALS(Cu,Pb,Zn)}$
- $\sum$PEC-$Q_{EXTMETALS(1\%OC)}$
- Cu:Al
- Fe:Al
- Zn:Cd

A4.4.1 Sum Equilibrium Partitioning-Based Sediment Benchmark-Toxic Units for Polycyclic Aromatic Hydrocarbons ($\sum$ESB-TU_{FCV} for PAHs)

Equilibrium-partitioning sediment benchmark toxic units ($\sum$ESB-TU_{FCV}) were calculated for PAHs measured in sediment samples, where sufficient data were available. The calculation of $\sum$ESB-TU_{FCV} is performed using the 13 recommended PAHs (i.e., acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene) and total organic carbon. An organic carbon-normalized concentration is calculated for each individual PAH by dividing the chemical concentration by the fraction organic carbon. A substance-specific ESB-TU was then calculated by dividing the organic carbon normalized concentration by the final chronic value (a toxicity threshold) for that substance. The sum of the 13 substance-specific ESB-TUs for an individual sample gives the $\sum$ESB-TU_{FCV}. A 50% certainty factor (2.75) was applied to the calculated $\sum$ESB-TU_{FCV} to estimate the $\sum$ESB-TU_{FCV} inclusive of the full suite of 34 recommended PAHs. One exception to this method occurred for Bortleson *et al*. (1994), where data were not available for all 13 PAHs. In this situation, $\sum$$ESBTU_{FCV}$ were calculated using all of the available data for individual PAHs on the list of 13 PAHs.

A4.4.2 Sum Pore-water Toxic Units for Divalent Metals ($\sum$PW-TU_{DM})

The sum of pore-water toxic units ($\sum$PW-TU_{DM}) for divalent metals was calculated for pore-water samples, where sufficient data were available. The toxicity screening values for the divalent metals are all hardness dependent. Therefore, for the calculation of $\sum$PW-TU_{DM}, data on the characteristics of each water sample were used to calculate a sample-specific toxicity screening value for each divalent metal. This sample-specific toxicity screening value was then used to exclude high non-detect measurements from the $\sum$PW-TU_{DM} calculation. The toxic unit (TU) for an individual divalent metal is calculated as the concentration of the divalent metal divided by the respective TSV (i.e., criterion continuous concentration; USEPA 2009). The $\sum$PW-TU_{DM} is the sum of the TUs for divalent metals (i.e., cadmium, copper, lead, nickel, silver, and zinc).

A4.4.3 Sum Simultaneously Extracted Metals Minus Acid Volatile Sulfide ($\sum$SEM-AVS) and ($\sum$SEM-AVS)/f_{OC}

The procedures for calculating $\sum$SEM-AVS are described in detail in USEPA (2003). Briefly, this metric is calculated by summing the molar concentrations of simultaneously extracted divalent metals (in µmoles/g) using the following equation:

$$\sum SEM = [SEM_{Cd}] + [SEM_{Cu}] + [SEM_{Pb}] + [SEM_{Ni}] + [SEM_{Zn}] + \tfrac{1}{2}\,[SEM_{Ag}]$$

The $\sum$SEM-AVS metric is then calculated by subtracting the molar concentration of AVS from the $\sum$SEM that was determined (see USEPA 2005 for example calculations). Toxicity to benthic invertebrates due to metals is not predicted when $\sum$SEM-AVS <0.0 (USEPA 2005).

The procedures for calculating ($\sum$SEM-AVS)/f_{OC} are described in USEPA (2005). Briefly, this metric is calculated by dividing $\sum$SEM-AVS (see Section A2.4 above) by the fraction of organic carbon (f_{OC}) in the sediment, where f_{OC} is the percent organic carbon in a sediment sample divided by 100 (i.e., if a sample has 4.5% OC, then f_{OC} = 0.045; see USEPA 2005 for example calculations). Toxicity due to the presence of divalent metals is not expected when ($\sum$SEM-AVS)/f_{OC} <130 µmol/g. In contrast, toxicity to benthic invertebrates is expected to be observed when ($\sum$SEM-AVS)/f_{OC} >3000 µmol/g (USEPA 2005).

A4.4.4 Sum Probable Effect Concentration-Quotient for Metals and Extended Metals ($\sum$PEC-Q_{METALS} and $\sum$PEC-$Q_{EXTMETALS}$)

The procedure for calculating $\sum$PEC-Q_{METALS} (MacDonald *et al.* 2000a) utilized the PEC values for arsenic, cadmium, chromium, copper, nickel, lead and zinc, and was calculated as follows:

$$\sum PEC - Q_{METALS} = \frac{[As]}{PEC_{As}} + \frac{[Cd]}{PEC_{Cd}} + \frac{[Cu]}{PEC_{Cu}} + \frac{[Cr]}{PEC_{Cr}} + \frac{[Pb]}{PEC_{Pb}} + \frac{[Ni]}{PEC_{Ni}} + \frac{[Zn]}{PEC_{Zn}}$$

The procedure for calculating $\sum$PEC-$Q_{EXTMETALS}$ utilized a different set of metals (antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese and zinc), but the same procedure as used for calculating the $\sum$PEC-Q_{METALS} was used to calculate the $\sum$PEC-$Q_{EXTMETALS}$. $\sum$PEC-$Q_{METALS(Cu,Pb,Zn)}$ was also calculated using the same procedure and only copper, leand, and zinc. Less-than-detection-limit data, where the detection limit was greater than the PEC, were excluded from these calculations.

A.4.4.5 Mean Probable Effect Concentration-Quotient for Metals (Mean PEC-Q_{METALS}) and Extended Metals (Mean PEC-$Q_{EXTMETALS}$)

The procedure for calculating mean PEC-Q_{METALS} (MacDonald *et al.* 2000a), utilized the PEC values for arsenic, cadmium, chromium, copper, nickel, lead and zinc, and was calculated as follows:

$$MeanPEC - Q_{METALS} = \left(\frac{[As]}{PEC_{As}} + \frac{[Cd]}{PEC_{Cd}} + \frac{[Cu]}{PEC_{Cu}} + \frac{[Cr]}{PEC_{Cr}} + \frac{[Pb]}{PEC_{Pb}} + \frac{[Ni]}{PEC_{Ni}} + \frac{[Zn]}{PEC_{Zn}} \right) \div 7$$

If data were available on fewer than seven metals, then the sum of the PEC-Qs is divided by the number of metals for which data were available.

The procedure for calculating Mean PEC-$Q_{EXTMETALS}$ utilized a different set of metals (antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese and zinc), but the procedure for calculating the Mean PEC-$Q_{EXTMETALS}$ was the same as that used for Mean PEC-Q_{METALS}. Less-than-detection-limit data, where the detection limit was greater than the PEC, were excluded from these calculations.

A.4.4.6 Mean Probable Effect Concentration-Quotients (Mean PEC-Qs)

Mean probable effect concentration quotients (Mean PEC-Qs) were calculated based on metals, PAHs and PCBs using the methods described in Ingersoll *et al*. (2001). The mean PEC-Q is calculated using data on the concentrations of metals, total polycyclic aromatic hydrocarbons (tPAHs), and total polychlorinated biphenyls (tPCBs) in sediment samples, and the corresponding PECs:

$$MeanPEC - Q = \left(MeanPEC - Q_{METALS} + \frac{tPAHs}{PEC_{tPAHs}} + \frac{tPCBs}{PEC_{tPCBs}} \right) \div 3$$

For those samples where PAH or PCB data were absent, the Mean PEC-Q was calculated as the average of the Mean PEC-Q_{METALS} and PEC-Q_{tPAHs} or the average of the Mean PEC-Q_{METALS} and PEC-Q_{tPCBs}. If neither tPCB nor tPAH data were available for a sample, no Mean PEC-Q was calculated.

In addition, organic carbon-normalized mean PEC-Qs were also calculated by dividing the mean PEC-Q by the fraction of organic carbon, reported for each sample.

A.4.4.8 Metal Ratios

Three metal ratios were calculated for the slag desgination analysis, as the concentration of the first metal divided by the concentration of the second metal:

$$\text{Cu:Al} = \frac{[Cu]}{[Al]};$$

$$\text{Zn:Cd} = \frac{[Zn]}{[Cd]} \text{ ; and,}$$

$$\text{Fe:Al} = \frac{[Fe]}{[Al]}.$$

A4.5 Summary of Environmental Quality Data

Summary statistics were generated for each analyte by reach, and by media type (i.e., sediment and pore-water). In addition, summary statistics for whole sediment samples were also grouped by sample depth (surficial 0-15 cm, and sub-surficial >15 cm). Sediment chemistry data for different size fractions (i.e., < 75 µm and > 75 µm) were excluded from the analysis. Summary statistics for whole sediment and pore-water included: sample size, 5th, 10th, 25th, 50th, 75th, 90th, 95th percentiles, mean, standard deviation, geometric mean, minimum and maximum value, and number and percent of samples reported as less than detection limit. High non-detects were included in this step of the analysis.

A4.6 Compilation of Toxicity Screening Values for the Preliminary Evaluation of Contaminants of Potential Concern

Whole sediment and pore-water chemistry data were screened against toxicity screening values (TSVs; MacDonald *et al.* 2000) and criterion continuous concentrations (CCC; USEPA 2009). These TSVs were used to identify and exclude chemical concentrations reported as less than the detection limit, where the detection limit was greater than the TSVs (i.e., high non-detects). The TSVs were also used to screen sediment and pore-water quality data in order to identify COPCs that occur in one or more samples at concentrations sufficient to potentially adverse any life stage of any aquatic species for extended time periods. The following is a description of the TSVs used to screen pore-water, and sediment chemistry data:

Toxicity Screening Values for Pore-Water - Benchmarks that define the concentrations of chemicals in water that do not adversely affect any life stage of any aquatic species that are exposed for extended time periods were selected for screening data on concentrations of chemicals of potential concern in pore-water in Upper Columbia River Basin . The criterion continuous concentration (CCC) promulgated by USEPA (2009) was selected as the toxicity screening value for pore-water.

Toxicity Screening Values for Sediment - Numerical sediment quality guidelines provide a basis for assessing the effects on benthic invertebrates and other aquatic organisms associated with exposure to sediment-associated chemicals of potential concern. Consensus-based threshold effect concentrations (TECs; MacDonald *et al.* 2000) were chosen as toxicity screening values for metals, PAHs, sum PCBs, and organochlorine pesticides for use in this assessment.

COPCs for which a TSV was not available from the above described sources were retained as uncertain COPCs in the screening step (as described in Section 6.8; Section A4.9).

For hardness-dependent TSVs for metals in water, the minimum hardness calculated from the available data (74.7 mg/L) was used to calculate the TSV that would be applied to identify high non-detects and applied for the screening step. The CCC for chromiumVI was applied to total chromium pore-water data because no total chromium CCC was available; the chromiumVI CCC was more conservative than the chromium III CCC; and, it is not uncommon for the majority of chromium to exist as chromium VI. No temperature or pH data were available for pore-water, therefore, no CCC could be applied to ammonia data. The aluminum CCC for pore-water is applicable for pH 6.5 to 9.0; however, this CCC was applied to all aluminum data because no pH data were available.

Simultaneously extracted metal concentrations in sediment samples were compared to TECs from MacDonald *et al.* (2000) that had been converted from µg/kg to µmol/g by dividing by the molar weight of the metal. The TEC for chlordane was applied to total chlordane, cis-chlordane, and trans-chlordane. The TEC for total PCBs was also applied to individual aroclor data. The TEC for endrin was also applied to endrin aldehyde and endrin ketone data.

A4.7 Spatial Evaluation of Data

In this report, the spatial extent of impacts to benthic invertebrates was evaluated by linking the chemistry and biological response data contained in the project database with GIS-based applications (ESRI's ArcView software). To facilitate spatial analyses of these data, the assessment area was first divided into six reaches, and one out of study area category:

- Reach 1: River mile 730 - 745;
- Reach 2: River mile 712 - 730;
- Reach 3: River mile 700 - 712;
- Reach 4: River mile 640 - 700;
- Reach 5: River mile 617 - 640;
- Reach 6: River mile 597.5 - 617; and,
- Out of Study Area: includes Lower Arrow Lake (Canada), Sanpoile River, and other tributaries to the UCR (i.e., Fivemile Creek, Crown Creek, Flat Creek, Nancy Creek, Barnaby Creek, and Cheweka Creek).

In this way, it was possible to evaluate and isolate the sediment chemistry, pore-water chemistry, and sediment toxicity data in individual reaches, as well as group the data by reference stations, which are all outside of the Upper Columbia River mainstem, except for one reference station [Station ID RM706A2(X7)] that was located on the Upper Columbia River mainstem.

A4.8 Characterization of Slag

A4.8.1 Classification of Sediment Samples into Slag Categories

To support evaluations of the potential influence of slag on sediment toxicity, sediment samples from the UCR were classified into three functional working groups (i.e., classes) using data on the concentrations of slag-indicator metals. More specifically, ratios of slag-indicator metals to reference element concentrations were used to classify sediment samples relative to slag content in a manner consistent with contaminant fate and transport conditions at the site. The slag identification methods provided a basis for grouping sediment samples from the UCR into the following classes:

- Slag-dominated sediment samples (i.e., slag-affected sediment samples);
- Slag-influenced sediment samples (i.e., potentially slag-affected sediment samples); and,
- Typical sediment samples (i.e., non slag-affected sediment samples).

Three models for classifying sediment samples into these three slag categories were evaluated (Cu:Al; Cu:Al and Zn:Cd; and Fe:Al and Zn:Cd). Chapter 5 describes in more detail, the development and evaluation of these three models.

A4.8.2 Classification of Slag Content Using Nearest Neighbor Analysis

The characterization of slag content in the sediments of the UCR was determined using the ratio of copper to aluminum in the 56 surficial sediment samples with sediment chemistry and toxicity. Due to the absence of aluminum measurements in the remaining studies with sediment chemistry and toxicity data (i.e., Besser *et al.* 2008 and Bortleson *et al.* 1994), slag designations were assigned using nearest neighbor analysis. The nearest neighbor analysis was performed using ESRI GIS software, assigning the slag designation to each station in Besser *et al.* 2008, and in Bortleson *et al.* 1994 based on the slag designation of the nearest station from the 2005 USEPA sampling program (Stefanoff *et al.* 2006; Schut and Stefanoff 2007). In addition, stations in Besser *et al.* (2008), and in Bortleson *et al.* (1994) that were not situated on the mainstem of the Upper Columbia River (i.e., on the Sanpoil River, or on Lower Arrow Lake, upstream of slag influence) were characterized as being non slag-affected.

A4.8.3 Estimation of Percent Slag Content

In addition to the classification of sediment samples into three categories (slag-affected, potentially slag-affected, and non slag-affected), the percent slag was also estimated using the same three different models evaluated in Chapter 5. Percent slag was calculated for three different indicator metal and reference metal pairs (Cu and Al; Zn and Cd; and Fe and Al) using the concentrations of indicator metals and reference metals in slag [based on the Nener (1992) results], and in reference sediments (six reference stations from the 2005 USEPA sampling program), and the following equation:

$$\frac{Ind.\ Metal}{Ref.\ Metal} @ (x \times 100)\%\ Slag = \frac{x(Ind.\ Metal_S) + (1 - x)(Ind.\ Metal_R)}{x(Ref.\ Metal_S) + (1 - x)(Ref.\ Metal_R)};$$

Where: x = the fraction of slag in a sediment sample;
S = slag sediments;
R = reference sediments;
Ind. Metal = indicator metal; and,
Ref. Metal = reference metal.

This is the same formula used to classify sediment samples into three categories based on 5% slag content (i.e., x = 0.05) in Chapter 5.

The equation above was rearranged to calculate the percent slag content in sediment samples:

$$x = 100 \times \frac{(Ind.\ Metal_R) - (Ratio)(Ind.\ Metal_R)}{[(Ratio)(Ref.\ Metal_S - Ref.\ Metal_R) + Ind.\ Metal_R - Ind.\ Metal_S};$$

Where: Ratio = the indicator metal to reference metal ratio.

In addition, the maximum percent slag was bound between zero and 100. In other words, if the above equation resulted in a value less than zero, that sediment sample was assigned a zero percent slag content; if the above equation resulted in a value greater than 100 that sediment sample was assigned 100% slag content.

In the application of the second model (Cu:Al and Zn:Cd; See Chapter 8 for more details), the maximum of the percent slag calculated for Cu:Al, and the percent slag calculated for Zn:Cd, was used as the final estimated percent slag value for sediment samples in Chapter 8 analysis. Percent slag content of the nearest neighbor was used for sediment samples without Zn, Cd, Cu, and/or Al data (Section A4.8.2 for more details on the nearest neighbor analysis).

A4.9 Screening of Sediment Chemistry and Pore-Water Chemistry Data

Data characterizing sediment and pore-water chemistry were available for a number of chemicals of potential concern (COPCs). To identify negligible-risk COPCs and exclude them from further consideration in the analysis, available sediment chemistry and pore-water chemistry were screened against TSVs (Tables A4.2 and A4.3). Only those COPCs/COPC mixtures with one or more measurements in the samples with both chemistry and toxicity data collected by USEPA in 2005 (Schut and Stefanoff 2007; Stefanoff *et al.* 2006) were considered for further evaluation. These COPC/COPC mixtures that met this initial criteria formed the basis for identifying COPC/COPC mixtures in all studies (Schut and Stefanoff 2007; Stefanoff *et al.* 2006; Bortleson *et al.* 1994; Besser *et al.* 2008). In addition, any measurements reported as less than the detection limit, where the detection limits were greater than the TSV, were excluded from the screening evaluation.

If the maximum measured concentration of a COPC in the database was greater than the TSV, then the COPC was retained for further evaluation. If the maximum measured concentration of a COPC was less than or equal to the TSV it was considered to pose negligible-risk to ecological receptors in the study area, and was not retained for further evaluation. If there was no guideline available for a COPC, it was retained as an uncertain COPC and carried forward into the subsequent step of the analysis, with the following exceptions:

- Acid volatile sulfides (AVS) in sediment was identified as an uncertain COPC because there was no available guideline. However, AVS was not retained for subsequent steps because AVS on its own provides little biologically relevant information. The sum of simultaneously extracted metal concentrations minus AVS ∑SEM-AVS is a more biologically relevant COPC mixture, and was retained for subsequent steps in the analysis;
- None of the individual PAHs for which guidelines were available, nor total PAHs exceeded the available guidelines. Therefore, relationships between the measured concentrations of all individual PAHs, total high molecular weight PAHs, total low molecular weight, and total PAHs, including those without available guidelines (i.e., uncertain PAHs) and toxicity would be unlikely to be observed. Hence, PAHs were retained for subsequent steps in the analysis; and,
- Additional COPC mixtures, although not included in the screening step, were added for subsequent steps of the analysis (i.e., Spearman rank correlation

analysis), including: $\sum$PEC-Q_{METALS}; $\sum$PEC-$Q_{METALS(1\%OC)}$; Mean PEC-$Q_{EXTMETALS}$; Mean PEC-$Q_{EXTMETALS(1\%OC)}$; $\sum$PEC-$Q_{EXTMETALS}$; $\sum$PEC-$Q_{EXTMETALS(1\%OC)}$; $\sum$PEC-$Q_{Cu,Pb,Zn}$; Cu:Al Ratio; and, Zn:Cd Ratio.

A4.10 Treatment of Sediment Toxicity Data

Sediment toxicity data from the USEPA 2005 sampling program (Stefanoff *et al.* 2006; Schut and Stefanoff 2007), Besser *et al.* (2008), and Bortleson et al (1994) were evaluated to ensure comparability of toxicity results between the three studies. In addition to the evaluation, response data were treated to ensure that response data were comparable between batches within a study as well as between studies. Data treatment included converting individual length to individual weight using published conversion equations for *Hyalella azteca* (Ingersoll *et al.* 2008), calculating the resulting biomass for *Chironomus dilutus* and *H. azteca*, and normalizing endpoint response data by either the control-response adjustment or by median reference-value adjustment methods.

A4.10.1 Conversion of the Growth Endpoint (Individual Length to Individual Weight)

The growth endpoint response data for *H. azteca* in Besser *et al.* (2008) were reported as individual organism length. For this data set, the growth endpoint was converted to individual organism weight in milligrams using the following equation (Ingersoll *et al.* 2008):

$$\text{Dry weight} = ([0.1770 \times (\text{length})] - 0.0292)^3$$

A4.10.2 Calculation of the Biomass Endpoint Response

Biomass for *H. azteca* and *C. dilutus* was calculated using the following formula:

$$Biomass = \sum_{r=1}^{r}\left(n_r \times S_r \times \overline{G}_r\right)$$

Where:

r = the replicate number
n_r = Number of organisms in a replicate;
S_r = Proportion of surviving organisms in a replicate at the end of the toxicity test;
G_r = Average individual organism weight in a replicate.

When more than eleven organisms were reported as surviving for a replicate, 10 individuals were used as the number of surviving organisms in the replicate for the biomass calculation (C.G. Ingersoll. United States Geological Survey. Pers. Comm.).

A4.10.3 Distribution of Normalized Sediment Toxicity Data

Sediment toxicity data were normalized according to procedures described in Section 6.4 of the report. The cumulative frequency distribution of these normalized sediment toxicity data were plotted for each species and endpoint (Figures A4.1 - A4.3).

Less than 20% of both the normalized survival data and the normalized reproduction data for cladocerans, *Ceriodaphnia dubia,* were below the minimum value of their respective reference envelopes (Figure A4.1). Approximately 60% of the normalized survival data for *C. dubia* were greater than 100%, while approximately 40% of the normalized reproduction data for *C. dubia* were greater than 100% [i.e., the response was greater than either the control response (Bortleson *et al.* 1994) or the median of the responses at the reference stations (Stefanoff *et al.* 2006; Schut and Stefanoff 2007); Figure A4.1].

Of the three midge (*Chironomus dilutus*) endpoints, survival had the greatest percentage of normalized response data (approximately 80%) above the minimum value of the reference envelope; for the growth endpoint, approximately 50% of the samples were above the minimum value of the reference envelope; and for the biomass endpoint only 20% of the samples were above the minimum value of the reference envelope (Figure A4.2). Approximately 50% of the normalized survival and growth responses for *C. dilutus* were greater than 100%, while only about 20% of the normalized *C. dilutus* biomass responses were greater than 100% [i.e., the response was greater than either the control response (Besser *et al.* 2008) or the median of the responses at the reference stations (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Figure A4.2]. For all three *C. dilutus* endpoints, there were no normalized responses below 50%.

Of the three amphipod (*Hyalella azteca*) endpoints, growth and biomass had the greatest percentage of normalized responses (i.e., between 70 and 80%) above the minimum value of the reference envelope; approximately 40% of normalized responses for survival were above the reference envelope minimum value (Figure A4.3). For all three *H. azteca* endpoints, between 15 and 35% of the normalized response data were above 100% [i.e., the response was greater than either the control response (Bortleson *et al.* 1994) or the median of the responses at the reference stations (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Figure A4.3]. All *H. azteca* normalized survival responses were greater than approximately 75%.

Whereas, all *H. azteca* growth and biomass normalized responses were greater than approximately 25% (Figure A4.3).

A4.11 Estimation of R^2 Values used in Concentration Response Model Development

The Concentration-Response Models (CRMs) developed to support the *Evaluation and Interpretation of the Sediment Chemistry and Sediment Toxicity Data for the Upper Columbia River Site* were created using the software environment for statistical computing and graphics, R (R Development Core Team 2011). A log-logistic (3 parameter) model was fit to the relationships between endpoint response (e.g., *Hyalella azteca*) and COPC concentration using the following equation:

$$f(x) = \frac{a}{1 + \left(\frac{x}{EC_{50}}\right)^b}$$

Where:

a = Upper limit of the response data (asymptote);
EC_{50} = Estimated median effect concentration; and,
b = Slope at the estimated median effect concentration.

Specifically, the parameters of the log-logistic model were fit using an iterative minimization procedure and the coefficient of determination (R^2) was calculated using the following equation:

$$R^2 = \frac{\text{RegressionSS}}{\text{TotalSS}}$$

Where:

R^2 = coefficient of determination;
RegressionSS = sums of squares for the regression model; and,
TotalSS = total sums of squares.

Similarly, R^2 can be calculated using the following equation:

$$R^2 = 1 - \frac{\text{ResidualSS}}{\text{TotalSS}}$$

Where:

R^2 = coefficient of determination;
ResidualSS = sums of squares of the residuals; and,
TotalSS = total sums of squares.

Both equations presented result in the same estimation of the R^2 value , as:

$$TotalSS = RegressionSS + ResidualSS$$

The R^2 value can be used as an estimate of the goodness of fit of the model and is calculated using the same equations that are used in other popular statistical software packages including SigmaPlot (Systat Software Inc. 2011).

A4.11 References Cited

Besser, J.M., W.G. Brumbaugh, C.D. Ivey, C.G. Ingersoll, and P.W. Moran. 2008. Biological and chemical characterization of metal bioavailability in sediments from Lake Roosevelt, Columbia River, Washington, USA. Arch. Environ, Contan, Toxicol. 54(4): 557-570.

Bortleson, G.C., S.E. Cox, M.D. Munn, R.J. Schumaker, E.K. Block, L.R. Lucy, and S.B. Cornelius. 1994. Sediment quality assessment of Franklin D. Roosevelt Lake and upstream reach of the Columbia River, Washington, 1992. Open-file Report 94-315. U.S. Geological Survey. Tacoma, Washington. 130 pp.

Clarke, J.U. and D.L. Brandon. 1994. Less than detection limit data - A problem for statistical analysis and decision making in dredged material disposal evaluations. Environmental Effects of Dredging Volume D-94-1. Waterways Experiment Station. US Army Corps of Engineers. Vicksburg, Mississippi.

El-Shaawari, A.H., and S.R. Esterby. 1992. Replacement of censored observations by a constant: An evaluation. Water Research 26(6):835-844. (As cited in USACE 1995).

Gaskin, J.E., T. Dafoe, and P. Brooksbank. 1990. Estimation of analytical values from sub-detection limit measurements for water quality parameters. Analyst 115:507-510. (As cited in USACE 1995).

Ingersoll, C.G., D.D. MacDonald, N. Wang, J.L. Crane, L.J. Field, P.S. Haverland, N.E.. Kemble, R.A. Lindskoog, C.G. Severn, and D.E. Smorong. 2001. Predictions of sediment toxicity using consensus-based freshwater sediment quality guidelines. Archives of Environmental Contamination and Toxicology 41:8-21.

Ingersoll, C.G., D.D. MacDonald, J.M. Besser, W.B. Brumbaugh, C.D. Ivey, N.E. Kemble, J.L. Kunz, T.W. May, N. Wang, and D.E. Smorong. 2008. Sediment chemistry, toxicity, and bioaccumulation data report for the US Environmental Protection Agency - Department of the Interior sampling of metal-contaminated sediment in the Tri-state Mining District in Missouri, Oklahoma, and Kansas. United States Environmental Protection Agency, and United States Fish and Wildlife Service. Missouri and Texas. Administrative Report CERC-8335-FY07-20-12.

MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. Archives of Environmental Contamination and Toxicology 39:20-31.

MacDonald, D.D., D.E. Smorong, C.G. Ingersoll, J.M. Besser, W.G. Brumbaugh, N. Kemble, T.W. May, C.D. Ivey, S. Irving, and M. O'Hare. 2009. Development and evaluation of sediment and pore-water toxicity thresholds to support sediment quality assessments in the Tri-State Mining District (TSMD), Missouri, Oklahoma, and Kansas. Draft Final Technical Report. Volume I: Text. Prepared for U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service. Prepared by MacDonald Environmental Sciences Ltd., U.S. Geological Survey, and CH2M Hill. Nanaimo, British Columbia.

Porter, P.S. and R.C. Ward. 1991. Estimating central tendency from uncensored trace level measurements. Water Resources Bulletin 27(4):687-700. (As cited in USACE 1995).

Schut, J. and Stefanoff, J. 2007. Upper Columbia River Site CERCLA RI/FS: Summary and evaluation of 2005 sediment toxicity test results. August 24, 2007 draft. Prepared for USEPA. Region 10. Seattle, Washington.

Stefanoff, J., J. Schut, and D. Shelton. 2006. Upper Columbia River Site CERCLA RI/FS: Summary and evaluation of 2005 sediment toxicity test results. August 10, 2006 draft. Prepared for USEPA. Region 10. Seattle, Washington.

USACE (U.S. Army Corps of Engineers). 1995. Guidelines for statistical treatment of less than detection limit data in dredged sediment evaluations. EEDP-04-23. Waterways Experiment Station. Vicksburg, Mississippi.

USEPA (United States Environmental Protection Agency). 2009. National recommended water quality criteria. Office of Water. Office of Science and Technology. Washington, District of Columbia.

Table A4.1. Probable Effect Concentrations (PECs) and PEC-type values used in the calculation of ΣPEC-Qs and Mean PEC-Qs used to assess sediment toxicity in the Upper Columbia River.

Chemical of Potential Concern	Selected PEC-Type Concentration			Reference
	Value	Units (DW)	Type	
Metals				
Antimony	25	mg/kg	ER-M	Long and Morgan 1991
Arsenic	33	mg/kg	PEC	MacDonald *et al.* 2000a
Cadmium	4.98	mg/kg	PEC	MacDonald *et al.* 2000a
Chromium	111	mg/kg	PEC	MacDonald *et al.* 2000a
Copper	149	mg/kg	PEC	MacDonald *et al.* 2000a
Iron	43766	mg/kg	SEL	Jaagumagi 1992
Lead	128	mg/kg	PEC	MacDonald *et al.* 2000a
Manganese	1100	mg/kg	SEL	Jaagumagi 1992
Nickel	48.6	mg/kg	PEC	MacDonald *et al.* 2000a
Zinc	459	mg/kg	PEC	MacDonald *et al.* 2000a
Polycyclic Aromatic Hydrocarbons (PAHs)				
Total PAHs	22800	µg/kg	PEC	MacDonald *et al.* 2000a
Polychlorinated Biphenyls (PCBs)				
Total PCBs	0.40	µg/kg	PEC	MacDonald *et al.* 2000b

DW = dry weight; ND = no data; NA = not applicable; PEL = probable effect level; ER-M = effects range-median.
PEC = probable effect concentration; SEL = severe effects level..

Table A4.2. Preliminary screen of chemical of potential concern in sediment in the Upper Columbia River (high-non-detects excluded[1]).

Chemical of Potential Concern	n	% non-detects	Guideline (TEC)	Maximum Value: Detected Values	Maximum Value: Non-Detected Values	Maximum Exceeds TEC?
Metals (mg/kg DW)						
Aluminum, total	56	0%	NA	21100	NA	Uncertain
Antimony, total	56	48%	NA	62.5	<14	Uncertain
Arsenic, total	75	5%	9.79	32	<1.9	EXCEEDS
Barium, total	56	0%	NA	1490	NA	Uncertain
Beryllium, total	56	0%	NA	1.5	NA	Uncertain
Cadmium, total	71	7%	0.99	11	<0.62	EXCEEDS
Calcium, total	56	0%	NA	229000	NA	Uncertain
Chromium, total	56	0%	43.4	111	NA	EXCEEDS
Cobalt, total	56	0%	NA	59.4	NA	Uncertain
Copper, total	75	0%	31.6	2800	NA	EXCEEDS
Iron, total	56	0%	NA	207000	NA	Uncertain
Lead, total	75	0%	35.8	1390	NA	EXCEEDS
Magnesium, total	56	0%	NA	21800	NA	Uncertain
Manganese, total	56	0%	NA	3410	NA	Uncertain
Mercury, total	75	4%	0.18	1.1	<0.19	EXCEEDS
Nickel, total	56	0%	22.7	27.35	NA	EXCEEDS
Potassium, total	56	0%	NA	4020	NA	Uncertain
Selenium, total	56	20%	NA	19.5	<7.7	Uncertain
Silver, total	56	98%	NA	0.71	<2.3	Uncertain
Sodium, total	56	0%	NA	1770	NA	Uncertain
Thallium, total	56	96%	NA	1.5	<5.8	Uncertain
Uranium, total	56	86%	NA	54.7	<52.5	Uncertain
Vanadium, total	56	0%	NA	41.3	NA	Uncertain
Zinc, total	75	0%	121	26000	NA	EXCEEDS
Simultaneously extracted (SE) metals (µmol/g)						
Acid volatile sulfides	64	33%	NA	25	<0.0486	Uncertain
SE antimony	56	48%	NA	0.13717	<0.00304	Uncertain
SE cadmium	64	3%	0.00881	0.0578	<0.00014	EXCEEDS
SE chromium	56	0%	0.835	1.539	NA	EXCEEDS
SE copper	64	2%	0.497	15.675	<0.00044	EXCEEDS
SE lead	64	0%	0.173	2.847	NA	EXCEEDS
SE mercury	56	20%	0.000897	0.000013	<0.000005	No
SE nickel	64	0%	0.387	1.377	NA	EXCEEDS
SE zinc	64	0%	1.82	244.723	NA	EXCEEDS
∑SEM-AVS[2]	64	0%	NA	258.174	NA	Uncertain
(ΣSEM-AVS)/f_{OC}[3]	64	0%	130	51600	NA	EXCEEDS
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)						
∑ESB-TU_{FCV}[4]	59	0%	0.1	0.0677	NA	No
Acenaphthene	57	96%	NA	0.2	<9	Uncertain
Acenaphthylene	58	100%	NA	NA	<51	Uncertain

Table A4.2. Preliminary screen of chemical of potential concern in sediment in the Upper Columbia River (high-non-detects excluded[1]).

Chemical of Potential Concern	n	% non-detects	Guideline (TEC)	Maximum Value		Maximum Exceeds TEC?
				Detected Values	Non-Detected Values	
PAHs (µg/kg DW; continued)						
Anthracene	58	93%	57.2	1	<41	No
Benz(a)anthracene	58	47%	108	6	<88	No
Benzo(a)pyrene	56	77%	150	7	<9	No
Benzo(b)fluoranthene	56	75%	NA	6	<9	Uncertain
Benzo(g,h,i)perylene	56	64%	NA	6	<9	Uncertain
Benzo(k)fluoranthene	56	73%	NA	5	<9	Uncertain
Carbazole	56	100%	NA	NA	<230	Uncertain
Chrysene	58	41%	166	11.5	<140	No
Dibenz(a,h)anthracene	56	93%	33	1	<9	No
Dibenzofuran	56	82%	NA	2	<9	Uncertain
Fluoranthene	59	41%	423	22.5	<71	No
Fluorene	58	95%	77.4	1	<31	No
Indeno(1,2,3-c,d)pyrene	56	61%	NA	6	<9	Uncertain
2-Methylnaphthalene	56	13%	NA	4	<9	Uncertain
Naphthalene	58	3%	176	7.7	<140	No
Nitrobenzene	56	100%	NA	NA	<230	Uncertain
Phenanthrene	59	34%	204	21.5	<150	No
Pyrene	58	41%	195	34	<38	No
Total HMW-PAHs[5]	59	37%	NA	62.8	<337	Uncertain
Total LMW-PAHs[6]	59	5%	NA	38.7	<413	Uncertain
Total PAHs[7]	59	5%	1610	101.45	<750	No
Polychlorinated Biphenyls (PCBs; µg/kg DW)						
Aroclor 1016	56	98%	59.8	25	<1.9	No
Aroclor 1221	56	100%	59.8	NA	<7.6	No
Aroclor 1232	56	100%	59.8	NA	<7.6	No
Aroclor 1242	56	100%	59.8	NA	<1.9	No
Aroclor 1248	56	100%	59.8	NA	<1.9	No
Aroclor 1254	56	100%	59.8	NA	<1.9	No
Aroclor 1260	56	98%	59.8	9.4	<1.9	No
Total PCBs[8]	56	98%	59.8	41.2	<24.7	No
Organochlorine Pesticides (µg/kg)						
Aldrin	56	100%	NA	NA	<0.75	Uncertain
Chlordane (cis & trans; calculated)	56	100%	3.24	NA	<1.5	No
Chlordane, cis-	56	100%	3.24	NA	<0.75	No
Chlordane, trans-	56	100%	3.24	NA	<0.75	No
Dieldrin	56	100%	1.9	NA	<1.6	No
Endosulfan sulfate	56	100%	NA	NA	<1.6	Uncertain

Table A4.2. Preliminary screen of chemical of potential concern in sediment in the Upper Columbia River (high-non-detects excluded[1]).

Chemical of Potential Concern	n	% non-detects	Guideline (TEC)	Maximum Value		Maximum Exceeds TEC?
				Detected Values	Non-Detected Values	
Organochlorine Pesticides (µg/kg; continued)						
Endosulfan-alpha	56	100%	NA	NA	<0.75	Uncertain
Endosulfan-beta	56	100%	NA	NA	<1.6	Uncertain
Endrin	56	100%	2.22	NA	<1.6	No
Endrin aldehyde	56	100%	2.22	NA	<1.6	No
Endrin ketone	56	100%	2.22	NA	<1.6	No
gamma-BHC (Lindane)	56	100%	2.37	NA	<0.75	No
Heptachlor	56	100%	NA	NA	<0.75	Uncertain
Heptachlor epoxide	56	100%	2.47	NA	<0.75	No
Hexachlorobenzene	56	96%	NA	0.45	<0.75	Uncertain
Hexachlorocyclohexane-alpha	56	93%	NA	0.69	<0.75	Uncertain
Hexachlorocyclohexane-beta	56	100%	NA	NA	<0.75	Uncertain
Hexachlorocyclohexane-delta	56	100%	NA	NA	<0.75	Uncertain
Hexachlorocyclopentadiene	56	100%	NA	NA	<230	Uncertain
Isophorone	56	100%	NA	NA	<230	Uncertain
Methoxychlor	56	98%	NA	2.4	<7.5	Uncertain
Nonachlor, cis-	56	100%	NA	NA	<0.75	Uncertain
Nonachlor, trans-	56	100%	NA	NA	<0.75	Uncertain
o,p'-DDD	56	100%	NA	NA	<1.6	Uncertain
p,p'- DDD	56	98%	NA	0.89	<1.6	Uncertain
Sum DDDs (*o,p'* + *p,p'*)	56	98%	4.88	1.335	<3.2	No
o,p'-DDE	56	96%	NA	0.685	<1.6	Uncertain
p,p'-DDE	56	79%	NA	5.2	<1.6	Uncertain
Sum DDEs (*o,p'* + *p,p'*)	56	79%	3.16	5.7	<3.2	EXCEEDS
o,p'- DDT	56	96%	NA	0.89	<1.6	Uncertain
p,p'-DDT	56	86%	NA	10	<1.6	Uncertain
Sum DDTs (*o,p'* + *p,p'*)	56	86%	4.16	10.89	<3.2	EXCEEDS
Total DDTs (Sum DDDs + Sum DDEs + Sum DDTs)	56	73%	5.28	16.8	<9.6	EXCEEDS
Oxychlordane	56	100%	NA	NA	<0.75	Uncertain
Toxaphene	56	100%	NA	NA	<75	Uncertain
Semi-Volatile Compounds (µg/kg)						
1,2,4-Trichlorobenzene	56	100%	NA	NA	<230	Uncertain
1,2-Dichlorobenzene	56	100%	NA	NA	<230	Uncertain
1,3-Dichlorobenzene	56	100%	NA	NA	<230	Uncertain
1,4-Dichlorobenzene	56	100%	NA	NA	<230	Uncertain
2,2'-oxybis(1-chloropropane)	56	100%	NA	NA	<230	Uncertain
2,4,5-Trichlorophenol	58	100%	NA	NA	<590	Uncertain
2,4,6-Trichlorophenol	58	100%	NA	NA	<230	Uncertain
2,4-Dichlorophenol	58	100%	NA	NA	<230	Uncertain
2,4-Dimethylphenol	56	100%	NA	NA	<230	Uncertain

Table A4.2. Preliminary screen of chemical of potential concern in sediment in the Upper Columbia River (high-non-detects excluded[1]).

Chemical of Potential Concern	n	% non-detects	Guideline (TEC)	Maximum Value		Maximum Exceeds TEC?
				Detected Values	Non-Detected Values	
Semi-Volatile Compounds (µg/kg; continued)						
2,4-Dinitrophenol	57	100%	NA	NA	<590	Uncertain
2,4-Dinitrotoluene	56	100%	NA	NA	<230	Uncertain
2,6-Dinitrotoluene	56	100%	NA	NA	<230	Uncertain
2-Chloronaphthalene	56	100%	NA	NA	<230	Uncertain
2-Chlorophenol	56	100%	NA	NA	<230	Uncertain
2-Fluorobiphenyl	56	100%	NA	NA	<230	Uncertain
2-Methylphenol	56	100%	NA	NA	<230	Uncertain
2-Nitroaniline	56	100%	NA	NA	<590	Uncertain
2-Nitrophenol	56	100%	NA	NA	<230	Uncertain
3,3'-Dichlorobenzidine	56	100%	NA	NA	<230	Uncertain
3-Nitroaniline	56	100%	NA	NA	<590	Uncertain
4-Bromophenyl phenyl ether	56	100%	NA	NA	<230	Uncertain
4-Chloro-3-methylphenol	56	100%	NA	NA	<230	Uncertain
4-Chloroaniline	56	100%	NA	NA	<230	Uncertain
4-Chlorophenyl phenyl ether	56	100%	NA	NA	<230	Uncertain
4-Methylphenol	56	98%	NA	200	<230	Uncertain
4-Nitroaniline	56	100%	NA	NA	<590	Uncertain
4-Nitrophenol	56	100%	NA	NA	<590	Uncertain
Acetophenone	56	100%	NA	NA	<230	Uncertain
Atrazine	56	100%	NA	NA	<230	Uncertain
Benzaldehyde	56	100%	NA	NA	<230	Uncertain
Benzoic acid	56	100%	NA	NA	<230	Uncertain
Benzyl alcohol	56	100%	NA	NA	<230	Uncertain
bis(2-Chloroethoxy)methane	56	100%	NA	NA	<230	Uncertain
Bis(2-chloroethyl)ether	56	98%	NA	63	<230	Uncertain
Bis(2-ethylhexyl) phthalate	58	90%	NA	980	<230	Uncertain
Butyl benzyl phthalate	56	100%	NA	NA	<230	Uncertain
Caprolactam	56	98%	NA	43	<230	Uncertain
Diethyl phthalate	56	100%	NA	NA	<230	Uncertain
Dimethyl phthalate	56	100%	NA	NA	<230	Uncertain
Di-n-butyl phthalate	57	98%	NA	590	<230	Uncertain
Dinitro-o-cresol	56	100%	NA	NA	<590	Uncertain
Di-N-octyl phthalate	56	100%	NA	NA	<230	Uncertain
Hexachlorobutadiene	56	100%	NA	NA	<0.75	Uncertain
Hexachloroethane	56	100%	NA	NA	<230	Uncertain
N-Nitrosodi-n-propylamine	56	100%	NA	NA	<230	Uncertain
N-Nitrosodiphenylamine	56	100%	NA	NA	<230	Uncertain
Pentachlorophenol	58	100%	NA	NA	<590	Uncertain
Phenol	59	100%	NA	NA	<230	Uncertain

Table A4.2. Preliminary screen of chemical of potential concern in sediment in the Upper Columbia River (high-non-detects excluded[1]).

Chemical of Potential Concern	n	% non-detects	Guideline (TEC)	Maximum Value: Detected Values	Maximum Value: Non-Detected Values	Maximum Exceeds TEC?
COPC Mixtures[9]						
Mean PEC-Q	58	0%	0.1	2.1654	NA	EXCEEDS
Mean $PEC\text{-}Q_{METALS}$	75	0%	NA	17.2	NA	Uncertain
Mean $PEC\text{-}Q_{METALS(1\%OC)}$	75	0%	0.1	34.4	NA	EXCEEDS
Nutrients/Inorganics/Conventionals						
Organic carbon, total	80	0%	NA	3.91	NA	Uncertain
Grainsize Fraction <75 µm	56	0%	NA	93	NA	Uncertain
Clay, percent	64	2%	NA	54	<1	Uncertain
Colloid, percent	56	0%	NA	13.02	NA	Uncertain
Fines, percent (silt+clay)	80	0%	NA	99	NA	Uncertain
Gravel, percent	56	0%	NA	20.6	NA	Uncertain
Sand - coarse, percent	56	0%	NA	12.9	NA	Uncertain
Sand - fine, percent	56	0%	NA	92.8	NA	Uncertain
Sand - medium, percent	56	0%	NA	82.7	NA	Uncertain
Sand, percent	64	0%	NA	97.7	NA	Uncertain
Silt, percent	64	0%	NA	67.89	NA	Uncertain

n = number; TEC = threshold effect concentration; NA = not applicable; *f* = fraction; OC = organic carbon; AVS = acid volatile sulfides; ESB-TU = equilibrium partitioning sediment benchmark toxic unit; HMW = high molecular weight; LMW = low molecular weight; PEC-Q = probable effect concentration-quotient.

[1]Data screened includes whole sediment data from CEE (2006a), Besser *et al.* (2008), and Bortleson *et al.* (1994), for stations meeting selection criteria described in Appendix 2. Only chemicals of potential concern for which there were one or more measurements from CEE (2006a) were considered in this screen.

[2] ∑SEM-AVS = the sum of simultaneously extracted metals concentrations (i.e., SE-cadmium, SE-copper, SE-lead, SE-nickel, SE-zinc, and one-half of SE-silver) minus the acid volatile sulfides concentration.

[3] (∑SEM-AVS)/f_{OC} = (∑SEM-AVS) divided by the fraction organic carbon.

[4] $\sum ESB\text{-}TU_{FCV}$ were calculated as the sum of the equilibrium partitioning sediment benchmark toxic units for the following 13 PAHs: acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene.

[5] Total HMW-PAHs were calculated if the following mandatory PAHs were measured: benz(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, pyrene.

[6] Total LMW-PAHs were calculated if the following mandatory PAHs were measured: 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, phenanthrene.

[7] Total PAHs were calculated as the sum of LMW- and HMW-PAHs.

[8] Total PCBs were calculated as the sum of the reported concentrations of individual Aroclors (i.e., Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260).

[9] PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total PAHs; and, total PCBs (Ingersoll *et al.* 2001).

$PEC\text{-}Q_{METALS}$ was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001);

$PEC\text{-}Q_{EXTMETALS}$ was calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.

1%OC = normalized to 1% organic carbon.

Table A4.3. Preliminary screen of chemicals of potential concern in pore water in Upper Columbia River (high-non-detects excluded[1]).

Chemical of Potential Concern	n	% non-detects	Guideline (CCC)	Maximum Value		Maximum Exceeds CCC?
				Detected Values	Non-Detected Values	
Metals (µg/L)						
Aluminum, total	50	0%	87	595	NA	EXCEEDS
Antimony, total	55	84%	NA	32.4	<60	Uncertain
Arsenic, total	63	70%	150	94	<10	No
Barium, total	55	0%	NA	734	NA	Uncertain
Beryllium, total	55	98%	NA	0.11	<5	Uncertain
Cadmium, total	36	6%	0.28	130	<0.17	EXCEEDS
Calcium, total	55	0%	NA	164000	NA	Uncertain
Chromium, total	55	20%	11	117	<10	EXCEEDS
Cobalt, total	55	40%	NA	7	<50	Uncertain
Copper, total	55	4%	10.5	600	<4.1	EXCEEDS
Iron, total	63	0%	1000	83000	NA	EXCEEDS
Lead, total	28	0%	3.07	3800	NA	EXCEEDS
Magnesium, total	55	0%	NA	41100	NA	Uncertain
Manganese, total	63	0%	NA	12800	NA	Uncertain
Mercury, total	55	55%	0.77	0.34	<0.2	No
Nickel, total	55	60%	60.7	81.1	<40	EXCEEDS
Potassium, total	55	0%	NA	8830	NA	Uncertain
Selenium, total	9	0%	5	20.7	NA	EXCEEDS
Sodium, total	55	2%	NA	12800	<3070	Uncertain
Thallium, total	55	98%	NA	6.8	<25	Uncertain
Uranium, total	55	95%	NA	42.2	<200	Uncertain
Vanadium, total	55	56%	NA	13.4	<50	Uncertain
Zinc, total	63	8%	140	2600	<44	EXCEEDS
$\sum$PW-$TU_{DIVALENT\ METALS}$[2]	63	0%	NA	1100	NA	Uncertain
Nutrients/Inorganics/Conventionals						
Dissolved organic carbon (%)	7	0%	NA	120	NA	Uncertain
Alkalinity, Carbonate total (mg/L)	8	0%	NA	130	NA	Uncertain
Conductivity (µS/cm)	8	0%	NA	370	NA	Uncertain
Hardness (mg/L)	63	0%	NA	180	NA	Uncertain
Ammonia (mg nitrogen/L)	8	0%	NA	1.9	NA	Uncertain
Sulfide, total (S_2; mg/L)	5	0%	0.002	0.22	NA	EXCEEDS

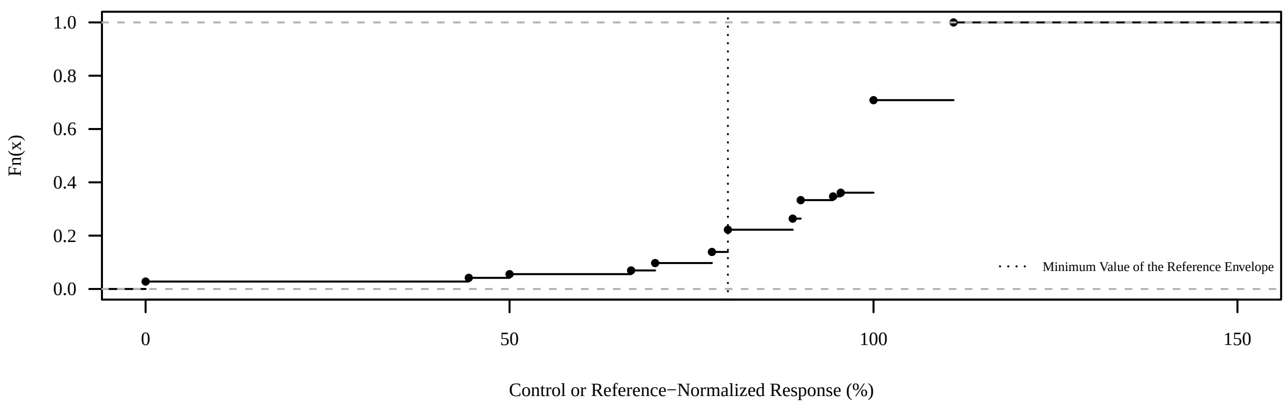
n = number; CCC = criterion continuous concentration; NA = not applicable.

[1]Data screened includes **pore water** data from CEE (2006a) and Besser *et al.* (2008) for stations meeting selection criteria described in Appendix 2. No pore water data were available from Bortleson *et al.* (1994). Only chemicals of potential concern for which there were one or more measurements from CEE (2006a) were considered in this screen.

[2] $\sum$PW-$TU_{DIVALENT\ METALS}$ = sum of pore-water toxic units for divalent metals (divalent metals include cadmium, copper, lead, nickel, silver, and zinc).

Figure A4.1. Cumulative frequency distributions of normalized responses observed in toxicity tests performed with *Ceriodaphnia dubia* in surficial sediments of the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

C. dubia Survival



C. dubia Reproduction

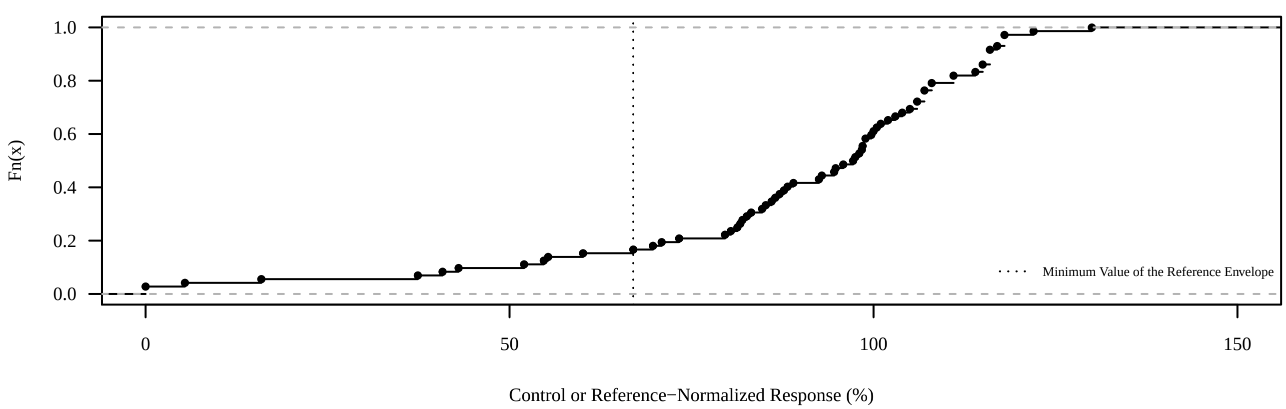
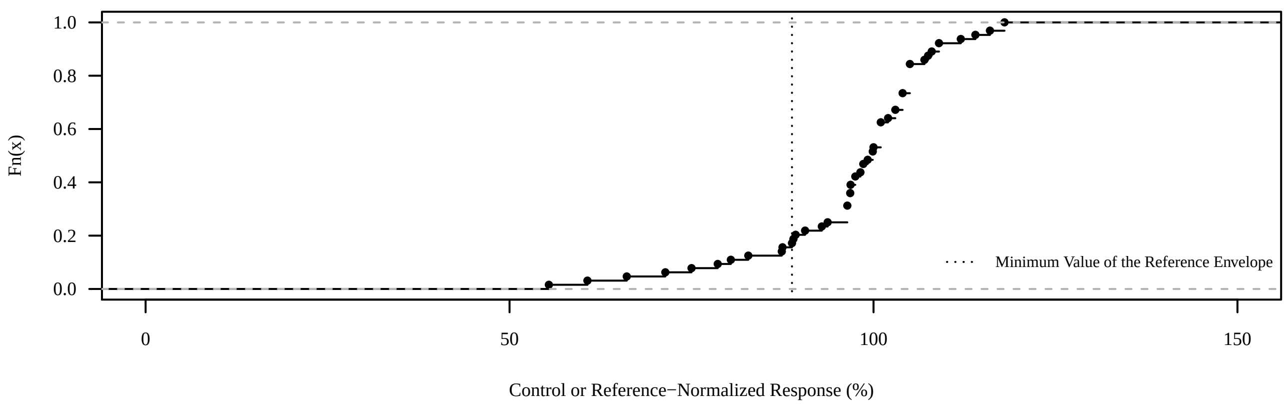
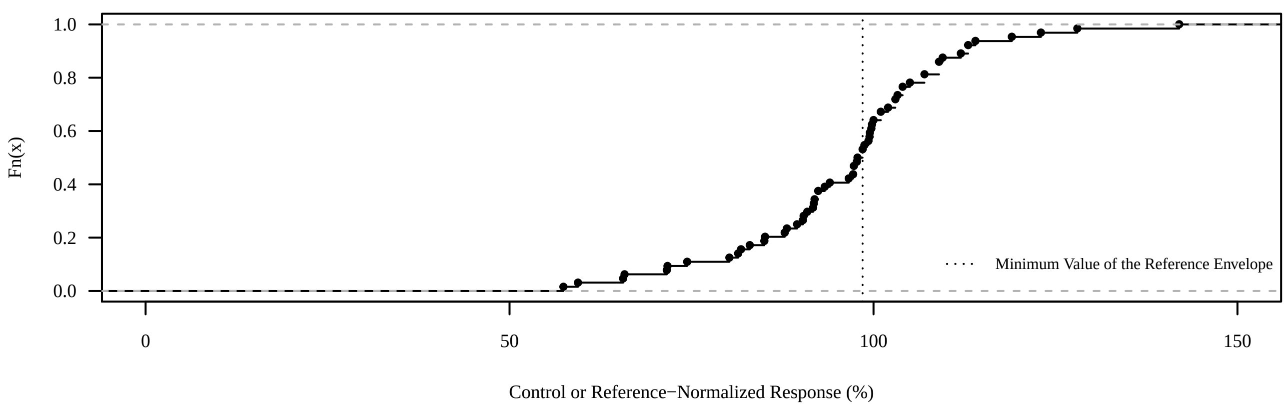


Figure A4.2. Cumulative frequency distributions of normalized responses observed in toxicity tests performed with *Chironomus dilutus* in surficial sediments of the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

C. dilutus Survival



C. dilutus Growth



C. dilutus Biomass

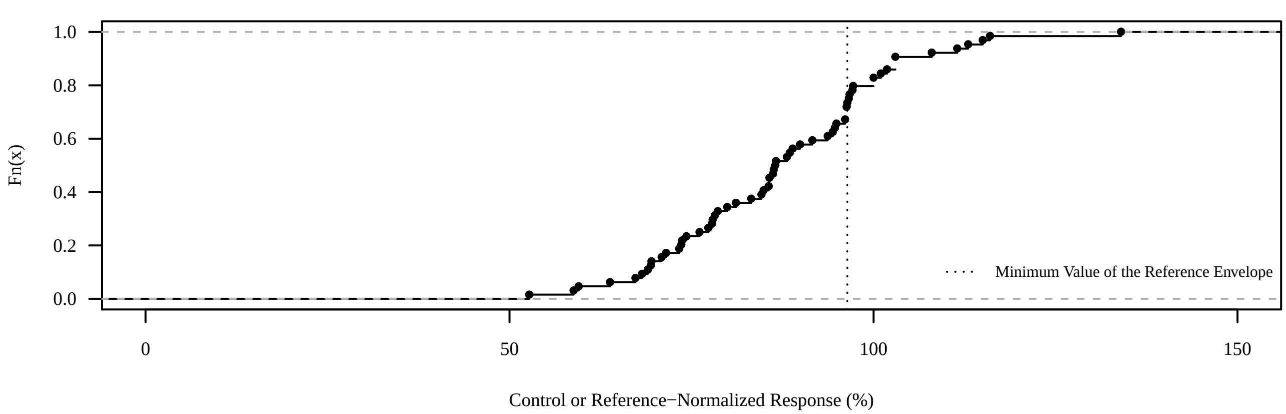
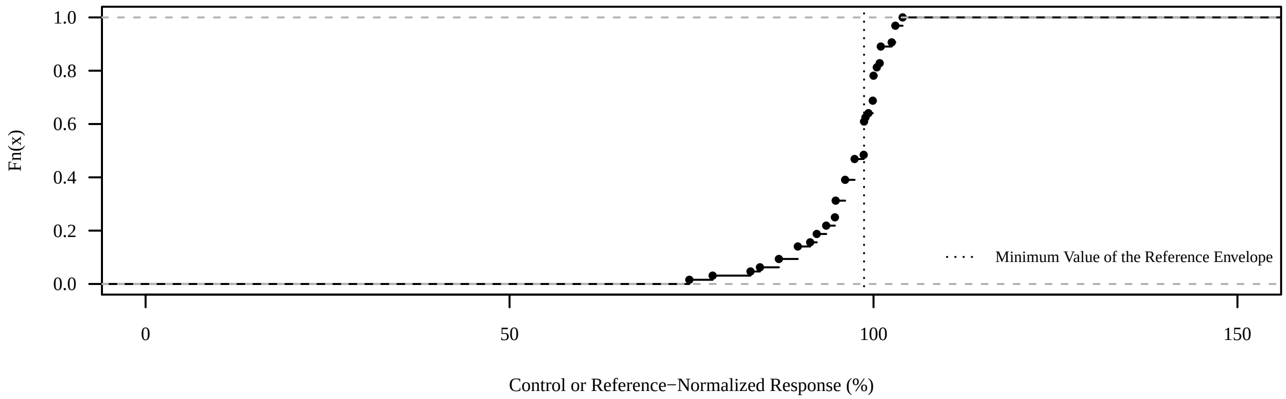
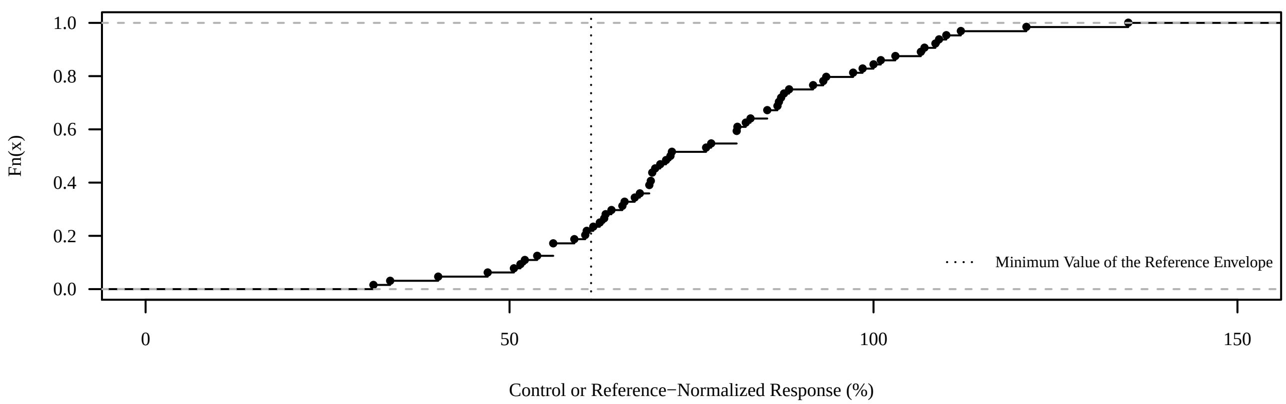


Figure A4.3. Cumulative frequency distributions of normalized responses observed in toxicity tests performed with *Hyalella azteca* in surficial sediments of the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

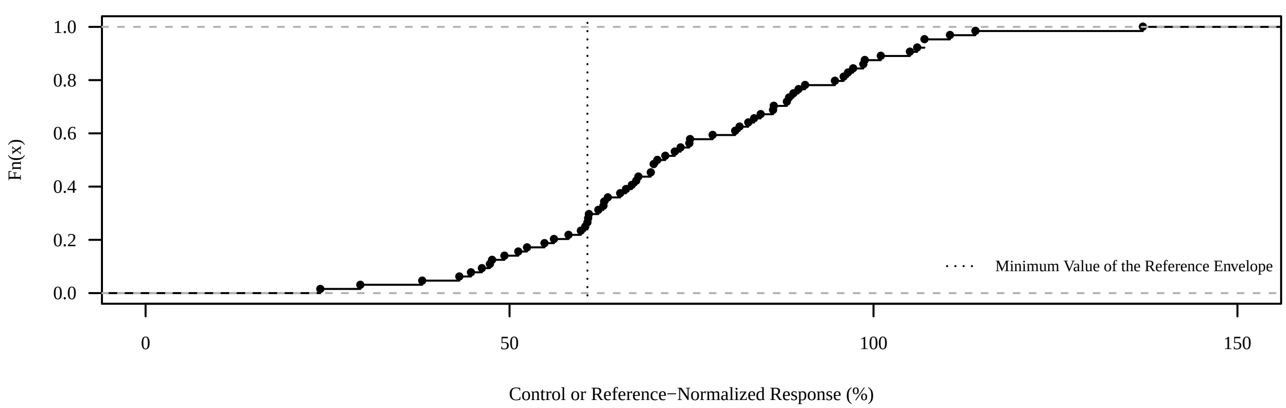
H. azteca Survival



H. azteca Growth



H. azteca Biomass



Appendix 5

Spearman Rank Correlations

Table A5.1. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Conventionals								
Percent Clay	0.0944	0.29	-0.317	0.525	0.644	0.354	0.393	0.426
Percent Coarse Sand	0.367	0.495	0.153	0.554	0.716	0.315	0.578	0.577
Percent Colloid	0.223	0.278	0.187	0.349	0.637	0.214	0.435	0.433
Percent Fine Sand	0.207	-0.0114	0.287	-0.177	0.00702	-0.372	-0.231	-0.267
Percent Fines	0.529	0.597	-0.106	0.599	0.773	0.409	0.612	0.645
Percent Gravel	0.161	0.236	0.325	0.215	0.503	0.433	0.448	0.477
Percent Medium Sand	-0.242	-0.0632	-0.234	-0.0825	-0.445	0.163	-0.00614	-0.0211
Percent Sand	-0.431	-0.512	-0.0371	**-0.688**	**-0.848**	-0.547	**-0.757**	**-0.79**
Percent Silt	0.36	0.452	-0.102	0.592	0.755	0.393	0.627	0.651
Total Organic Carbon (%)	0.361	0.566	-0.145	0.59	0.736	0.539	0.664	0.675
Metals (mg/kg DW)								
Total Aluminum	-0.435	-0.245	-0.293	-0.334	-0.495	-0.0618	-0.273	-0.276
Total Antimony	-0.465	-0.394	-0.263	-0.267	**-0.65**	-0.282	-0.382	-0.433
Total Arsenic	-0.446	-0.385	-0.0296	-0.265	-0.129	-0.172	-0.231	-0.232
Total Barium	**-0.601**	-0.538	-0.288	-0.463	**-0.653**	-0.318	**-0.483**	-0.47
Total Beryllium	-0.499	-0.368	-0.146	-0.342	-0.446	0.0243	-0.194	-0.205
Total Cadmium	0.531	0.464	-0.0659	0.332	0.5	0.163	0.309	0.364
Total Calcium	-0.561	**-0.592**	-0.217	-0.572	**-0.632**	-0.236	**-0.577**	-0.507
Total Chromium	-0.503	-0.476	-0.252	-0.418	**-0.757**	-0.331	**-0.423**	-0.46
Total Cobalt	-0.453	-0.459	-0.313	-0.391	**-0.773**	-0.368	**-0.458**	-0.489
Total Copper	-0.463	-0.466	-0.35	-0.448	**-0.811**	-0.488	**-0.485**	-0.539
Total Iron	-0.406	-0.298	-0.407	-0.381	**-0.744**	-0.334	**-0.441**	-0.47
Total Lead	-0.0229	0.0144	-0.223	-0.229	-0.219	-0.028	0.00065	0.0351
Total Magnesium	0.161	0.0254	0.159	0.24	0.628	0.195	0.3	0.314
Total Manganese	-0.339	-0.291	-0.38	-0.411	**-0.797**	-0.378	**-0.445**	-0.479
Total Mercury	0.324	0.313	0.044	0.417	0.746	0.384	0.273	0.305
Total Nickel	-0.303	-0.262	0.233	-0.0316	0.41	0.351	0.0307	0.0992

Table A5.1. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Metals (mg/kg DW; continued)								
Total Potassium	-0.318	-0.279	-0.395	-0.295	-0.477	-0.0786	-0.283	-0.27
Total Selenium	-0.345	-0.287	-0.252	-0.254	-0.267	0.229	-0.183	-0.133
Total Silver	-0.0893	-0.198	0.351	-0.0271	0.466	0.156	-0.052	-0.0335
Total Sodium	-0.375	-0.393	-0.267	-0.484	**-0.785**	-0.307	**-0.498**	-0.507
Total Thallium	0.0204	-0.107	0.333	-0.14	0.443	0.125	-0.0861	-0.0461
Total Uranium	-0.0771	-0.156	0.308	-0.231	0.222	-0.188	-0.246	-0.234
Total Vanadium	**-0.583**	-0.425	-0.0934	-0.421	-0.413	0.122	-0.212	-0.159
Total Zinc	-0.512	-0.498	-0.424	-0.422	**-0.739**	-0.425	**-0.503**	-0.527
Simultaneously extracted metals (SEM; µmol/g)								
SE Antimony	-0.456	-0.505	0.222	-0.398	-0.464	-0.448	**-0.582**	**-0.632**
SE Cadmium	0.32	0.231	-0.0984	0.184	0.335	0.286	0.173	0.205
SE Chromium	-0.348	-0.418	-0.184	-0.515	**-0.878**	-0.362	**-0.533**	-0.554
SE Copper	-0.0284	-0.093	-0.0267	-0.321	**-0.606**	-0.367	-0.321	-0.344
SE Lead	0.327	0.348	0.057	-0.00845	0.213	0.0539	0.0933	0.149
SE Nickel	-0.414	-0.362	-0.0701	0.013	0.236	0.195	-0.0143	-0.00651
SE Zinc	-0.241	-0.264	-0.272	-0.498	**-0.786**	-0.445	**-0.549**	**-0.551**
ΣSEM-AVS	-0.266	-0.285	-0.245	-0.519	**-0.785**	-0.432	**-0.543**	-0.547
(ΣSEM-AVS)/f_{OC}	-0.301	-0.369	-0.132	**-0.606**	**-0.877**	**-0.568**	**-0.659**	**-0.603**
Organochlorine Pesticides (µg/kg)								
Hexachlorobenzene	0.265	0.44	-0.0891	0.323	0.562	0.178	0.421	0.484
Hexachlorocyclohexane-alpha	0.371	0.487	0.0214	0.333	0.381	0.204	0.476	0.413
Methoxychlor	0.168	0.346	-0.103	0.358	0.619	0.172	0.409	0.416
p,p'-DDD	0.166	0.315	-0.0801	0.327	0.613	0.134	0.349	0.365
o,p'-DDE	0.205	0.192	0.0699	0.208	0.558	0.143	0.285	0.307
p,p'-DDE	0.218	0.386	-0.0596	0.275	0.579	0.0217	0.298	0.281

Table A5.1. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Organochlorine Pesticides (µg/kg; continued)								
Sum DDEs[1]	0.226	0.364	-0.0269	0.253	0.574	0.0164	0.284	0.267
o,p'-DDT	0.166	0.315	-0.0801	0.327	0.613	0.134	0.349	0.365
p,p'-DDT	0.0239	-0.102	0.381	-0.214	0.386	-0.00574	-0.0646	-0.0272
Sum DDTs[2]	0.0542	-0.0808	0.388	-0.191	0.408	-0.00574	-0.0514	-0.0149
Total DDTs[3]	0.241	0.181	0.171	0.0949	0.615	0.0491	0.172	0.189
Semi-Volatile Compounds (µg/kg)								
4-Methylphenol	0.012	0.32	-0.0857	0.297	0.568	0.14	0.324	0.308
Bis(2-chloroethyl)ether	0.012	0.32	-0.0857	0.297	0.568	0.14	0.324	0.308
Bis(2-ethylhexyl) phthalate	0.00374	0.355	-0.00224	0.159	0.429	0.206	0.404	0.391
Caprolactam	0.012	0.32	-0.0857	0.297	0.568	0.14	0.324	0.308
Di-n-butyl phthalate	0.012	0.32	-0.0857	0.297	0.568	0.14	0.324	0.308
COPC Mixtures[4]								
Mean PEC-Q	-0.375	-0.326	-0.35	-0.442	**-0.772**	-0.393	**-0.475**	-0.504
Mean PEC-Q_{METALS}	-0.488	-0.469	-0.399	-0.422	**-0.705**	-0.399	**-0.499**	-0.516
Mean PEC-$Q_{METALS(1\%OC)}$	**-0.608**	**-0.606**	-0.357	-0.501	**-0.844**	**-0.57**	**-0.668**	**-0.584**
Mean PEC-$Q_{EXTMETALS}$	-0.488	-0.468	-0.414	-0.4	**-0.685**	-0.369	**-0.488**	-0.501
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	**-0.599**	**-0.6**	-0.373	-0.486	**-0.832**	**-0.553**	**-0.676**	**-0.584**
ΣPEC-$Q_{Cu,Pb,Zn}$	-0.488	-0.474	-0.378	-0.465	**-0.754**	-0.455	**-0.516**	-0.545
ΣPEC-$Q_{EXTMETALS}$	-0.49	-0.471	-0.368	-0.479	**-0.769**	-0.48	**-0.5**	**-0.55**
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	**-0.601**	**-0.597**	-0.323	-0.522	**-0.858**	**-0.58**	**-0.677**	**-0.578**
ΣPEC-Q_{METALS}	-0.481	-0.469	-0.378	-0.465	**-0.754**	-0.455	**-0.516**	-0.545
ΣPEC-$Q_{METALS(1\%OC)}$	**-0.567**	**-0.627**	-0.135	**-0.621**	**-0.895**	**-0.624**	**-0.674**	**-0.712**

Table A5.1. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Slag Indicators								
Cu:Al	-0.351	-0.317	-0.337	-0.265	**-0.84**	-0.358	**-0.408**	-0.432
Zn:Cd	**-0.545**	-0.471	-0.322	-0.482	**-0.857**	-0.494	**-0.471**	-0.538

DW = dry weight; r_s = Spearman correlation coefficient; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; Al = alumium; Cd = cadmium; Cu = copper; Zn = zinc; PAHs = polycyclic aromatic hydrocarbons; PCBs = polychlorinated biphenyls.

[1]Sum DDEs is calcuated as the sum of p,p'-DDE and o,p'-DDE congeners.
[2]Sum DDTs is calcuated as the sum of p,p'-DDT and o,p'-DDT congeners.
[3]Total DDTs is calcuated as the sum of Sum DDE, Sum DDT, and Sum DDD.
[4] PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total PAHs; and, total PCBs (Ingersoll *et al.* 2001).
PEC-Q_{METALS} was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001);
PEC-$Q_{EXTMETALS}$ was calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

Table A5.2. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for potentially slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Conventionals								
Percent Clay	-0.528	-0.548	-0.351	-0.2	-0.183	-0.471	**-0.517**	-0.517
Percent Coarse Sand	0.416	-0.241	0.145	0.193	0.482	0.177	-0.301	-0.193
Percent Colloid	-0.503	-0.452	-0.563	-0.0238	-0.643	-0.0241	-0.262	-0.214
Percent Fine Sand	0.356	0.595	-0.204	0.476	0.262	0.265	0.762	0.69
Percent Fines	-0.44	-0.579	-0.117	-0.583	-0.367	-0.328	**-0.833**	-0.717
Percent Gravel	0.338	-0.218	-0.0412	0.0273	0.3	-0.0414	-0.355	-0.273
Percent Medium Sand	0.658	0.374	0.255	0.386	0.458	0.329	0.277	0.374
Percent Sand	0.503	0.81	0.117	0.583	0.367	0.328	0.833	0.717
Percent Silt	-0.503	-0.81	-0.109	-0.65	-0.617	0.0336	**-0.533**	-0.367
Total Organic Carbon (%)	-0.301	-0.464	-0.276	-0.4	-0.417	-0.37	**-0.75**	-0.617
Metals (mg/kg DW)								
Total Aluminum	-0.417	-0.405	-0.216	-0.524	-0.619	-0.434	**-0.738**	-0.69
Total Antimony	0.0503	-0.342	-0.54	0.586	-0.0244	0.383	-0.0488	0.0976
Total Arsenic	-0.069	-0.317	0.167	-0.3	0.267	-0.496	**-0.517**	-0.633
Total Barium	-0.43	-0.571	0.216	-0.452	0.119	-0.193	**-0.429**	-0.571
Total Beryllium	-0.258	-0.476	-0.659	-0.0952	-0.738	-0.0482	**-0.5**	-0.381
Total Cadmium	-0.345	-0.533	0.184	-0.333	0.2	-0.328	**-0.467**	-0.55
Total Calcium	-0.454	-0.19	0.108	-0.0952	0.0714	-0.0241	0.0476	-0.0952
Total Chromium	-0.43	-0.429	-0.587	-0.238	-0.833	-0.217	**-0.524**	-0.429
Total Cobalt	-0.209	-0.286	-0.24	-0.429	-0.524	-0.277	**-0.595**	-0.571
Total Copper	-0.311	-0.633	0.0586	-0.417	0.0167	-0.361	**-0.567**	-0.6
Total Iron	-0.7	-0.333	-0.0359	-0.667	-0.548	-0.627	**-0.667**	-0.714
Total Lead	-0.207	-0.683	0.134	-0.233	0.3	-0.303	**-0.55**	-0.617
Total Magnesium	-0.54	-0.286	-0.18	-0.167	-0.19	-0.145	-0.0714	-0.19
Total Manganese	-0.405	-0.19	-0.252	-0.524	-0.619	-0.349	-0.262	-0.333
Total Mercury	-0.311	-0.767	-0.0418	-0.217	0.2	-0.185	**-0.583**	-0.6
Total Nickel	-0.135	-0.286	-0.0719	-0.476	-0.286	-0.229	**-0.524**	-0.571

Table A5.2. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for potentially slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Metals (mg/kg DW; continued)								
Total Potassium	-0.172	-0.476	-0.0838	-0.548	-0.333	-0.193	**-0.524**	-0.571
Total Selenium	-0.295	0.0952	-0.204	0.286	0.0952	-0.0482	0.286	0.238
Total Silver	-0.466	-0.571	-0.659	0.0714	-0.476	-0.12	-0.381	-0.286
Total Sodium	-0.503	-0.214	-0.707	-0.0714	**-0.857**	-0.157	-0.262	-0.214
Total Thallium	-0.466	-0.571	-0.659	0.0714	-0.476	-0.12	-0.381	-0.286
Total Uranium	-0.196	0.0952	-0.491	0.524	-0.143	0.169	0.19	0.238
Total Vanadium	-0.331	-0.0952	-0.695	0	-0.762	-0.0843	-0.238	-0.19
Total Zinc	-0.311	-0.417	0.234	-0.367	0.217	-0.403	-0.4	-0.517
Simultaneously extracted metals (SEM; µmol/g)								
SE Antimony	0.11	0.333	0.216	0.548	0.524	0.325	0.5	0.476
SE Cadmium	-0.16	-0.548	0.669	-0.5	0.367	-0.269	**-0.717**	-0.733
SE Chromium	-0.479	-0.548	0.144	-0.0952	0.143	0.012	-0.286	-0.357
SE Copper	-0.246	-0.405	0.469	-0.117	0.25	0.084	-0.15	-0.167
SE Lead	-0.0859	-0.762	0.519	-0.483	0.433	-0.269	**-0.75**	-0.783
SE Nickel	0.27	-0.667	-0.084	0.159	0.536	0.114	-0.377	-0.41
SE Zinc	-0.54	-0.524	0.544	-0.4	0.417	-0.538	**-0.467**	-0.6
ΣSEM-AVS	-0.393	-0.69	0.594	-0.617	0.2	-0.303	**-0.617**	-0.65
(ΣSEM-AVS)/f_{OC}	0.295	0.19	0.611	0.3	0.717	0.235	0.4	0.267
Organochlorine Pesticides (µg/kg)								
Hexachlorobenzene	-0.675	-0.619	-0.455	-0.167	-0.476	-0.374	**-0.548**	-0.476
Hexachlorocyclohexane-alpha	-0.675	-0.619	-0.455	-0.167	-0.476	-0.374	**-0.548**	-0.476
Methoxychlor	-0.675	-0.619	-0.455	-0.167	-0.476	-0.374	**-0.548**	-0.476
p,p'-DDD	-0.675	-0.619	-0.455	-0.167	-0.476	-0.374	**-0.548**	-0.476
o,p'-DDE	-0.675	-0.619	-0.455	-0.167	-0.476	-0.374	**-0.548**	-0.476
p,p'-DDE	-0.307	-0.452	0.012	-0.5	-0.405	-0.482	**-0.714**	-0.595

Table A5.2. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for potentially slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Organochlorine Pesticides (µg/kg; continued)								
Sum DDEs[3]	-0.577	-0.524	0.0719	-0.69	-0.429	-0.735	**-0.833**	-0.762
o,p'-DDT	-0.675	-0.619	-0.455	-0.167	-0.476	-0.374	**-0.548**	-0.476
p,p'-DDT	-0.503	-0.69	-0.012	-0.595	-0.262	-0.651	**-0.905**	-0.833
Sum DDTs[4]	-0.503	-0.69	-0.012	-0.595	-0.262	-0.651	**-0.905**	-0.833
Total DDTs[5]	-0.54	-0.619	-0.0359	-0.667	-0.405	-0.711	**-0.881**	-0.81
Semi-Volatile Compounds (µg/kg)								
4-Methylphenol	-0.683	-0.602	-0.406	-0.133	-0.446	-0.335	**-0.554**	-0.482
Bis(2-chloroethyl)ether	-0.733	-0.747	-0.115	-0.349	-0.229	-0.348	**-0.602**	-0.627
Bis(2-ethylhexyl) phthalate	0.0601	-0.0672	-0.552	0.229	-0.157	0.0061	-0.361	-0.265
Caprolactam	-0.683	-0.602	-0.406	-0.133	-0.446	-0.335	**-0.554**	-0.482
Di-n-butyl phthalate	-0.683	-0.602	-0.406	-0.133	-0.446	-0.335	**-0.554**	-0.482
COPC Mixtures[4]								
Mean PEC-Q	-0.43	-0.571	0.216	-0.452	0.119	-0.193	**-0.429**	-0.571
Mean $PEC\text{-}Q_{METALS}$	-0.173	-0.55	0.151	-0.25	0.283	-0.345	**-0.517**	-0.6
Mean $PEC\text{-}Q_{METALS(1\%OC)}$	0.138	-0.05	-0.0251	0.167	0.433	-0.218	0.117	-0.15
Mean $PEC\text{-}Q_{EXTMETALS}$	-0.242	-0.6	0.0418	-0.233	0.283	-0.496	**-0.567**	-0.667
Mean $PEC\text{-}Q_{EXTMETALS(1\%OC)}$	0.345	0.05	-0.0502	0.367	0.533	-0.042	0.25	-0.0333
$\Sigma PEC\text{-}Q_{Cu,Pb,Zn}$	-0.173	-0.55	0.184	-0.333	0.2	-0.328	**-0.467**	-0.55
$\Sigma PEC\text{-}Q_{EXTMETALS}$	-0.414	-0.583	0.0753	-0.433	0.0333	-0.328	**-0.517**	-0.567
$\Sigma PEC\text{-}Q_{EXTMETALS(1\%OC)}$	0.207	0.233	-0.0586	0.25	0.183	0.412	0.533	0.333
$\Sigma PEC\text{-}Q_{METALS}$	-0.242	-0.583	0.184	-0.333	0.2	-0.328	**-0.467**	-0.55
$\Sigma PEC\text{-}Q_{METALS(1\%OC)}$	0.069	0.133	0.167	0.217	0.317	0.227	0.317	0.217

Table A5.2. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for potentially slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Slag Indicators								
Cu:Al	-0.432	-0.216	0.187	-0.156	0.132	-0.0424	-0.0238	-0.144
Zn:Cd	-0.069	0.3	0.293	0.283	0.183	-0.151	0.35	0.283

DW = dry weight; r_s = Spearman correlation coefficient; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; Al = alumium; Cd = cadmium; Cu = copper; Zn = zinc; PAHs = polycyclic aromatic hydrocarbons; PCBs = polychlorinated biphenyls.

[1] Sum DDEs is calcuated as the sum of p,p'-DDE and o,p'-DDE congeners.
[2] Sum DDTs is calcuated as the sum of p,p'-DDT and o,p'-DDT congeners.
[3] Total DDTs is calcuated as the sum of Sum DDE, Sum DDT, and Sum DDD.
[4] PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total PAHs; and, total PCBs (Ingersoll *et al.* 2001).
PEC-Q_{METALS} was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001);
PEC-$Q_{EXTMETALS}$ was calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

Table A5.3. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for non slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Conventionals								
Percent Clay	0.165	-0.451	-0.266	0.0993	0.00963	0.0903	**-0.525**	**-0.486**
Percent Coarse Sand	-0.0731	-0.00879	0.271	-0.232	0.292	0.0565	**-0.594**	0.497
Percent Colloid	0.0894	-0.446	-0.451	0.314	-0.326	0.00792	**-0.583**	**-0.551**
Percent Fine Sand	-0.0363	0.195	0.00346	0.207	-0.0113	0.483	0.536	0.0182
Percent Fines	0.0783	**-0.479**	-0.375	0.185	-0.0692	0.123	0.545	**-0.543**
Percent Gravel	0.265	0.287	0.244	-0.265	0.461	0.349	0.524	0.601
Percent Medium Sand	-0.107	0.147	0.412	-0.396	0.208	-0.235	-0.0527	0.513
Percent Sand	-0.235	0.307	0.426	-0.171	0.0248	-0.159	0.575	0.494
Percent Silt	0.135	-0.404	-0.395	0.249	-0.138	0.13	**-0.551**	**-0.498**
Total Organic Carbon (%)	-0.108	-0.0932	-0.0036	0.409	0.428	0.379	-0.0594	0.000306
Metals (mg/kg DW)								
Total Aluminum	0.253	-0.441	-0.356	0.0342	-0.413	-0.0276	**-0.585**	**-0.548**
Total Antimony	0.00549	0.0179	0.0209	0.358	0.293	0.066	0.295	0.326
Total Arsenic	0.151	**-0.482**	-0.127	-0.0642	-0.119	-0.0424	-0.0972	-0.0483
Total Barium	0.145	**-0.515**	-0.248	0.149	-0.0562	0.158	-0.324	-0.256
Total Beryllium	0.214	-0.394	-0.453	0.0943	**-0.485**	-0.0258	**-0.651**	**-0.624**
Total Cadmium	0.212	-0.0688	0.054	-0.0915	0.354	0.332	-0.21	-0.108
Total Calcium	-0.0687	-0.306	-0.13	0.0158	0.0591	-0.0144	0.0847	0.111
Total Chromium	0.115	-0.366	-0.281	0.163	-0.291	0.199	**-0.547**	**-0.5**
Total Cobalt	0.174	**-0.538**	-0.402	0.124	-0.407	0.0997	**-0.599**	**-0.558**
Total Copper	-0.0575	**-0.541**	-0.336	0.0721	-0.256	0.144	**-0.544**	**-0.531**
Total Iron	0.136	**-0.544**	-0.443	0.0245	**-0.51**	-0.0754	**-0.577**	**-0.557**
Total Lead	0.0217	**-0.469**	-0.231	0.0341	-0.0199	0.253	-0.39	-0.327
Total Magnesium	0.0962	-0.421	-0.321	-0.0709	-0.435	-0.151	-0.346	-0.333
Total Manganese	0.0521	**-0.604**	-0.351	0.121	-0.377	0.0389	-0.379	-0.355
Total Mercury	-0.0383	-0.19	-0.188	0.124	0.0292	0.295	-0.332	-0.29
Total Nickel	0.0606	-0.455	-0.321	0.161	-0.361	0.157	**-0.537**	**-0.509**

Table A5.3. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for non slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Metals (mg/kg DW; continued)								
Total Potassium	0.372	-0.378	-0.368	0.0148	-0.444	-0.0409	**-0.523**	**-0.483**
Total Selenium	-0.0221	-0.277	-0.0986	0.195	-0.0658	-0.101	-0.016	-0.0165
Total Silver	-0.0998	0.171	0.0406	0.449	0.26	0.35	0.092	0.121
Total Sodium	0.173	**-0.483**	-0.232	-0.033	-0.172	0.028	**-0.411**	-0.372
Total Thallium	-0.0471	0.202	-0.0275	0.478	0.246	0.306	0.0408	0.0795
Total Uranium	-0.0405	0.245	-0.0235	0.5	0.231	0.328	0.0367	0.0789
Total Vanadium	0.112	**-0.489**	-0.327	0.0936	-0.335	0.136	**-0.564**	**-0.528**
Total Zinc	0.124	-0.403	-0.238	0.14	-0.122	0.231	**-0.556**	**-0.48**
Simultaneously extracted metals (SEM; µmol/g)								
SE Antimony	0.126	-0.115	-0.0661	0.31	0.103	0.441	-0.123	-0.0177
SE Cadmium	0.159	-0.0238	-0.141	0.175	0.055	0.293	-0.295	-0.224
SE Chromium	0.0484	-0.249	-0.329	0.296	-0.158	0.408	-0.367	-0.302
SE Copper	0.108	-0.109	-0.344	0.158	-0.0949	0.445	**-0.425**	-0.372
SE Lead	0.139	-0.105	-0.248	0.153	-0.062	0.35	-0.385	-0.322
SE Nickel	0.149	-0.109	-0.219	0.000306	0.0226	0.42	-0.306	-0.255
SE Zinc	0.138	0.148	-0.143	0.205	-0.0484	0.342	-0.324	-0.274
ΣSEM-AVS	0.294	0.154	-0.227	0.119	-0.168	0.255	-0.347	-0.294
(ΣSEM-AVS)/f_{OC}	0.285	0.0939	-0.254	-0.0451	**-0.454**	0.0389	-0.211	-0.434
Organochlorine Pesticides (µg/kg)								
Hexachlorobenzene	-0.0872	0.0117	0.0161	0.534	0.286	0.229	0.0456	0.113
Hexachlorocyclohexane-alpha	-0.0987	0.00913	-0.0182	0.544	0.271	0.252	0.0508	0.11
Methoxychlor	-0.0306	-0.078	-0.0105	0.453	0.264	0.134	0.0291	0.0889
p,p'-DDD	-0.149	-0.0306	-0.0707	0.575	0.182	0.208	-0.0303	0.0302
o,p'-DDE	-0.0795	-0.0405	-0.022	0.548	0.229	0.14	0.0126	0.0618
p,p'-DDE	-0.168	0.0289	0.0393	0.504	0.0836	0.341	-0.112	-0.0756

Table A5.3. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for non slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Organochlorine Pesticides (µg/kg; continued)								
Sum DDEs[1]	-0.132	0.0222	0.0867	0.497	0.175	0.314	-0.0355	0.00308
o,p'-DDT	-0.165	-0.0844	-0.131	0.603	0.109	0.137	-0.093	-0.0475
p,p'-DDT	-0.173	-0.108	-0.167	0.615	0.0676	0.116	-0.119	-0.0786
Sum DDTs[2]	-0.173	-0.108	-0.167	0.615	0.0676	0.116	-0.119	-0.0786
Total DDTs[3]	-0.176	-0.0153	-0.0408	0.575	0.112	0.265	-0.115	-0.0674
Semi-Volatile Compounds (µg/kg)								
4-Methylphenol	-0.107	0.0311	0.0707	0.511	0.345	0.205	0.116	0.174
Bis(2-chloroethyl)ether	-0.118	0.0389	0.0621	0.511	0.335	0.191	0.109	0.165
Bis(2-ethylhexyl) phthalate	-0.14	-0.00422	0.0782	0.502	0.33	0.183	0.128	0.179
Caprolactam	-0.204	0.0699	0.134	0.454	0.348	0.136	0.216	0.248
Di-n-butyl phthalate	-0.132	-0.0367	0.0621	0.511	0.335	0.191	0.109	0.165
COPC Mixtures[4]								
Mean PEC-Q	0.104	**-0.466**	-0.274	0.122	-0.303	0.105	**-0.468**	-0.412
Mean $PEC\text{-}Q_{METALS}$	0.0892	**-0.494**	-0.311	0.084	-0.197	0.182	**-0.501**	-0.434
Mean $PEC\text{-}Q_{METALS(1\%OC)}$	0.0704	**-0.486**	-0.383	-0.124	**-0.562**	-0.169	-0.0998	**-0.503**
Mean $PEC\text{-}Q_{EXTMETALS}$	0.0504	**-0.515**	-0.397	0.0836	-0.329	0.146	**-0.505**	**-0.449**
Mean $PEC\text{-}Q_{EXTMETALS(1\%OC)}$	0.0187	**-0.506**	**-0.445**	-0.127	**-0.641**	-0.187	-0.159	**-0.513**
$\Sigma PEC\text{-}Q_{Cu,Pb,Zn}$	0.0665	**-0.478**	-0.322	0.096	-0.134	0.222	**-0.563**	**-0.502**
$\Sigma PEC\text{-}Q_{EXTMETALS}$	0.0501	**-0.453**	-0.389	0.0141	-0.407	0.0958	**-0.426**	-0.385
$\Sigma PEC\text{-}Q_{EXTMETALS(1\%OC)}$	0.0887	-0.43	**-0.461**	-0.114	**-0.727**	-0.247	-0.153	**-0.497**
$\Sigma PEC\text{-}Q_{METALS}$	0.105	-0.433	-0.319	0.0313	-0.277	0.151	**-0.455**	-0.392
$\Sigma PEC\text{-}Q_{METALS(1\%OC)}$	0.179	-0.137	-0.128	**-0.467**	**-0.501**	-0.265	-0.11	-0.132

Table A5.3. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for non slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Slag Indicators								
Cu:Al	-0.148	-0.305	-0.145	0.222	0.0653	0.239	-0.0951	-0.196
Zn:Cd	-0.245	-0.0774	-0.124	0.241	**-0.482**	-0.283	-0.13	-0.127

DW = dry weight; r_s = Spearman correlation coefficient; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; Al = alumium; Cd = cadmium; Cu = copper; Zn = zinc; PAHs = polycyclic aromatic hydrocarbons; PCBs = polychlorinated biphenyls.

[1]Sum DDEs is calcuated as the sum of p,p'-DDE and o,p'-DDE congeners.
[2]Sum DDTs is calcuated as the sum of p,p'-DDT and o,p'-DDT congeners.
[3]Total DDTs is calcuated as the sum of Sum DDE, Sum DDT, and Sum DDD.
[4] PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total PAHs; and, total PCBs (Ingersoll *et al.* 2001).
PEC-Q_{METALS} was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001);
PEC-$Q_{EXTMETALS}$ was calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

Table A5.4. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for all types of sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival	Reproduction	Survival	Growth	Biomass	Survival	Growth	Biomass
	r_s	r_s	r_s	r_s	r_s	r_s	r_s	r_s
Conventionals								
Percent Clay	0.0666	-0.18	**-0.417**	0.271	0.111	0.371	-0.195	-0.107
Percent Coarse Sand	0.23	0.141	0.111	0.167	0.365	0.295	-0.153	0.541
Percent Colloid	0.0893	-0.167	**-0.519**	0.303	-0.138	0.375	-0.21	-0.093
Percent Fine Sand	0.0654	0.123	0.312	-0.059	0.116	-0.144	0.42	-0.134
Percent Fines	0.156	-0.104	**-0.428**	0.274	0.0633	0.386	0.132	-0.131
Percent Gravel	0.296	0.195	0.183	0.0404	0.396	0.334	0.53	0.455
Percent Medium Sand	0.0118	0.1	0.23	-0.0842	0.0363	-0.0819	-0.087	0.407
Percent Sand	-0.16	0.0663	0.452	-0.277	-0.101	**-0.425**	0.411	0.0485
Percent Silt	0.0769	-0.137	**-0.428**	0.266	-0.00358	0.418	-0.165	-0.0856
Total Organic Carbon (%)	-0.0239	0.0808	-0.122	0.289	0.416	0.344	0.0187	0.0516
Metals (mg/kg DW)								
Total Aluminum	-0.132	**-0.417**	-0.347	-0.171	**-0.525**	0.00492	**-0.479**	**-0.415**
Total Antimony	-0.125	-0.152	0.283	-0.119	0.0577	**-0.416**	-0.0843	-0.149
Total Arsenic	-0.205	**-0.466**	0.0164	-0.206	-0.0561	-0.158	-0.198	-0.19
Total Barium	-0.289	-0.374	0.217	-0.362	-0.0506	-0.383	**-0.404**	**-0.455**
Total Beryllium	-0.164	**-0.43**	-0.386	-0.145	**-0.541**	-0.0142	**-0.55**	**-0.499**
Total Cadmium	-0.0118	-0.0447	0.186	-0.165	0.264	-0.072	-0.242	-0.251
Total Calcium	-0.278	-0.305	0.248	-0.326	0.0724	-0.332	-0.123	-0.173
Total Chromium	-0.225	-0.369	0.00869	-0.264	-0.321	-0.335	**-0.485**	**-0.523**
Total Cobalt	-0.144	**-0.465**	-0.0438	-0.254	-0.384	-0.371	**-0.494**	**-0.524**
Total Copper	-0.302	-0.307	0.191	-0.296	-0.139	**-0.404**	**-0.419**	**-0.48**
Total Iron	-0.243	-0.379	0.0969	-0.353	-0.275	**-0.503**	**-0.465**	**-0.521**
Total Lead	-0.23	-0.273	0.141	-0.287	0.00678	-0.251	-0.358	-0.383
Total Magnesium	-0.0975	-0.257	-0.000205	-0.167	-0.0033	-0.232	-0.212	-0.264
Total Manganese	-0.137	-0.398	0.0744	-0.293	-0.289	**-0.461**	-0.357	**-0.406**
Total Mercury	-0.144	-0.0943	0.108	-0.108	0.175	-0.0567	-0.325	-0.343
Total Nickel	-0.0674	-0.348	-0.327	0.109	-0.189	0.34	-0.344	-0.286

Table A5.4. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for all types of sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Metals (mg/kg DW; continued)								
Total Potassium	0.00535	-0.377	-0.284	-0.197	**-0.5**	-0.085	**-0.444**	-0.391
Total Selenium	-0.143	-0.163	0.0978	-0.105	0.0385	-0.199	-0.0842	-0.117
Total Silver	-0.173	-0.0683	0.000922	0.108	0.203	0.256	-0.121	-0.112
Total Sodium	-0.137	-0.33	0.0962	-0.321	-0.239	**-0.426**	-0.374	**-0.413**
Total Thallium	-0.123	-0.0306	-0.0518	0.0952	0.18	0.231	-0.151	-0.137
Total Uranium	0.011	0.0536	0.0361	0.168	0.17	0.0834	-0.0185	-0.0194
Total Vanadium	-0.223	**-0.482**	-0.314	-0.122	-0.388	0.0834	**-0.483**	**-0.441**
Total Zinc	-0.255	-0.26	0.213	-0.27	-0.0863	-0.366	**-0.411**	**-0.453**
Simultaneously extracted metals (SEM; µmol/g)								
SE Antimony	-0.194	-0.17	0.359	-0.196	0.0782	-0.285	-0.3	-0.352
SE Cadmium	-0.00672	0.0264	0.0905	-0.0782	0.198	-0.0364	-0.215	-0.206
SE Chromium	-0.23	-0.207	0.247	-0.269	-0.0722	-0.351	-0.368	**-0.42**
SE Copper	-0.115	-0.0642	0.245	-0.192	-0.0065	-0.237	-0.295	-0.344
SE Lead	-0.139	-0.0875	0.182	-0.221	0.0773	-0.173	-0.347	-0.364
SE Nickel	-0.046	-0.221	-0.133	-0.000939	0.109	0.255	-0.245	-0.212
SE Zinc	-0.202	-0.076	0.263	-0.266	-0.0661	-0.342	-0.358	**-0.404**
ΣSEM-AVS	-0.13	-0.0853	0.275	-0.306	-0.0765	-0.362	-0.342	-0.387
(ΣSEM-AVS)/f_{OC}	-0.12	-0.0851	0.28	-0.318	-0.149	**-0.415**	-0.28	**-0.407**
Organochlorine Pesticides (µg/kg)								
Hexachlorobenzene	-0.0697	0.0963	-0.0726	0.23	0.293	0.195	0.0535	0.0975
Hexachlorocyclohexane-alpha	-0.0296	0.118	-0.132	0.286	0.224	0.278	0.0959	0.113
Methoxychlor	-0.0765	-0.00646	-0.129	0.237	0.299	0.196	0.0863	0.0652
p,p'-DDD	-0.142	0.00986	-0.124	0.269	0.25	0.219	0.000941	0.0169
o,p'-DDE	-0.108	-0.0398	-0.0785	0.221	0.241	0.161	-0.0192	-0.00963
p,p'-DDE	-0.0917	0.0712	-0.0303	0.194	0.128	0.156	-0.00149	0.0225

Table A5.4. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for all types of sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia* Survival r_s	*Ceriodaphnia dubia* Reproduction r_s	*Chironomus dilutus* Survival r_s	*Chironomus dilutus* Growth r_s	*Chironomus dilutus* Biomass r_s	*Hyalella azteca* Survival r_s	*Hyalella azteca* Growth r_s	*Hyalella azteca* Biomass r_s
Organochlorine Pesticides (µg/kg; continued)								
Sum DDEs[1]	-0.148	0.0488	-0.0169	0.154	0.158	0.14	-0.022	-0.00222
o,p'-DDT	-0.142	-0.0271	-0.177	0.301	0.19	0.2	-0.0254	-0.0109
p,p'-DDT	-0.174	-0.161	-0.0402	0.093	0.109	0.15	-0.181	-0.16
Sum DDTs[2]	-0.172	-0.15	-0.0592	0.12	0.121	0.149	-0.175	-0.156
Total DDTs[3]	-0.156	-0.0282	-0.0396	0.152	0.17	0.154	-0.106	-0.0904
Semi-Volatile Compounds (µg/kg)								
4-Methylphenol	-0.168	0.0448	-0.0403	0.2	0.337	0.154	0.0595	0.058
Bis(2-chloroethyl)ether	-0.164	0.0461	-0.0237	0.187	0.36	0.148	0.0688	0.0669
Bis(2-ethylhexyl) phthalate	-0.0958	0.0918	-0.0297	0.148	0.294	0.155	0.0912	0.091
Caprolactam	-0.226	0.0617	0.00472	0.172	0.339	0.105	0.0883	0.0687
Di-n-butyl phthalate	-0.173	0.00878	-0.0473	0.198	0.328	0.146	0.0526	0.0505
COPC Mixtures[4]								
Mean PEC-Q	-0.232	-0.282	0.25	-0.34	-0.114	**-0.445**	**-0.414**	**-0.472**
Mean PEC-Q_{METALS}	-0.267	-0.326	0.166	-0.301	-0.118	-0.374	**-0.421**	**-0.461**
Mean PEC-$Q_{METALS(1\%OC)}$	-0.228	-0.304	0.173	-0.315	-0.21	**-0.475**	-0.186	**-0.43**
Mean PEC-$Q_{EXTMETALS}$	-0.279	-0.357	0.109	-0.293	-0.179	-0.381	**-0.44**	**-0.482**
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	-0.219	-0.325	0.115	-0.28	-0.27	**-0.48**	-0.202	**-0.419**
ΣPEC-$Q_{Cu,Pb,Zn}$	-0.281	-0.293	0.183	-0.298	-0.101	-0.377	**-0.429**	**-0.474**
ΣPEC-$Q_{EXTMETALS}$	-0.285	-0.314	0.139	-0.328	-0.213	**-0.412**	**-0.413**	**-0.471**
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	-0.199	-0.294	0.112	-0.296	-0.323	**-0.481**	-0.197	**-0.404**
ΣPEC-Q_{METALS}	-0.266	-0.301	0.177	-0.323	-0.146	-0.393	**-0.407**	**-0.456**
ΣPEC-$Q_{METALS(1\%OC)}$	-0.152	-0.223	0.233	**-0.416**	-0.309	**-0.516**	-0.187	-0.257

Table A5.4. Spearman rank correlations between sediment chemistry data and normalized sediment toxicity data for all types of sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Slag Indicators								
Cu:Al	-0.252	-0.248	0.248	-0.264	-0.00053	-0.366	-0.294	-0.391
Zn:Cd	-0.3	-0.144	0.249	-0.158	-0.25	**-0.523**	-0.154	-0.223

DW = dry weight; r_s = Spearman correlation coefficient; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; Al = alumium; Cd = cadmium; Cu = copper; Zn = zinc; PAHs = polycyclic aromatic hydrocarbons; PCBs = polychlorinated biphenyls.

[1]Sum DDEs is calcuated as the sum of p,p'-DDE and o,p'-DDE congeners.
[2]Sum DDTs is calcuated as the sum of p,p'-DDT and o,p'-DDT congeners.
[3]Total DDTs is calcuated as the sum of Sum DDE, Sum DDT, and Sum DDD.
[4] PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total PAHs; and, total PCBs (Ingersoll *et al.* 2001).
PEC-Q_{METALS} was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001);
PEC-$Q_{EXTMETALS}$ was calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

Table A5.5. Spearman rank correlations between pore-water chemistry data and normalized pore-water toxicity data for slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Metals (mg/kg DW)								
Aluminum, dissolved	-0.354	-0.176	0.0714	-0.438	-0.338	-0.0911	-0.312	-0.322
Antimony, dissolved	-0.0709	0.163	0.0833	0.245	0.396	0.0367	0.3	0.287
Barium, dissolved	0.166	0.327	0.0194	0.482	0.573	0.434	0.573	0.554
Beryllium, dissolved	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium, dissolved	-0.346	-0.243	-0.122	-0.0508	0.0742	0.273	-0.2	-0.148
Calcium, dissolved	0.405	0.486	-0.00704	0.735	0.795	0.461	0.794	0.789
Chromium, dissolved	-0.0762	-0.338	0.147	-0.161	-0.442	-0.31	-0.378	-0.382
Cobalt, dissolved	-0.366	-0.388	-0.351	-0.426	-0.399	-0.493	**-0.634**	**-0.683**
Copper, dissolved	-0.00825	0.268	-0.0697	0.0649	-0.229	0.0581	0.177	0.173
Iron, dissolved	-0.0852	-0.199	0.0586	-0.139	-0.00455	-0.135	-0.242	-0.26
Lead, dissolved	-0.0164	0.0487	-0.123	0.0892	0.2	0.143	-0.0428	0.0259
Magnesium, dissolved	0.39	0.541	-0.0511	0.747	0.72	0.542	0.841	0.828
Manganese, dissolved	0.463	0.584	0.121	0.586	0.658	0.478	0.839	0.818
Nickel, dissolved	-0.238	-0.501	0.574	-0.529	-0.0649	0.183	-0.378	-0.33
Potassium, dissolved	0.225	0.386	-0.096	0.621	0.587	0.236	0.681	0.618
Selenium, dissolved	-0.227	-0.32	0.0469	-0.263	-0.135	-0.417	-0.372	-0.391
Sodium, dissolved	0.344	0.45	0.123	0.585	0.604	0.516	0.696	0.691
Thallium, dissolved	ND	ND	ND	ND	ND	ND	ND	ND
Uranium, dissolved	-0.304	-0.349	0.16	-0.303	-0.326	0.0397	-0.191	-0.161
Vanadium, dissolved	-0.545	-0.543	0.00397	-0.404	-0.22	-0.357	**-0.495**	-0.569
Zinc, dissolved	0.178	0.291	0.125	0.278	0.168	0.0985	0.29	0.279
[1]$\sum$PW-TU$_{DIVALENT\ METALS}$	0.197	0.297	0.108	-0.0312	-0.108	-0.0411	0.026	0.0338

r_s = Spearman correlation coefficient; ND = insufficient data were available to assess correlations.

[1] $\sum$PW-TU$_{DIVALENT\ METALS}$ = sum of pore-water toxic units for divalent metals (divalent metals include cadmium, copper, lead, nickel, silver, and zinc).

Table A5.6. Spearman rank correlations between pore-water chemistry data and normalized pore-water toxicity data for potentially slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Metals (mg/kg DW)								
Aluminum, dissolved	-0.0123	-0.69	0	-0.452	-0.167	-0.145	**-0.762**	-0.69
Antimony, dissolved	ND	ND	ND	ND	ND	ND	ND	ND
Barium, dissolved	-0.393	0.214	0.431	-0.0238	0.286	-0.289	0.238	0.167
Beryllium, dissolved	0.255	0.577	-0.083	0.247	-0.0825	0.167	0.247	0.247
Cadmium, dissolved	-0.19	-0.317	0.275	-0.148	0.261	-0.25	**-0.705**	-0.67
Calcium, dissolved	-0.11	0.738	-0.0719	0.429	-0.0476	0.0843	0.69	0.643
Chromium, dissolved	0.408	0.204	-0.0181	0.395	0.263	0.364	0.551	0.587
Cobalt, dissolved	-0.403	-0.268	0.356	-0.22	0.195	-0.0247	-0.0244	-0.171
Copper, dissolved	0.11	-0.571	0.159	-0.117	0.333	-0.227	**-0.633**	-0.633
Iron, dissolved	-0.761	-0.405	0.0921	-0.55	-0.0667	-0.748	**-0.417**	-0.55
Lead, dissolved	-0.604	-0.683	0.34	-0.356	0.22	-0.624	**-0.729**	-0.763
Magnesium, dissolved	0.884	0.548	-0.144	0.81	0.333	0.795	0.643	0.738
Manganese, dissolved	0.503	0.833	-0.151	0.567	-0.0333	0.563	1	0.967
Nickel, dissolved	0.255	0.577	-0.083	0.247	-0.0825	0.167	0.247	0.247
Potassium, dissolved	0.0859	0.929	0.0838	0.357	-0.0238	0.0482	0.714	0.69
Selenium, dissolved	-0.34	-0.577	-0.498	-0.412	-0.412	-0.417	**-0.577**	-0.577
Sodium, dissolved	-0.405	0.333	0.563	-0.143	0.119	-0.386	0.0714	0.0476
Thallium, dissolved	ND	ND	ND	ND	ND	ND	ND	ND
Uranium, dissolved	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium, dissolved	-0.34	-0.577	-0.498	-0.412	-0.412	-0.417	**-0.577**	-0.577
Zinc, dissolved	-0.0368	-0.619	0.226	-0.217	0.0333	0.0924	-0.317	-0.217
[1]∑PW-TU$_{DIVALENT\ METALS}$	0.0614	-0.738	-0.0586	-0.133	0.25	-0.269	**-0.733**	-0.717

r_s = Spearman correlation coefficient; ND = insufficient data were available to assess correlations.

[1] ∑PW-TU$_{DIVALENT\ METALS}$ = sum of pore-water toxic units for divalent metals (divalent metals include cadmium, copper, lead, nickel, silver, and zinc).

Table A5.7. Spearman rank correlations between pore-water chemistry data and normalized pore-water toxicity data for non slag-affected sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Metals (mg/kg DW)								
Aluminum, dissolved	-0.0312	-0.273	-0.331	0.372	**-0.482**	-0.0493	-0.29	-0.323
Antimony, dissolved	ND	ND	ND	ND	ND	ND	ND	ND
Barium, dissolved	0.042	0.245	0.0845	0.326	-0.0391	0.0813	-0.0222	0.00479
Beryllium, dissolved	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium, dissolved	0.00331	-0.0312	-0.226	-0.0852	-0.0646	0.295	-0.177	-0.111
Calcium, dissolved	-0.15	0.132	0.235	0.468	0.256	0.353	0.345	0.395
Chromium, dissolved	0.0845	0.0142	0.165	-0.0323	-0.0482	**-0.437**	0.306	0.272
Cobalt, dissolved	0.1	0.0893	-0.219	-0.00631	-0.285	0.153	-0.208	-0.178
Copper, dissolved	0.55	0.192	**-0.421**	0.0293	-0.37	0.121	-0.273	-0.239
Iron, dissolved	0.326	0.095	0.0216	0.0842	0.153	-0.0436	-0.109	-0.0883
Lead, dissolved	0.0111	-0.0835	-0.163	-0.0528	0.0341	0.118	-0.268	-0.265
Magnesium, dissolved	-0.00537	0.0796	0.228	0.383	0.352	0.287	0.384	0.447
Manganese, dissolved	0.0627	0.189	0.0502	0.299	-0.108	-0.0396	-0.0491	-0.0505
Nickel, dissolved	-0.234	0.0577	0.0957	-0.224	0.293	0.321	0.234	0.276
Potassium, dissolved	-0.163	0.193	0.217	0.27	0.359	0.443	0.22	0.302
Selenium, dissolved	0	-0.215	0.198	-0.178	0.211	0.0723	-0.0261	0.00764
Sodium, dissolved	-0.0261	0.081	0.0357	0.522	0.143	0.259	-0.0936	-0.0413
Thallium, dissolved	-0.202	-0.238	0.107	-0.155	0.226	0.144	-0.0834	-0.0596
Uranium, dissolved	0.0632	-0.155	0	-0.25	-0.274	-0.168	-0.298	-0.322
Vanadium, dissolved	0.0701	-0.0569	0.152	0.123	0.437	0.253	0.239	0.329
Zinc, dissolved	-0.00639	0.161	0.0869	-0.153	-0.148	-0.182	0.0224	0.0199
[1]$\sum$PW-$TU_{DIVALENT\ METALS}$	-0.0706	0.123	-0.12	0.185	-0.125	-0.146	-0.17	-0.166

r_s = Spearman correlation coefficient; ND = insufficient data were available to assess correlations.

[1] $\sum$PW-$TU_{DIVALENT\ METALS}$ = sum of pore-water toxic units for divalent metals (divalent metals include cadmium, copper, lead, nickel, silver, and zinc).

Table A5.8. Spearman rank correlations between pore-water chemistry data and normalized pore-water toxicity data for all types of sediment samples from the Upper Columbia River (bolded values represent values for which the r_s is <-0.4 and the p-value is <0.005).

Chemical of Potential Concern (COPC)	*Ceriodaphnia dubia*		*Chironomus dilutus*			*Hyalella azteca*		
	Survival r_s	Reproduction r_s	Survival r_s	Growth r_s	Biomass r_s	Survival r_s	Growth r_s	Biomass r_s
Metals (mg/kg DW)								
Aluminum, dissolved	-0.12	-0.297	-0.293	0.0448	**-0.425**	0.0537	-0.283	-0.231
Antimony, dissolved	0.0633	0.121	-0.131	0.226	0.162	0.312	0.272	0.306
Barium, dissolved	-0.00794	0.229	0.211	0.224	0.308	0.0605	0.212	0.184
Beryllium, dissolved	0.165	0.163	0.0343	0.146	-0.0171	-0.0258	0.163	0.146
Cadmium, dissolved	-0.196	-0.164	-0.131	-0.0651	0.04	0.198	-0.238	-0.187
Calcium, dissolved	0.112	0.371	0.116	0.538	0.458	0.278	0.585	0.556
Chromium, dissolved	0.135	-0.0535	0.197	0.0136	-0.106	-0.268	0.198	0.179
Cobalt, dissolved	-0.111	-0.137	-0.0448	-0.294	-0.222	-0.167	-0.316	-0.326
Copper, dissolved	0.0608	0.0161	0.0218	-0.189	-0.201	-0.188	-0.265	-0.268
Iron, dissolved	0.0086	-0.0814	-0.0559	-0.0186	0.0774	-0.0467	-0.259	-0.223
Lead, dissolved	-0.143	-0.12	-0.112	-0.0965	0.103	0.126	-0.211	-0.133
Magnesium, dissolved	0.25	0.315	0.0747	0.58	0.496	0.364	0.653	0.645
Manganese, dissolved	0.201	0.352	-0.0715	0.442	0.141	0.232	0.343	0.358
Nickel, dissolved	-0.263	-0.152	0.22	-0.27	0.114	0.187	-0.0803	-0.0445
Potassium, dissolved	-0.00955	0.316	0.0979	0.401	0.426	0.231	0.458	0.422
Selenium, dissolved	-0.0755	-0.298	0.0358	-0.24	0.000812	-0.126	-0.201	-0.204
Sodium, dissolved	0.149	0.269	0.0672	0.482	0.305	0.256	0.349	0.363
Thallium, dissolved	-0.169	-0.176	0.129	-0.133	0.189	0.0344	-0.0857	-0.0772
Uranium, dissolved	-0.11	-0.212	0.00909	-0.227	-0.29	0.0198	-0.22	-0.166
Vanadium, dissolved	-0.288	-0.31	0.131	-0.243	0.144	-0.114	-0.308	-0.34
Zinc, dissolved	-0.0702	0.0307	0.219	-0.161	-0.0381	-0.199	0.00956	-0.0163
[1]$\sum$PW-TU$_{DIVALENT\ METALS}$	-0.171	-0.0596	0.0599	-0.166	-0.137	-0.247	-0.343	-0.331

r_s = Spearman correlation coefficient; ND = insufficient data were available to assess correlations.

[1] $\sum$PW-TU$_{DIVALENT\ METALS}$ = sum of pore-water toxic units for divalent metals (divalent metals include cadmium, copper, lead, nickel, silver, and zinc).

Appendix 6

Concentration Response Models

Figure A6.1. Relationship between *Ceriodaphnia dubia* survival and total Barium for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

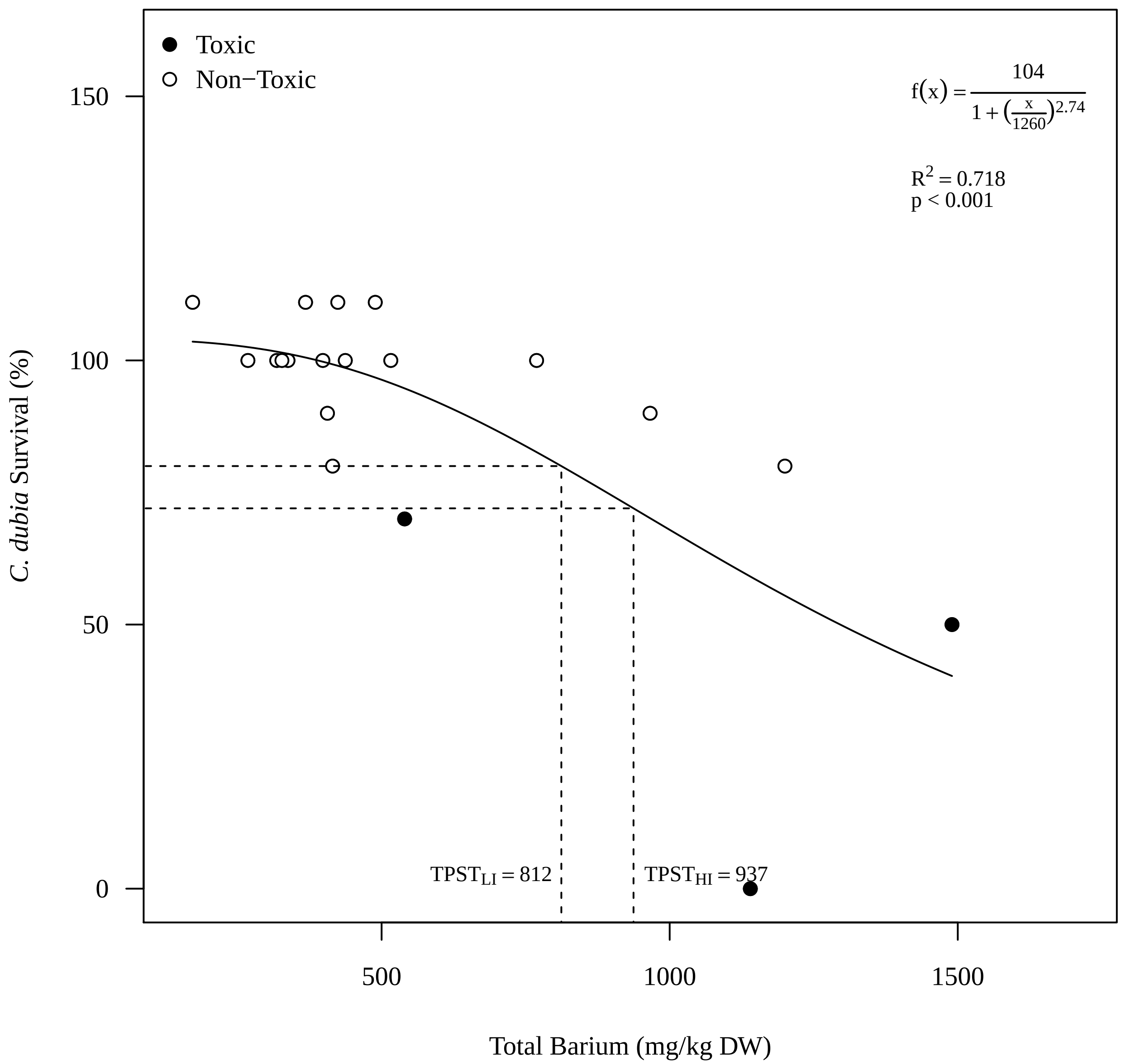


Figure A6.2. Relationship between *Ceriodaphnia dubia* survival and total Beryllium for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

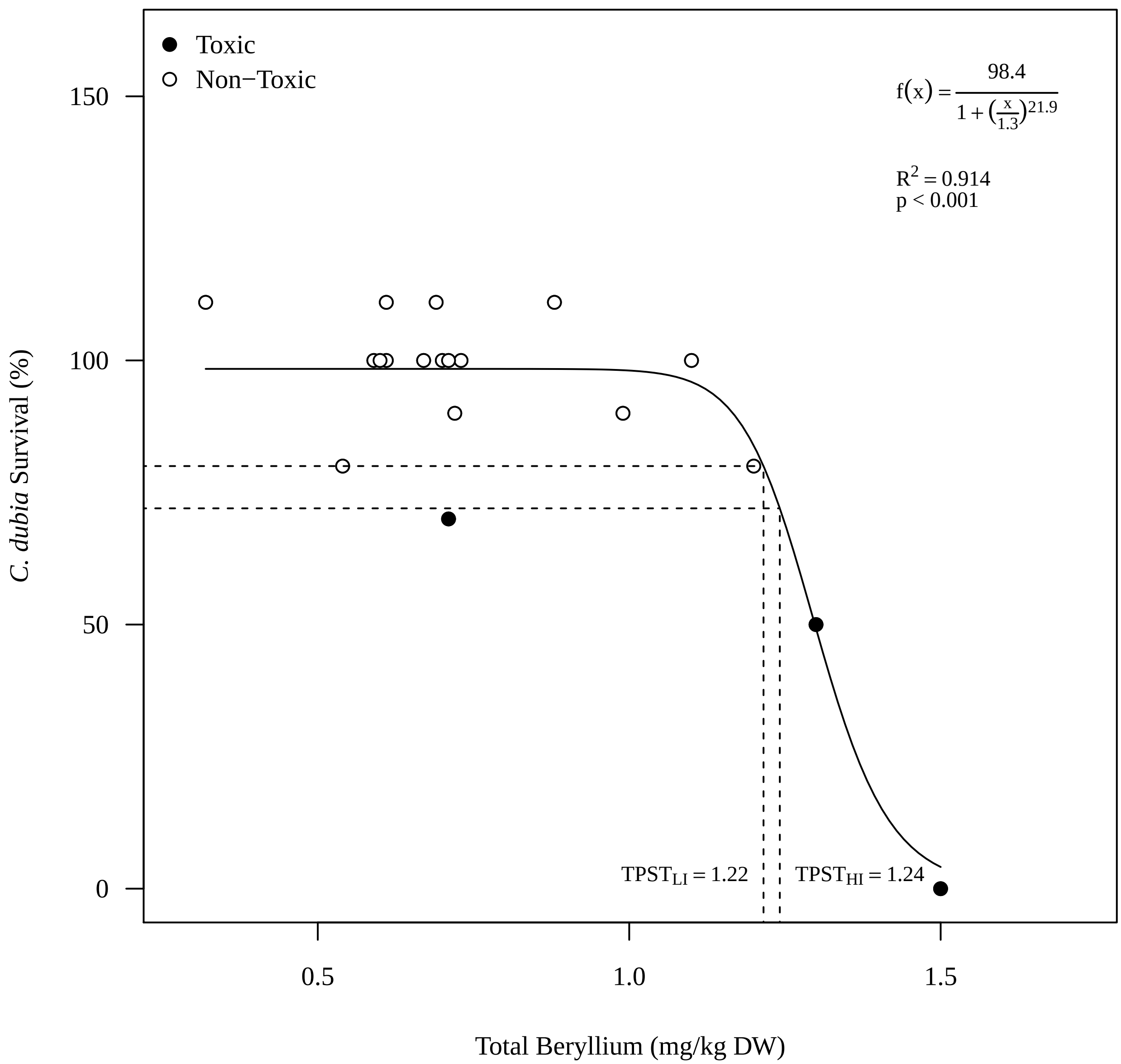


Figure A6.3. Relationship between *Ceriodaphnia dubia* survival and total Chromium for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

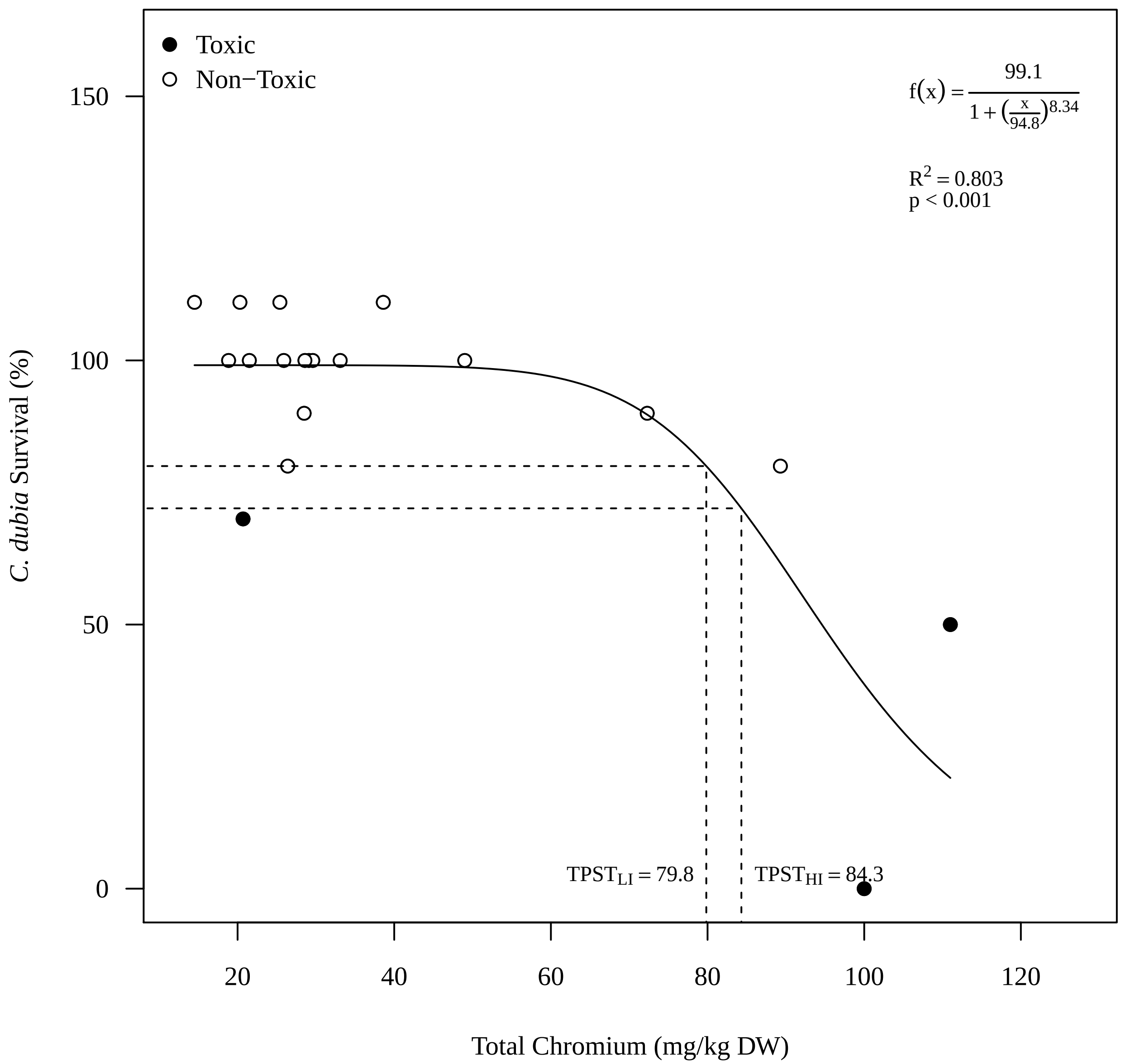


Figure A6.4. Relationship between *Ceriodaphnia dubia* survival and total Cobalt for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

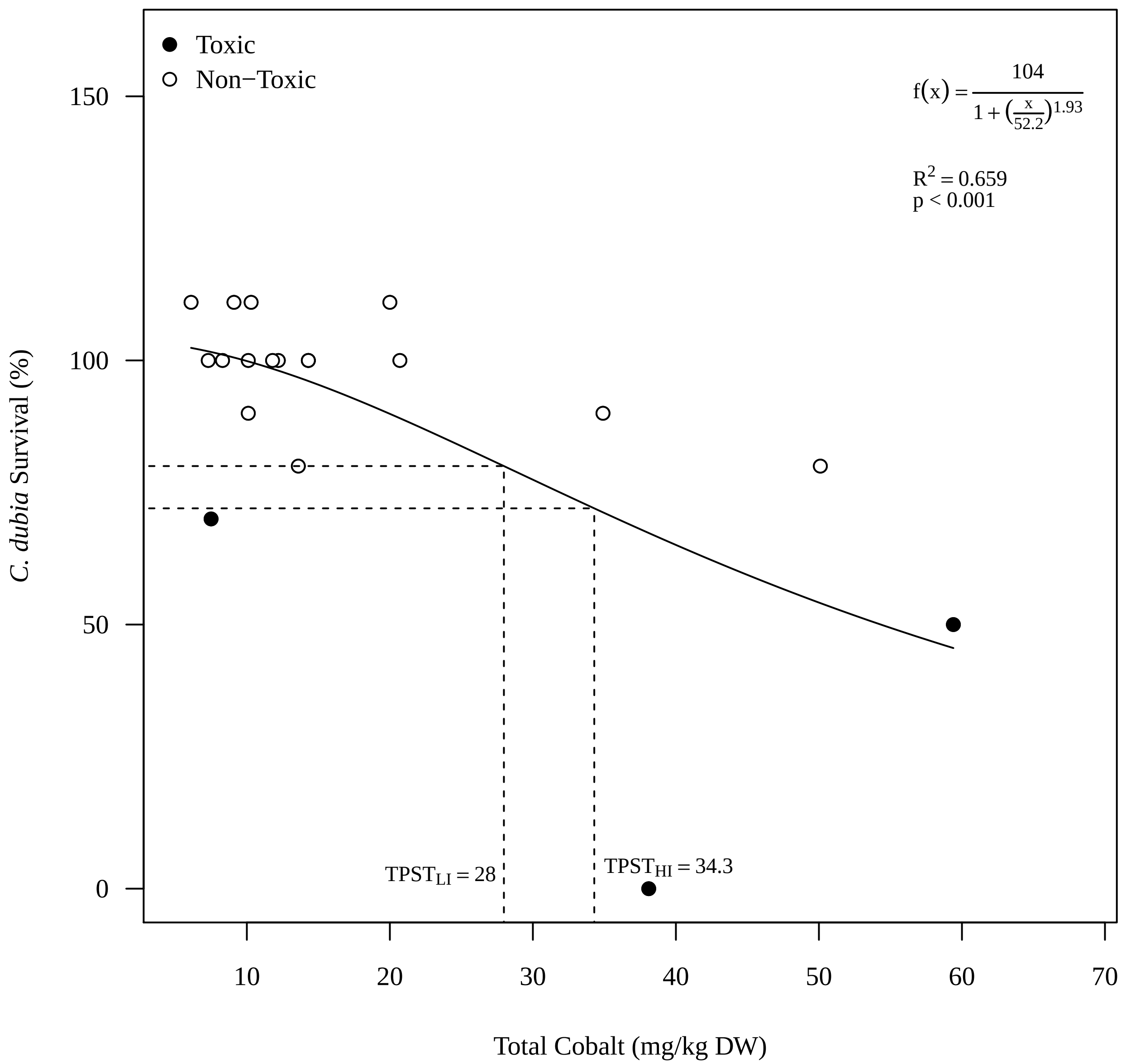


Figure A6.5. Relationship between *Ceriodaphnia dubia* survival and total Copper for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

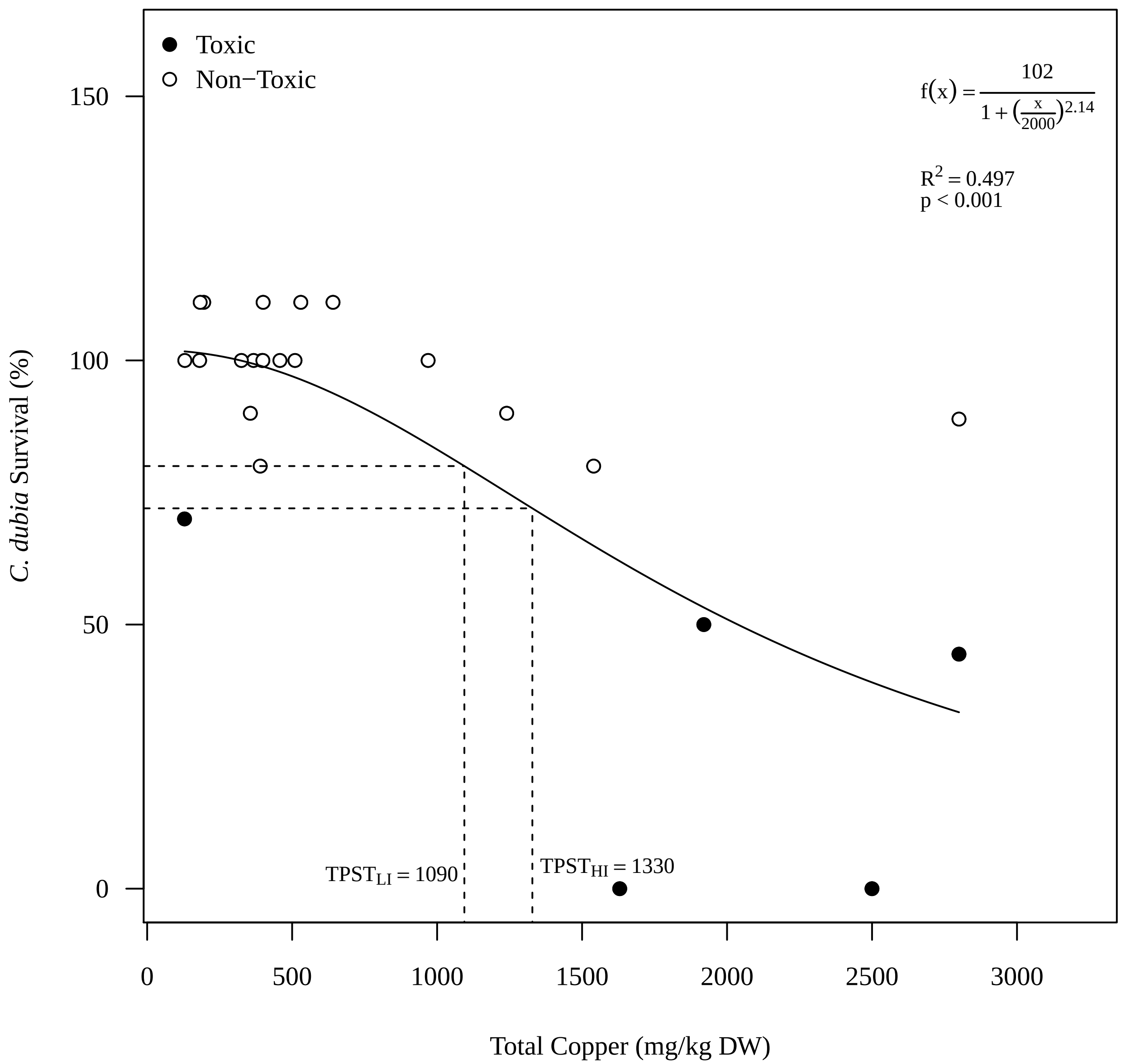


Figure A6.6. Relationship between *Ceriodaphnia dubia* survival and total Iron for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

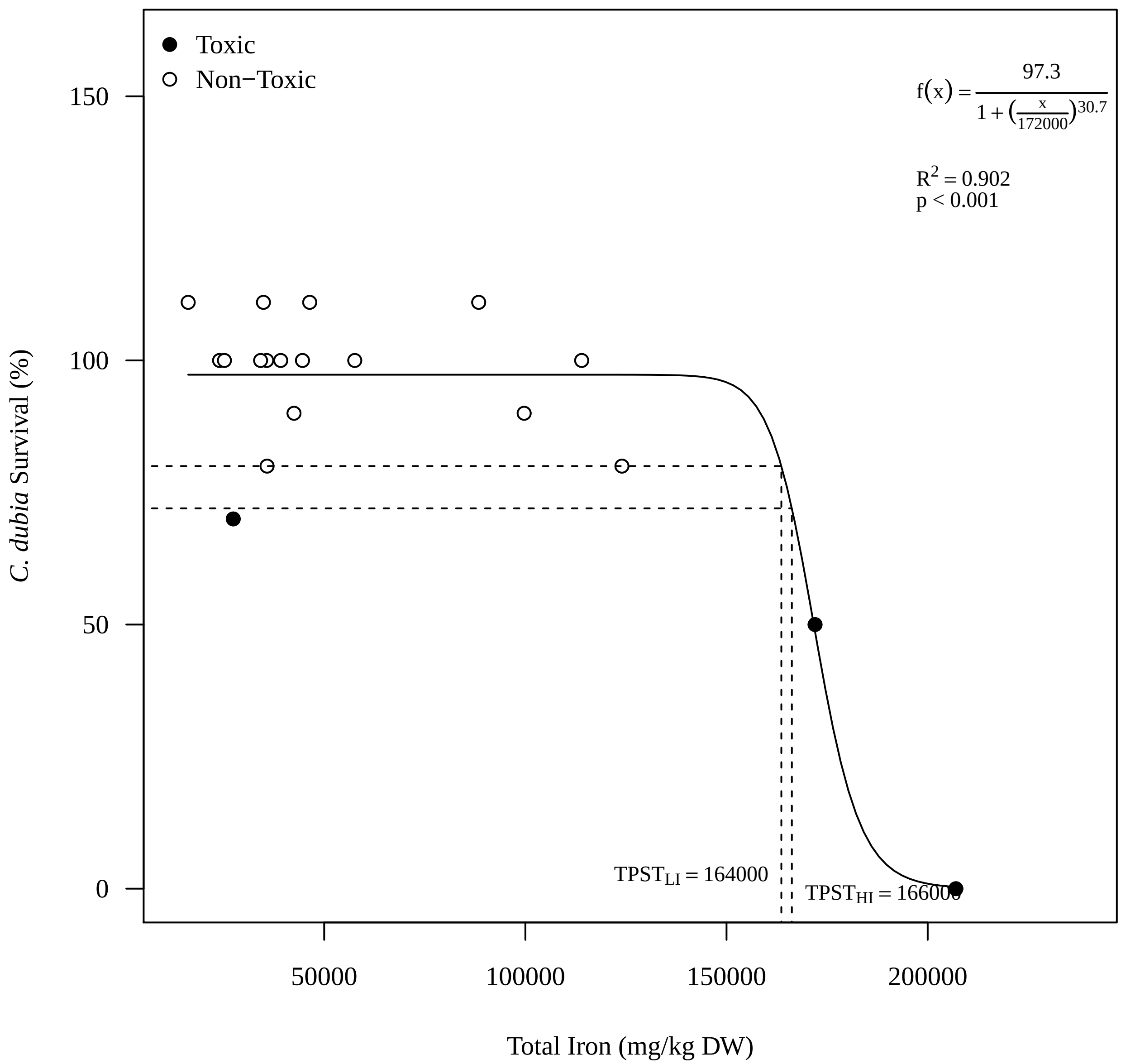


Figure A6.7. Relationship between *Ceriodaphnia dubia* survival and total Vanadium for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

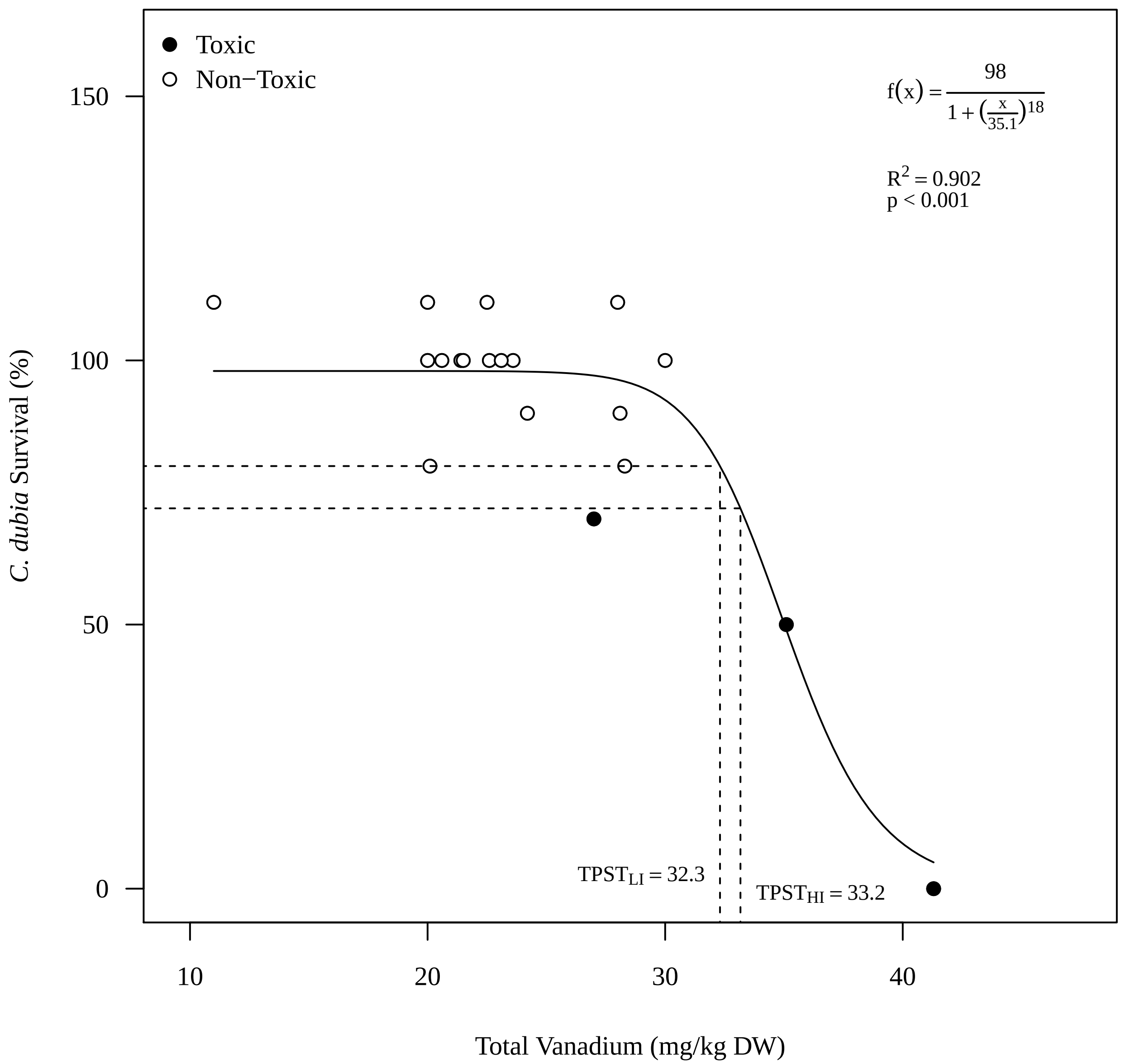


Figure A6.8. Relationship between *Ceriodaphnia dubia* survival and Mean PEC−$Q_{EXT\ METALS}$ for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

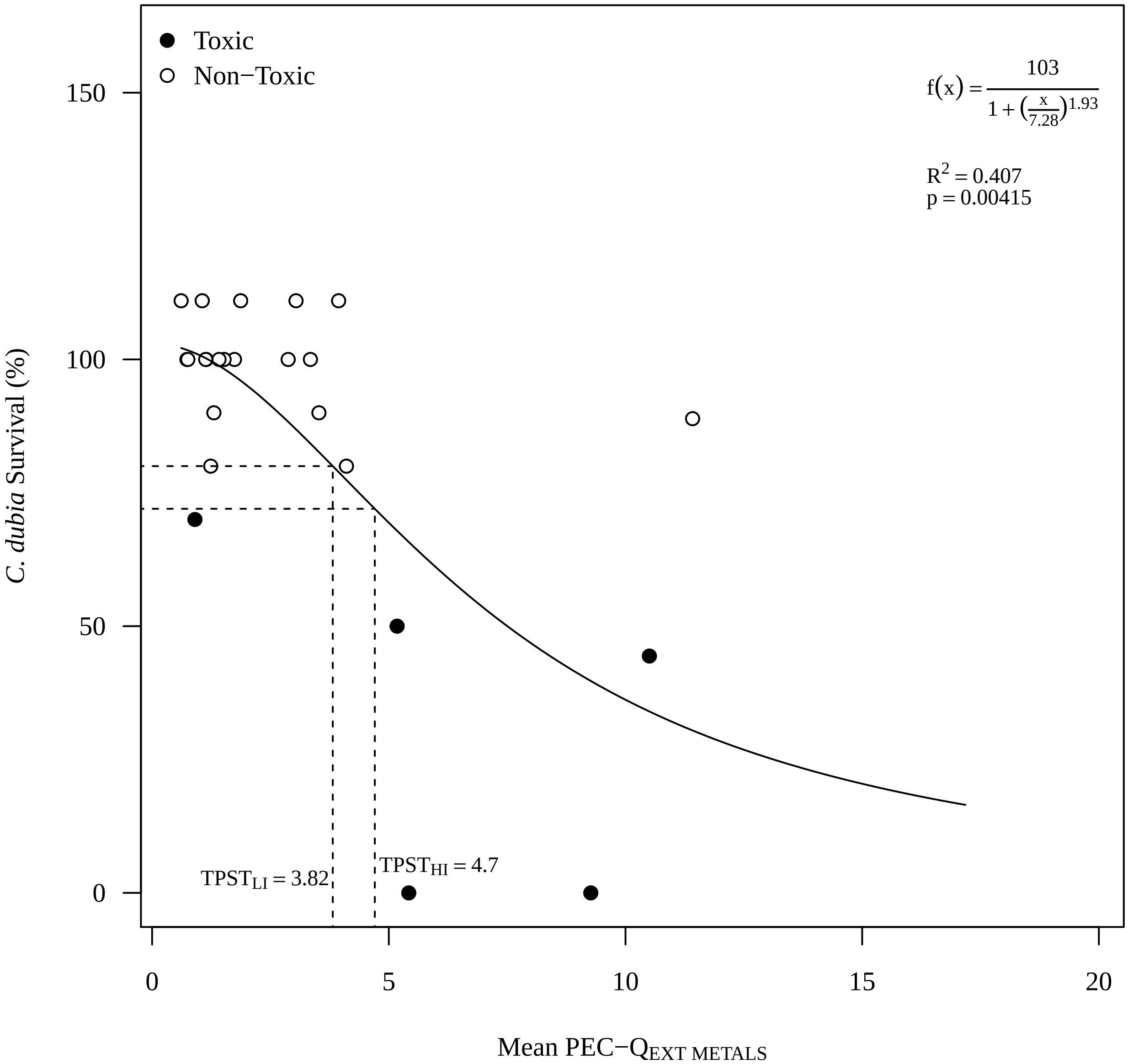


Figure A6.9. Relationship between *Ceriodaphnia dubia* survival and $\sum$PEC−Q$_{METAL}$ for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

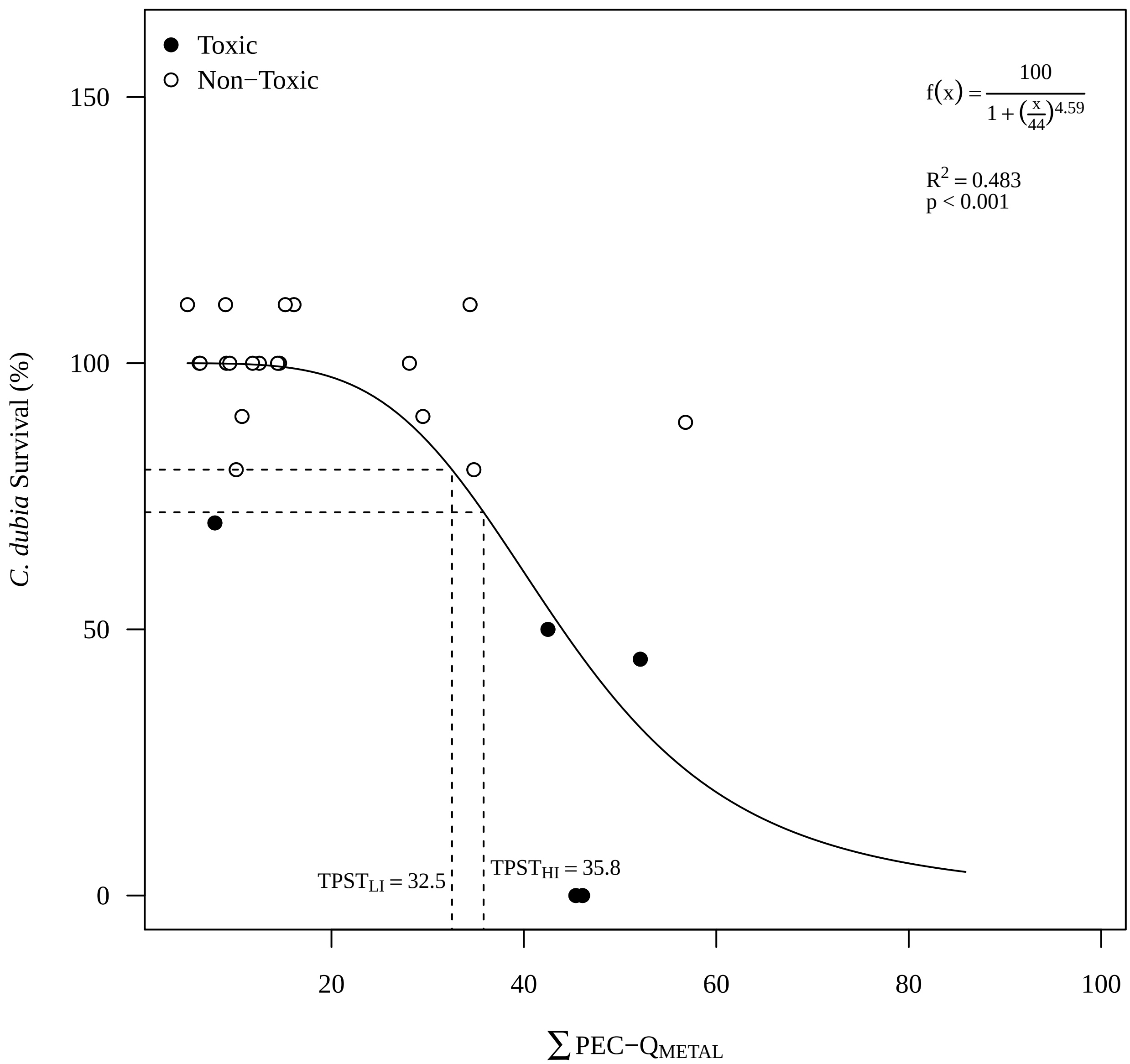


Figure A6.10. Relationship between *Ceriodaphnia dubia* survival and $\sum$ PEC−$Q_{METAL(1\%OC)}$ for affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

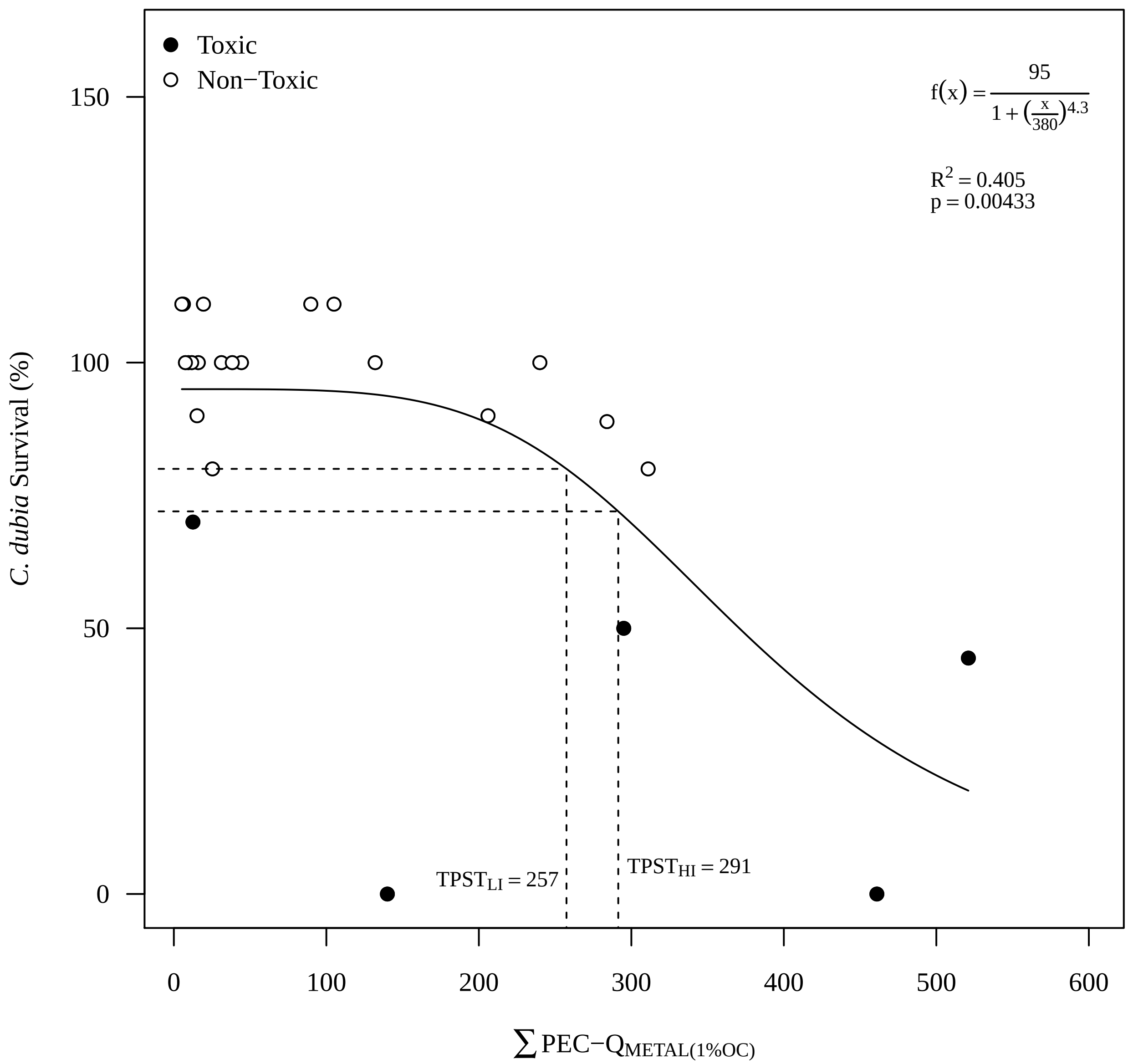


Figure A6.11 Relationship between *Ceriodaphnia dubia* survival and $\sum$PEC−$Q_{EXT\ METAL}$ for slag-affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

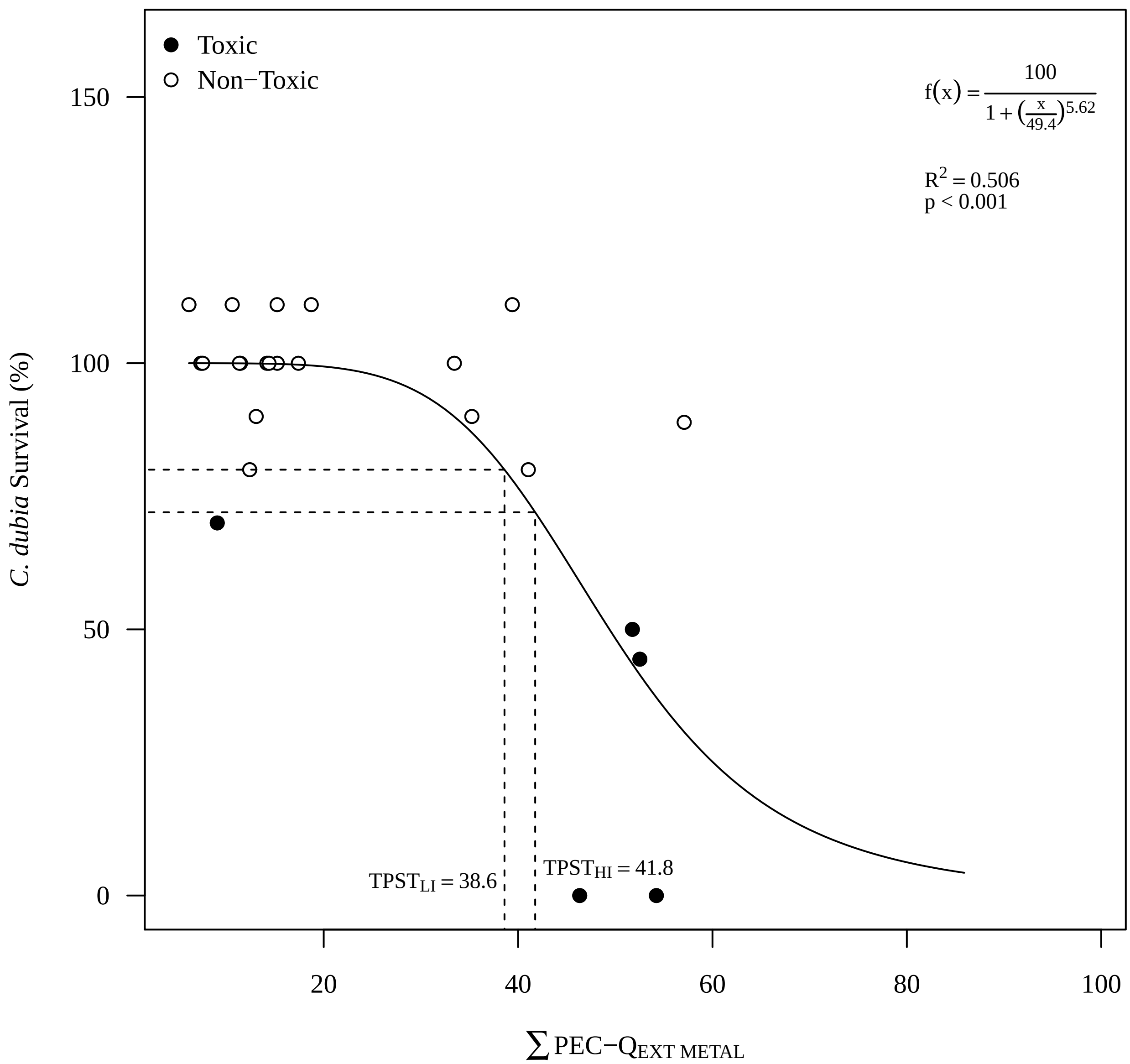


Figure A6.12 Relationship between *Ceriodaphnia dubia* survival and $\sum$ PEC−Q$_{EXT\ METAL(1\%OC}$ for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

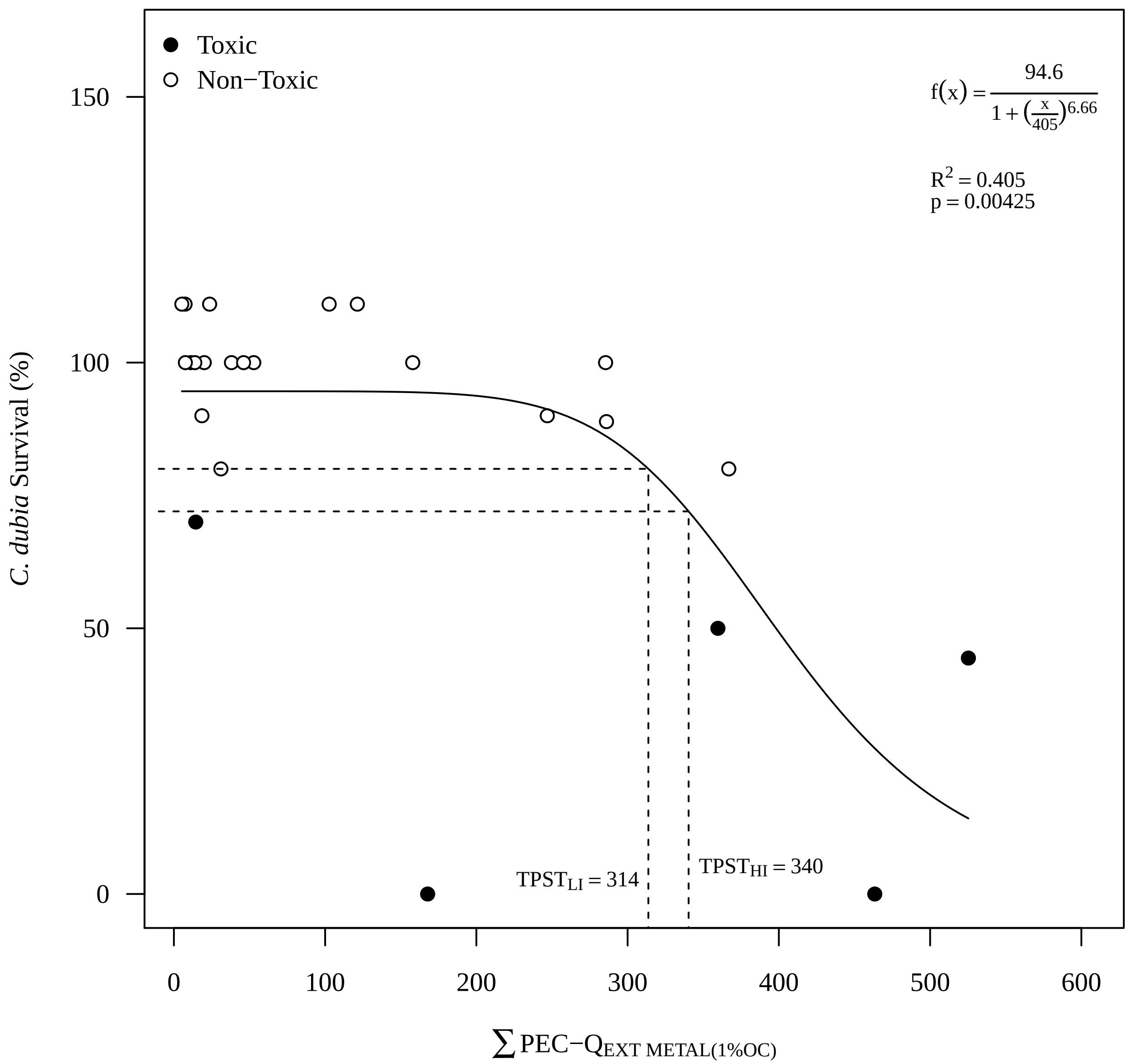


Figure A6.13 Relationship between *Ceriodaphnia dubia* survival and Cu:Al for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

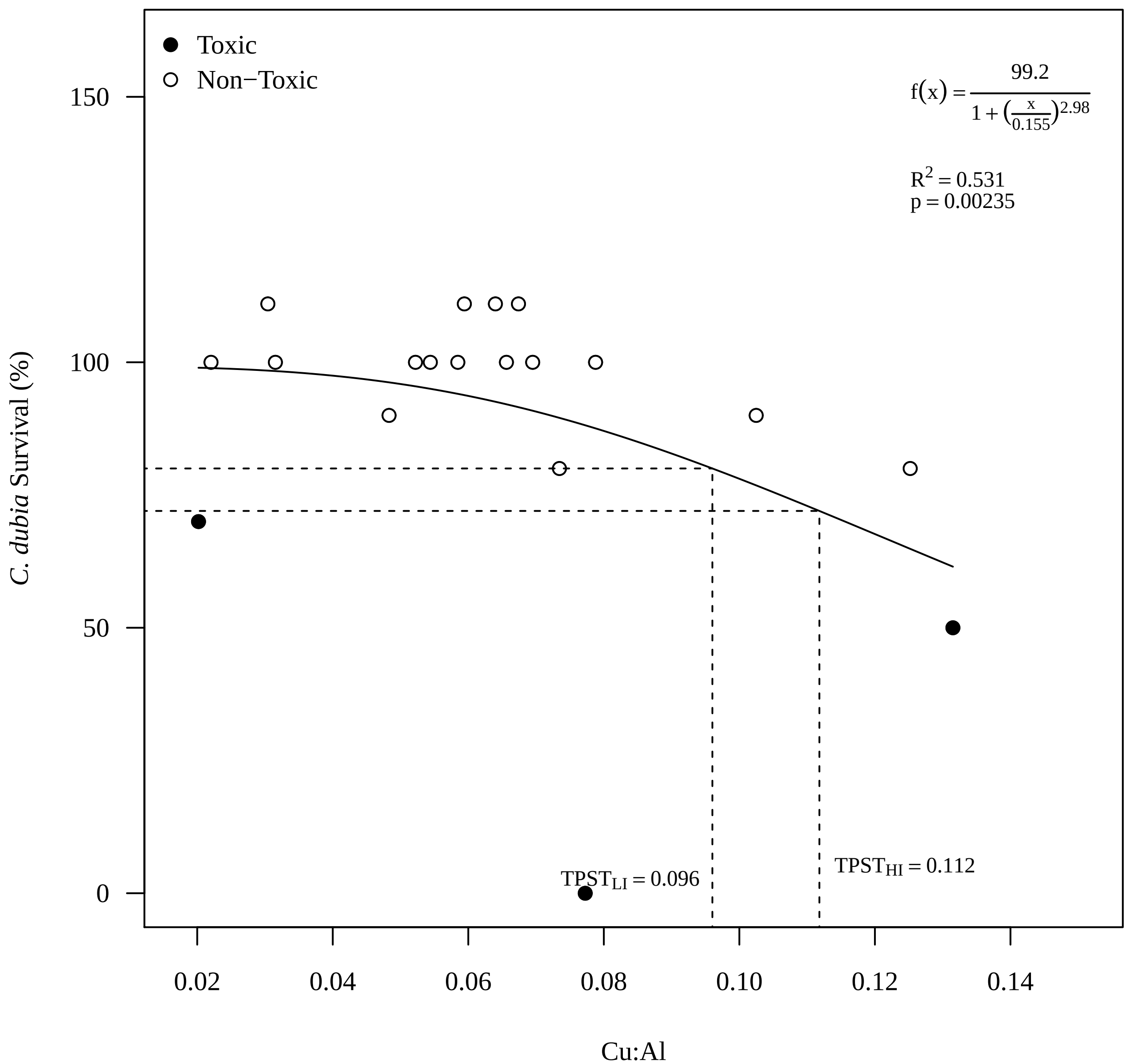


Figure A6.14. Relationship between *Ceriodaphnia dubia* reproduction and total Barium for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

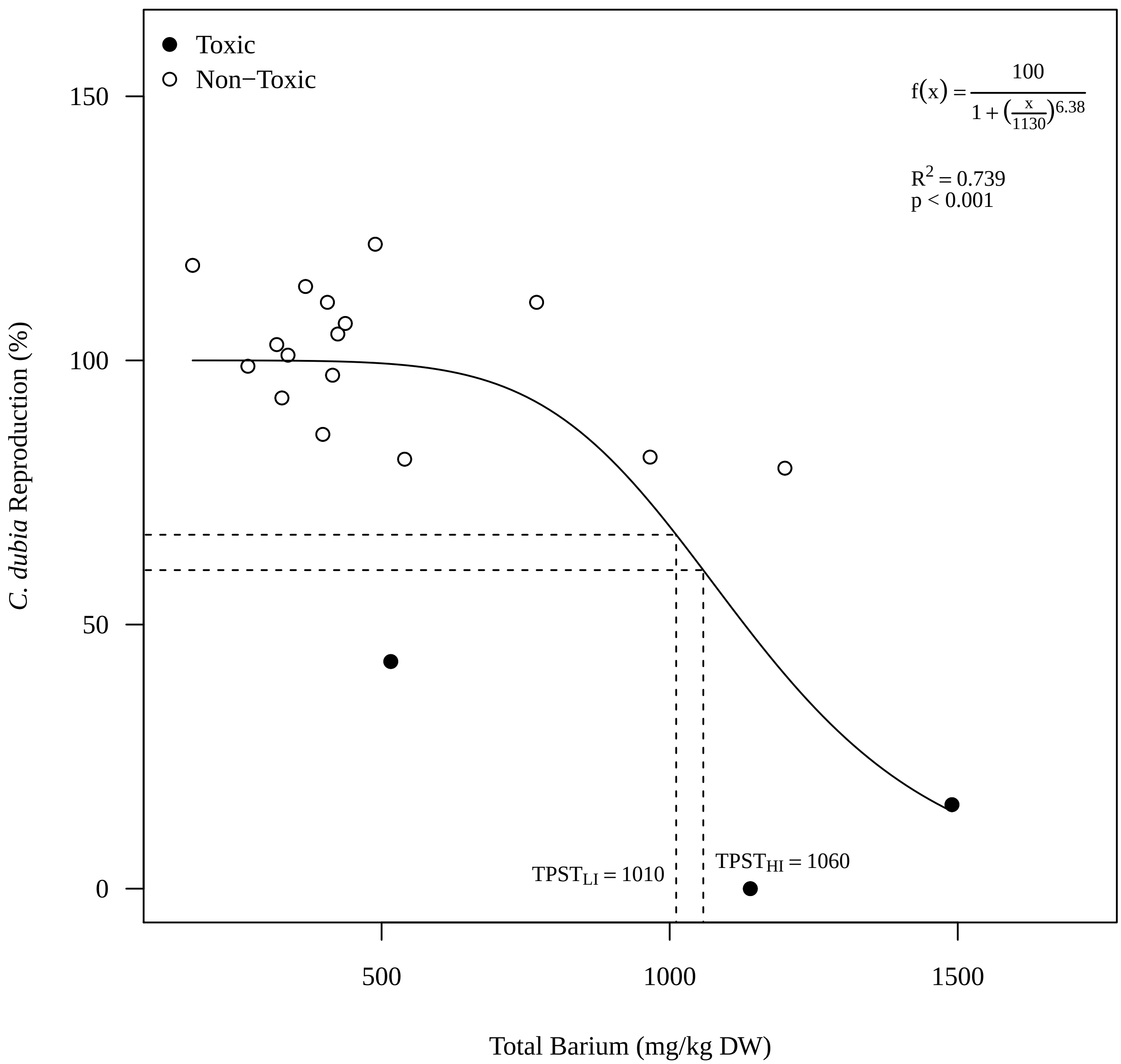


Figure A6.15. Relationship between *Ceriodaphnia dubia* reproduction and total Beryllium for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

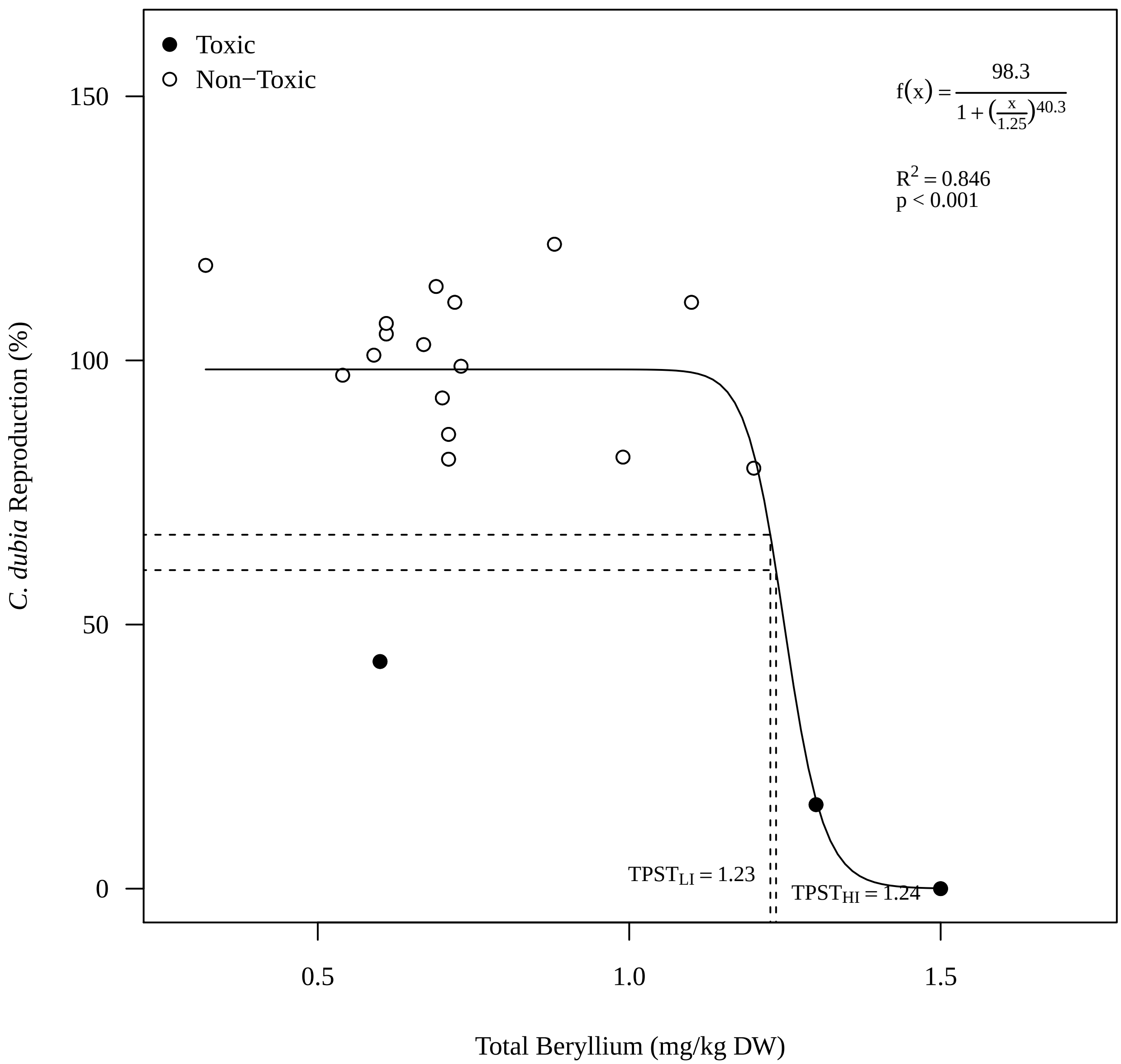


Figure A6.16. Relationship between *Ceriodaphnia dubia* reproduction and total Calcium for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

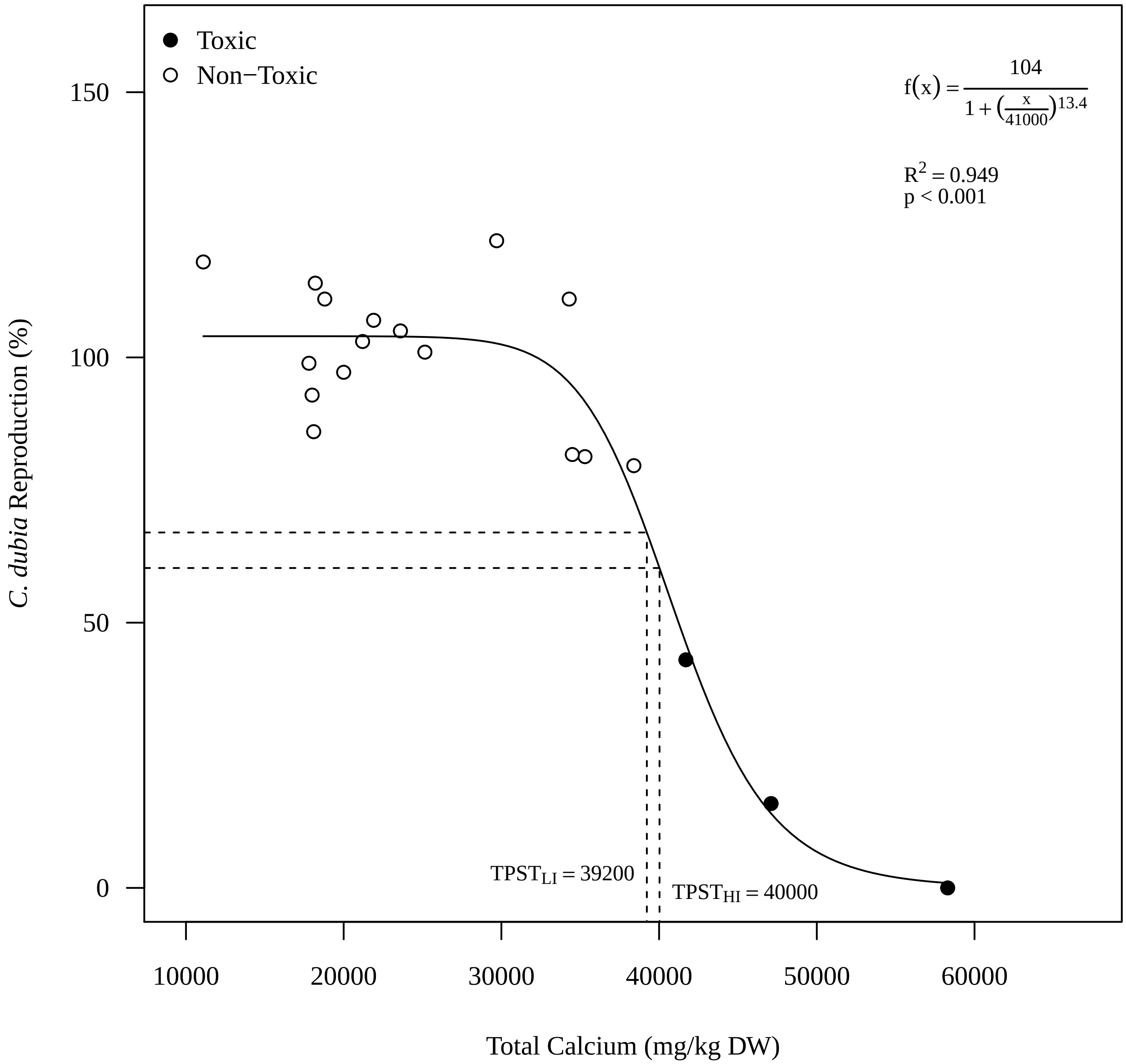


Figure A6.17. Relationship between *Ceriodaphnia dubia* reproduction and total Cobalt for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

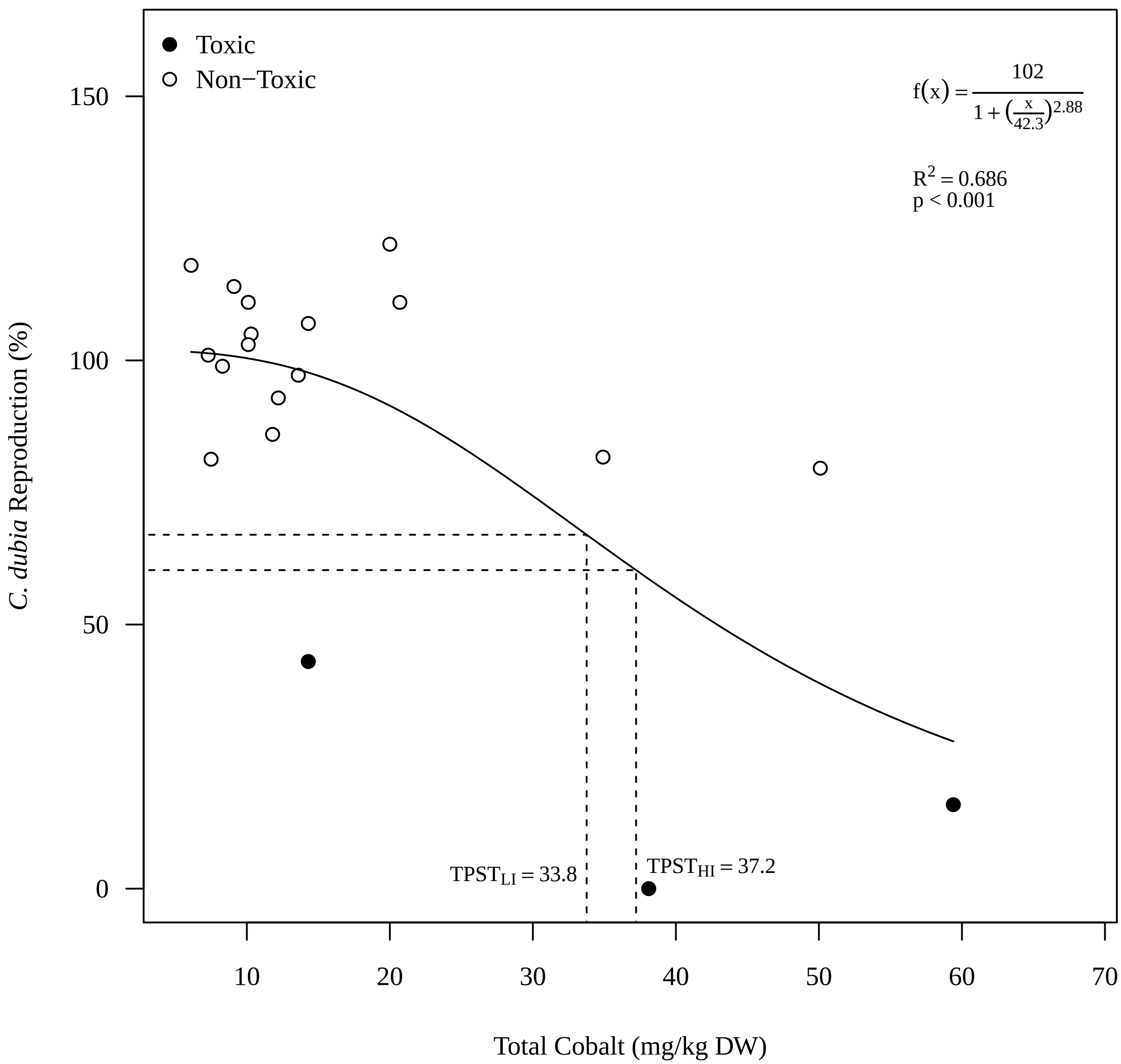


Figure A6.18. Relationship between *Ceriodaphnia dubia* reproduction and total Iron for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

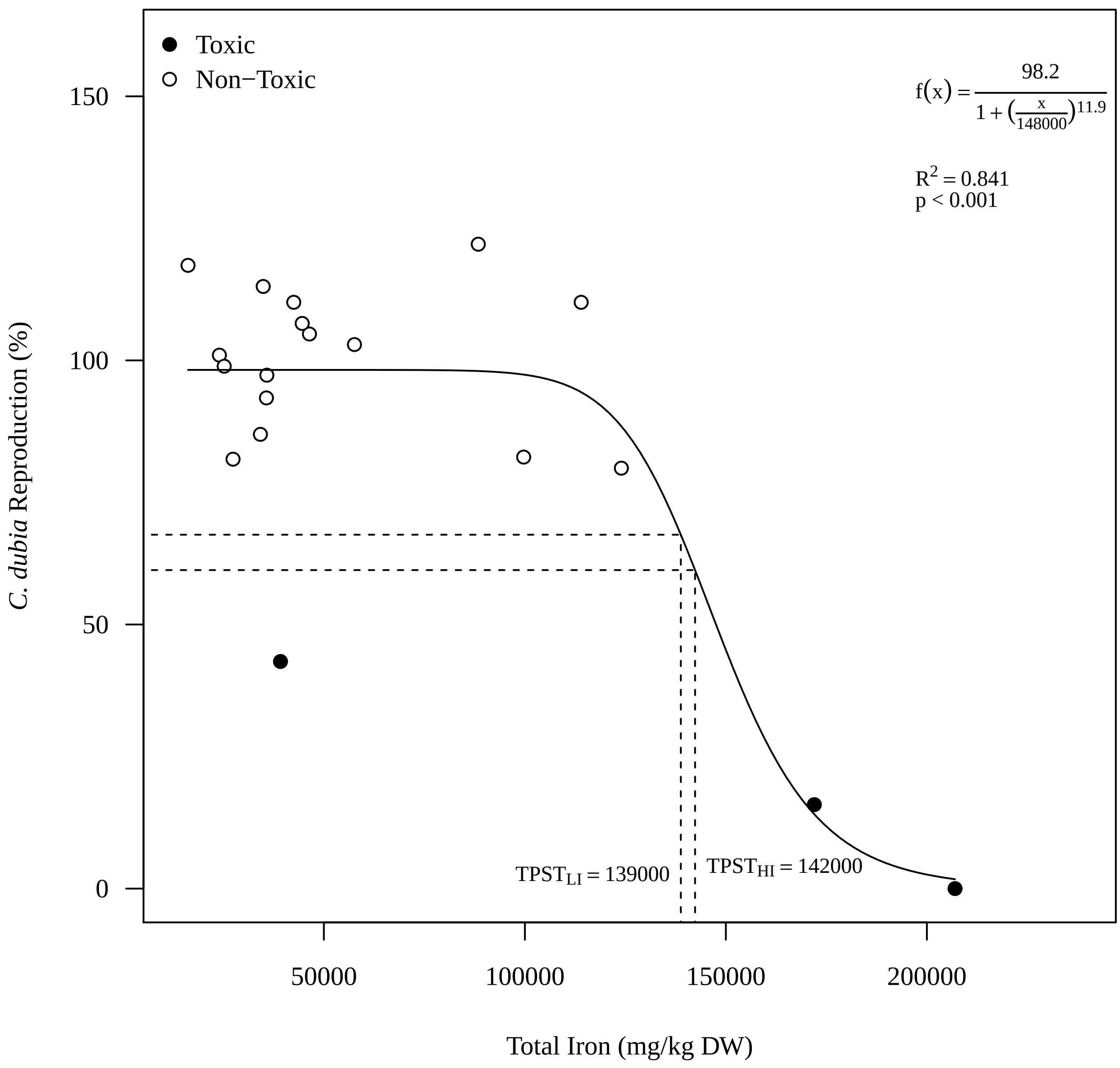


Figure A6.19. Relationship between *Ceriodaphnia dubia* reproduction and SE Chromium for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

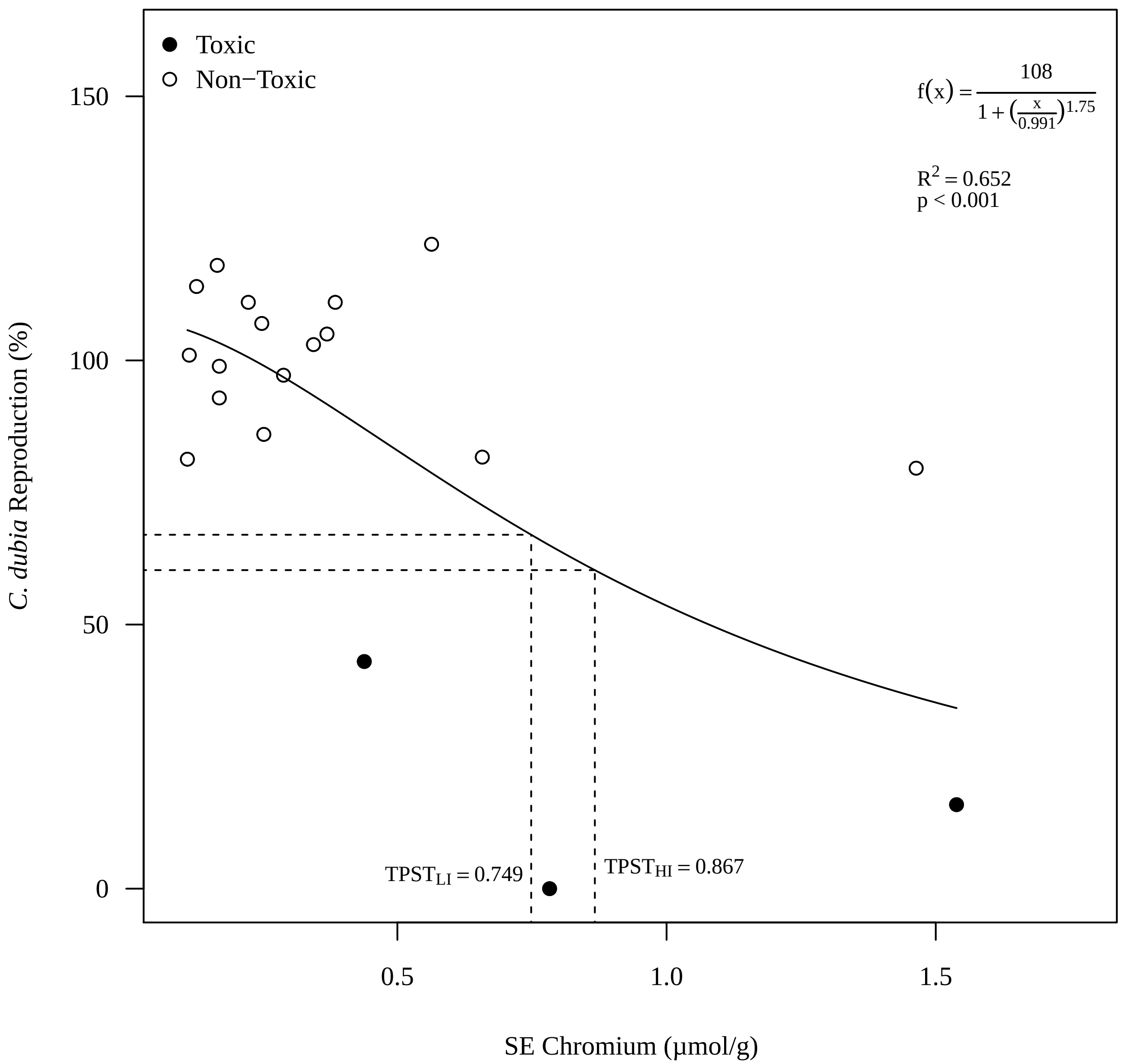


Figure A6.20. Relationship between *Ceriodaphnia dubia* reproduction and SE Zinc for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

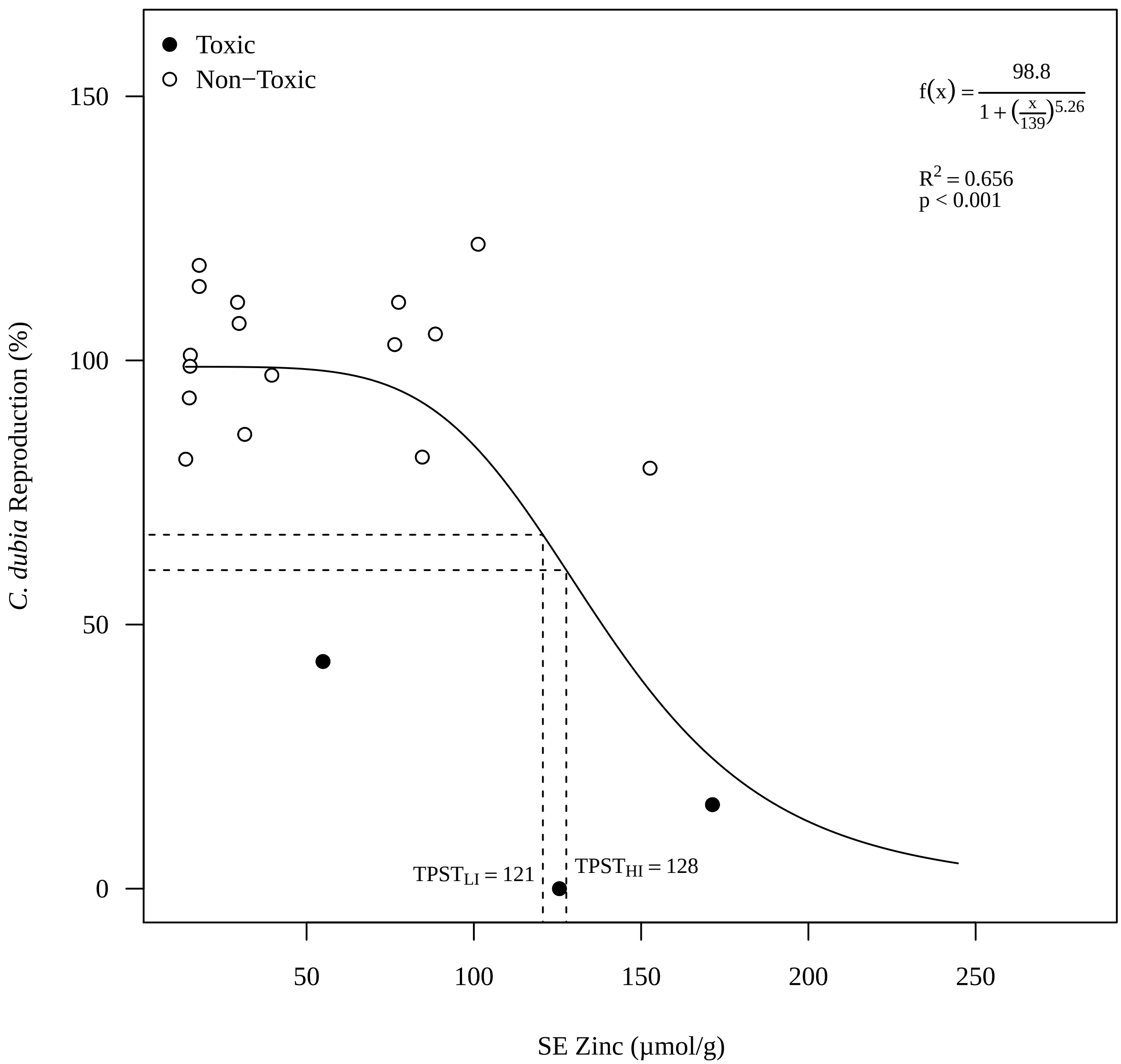


Figure A6.21. Relationship between *Ceriodaphnia dubia* reproduction and Mean PEC−Q$_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

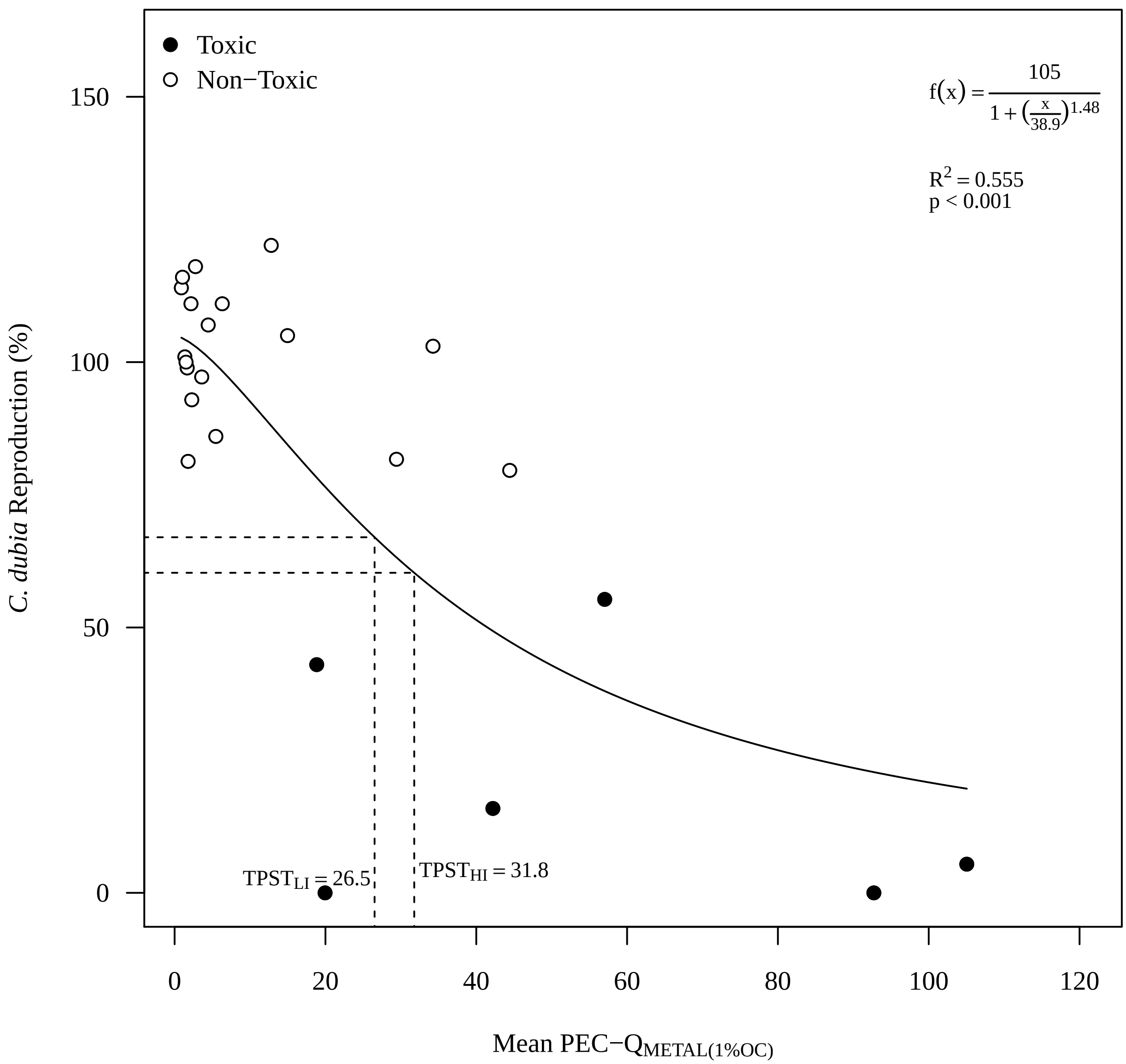


Figure A6.22. Relationship between *Ceriodaphnia dubia* reproduction and Mean PEC−$Q_{EXT\ METAL}$ for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

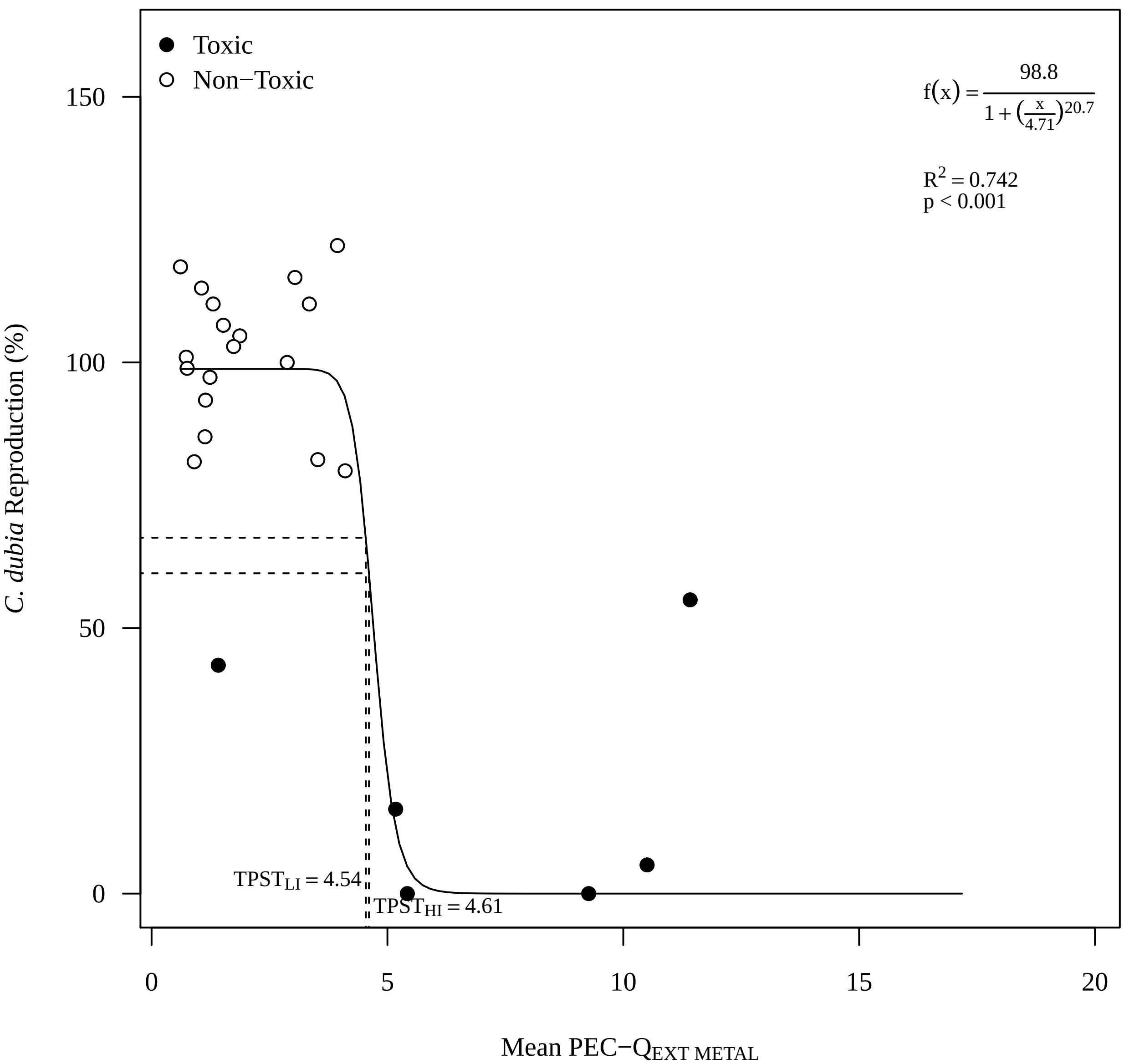


Figure A6.23. Relationship between *Ceriodaphnia dubia* reproduction and Mean PEC−Q$_{EXT\ METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

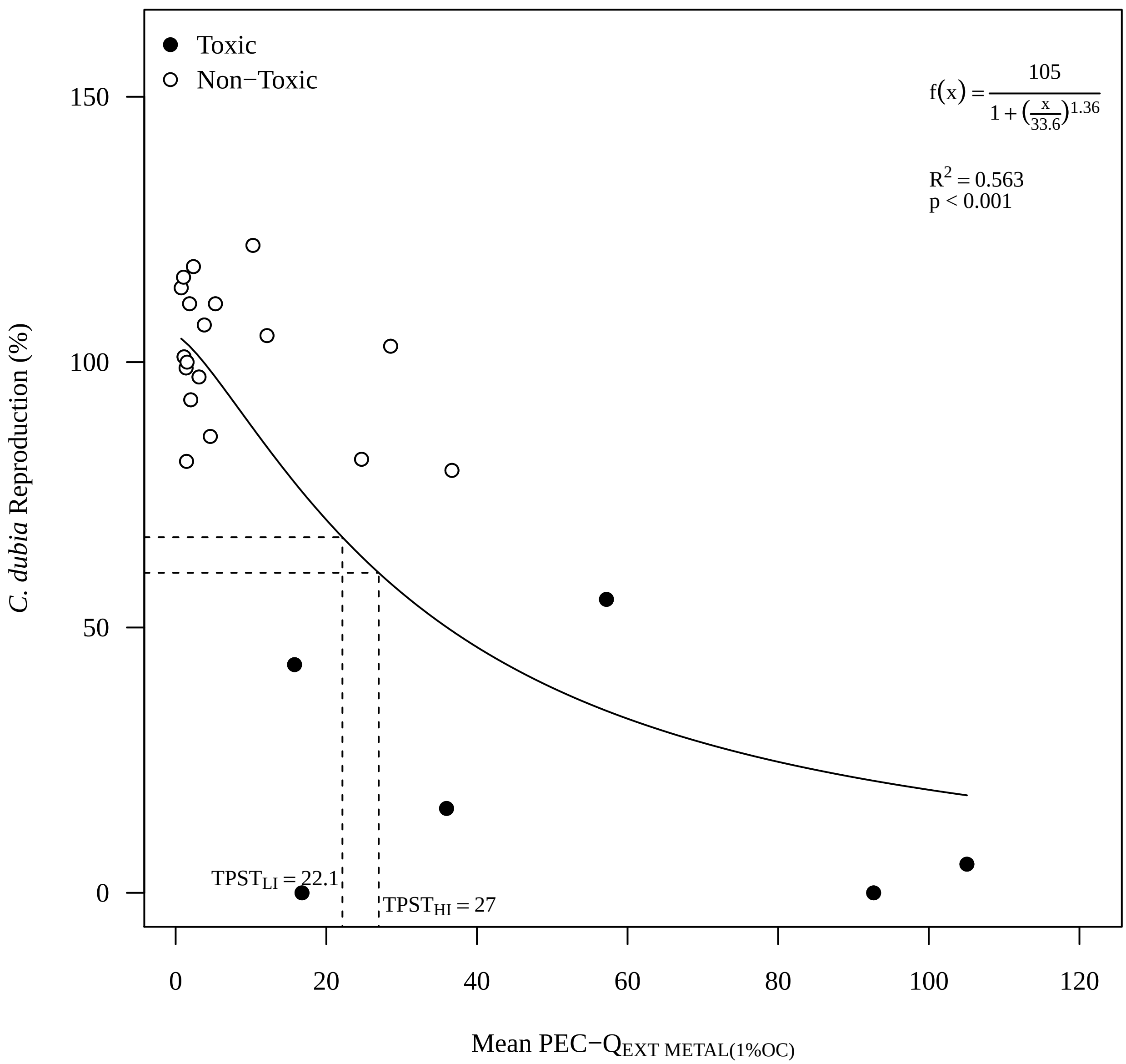


Figure A6.24. Relationship between *Ceriodaphnia dubia* reproduction and $\sum$PEC−Q$_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

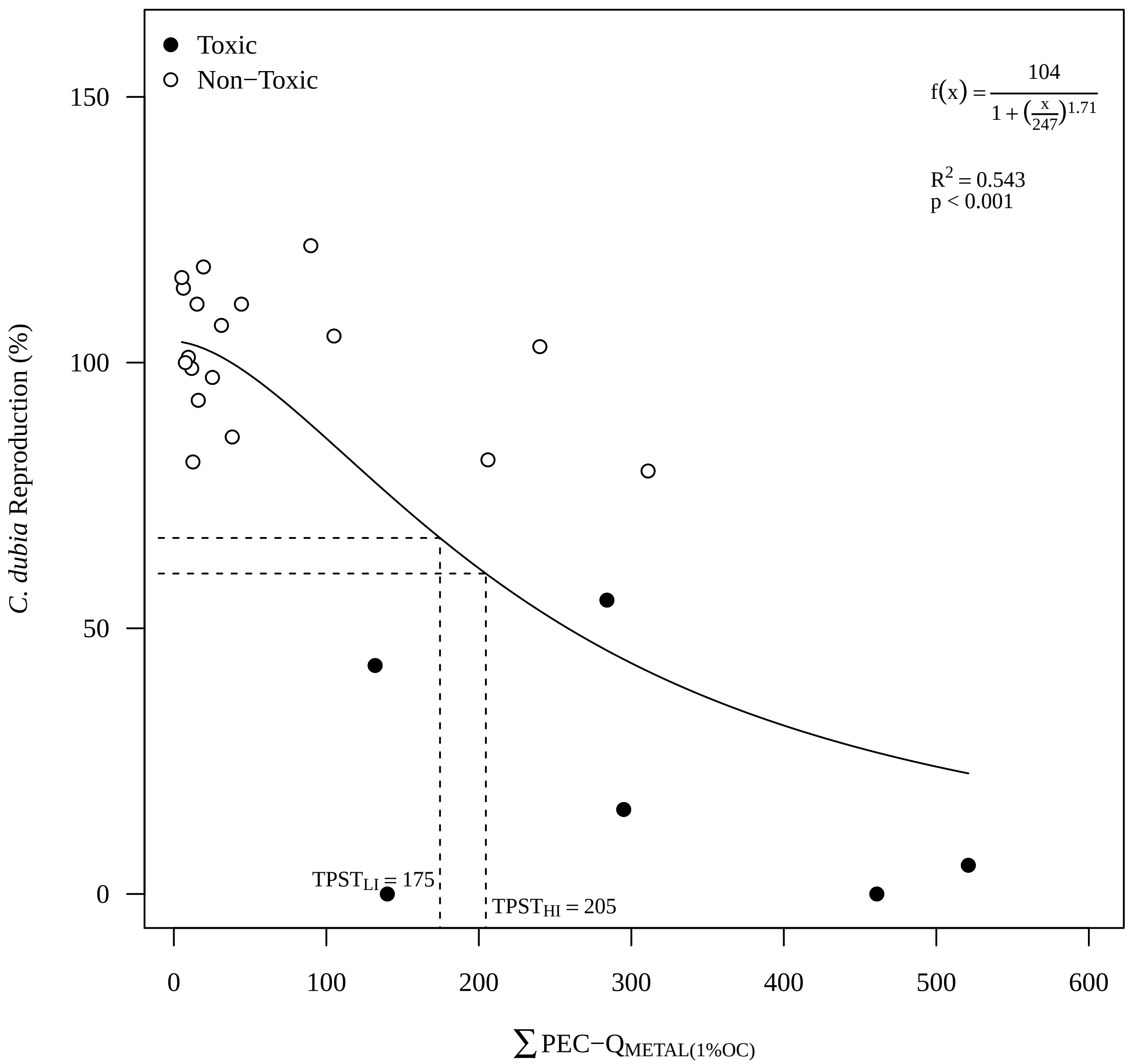


Figure A6.25. Relationship between *Ceriodaphnia dubia* reproduction and $\sum$PEC−Q$_{EXT\ METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

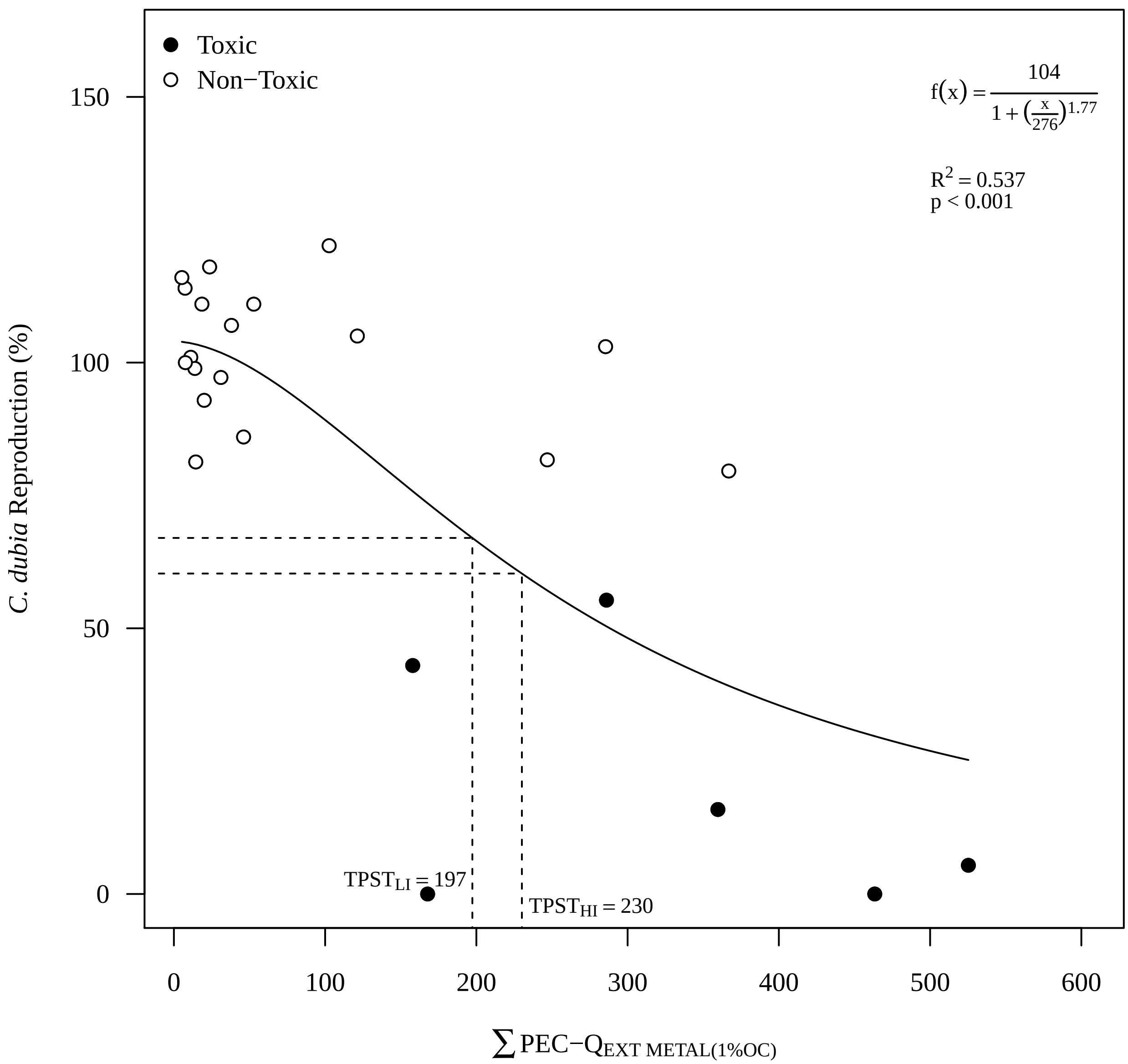


Figure A6.26 Relationship between *Ceriodaphnia dubia* reproduction and Cu:Al for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

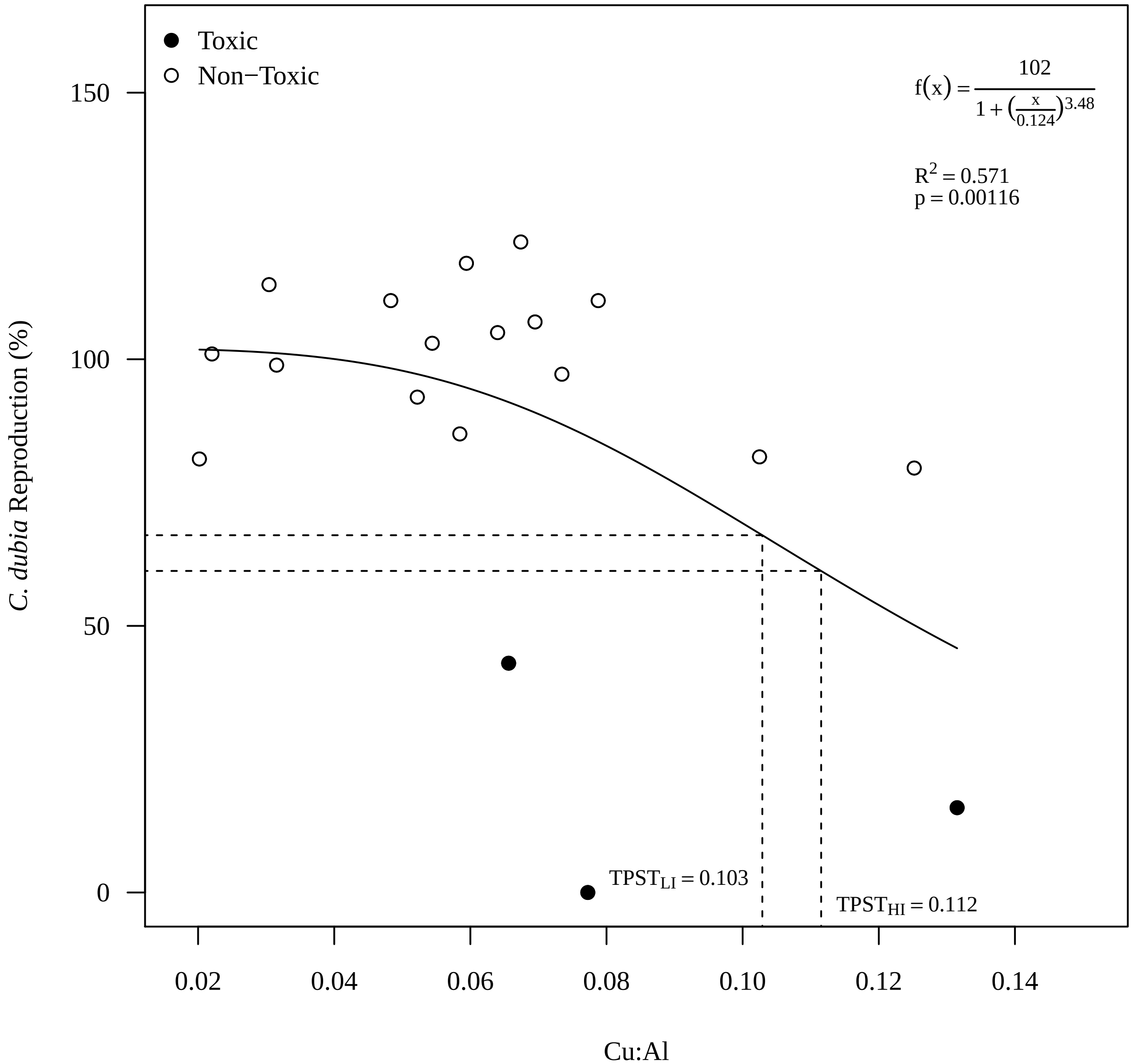


Figure A6.27. Relationship between *Ceriodaphnia dubia* reproduction and percent sand for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007).

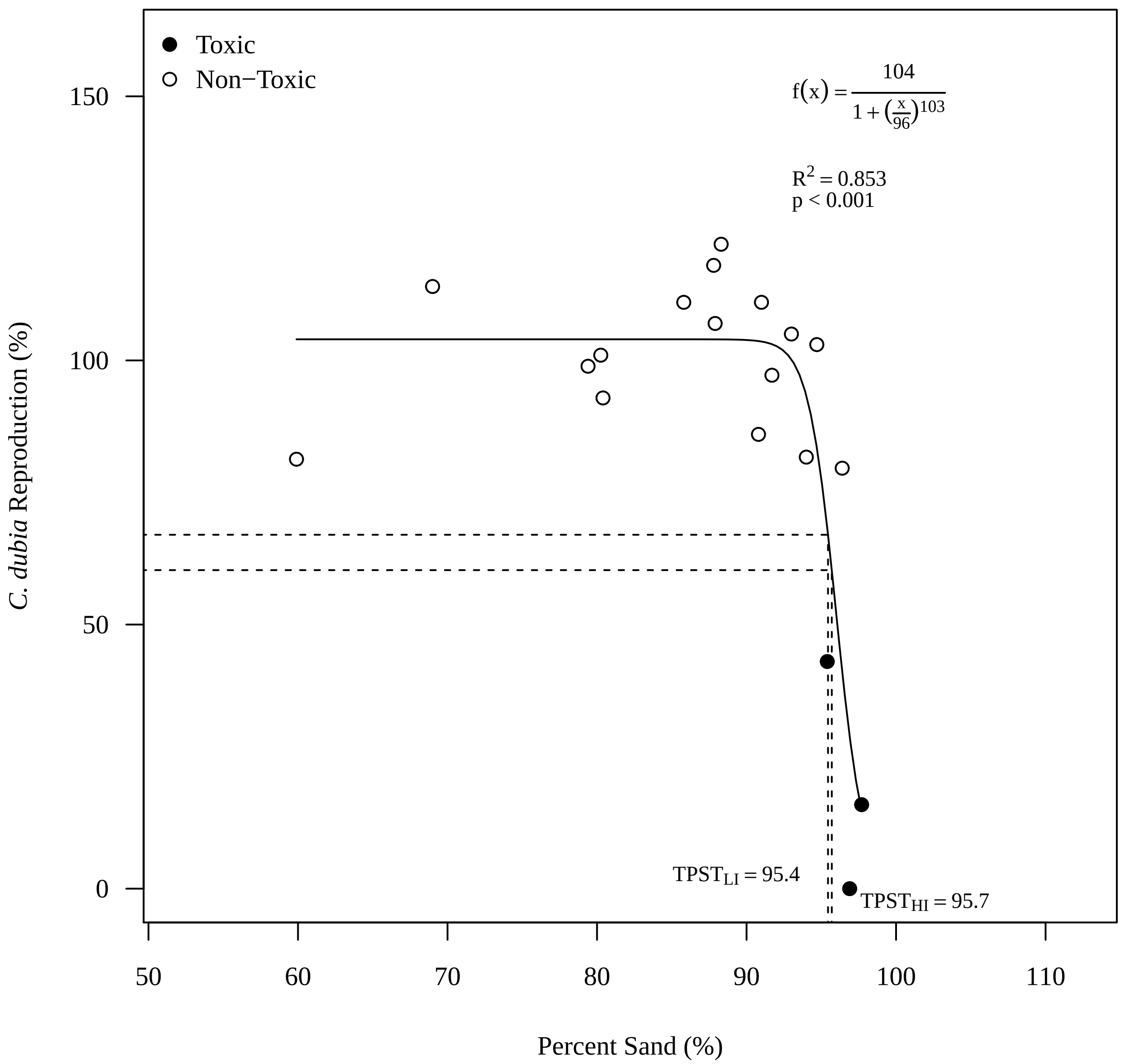


Figure A6.28. Relationship between *Chironomus dilutus* growth and (∑ SEM−AVS)/f_{OC} for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

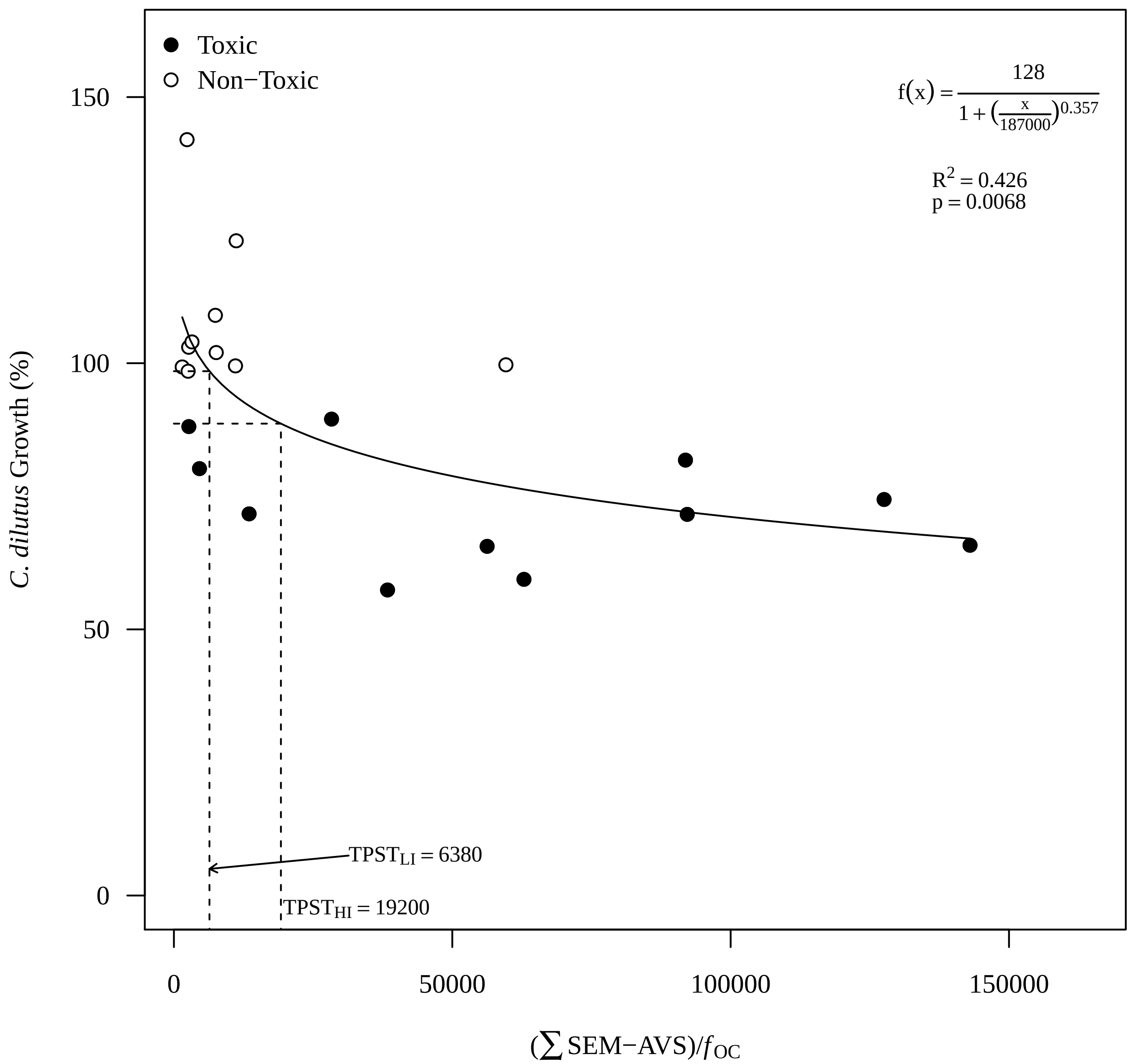


Figure A6.29. Relationship between *Chironomus dilutus* growth and Mean PEC−$Q_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

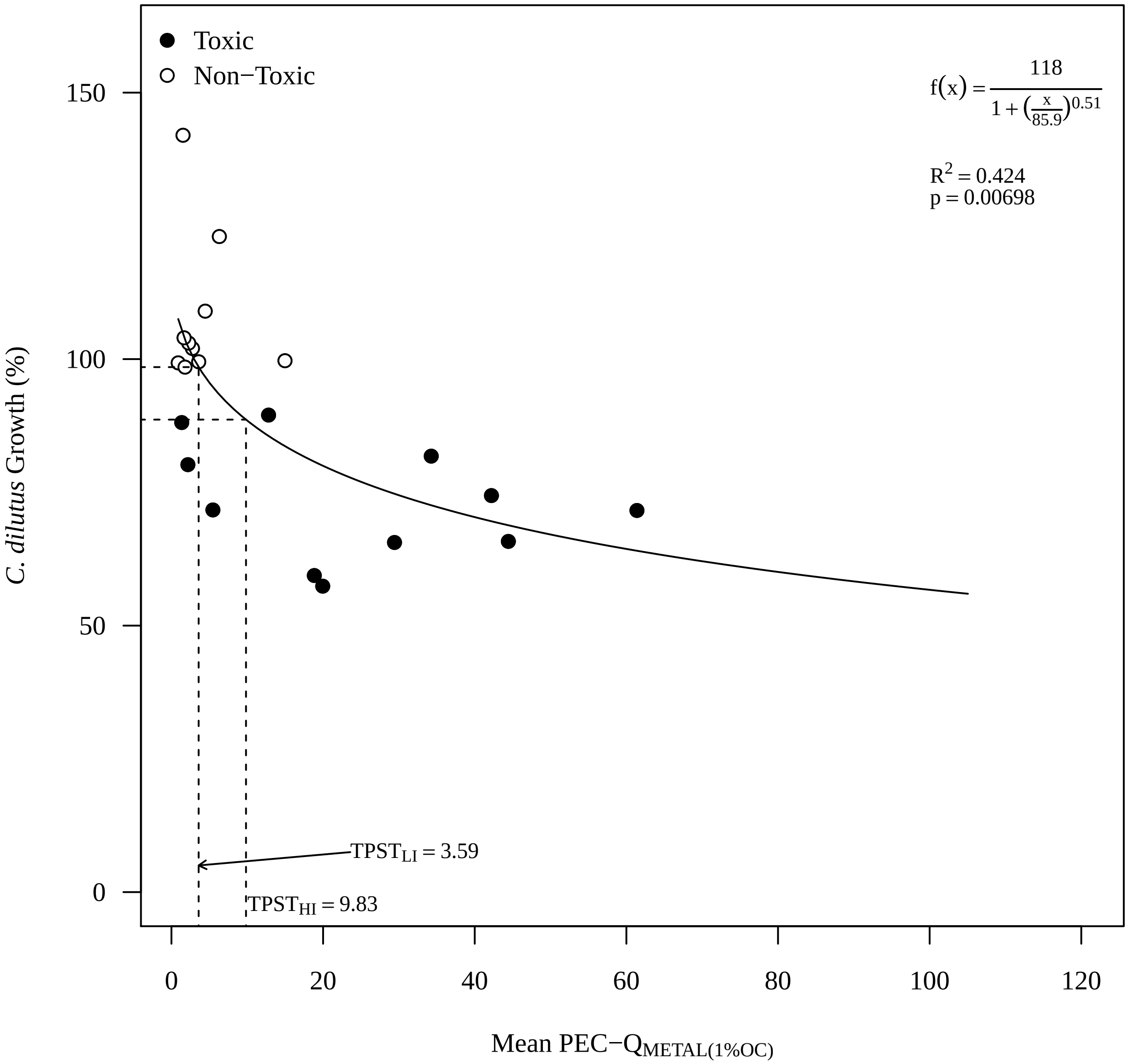


Figure A6.30. Relationship between *Chironomus dilutus* growth and $\sum$PEC−$Q_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.*2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

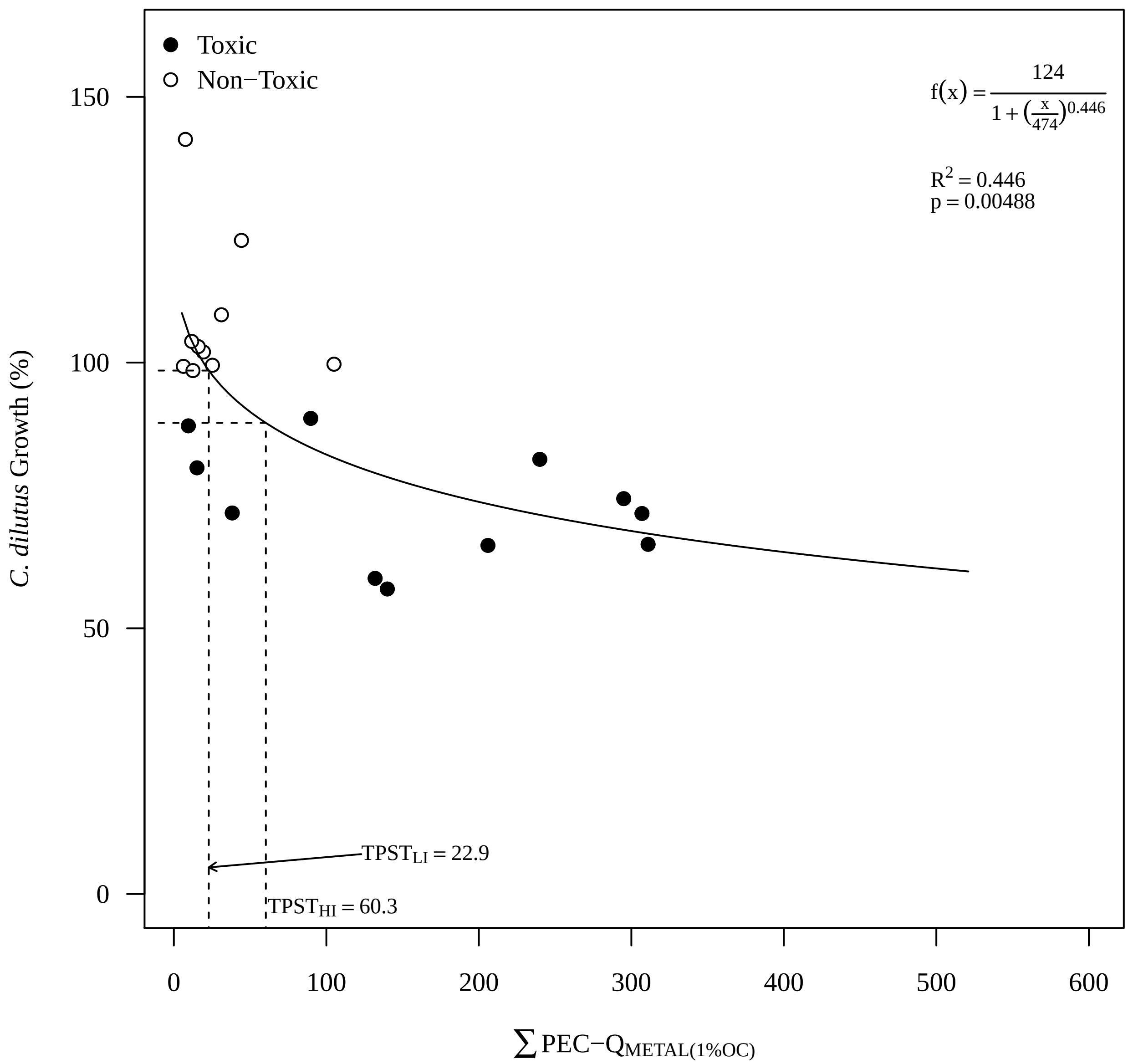


Figure A6.31. Relationship between *Chironomus dilutus* growth and $\sum$ PEC−Q$_{EXT\ METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

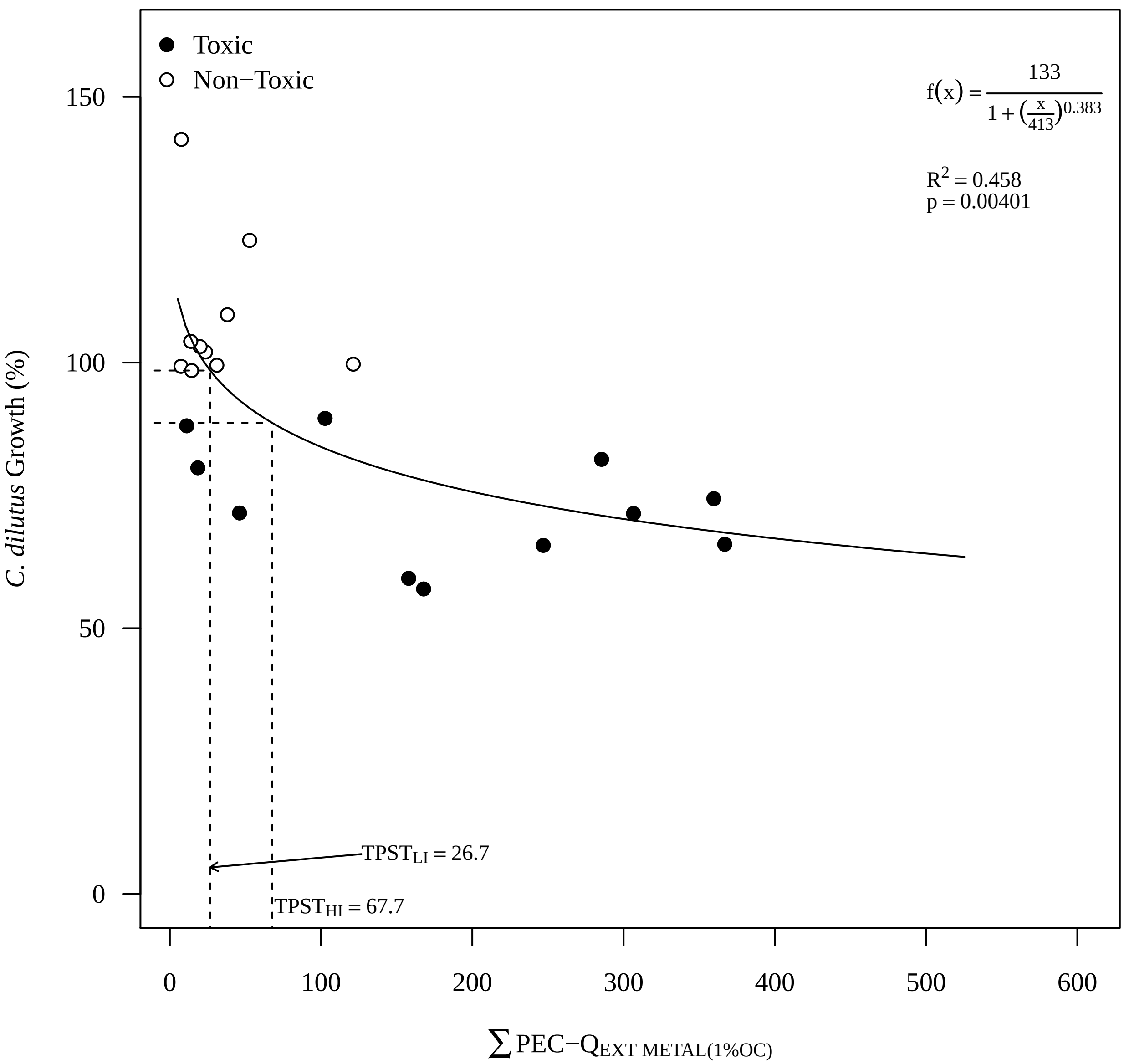


Figure A6.32. Relationship between *Chironomus dilutus* growth and percent sand for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

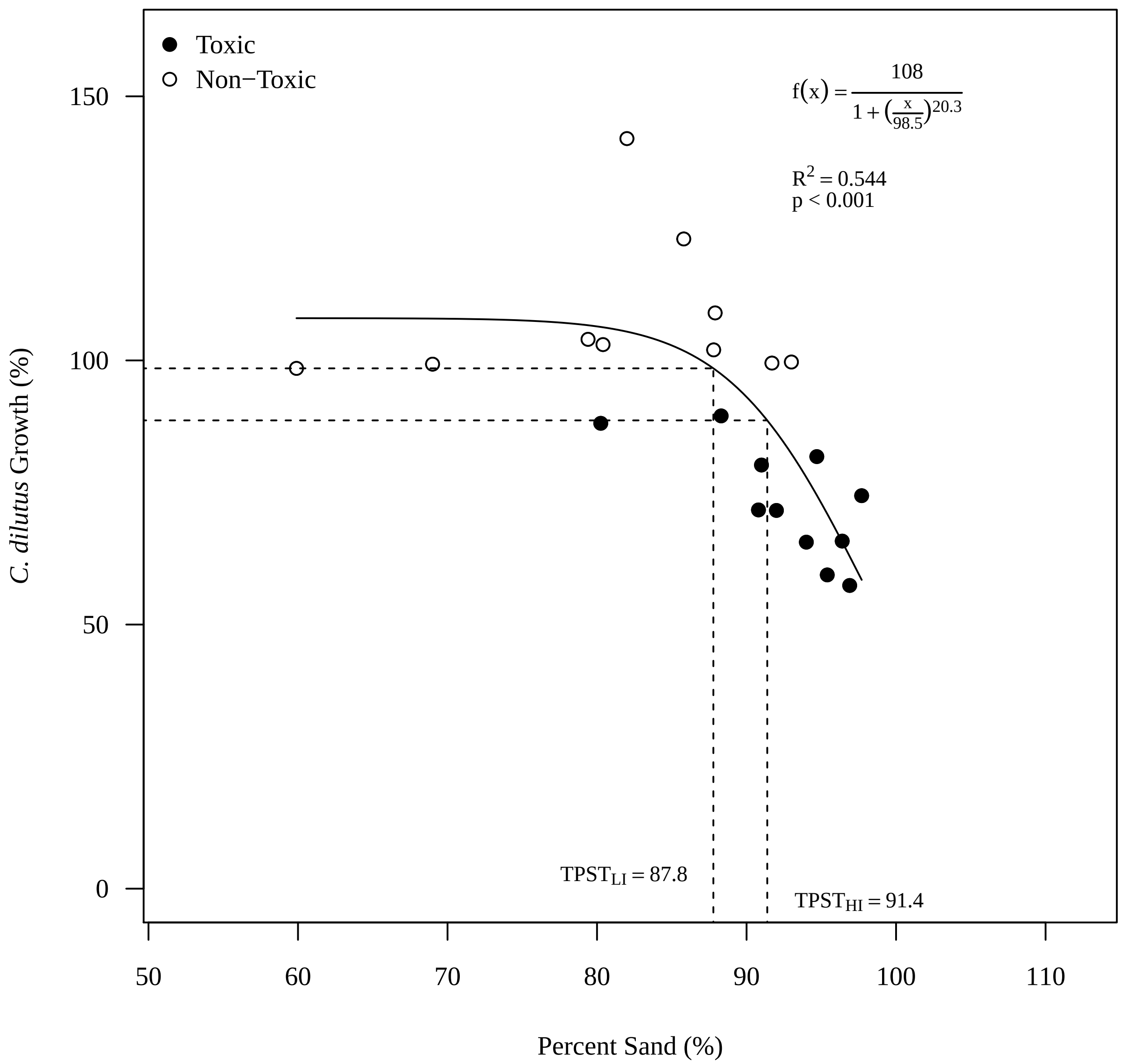


Figure A6.33. Relationship between *Chironomus dilutus* biomass and total Barium for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

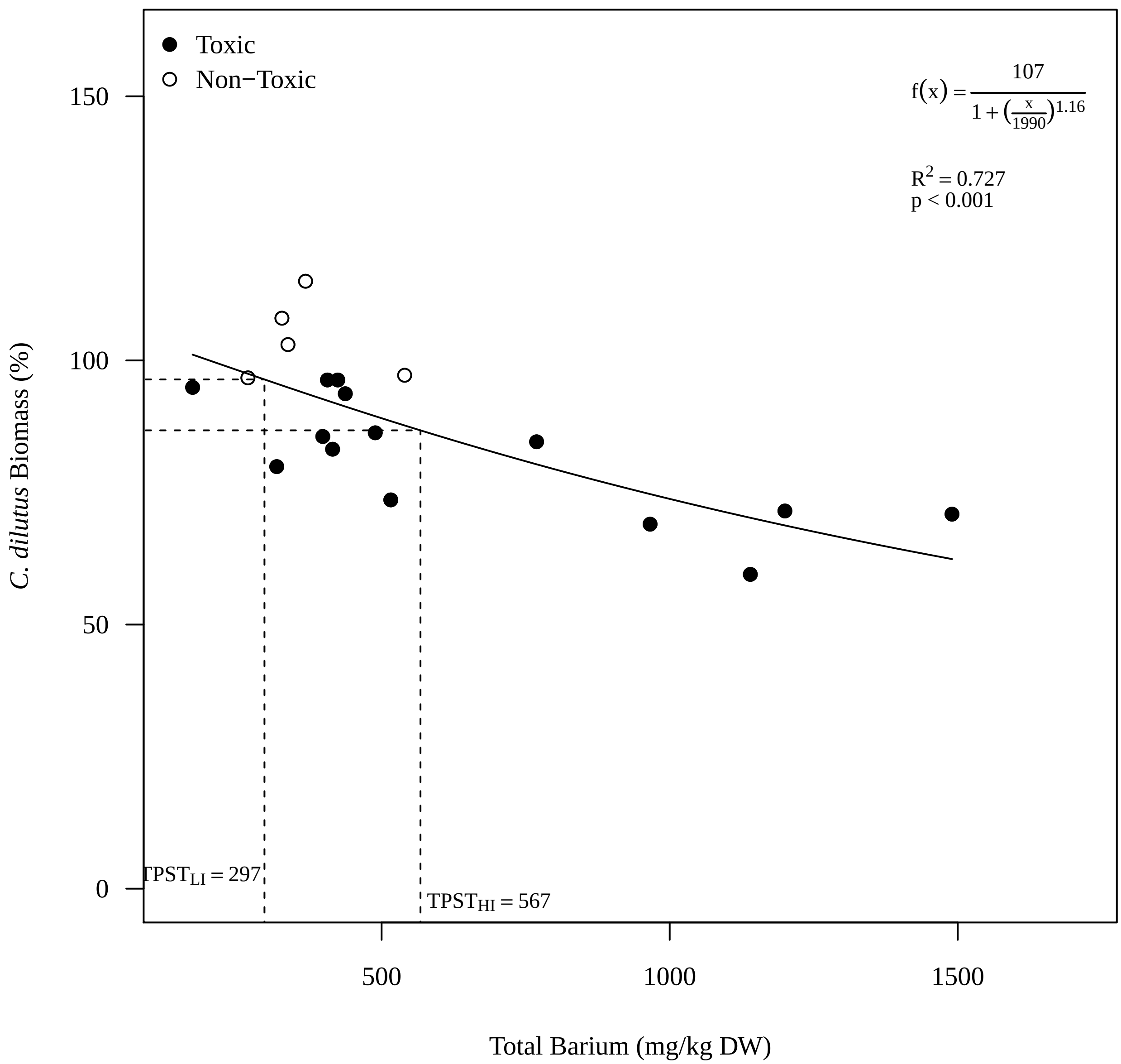


Figure A6.34. Relationship between *Chironomus dilutus* biomass and total Calcium for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

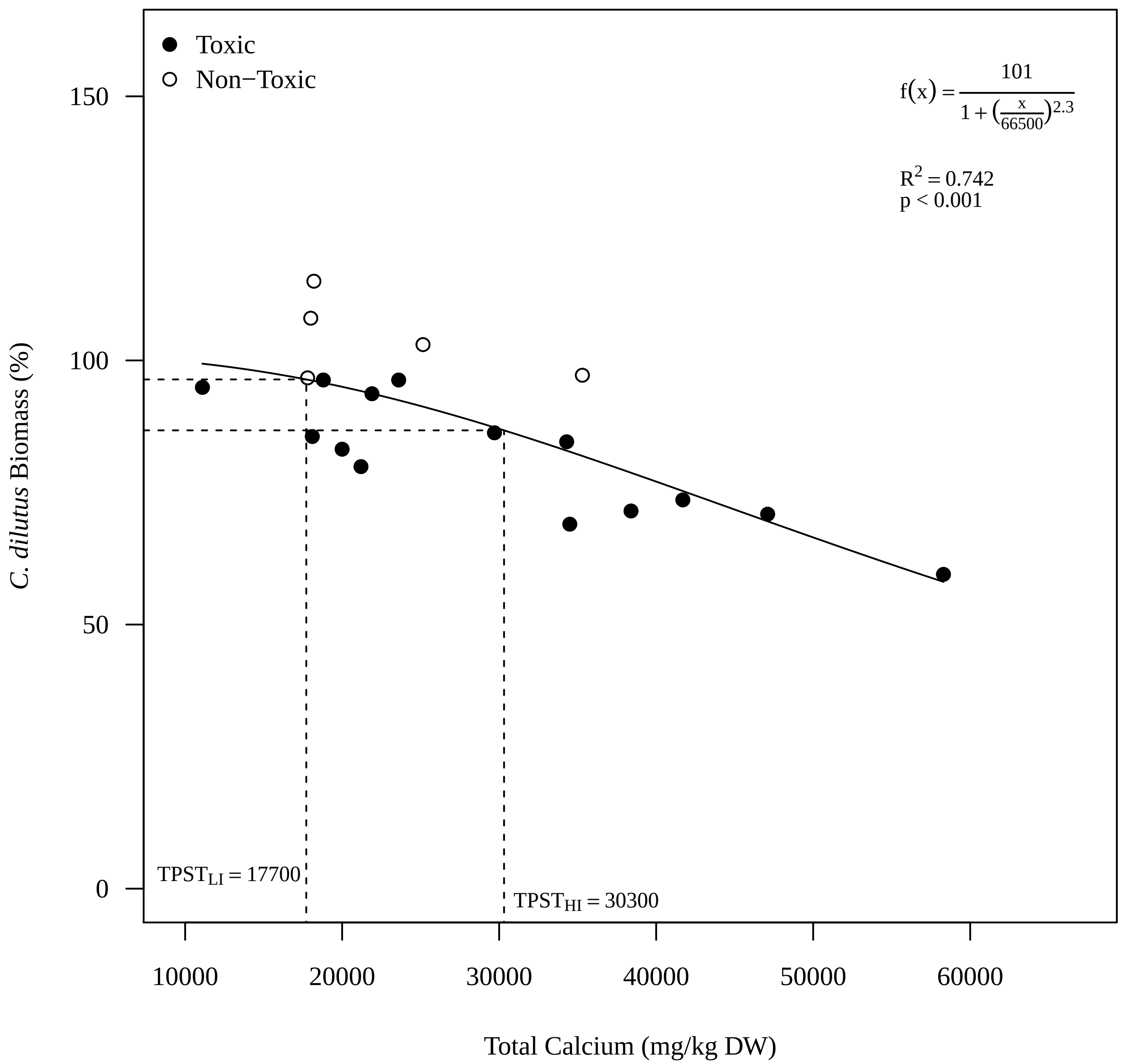


Figure A6.35. Relationship between *Chironomus dilutus* biomass and total Copper for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

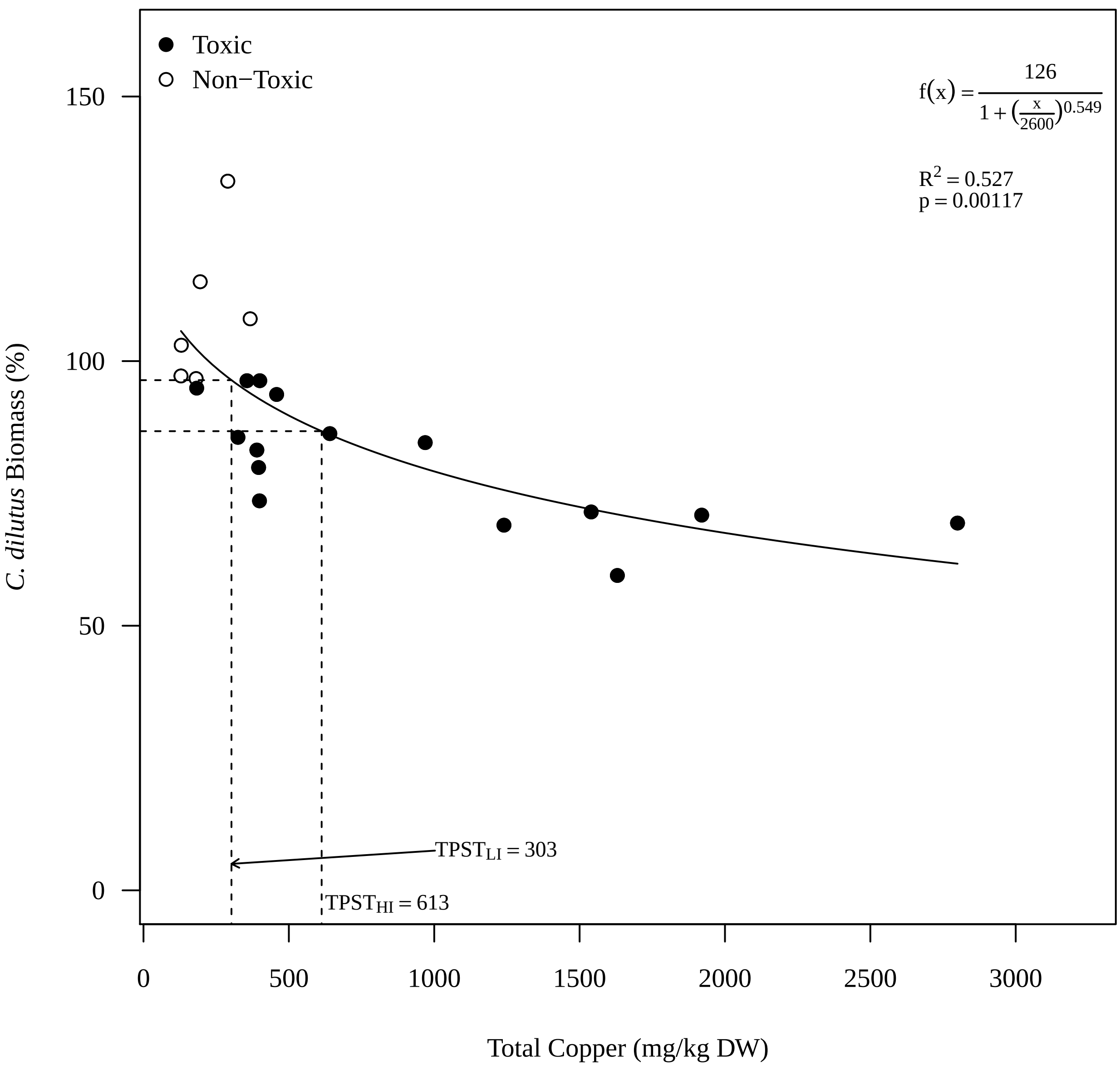


Figure A6.36. Relationship between *Chironomus dilutus* biomass and total Manganese for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

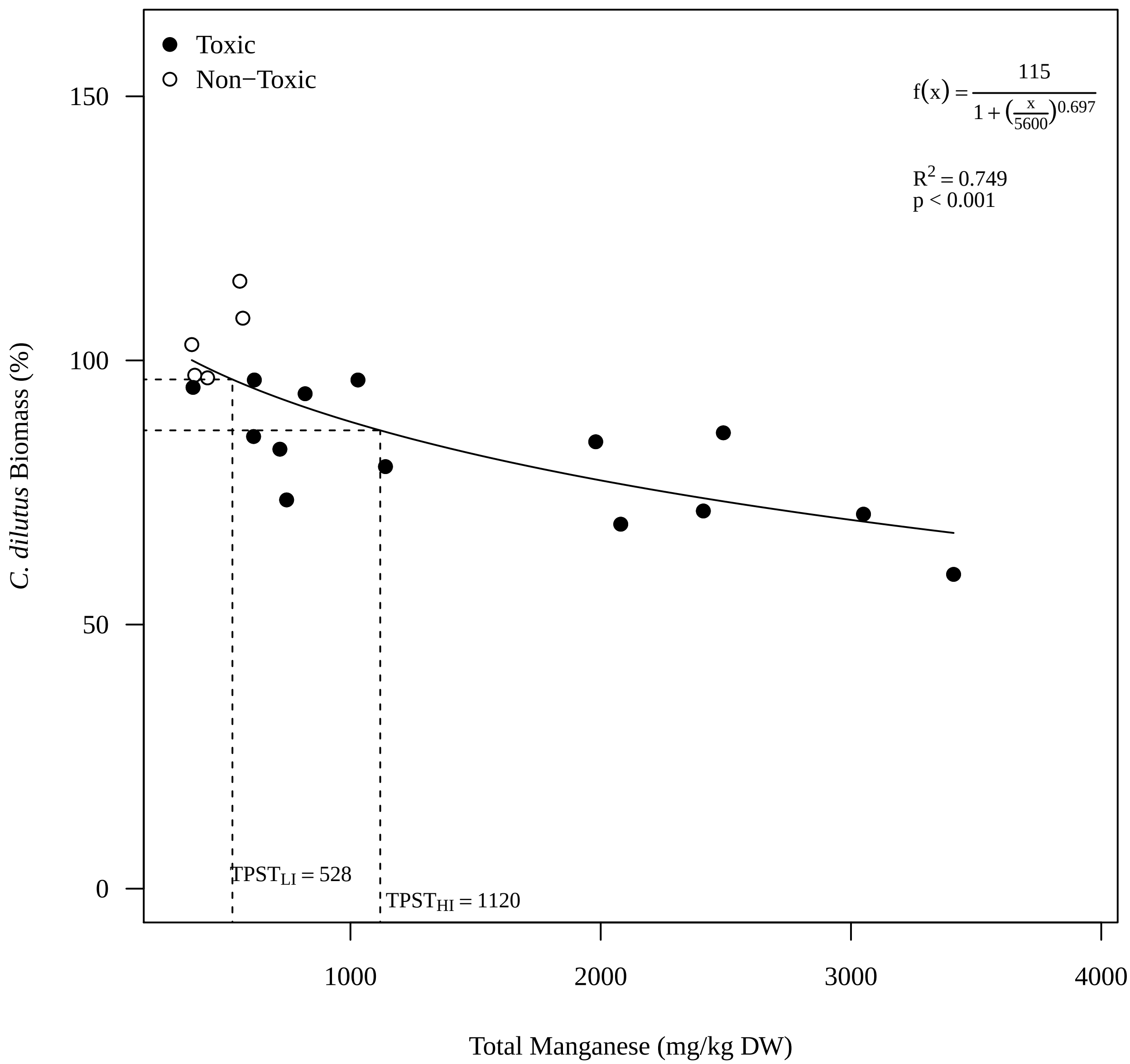


Figure A6.37. Relationship between *Chironomus dilutus* biomass and Mean PEC−Q for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

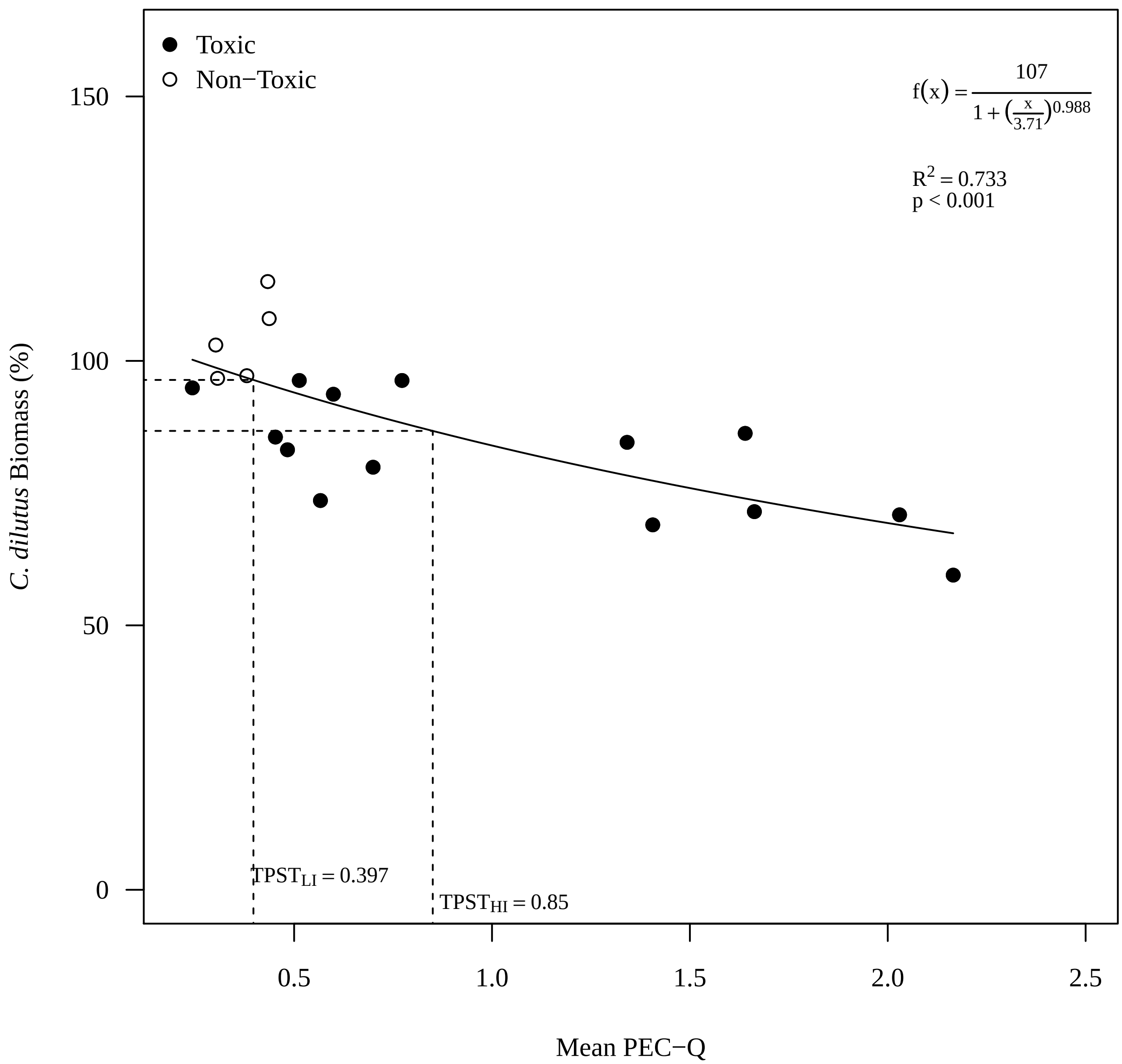


Figure A6.38. Relationship between *Chironomus dilutus* biomass and $\sum$PEC−Q$_{EXT\ METAL}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

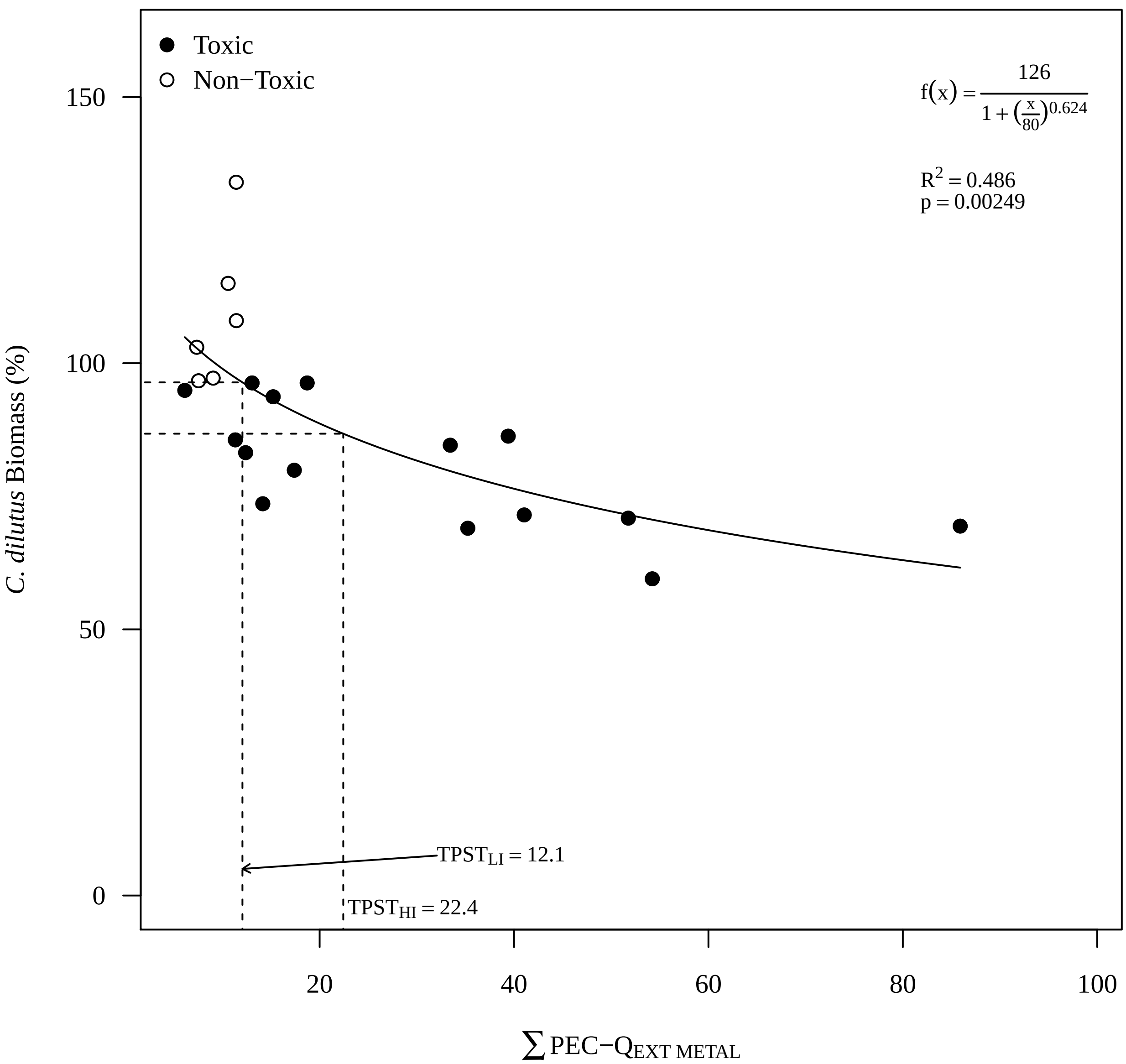


Figure A6.39. Relationship between *Chironomus dilutus* biomass and Cu:Al for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

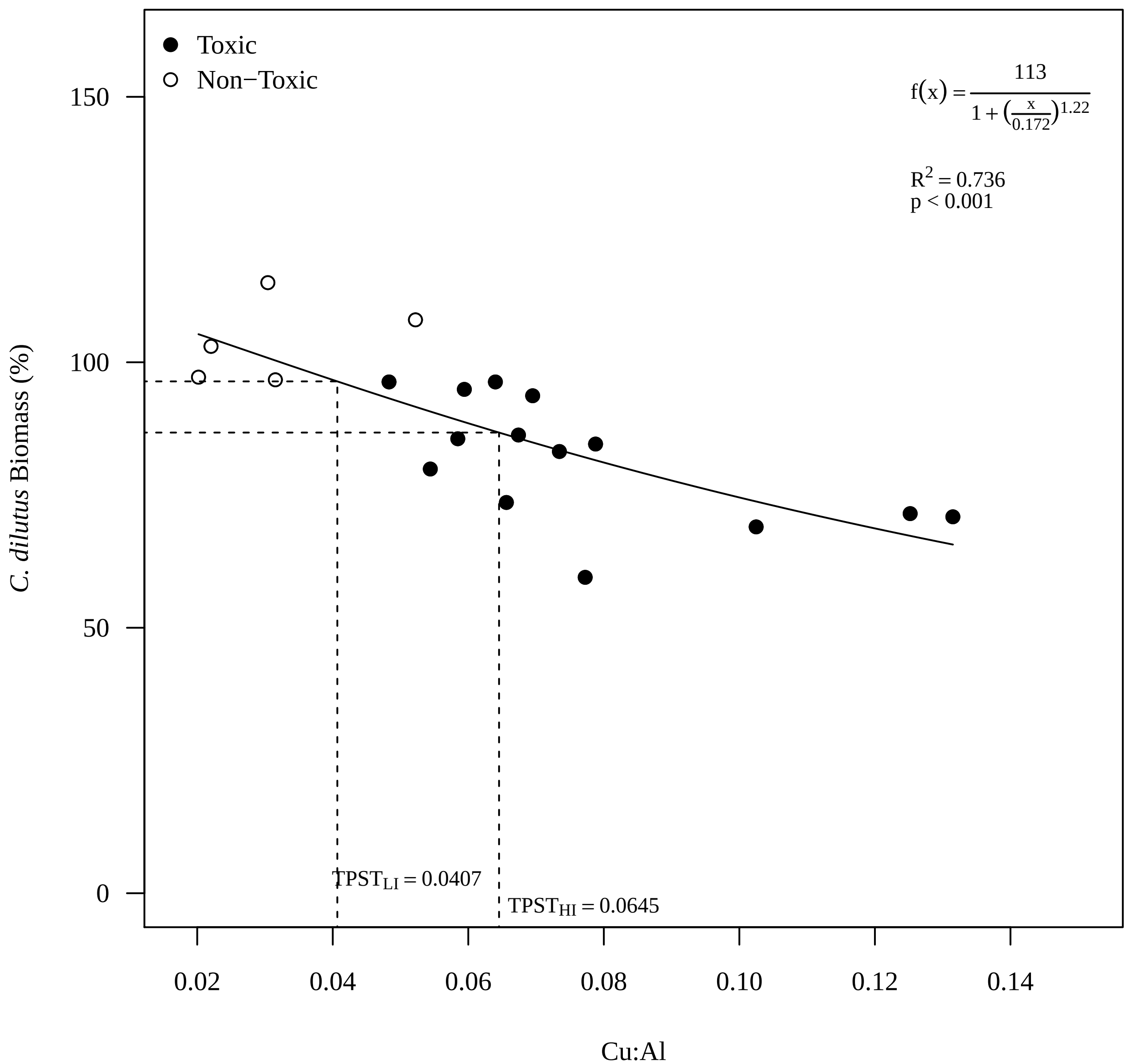


Figure A6.40. Relationship between *Chironomus dilutus* biomass and percent sand for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

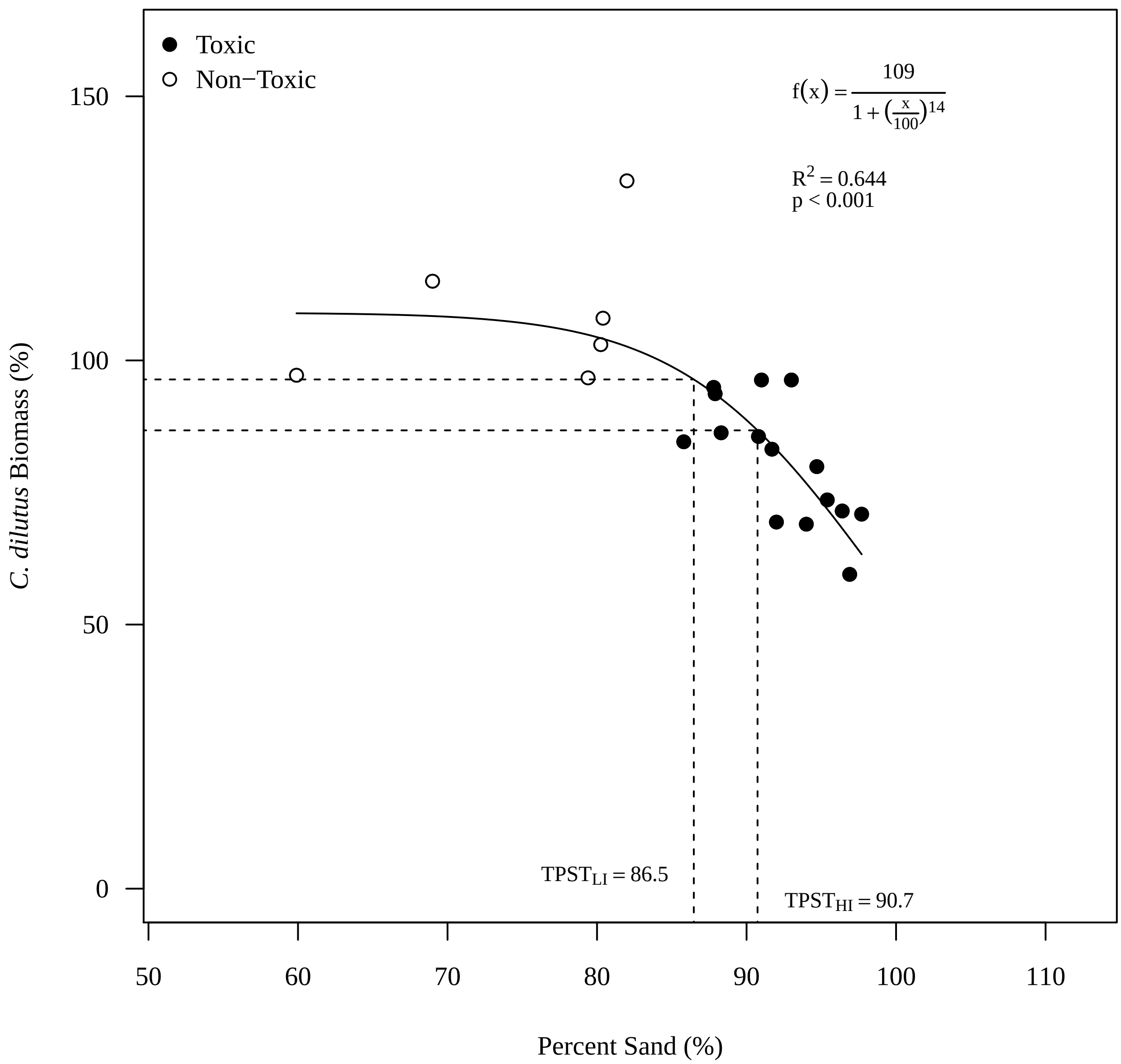


Figure A6.41. Relationship between *Hyalella azteca* growth and total Chromium for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

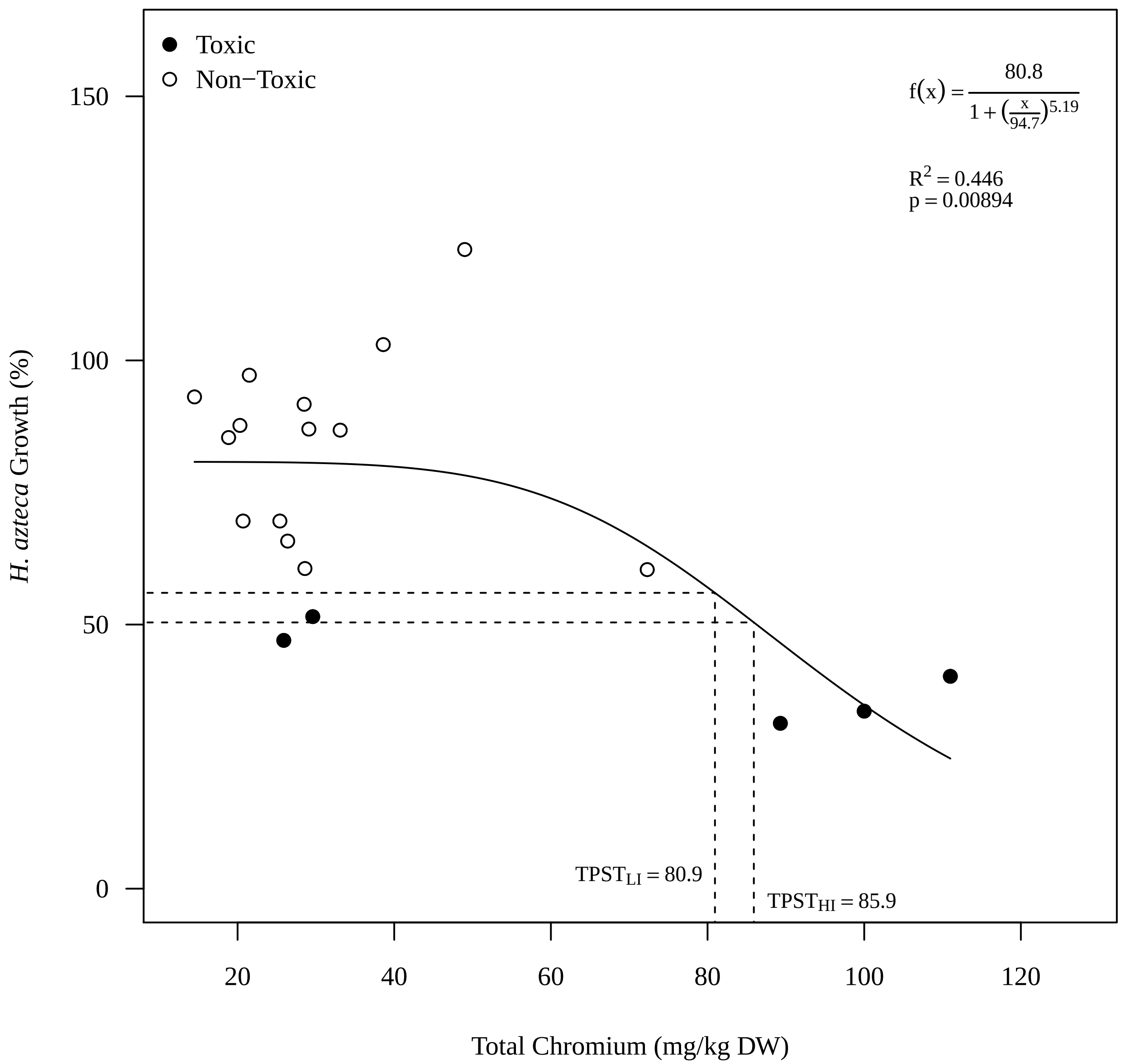


Figure A6.42. Relationship between *Hyalella azteca* growth and SE Chromium for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

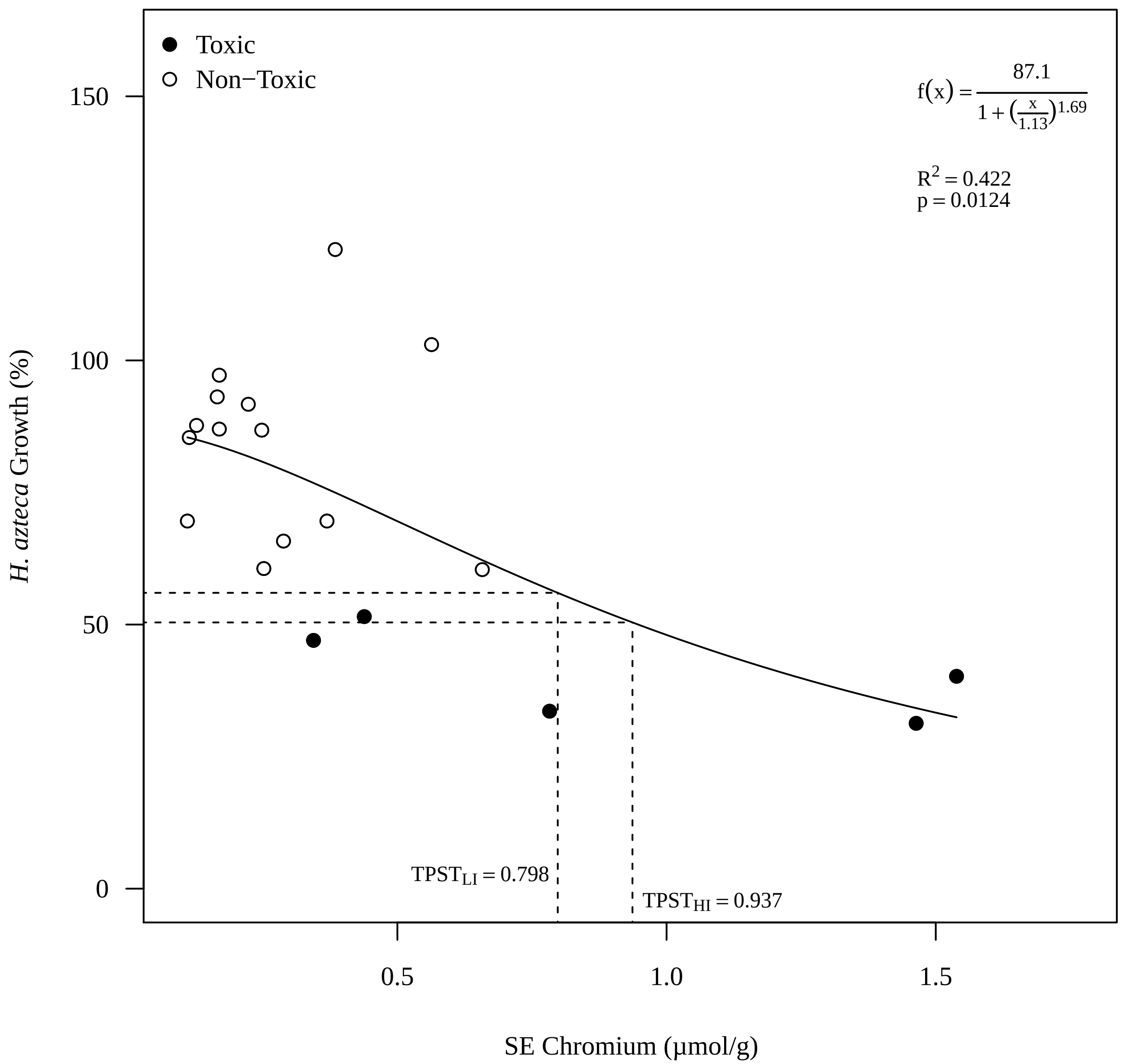


Figure A6.43. Relationship between *Hyalella azteca* growth and $(\sum \text{SEM}-\text{AVS})/f_{OC}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

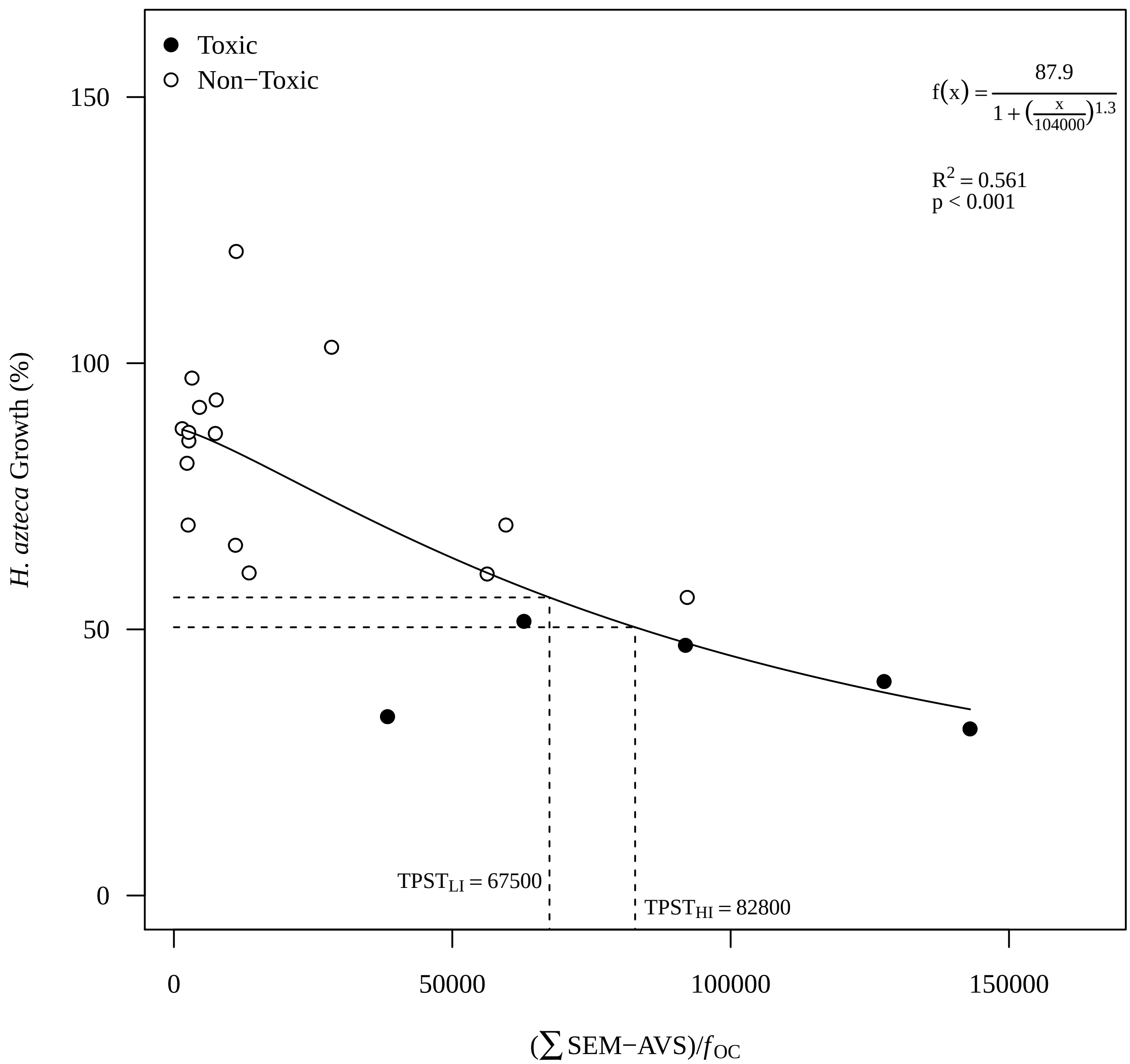


Figure A6.44. Relationship between *Hyalella azteca* growth and Mean PEC−$Q_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

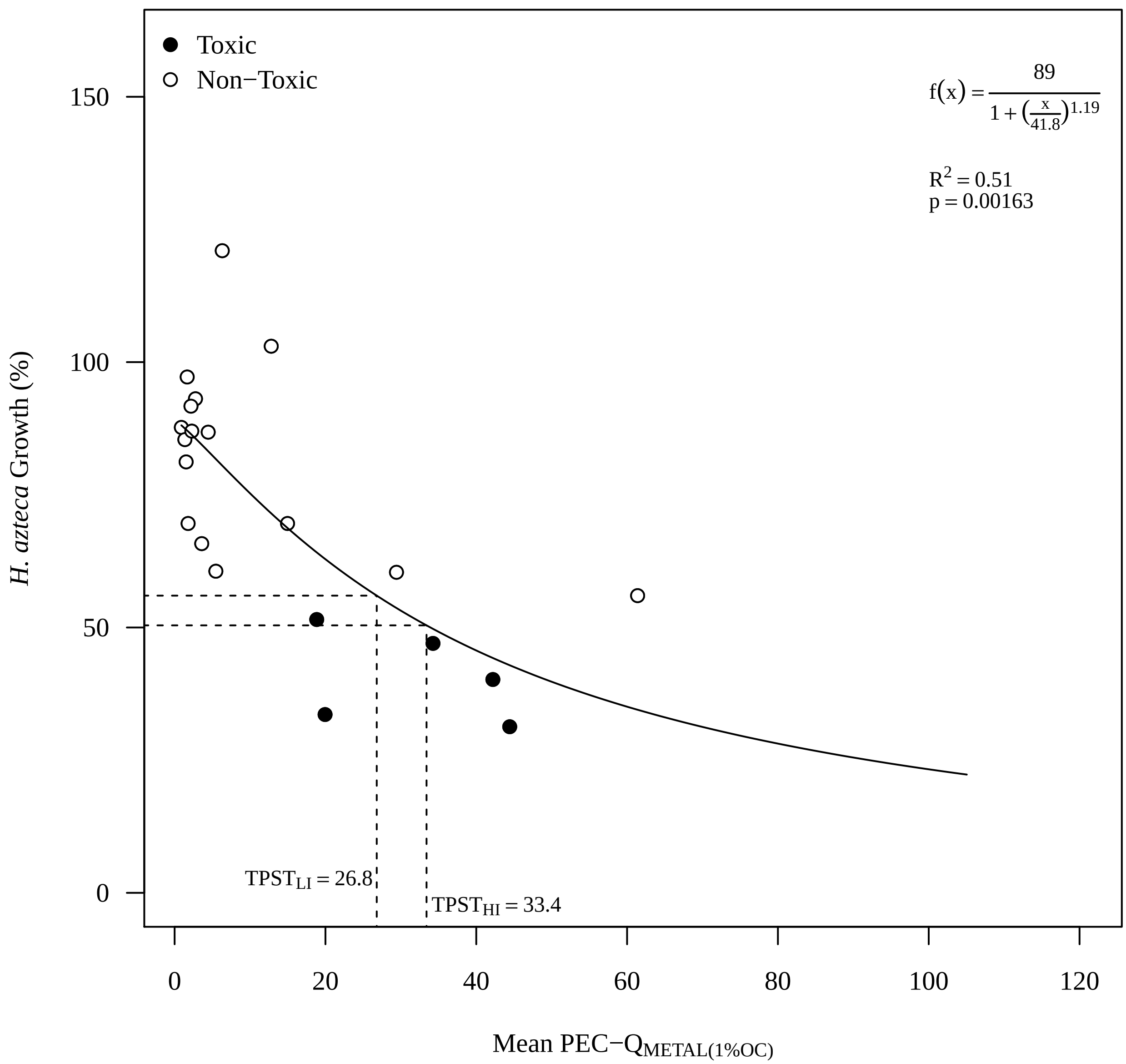


Figure A6.45. Relationship between *Hyalella azteca* growth and Mean PEC−$Q_{EXT\ METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

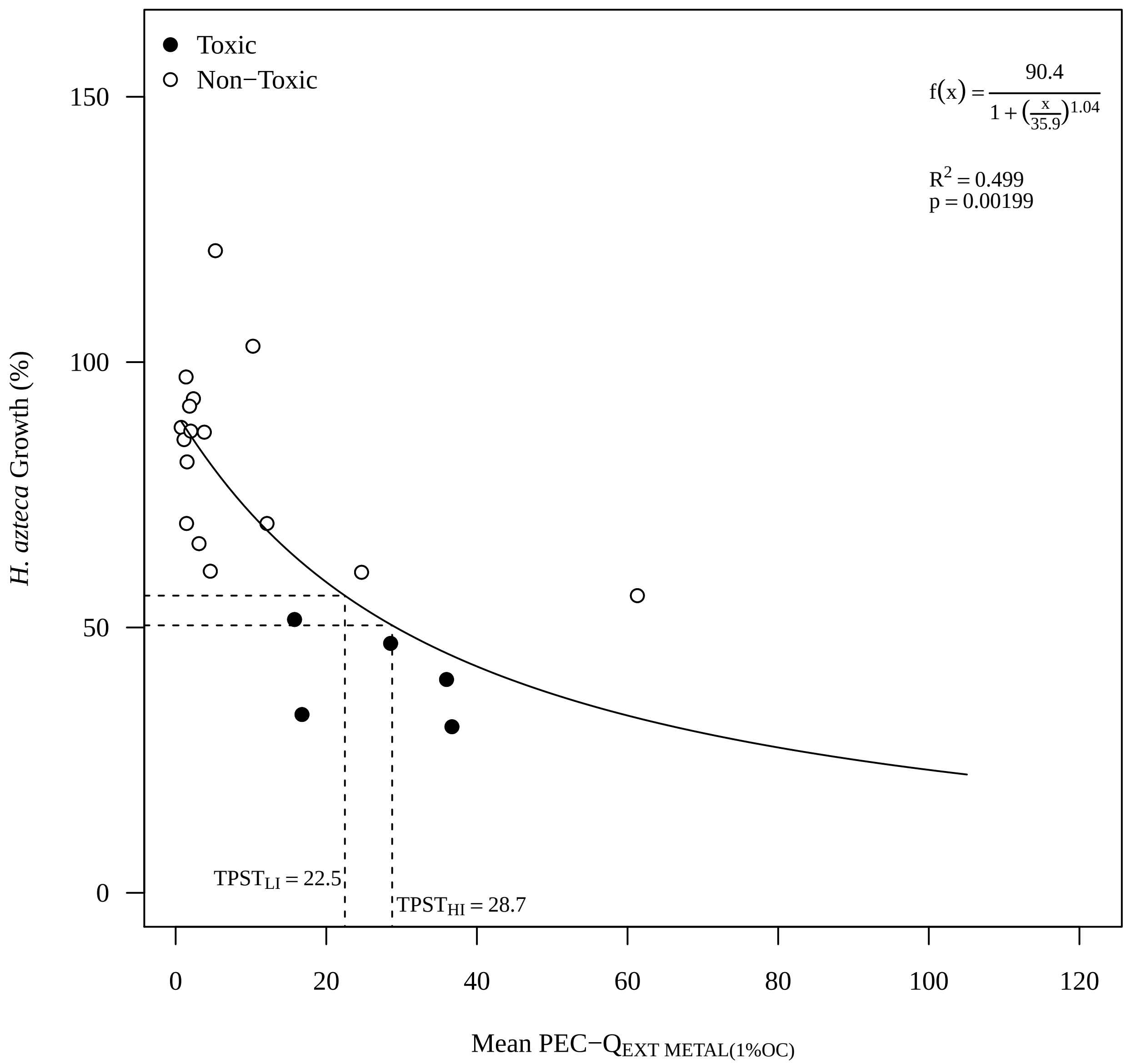


Figure A6.46. Relationship between *Hyalella azteca* growth and $\sum$PEC−Q$_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

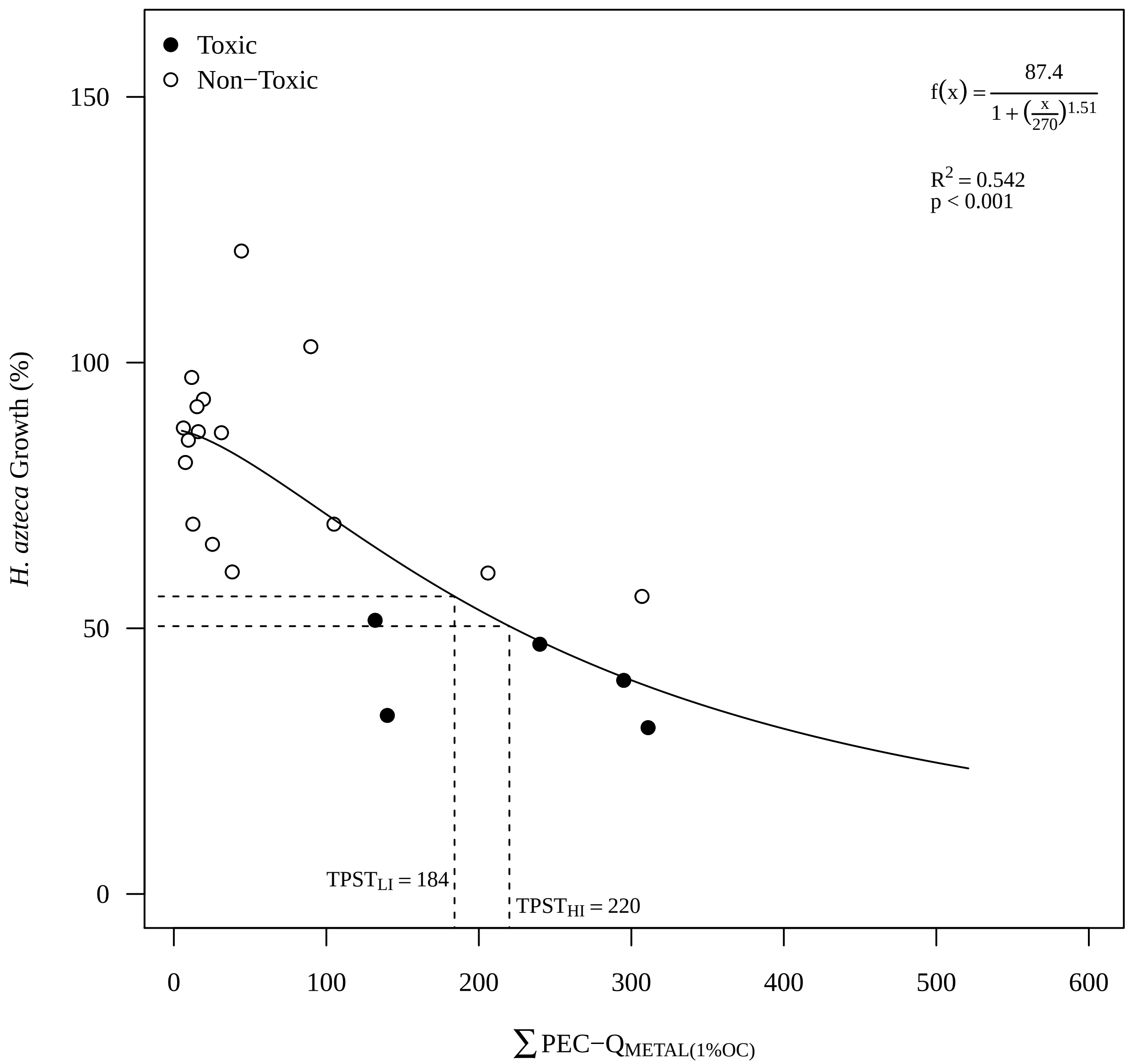


Figure A6.47. Relationship between *Hyalella azteca* growth and $\sum$ PEC−Q$_{EXT\ METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.*2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

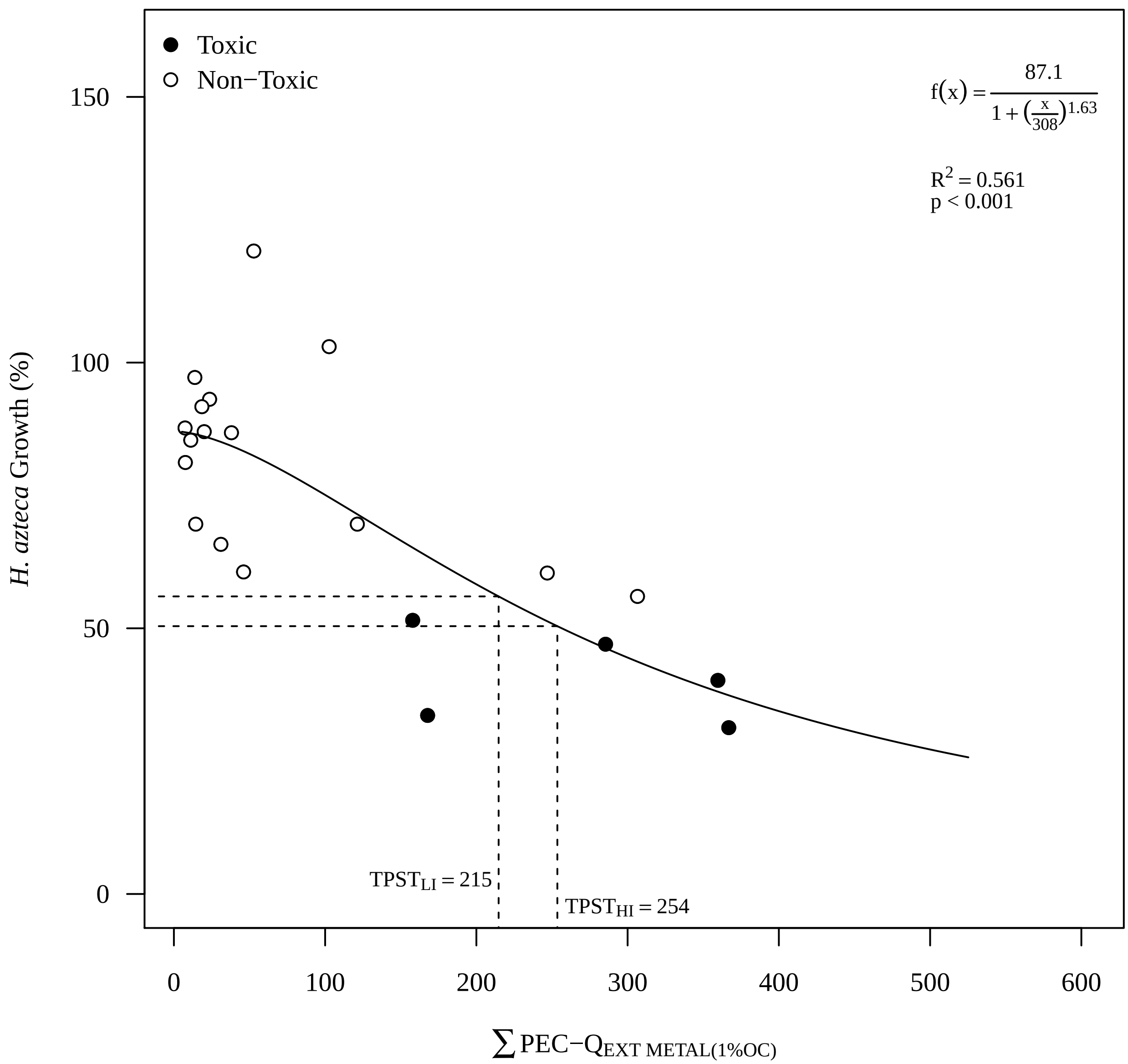


Figure A6.48. Relationship between *Hyalella azteca* growth and Zn:Cd for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

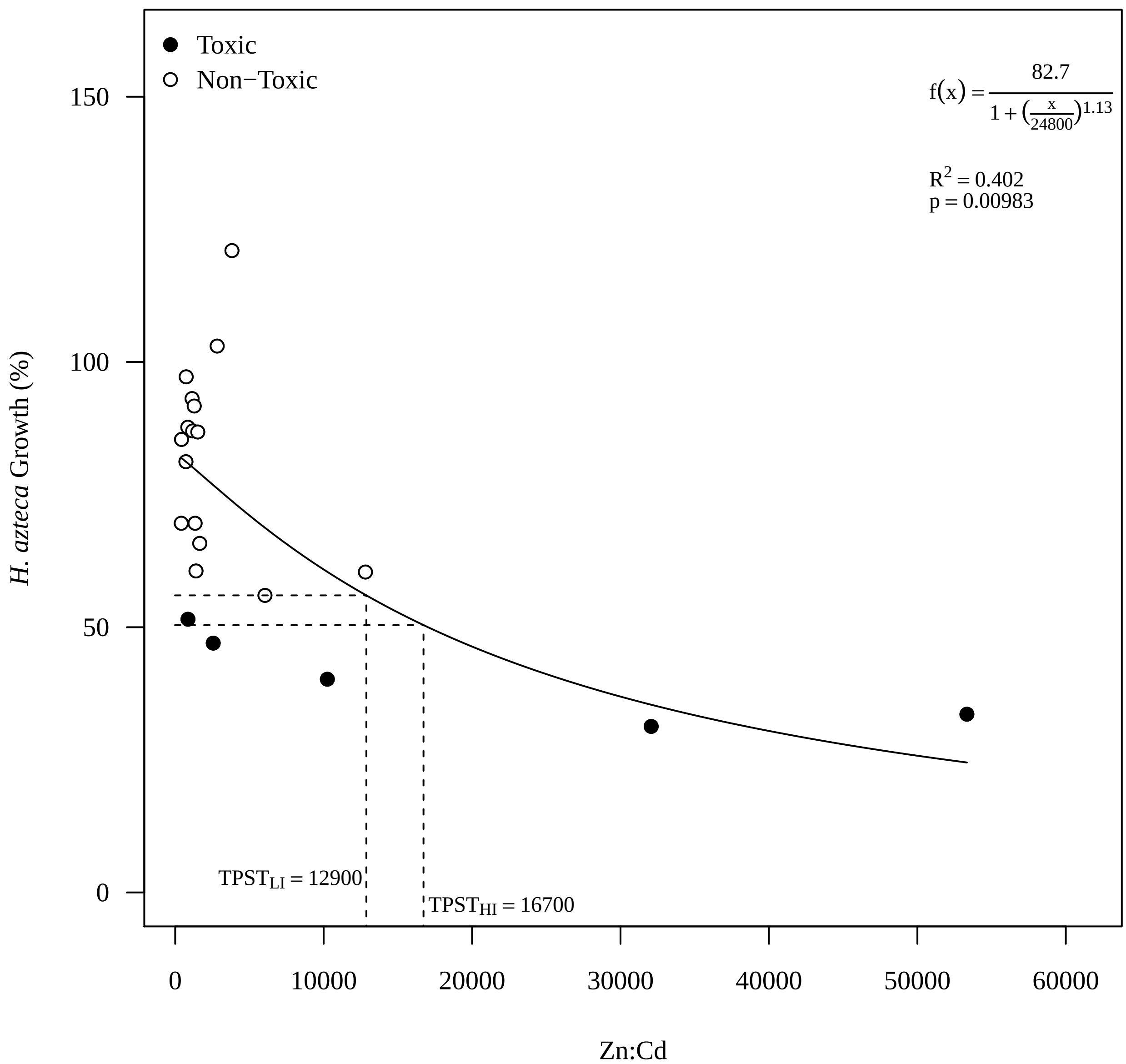


Figure A6.49. Relationship between *Hyalella azteca* growth and percent sand for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

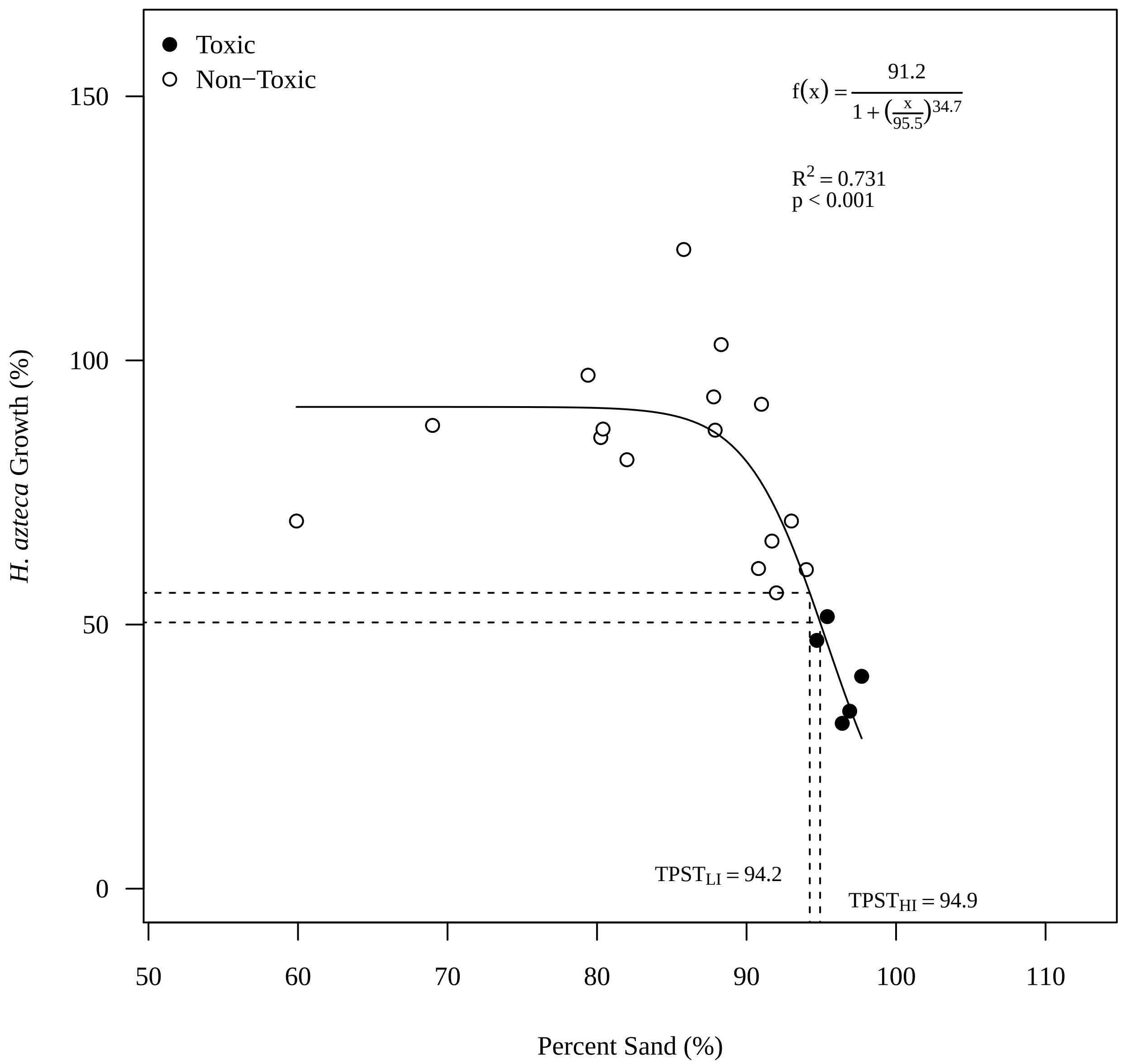


Figure A6.50. Relationship between *Hyalella azteca* biomass and total Chromium for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

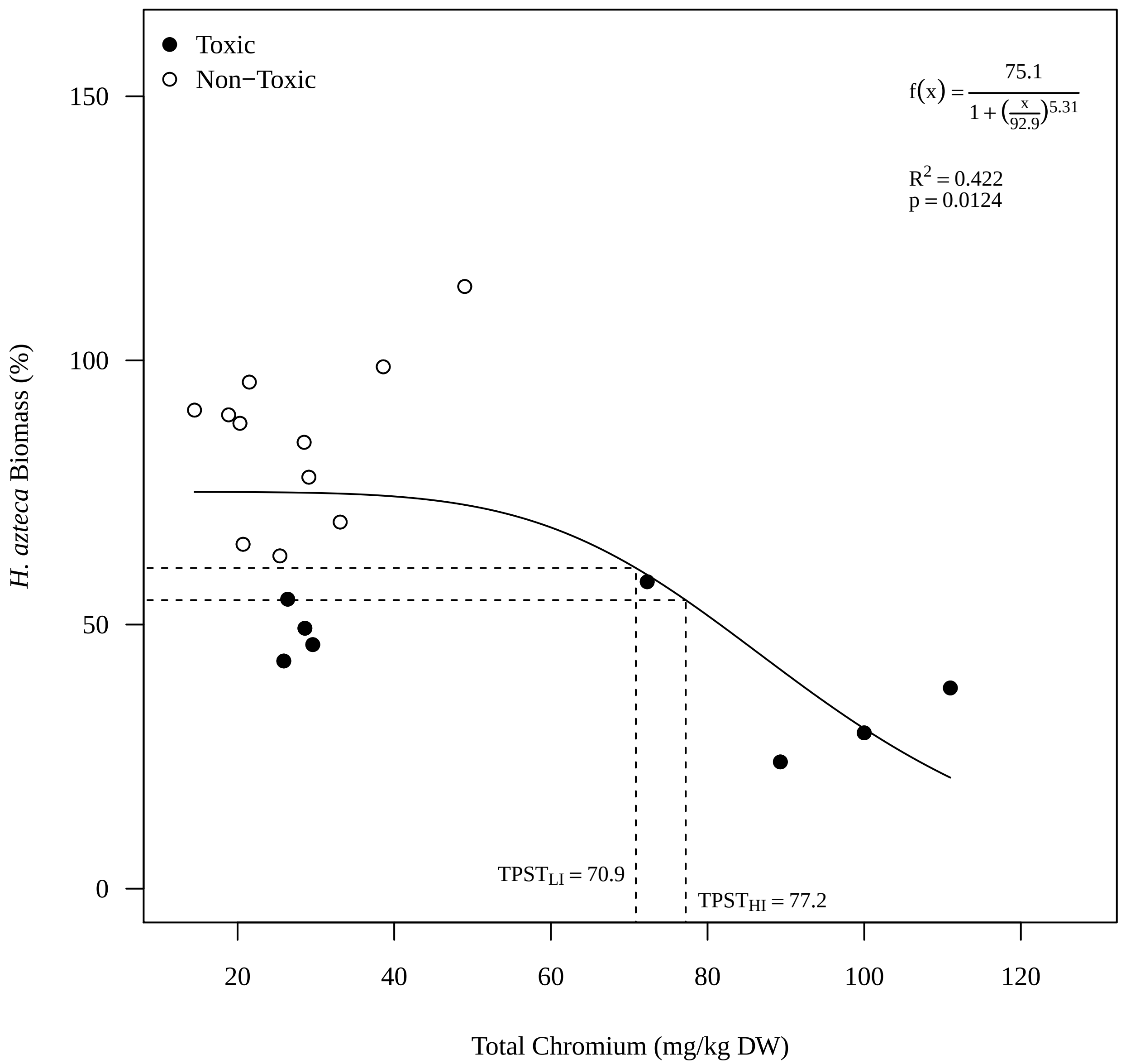


Figure A6.51. Relationship between *Hyalella azteca* biomass and SE Chromium for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

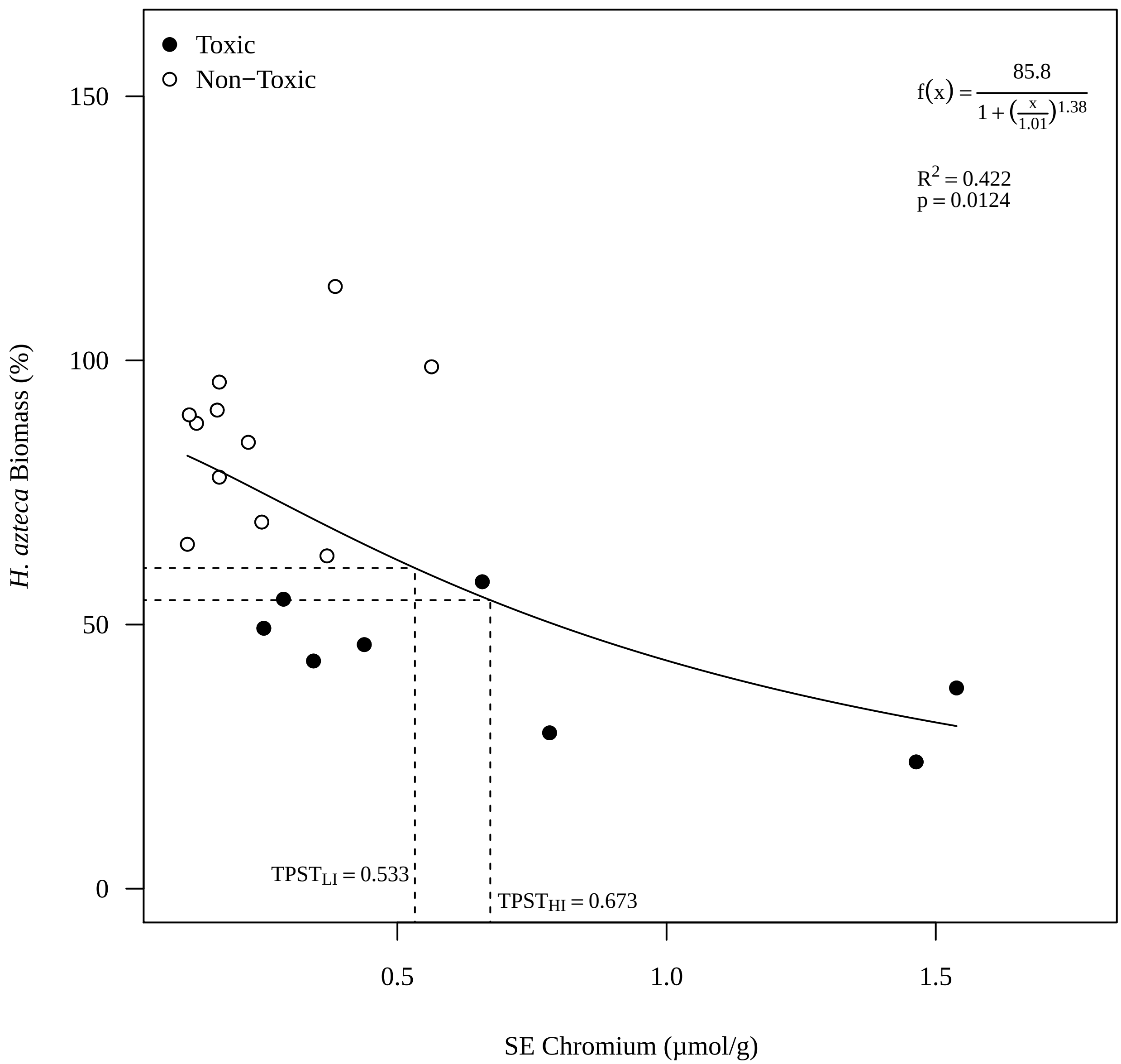


Figure A6.52. Relationship between *Hyalella azteca* biomass and ($\sum$ SEM−AVS)/f_{OC} for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

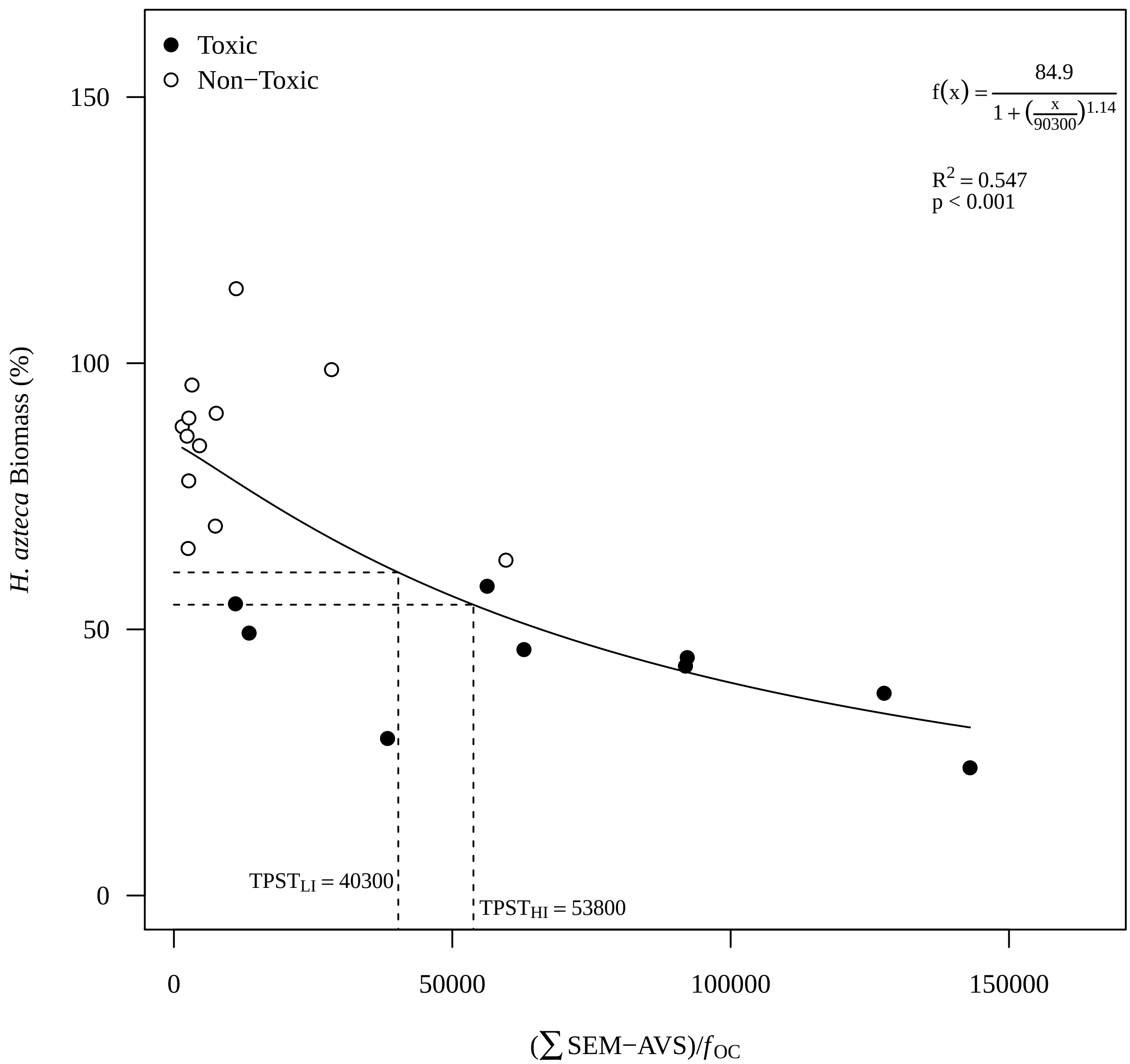


Figure A6.53. Relationship between *Hyalella azteca* biomass and Mean PEC−$Q_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

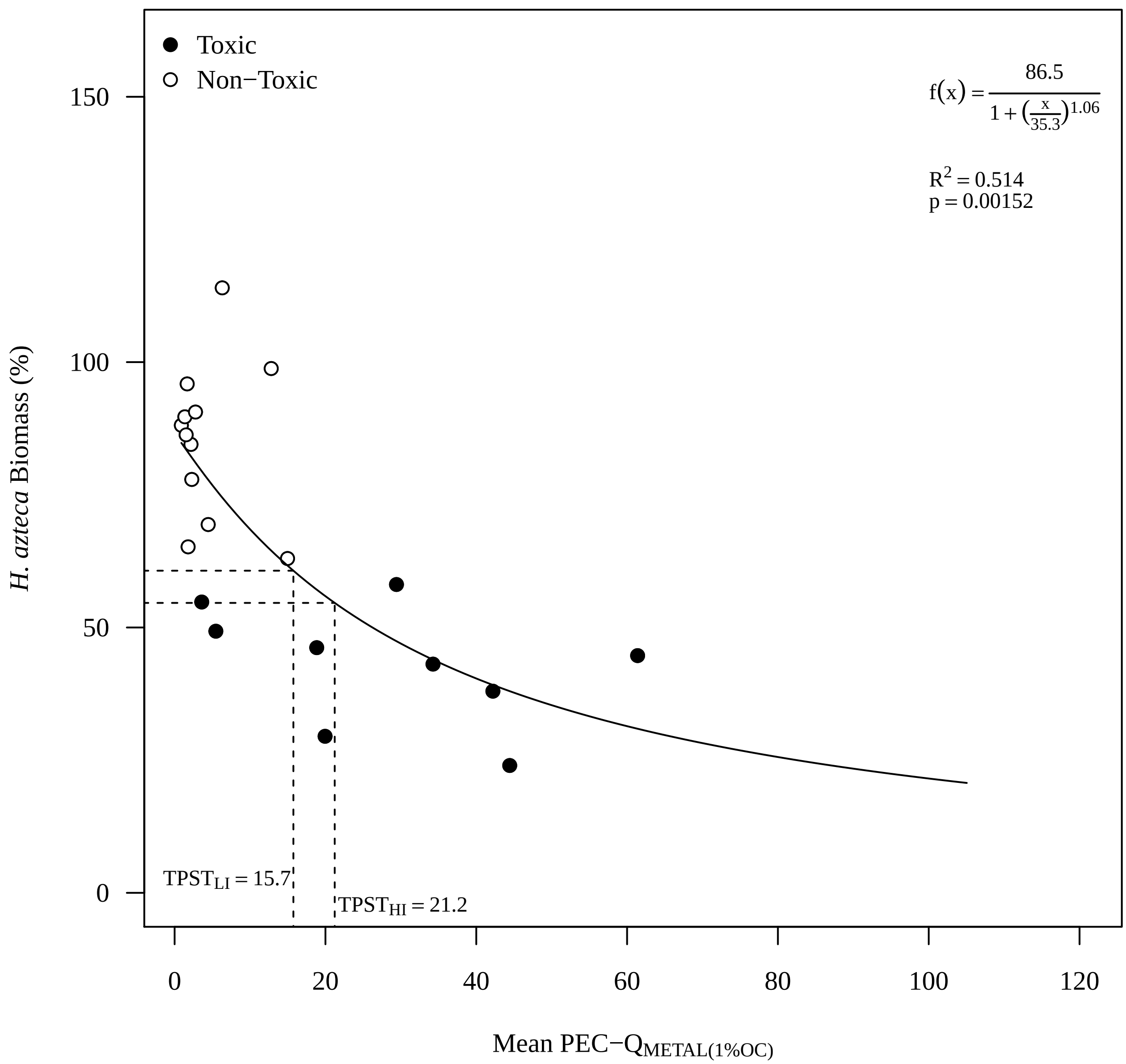


Figure A6.54. Relationship between *Hyalella azteca* biomass and Mean PEC−Q$_{EXT\ METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

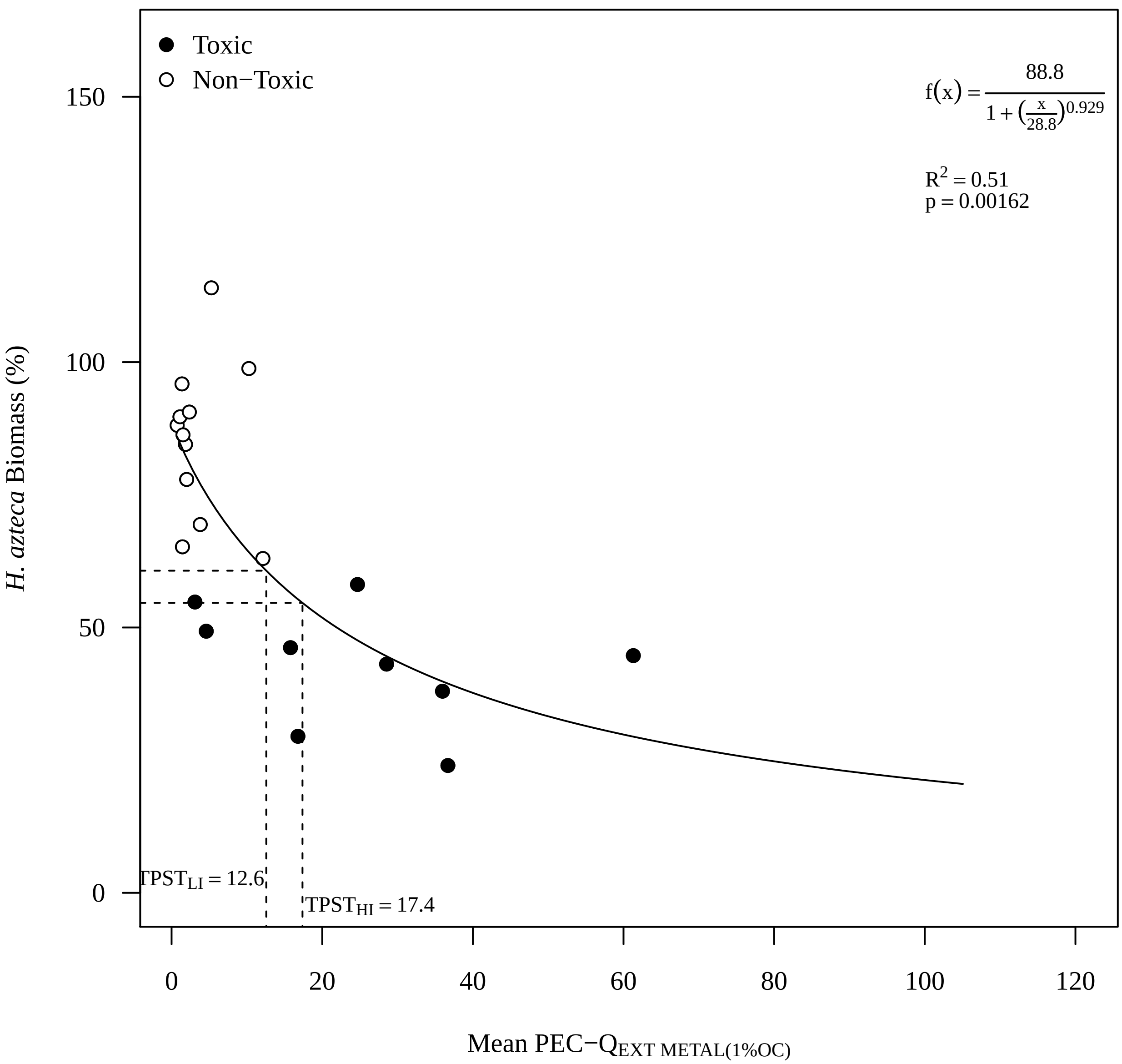


Figure A6.55. Relationship between *Hyalella azteca* biomass and $\sum$PEC−Q$_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.*2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

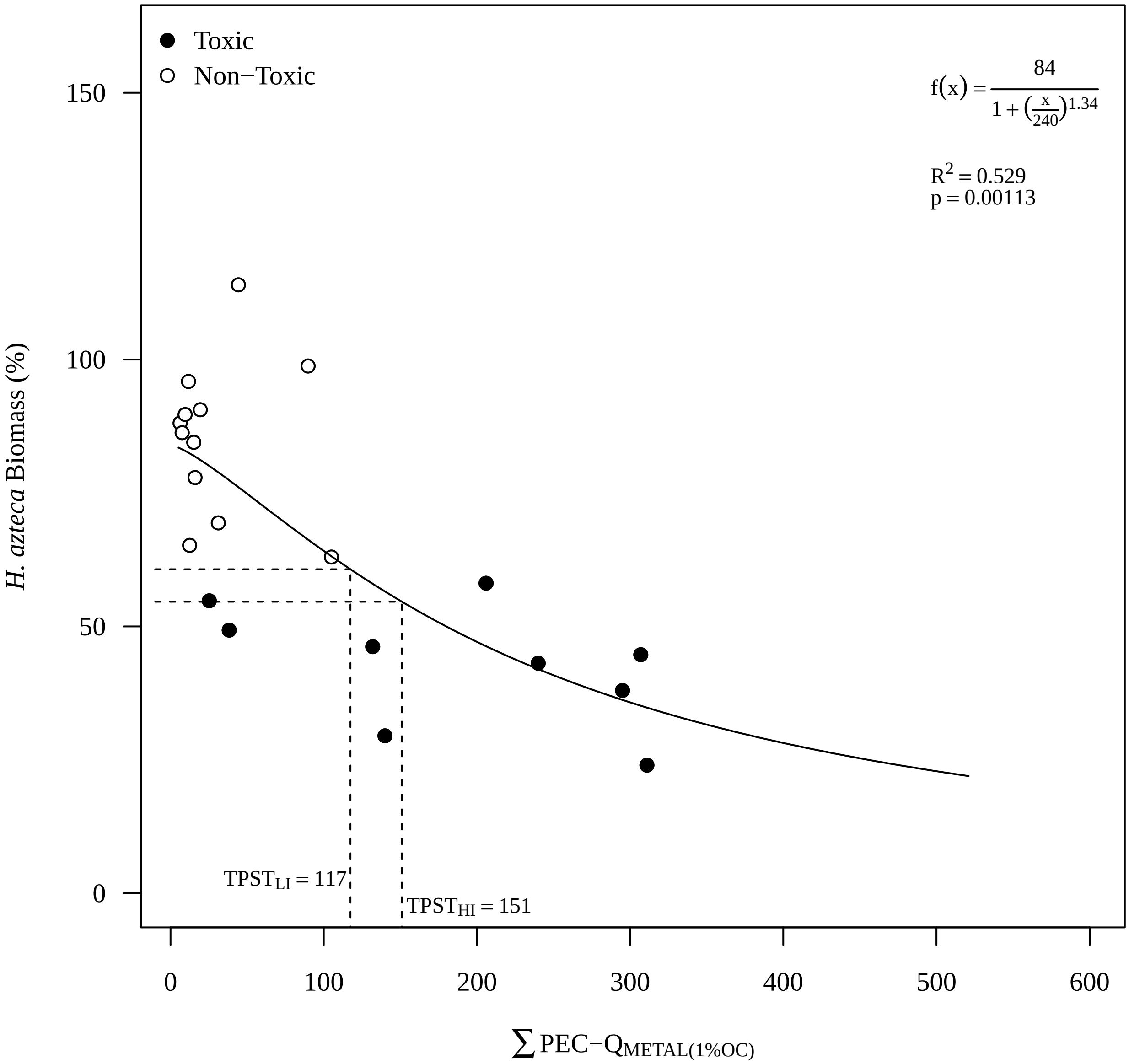


Figure A6.56. Relationship between *Hyalella azteca* biomass and $\sum$ PEC−Q$_{EXT\ METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.*2006; Schut and Stefanoff 2007; Besser *et al.* 2008).

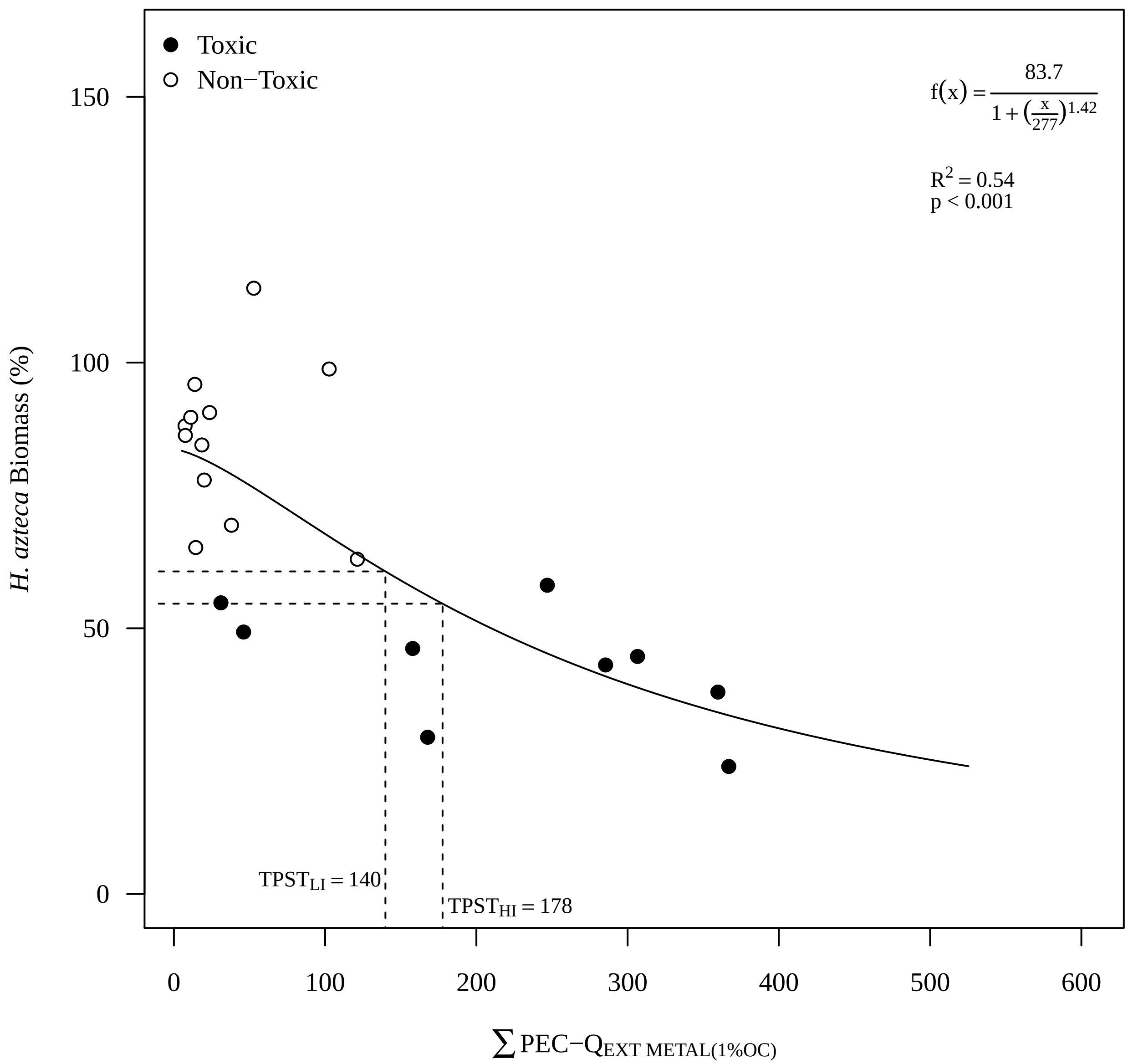
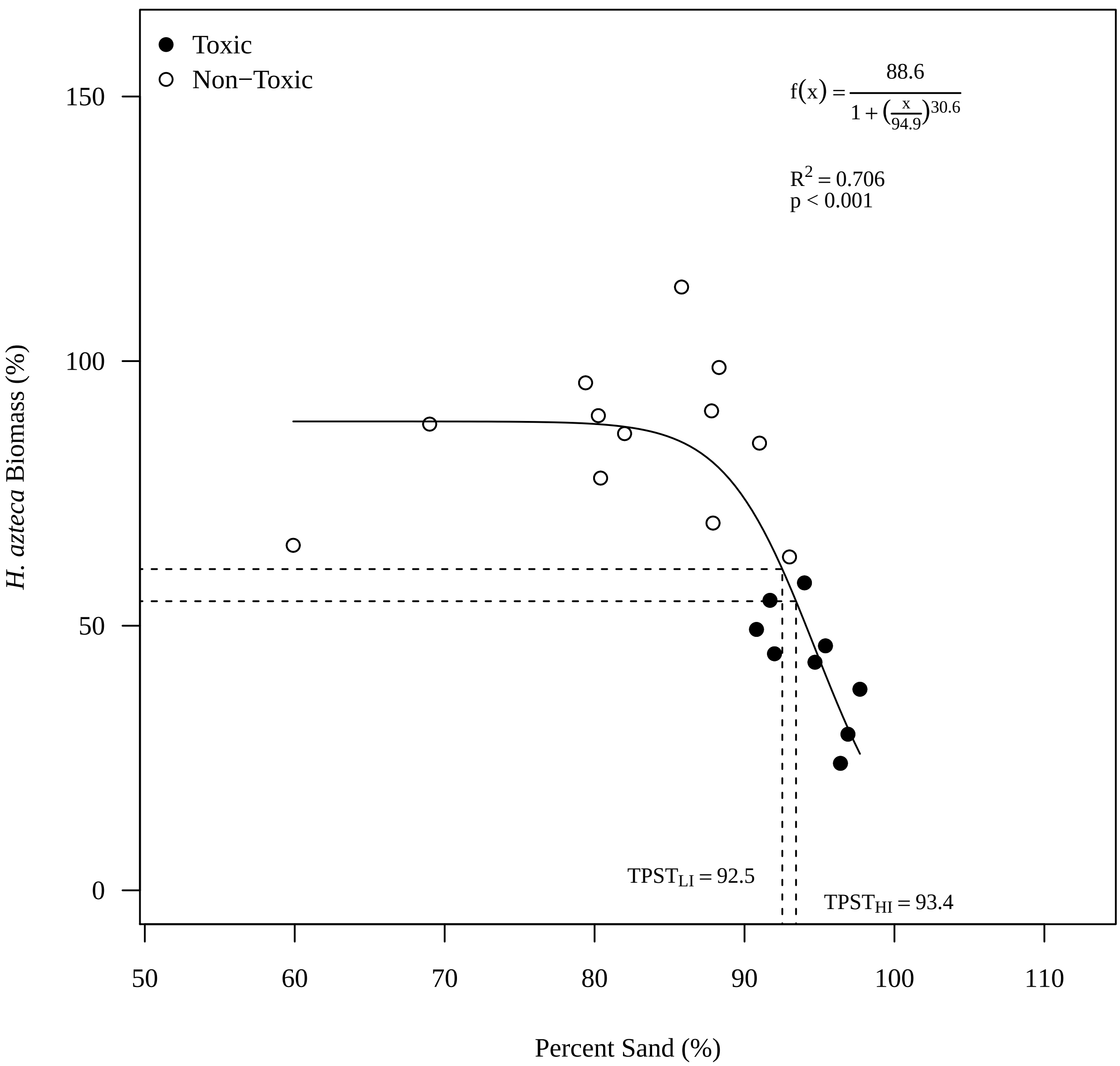


Figure A6.57. Relationship between *Hyalella azteca* biomass and percent sand for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008).



Appendix 7

Reliability and Predictive Ability Analysis

Table A7.1. Summary of the thresholds for predicting sediment toxicity (TPST) that were derived using the concentration-response models, developed for slag-affected sediment samples for the 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* , 10-day toxicity tests with the midge, *Chironomus dilutus,* and 28-day toxicity tests with the amphipod, *Hyalella azteca* .

Toxicity Test Endpoint Used to Develop the Relationship/ COPC, COPC Mixture, Slag Indicator	Regression Equation Type	Regression Equation	r^2 [1]	p value	Preliminary TPST	
					$TPST_{LI}$	$TPST_{HI}$
Basis for $TPST_{LI}$/$TPST_{HI}$ Values: 7-d *C. dubia* Survival						
Total Barium (mg/kg DW)	Log3	$f(x)=104/[1+(x/1260)^{2.74}]$	0.718	<0.001	812	937
Total Beryllium (mg/kg DW)	Log3	$f(x)=98.4/[1+(x/1.3)^{21.9}]$	0.914	<0.001	1.22	1.24
Total Chromium (mg/kg DW)	Log3	$f(x)=99.1/[1+(x/94.8)^{8.34}]$	0.803	<0.001	79.8	84.3
Total Cobalt (mg/kg DW)	Log3	$f(x)=104/[1+(x/52.2)^{1.93}]$	0.659	<0.001	28	34.3
Total Copper (mg/kg DW)	Log3	$f(x)=102/[1+(x/2000)^{2.14}]$	0.497	<0.001	1090	1330
Total Iron (mg/kg DW)	Log3	$f(x)=97.3/[1+(x/172000)^{30.7}]$	0.902	<0.001	164000	166000
Total Vanadium (mg/kg DW)	Log3	$f(x)=98/[1+(x/35.1)^{18}]$	0.902	<0.001	32.3	33.2
Mean $PEC\text{-}Q_{EXTMETALS}$	Log3	$f(x)=103/[1+(x/7.28)^{1.93}]$	0.407	0.00415	3.82	4.7
$\Sigma PEC\text{-}Q_{METALS}$	Log3	$f(x)=100/[1+(x/44)^{4.59}]$	0.483	<0.001	32.5	35.8
$\Sigma PEC\text{-}Q_{METALS(1\%OC)}$	Log3	$f(x)=95/[1+(x/380)^{4.3}]$	0.405	0.00433	257	291
$\Sigma PEC\text{-}Q_{EXTMETALS}$	Log3	$f(x)=100/[1+(x/49.4)^{5.62}]$	0.506	<0.001	38.6	41.8
$\Sigma PEC\text{-}Q_{EXTMETALS(1\%OC)}$	Log3	$f(x)=94.6/[1+(x/405)^{6.66}]$	0.405	0.00425	314	340
Cu:Al	Log3	$f(x)=99.2/[1+(x/0.155)^{2.98}]$	0.531	0.00235	0.096	0.112
Basis for $TPST_{LI}$/$TPST_{HI}$ Values: 7-d *C. dubia* Reproduction						
Total Barium (mg/kg DW)	Log3	$f(x)=100/[1+(x/1130)^{6.38}]$	0.739	<0.001	1010	1060
Total Beryllium (mg/kg DW)	Log3	$f(x)=98.3/[1+(x/1.25)^{40.3}]$	0.846	<0.001	1.23	1.24
Total Calcium (mg/kg DW)	Log3	$f(x)=104/[1+(x/41000)^{13.4}]$	0.949	<0.001	39200	40000
Total Cobalt (mg/kg DW)	Log3	$f(x)=102/[1+(x/42.3)^{2.88}]$	0.686	<0.001	33.8	37.2
Total Iron (mg/kg DW)	Log3	$f(x)=98.2/[1+(x/148000)^{11.9}]$	0.841	<0.001	139000	142000
SE Chromium (µmol/g)	Log3	$f(x)=108/[1+(x/0.991)^{1.75}]$	0.652	<0.001	0.749	0.867
SE Zinc (µmol/g)	Log3	$f(x)=98.8/[1+(x/139)^{5.26}]$	0.656	<0.001	121	128
Mean $PEC\text{-}Q_{METALS(1\%OC)}$	Log3	$f(x)=105/[1+(x/38.9)^{1.48}]$	0.555	<0.001	26.5	31.8

Table A7.1. Summary of the thresholds for predicting sediment toxicity (TPST) that were derived using the concentration-response models, developed for slag-affected sediment samples for the 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* , 10-day toxicity tests with the midge, *Chironomus dilutus,* and 28-day toxicity tests with the amphipod, *Hyalella azteca* .

Toxicity Test Endpoint Used to Develop the Relationship/ COPC, COPC Mixture, Slag Indicator	Regression Equation Type	Regression Equation	r^2 [1]	p value	Preliminary TPST	
					$TPST_{LI}$	$TPST_{HI}$
Basis for $TPST_{LI}/TPST_{HI}$ Values: 7-d *C. dubia* Reproduction (continued)						
Mean $PEC\text{-}Q_{EXTMETALS}$	Log3	$f(x)=98.8/[1+(x/4.71)^{20.7}]$	0.742	<0.001	4.54	4.61
Mean $PEC\text{-}Q_{EXTMETALS(1\%OC)}$	Log3	$f(x)=105/[1+(x/33.6)^{1.36}]$	0.563	<0.001	22.1	27
$\Sigma PEC\text{-}Q_{METAL(1\%OC)}$	Log3	$f(x)=104/[1+(x/247)^{1.71}]$	0.543	<0.001	175	205
$\Sigma PEC\text{-}Q_{EXT\ METAL(1\%OC)}$	Log3	$f(x)=104/[1+(x/276)^{1.77}]$	0.537	<0.001	197	230
Cu:Al	Log3	$f(x)=102/[1+(x/0.124)^{3.48}]$	0.571	0.00116	0.103	0.112
Percent Sand	Log3	$f(x)=104/[1+(x/96)^{103}]$	0.853	<0.001	95.4	95.7
Basis for $TPST_{LI}/TPST_{HI}$ Values: 10-d *C. dilutus* Growth						
$(\Sigma SEM\text{-}AVS)/f_{OC}$ (µmol/g)	Log3	$f(x)=128/[1+(x/187000)^{0.357}]$	0.426	0.0068	6380	19200
Mean $PEC\text{-}Q_{METALS(1\%OC)}$	Log3	$f(x)=118/[1+(x/85.9)^{0.51}]$	0.424	0.00698	3.59	9.83
$\Sigma PEC\text{-}Q_{METAL(1\%OC)}$	Log3	$f(x)=124/[1+(x/474)^{0.446}]$	0.446	0.00488	22.9	60.3
$\Sigma PEC\text{-}Q_{EXT\ METAL(1\%OC)}$	Log3	$f(x)=133/[1+(x/413)^{0.383}]$	0.458	0.00401	26.7	67.7
Percent Sand	Log3	$f(x)=108/[1+(x/98.5)^{20.3}]$	0.544	< 0.001	87.8	91.4
Basis for $TPST_{LI}/TPST_{HI}$ Values: 10-d *C. dilutus* Biomass						
Total Barium (mg/kg DW)	Log3	$f(x)=107/[1+(x/1990)^{1.16}]$	0.727	<0.001	297	567
Total Calcium (mg/kg DW)	Log3	$f(x)=101/[1+(x/66500)^{2.3}]$	0.742	<0.001	17700	30300
Total Copper (mg/kg DW)	Log3	$f(x)=126/[1+(x/2600)^{0.549}]$	0.527	0.00117	303	613
Total Manganese (mg/kg DW)	Log3	$f(x)=115/[1+(x/5600)^{0.697}]$	0.749	<0.001	528	1120
Mean PEC-Q	Log3	$f(x)=107/[1+(x/3.71)^{0.988}]$	0.733	<0.001	0.397	0.85
$\Sigma PEC\text{-}Q_{EXT\ METAL}$	Log3	$f(x)=126/[1+(x/80)^{0.624}]$	0.486	0.00249	12.1	22.4
Cu:Al	Log3	$f(x)=113/[1+(x/0.172)^{1.22}]$	0.736	<0.001	0.0407	0.0645
Percent Sand	Log3	$f(x)=109/[1+(x/100)^{14}]$	0.644	<0.001	86.5	90.7

Table A7.1. Summary of the thresholds for predicting sediment toxicity (TPST) that were derived using the concentration-response models, developed for slag-affected sediment samples for the 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* , 10-day toxicity tests with the midge, *Chironomus dilutus,* and 28-day toxicity tests with the amphipod, *Hyalella azteca* .

Toxicity Test Endpoint Used to Develop the Relationship/ COPC, COPC Mixture, Slag Indicator	Regression Equation Type	Regression Equation	r^2 [1]	p value	Preliminary TPST	
					$TPST_{LI}$	$TPST_{HI}$
Basis for $TPST_{LI}$/$TPST_{HI}$ Values: 28-d *H. azteca* Growth						
Total Chromium (mg/kg DW)	Log3	$f(x)=80.8/[1+(x/94.7)^{5.19}]$	0.446	0.00894	80.9	85.9
SE Chromium (µmol/g)	Log3	$f(x)=87.1/[1+(x/1.13)^{1.69}]$	0.422	0.0124	0.798	0.937
(∑SEM-AVS)/f_{OC} (µmol/g)	Log3	$f(x)=87.9/[1+(x/104000)^{1.3}]$	0.561	< 0.001	67500	82800
Mean PEC-$Q_{METALS(1\%OC)}$	Log3	$f(x)=89/[1+(x/41.8)^{1.19}]$	0.51	0.00163	26.8	33.4
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	Log3	$f(x)=90.4/[1+(x/35.9)^{1.04}]$	0.499	0.00199	22.5	28.7
ΣPEC-$Q_{METAL(1\%OC)}$	Log3	$f(x)=87.4/[1+(x/270)^{1.51}]$	0.542	<0.001	184	220
ΣPEC-$Q_{EXT\ METAL(1\%OC)}$	Log3	$f(x)=87.1/[1+(x/308)^{1.63}]$	0.561	<0.001	215	254
Zn:Cd	Log3	$f(x)=82.7/[1+(x/24800)^{1.13}]$	0.402	0.00983	12900	16700
Percent Sand	Log3	$f(x)=91.2/[1+(x/95.5)^{34.7}]$	0.731	< 0.001	94.2	94.9
Basis for $TPST_{LI}$/$TPST_{HI}$ Values: 28-d *H. azteca* Biomass						
Total Chromium (mg/kg DW)	Log3	$f(x)=75.1/[1+(x/92.9)^{5.31}]$	0.422	0.0124	70.9	77.2
SE Chromium (µmol/g)	Log3	$f(x)=85.8/[1+(x/1.01)^{1.38}]$	0.422	0.0124	0.533	0.673
(∑SEM-AVS)/f_{OC} (µmol/g)	Log3	$f(x)=84.9/[1+(x/90300)^{1.14}]$	0.547	<0.001	40300	53800
Mean PEC-$Q_{METALS(1\%OC)}$	Log3	f(x)=86.5/[1+(x/35.3)1.06]	0.514	0.00152	15.7	21.2
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	Log3	$f(x)=88.8/[1+(x/28.8)^{0.929}]$	0.51	0.00162	12.6	17.4
ΣPEC-$Q_{EXTMETAL(1\%OC)}$	Log3	$f(x)=83.7/[1+(x/277)^{1.42}]$	0.54	< 0.001	140	178
ΣPEC-$Q_{METAL(1\%OC)}$	Log3	$f(x)=84/[1+(x/240)^{1.34}]$	0.529	0.00113	117	151
Percent Sand	Log3	$f(x)=88.6/[1+(x/94.9)^{30.6}]$	0.706	< 0.001	92.5	93.4

COPC = chemical of potential concern; r^2 [1] = coefficient of determination; d = day; TPST = threshold for predicting sediment toxicity; LI = low impact; HI = high impact;

OC = organic carbon; PEC-Q = probable effect concentration-quotients; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides;

f_{OC} = fraction organic carbon; 1%OC = normalized to 1% organic carbon; Al = alumium; Cd = cadmium; Cu = copper; Zn = zinc.

PEC-Q_{METALS} = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).

PEC-$Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.

Table A7.2. Reliability of the thresholds for predicting sediment toxicity that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia*, 10-day toxicity tests with the midge, *Chironomus dilutus*, and 28-day toxicity tests with the amphipod, *Hyalella azteca* for slag-affected sediment samples.

Toxicity Test Endpoint Used to Develop the Relationship/ COPC, COPC Mixture, Slag Indicator	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Basis for $TPST_{LI}$/$TPST_{HI}$ Values: 7-d *C. dubia* Survival										
Total Barium (mg/kg DW)	19	812	937	7% (1 of 15)	50% (2 of 4)	84%	No Data	7% (1 of 15)	50% (2 of 4)	84%
Total Beryllium (mg/kg DW)	19	1.22	1.24	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Total Chromium (mg/kg DW)	19	79.8	84.3	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	No Data	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Total Cobalt (mg/kg DW)	19	28	34.3	7% (1 of 15)	50% (2 of 4)	84%	No Data	7% (1 of 15)	50% (2 of 4)	84%
Total Copper (mg/kg DW)	24	1090	1330	**6% (1 of 17)**	**57% (4 of 7)**	**83%**	0% (0 of 1)	**6% (1 of 18)**	**67% (4 of 6)**	**88%**
Total Iron (mg/kg DW)	19	164000	166000	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Total Vanadium (mg/kg DW)	19	32.3	33.2	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Mean $PEC\text{-}Q_{EXTMETALS}$	24	3.82	4.7	**6% (1 of 17)**	**57% (4 of 7)**	**83%**	0% (0 of 2)	**5% (1 of 19)**	**80% (4 of 5)**	**92%**
$\Sigma PEC\text{-}Q_{METALS}$	24	32.5	35.8	**6% (1 of 17)**	**57% (4 of 7)**	**83%**	0% (0 of 2)	**5% (1 of 19)**	**80% (4 of 5)**	**92%**
$\Sigma PEC\text{-}Q_{METALS(1\%OC)}$	24	257	291	**11% (2 of 19)**	**60% (3 of 5)**	**83%**	0% (0 of 1)	**10% (2 of 20)**	**75% (3 of 4)**	**88%**
$\Sigma PEC\text{-}Q_{EXTMETALS}$	24	38.6	41.8	**6% (1 of 17)**	**57% (4 of 7)**	**83%**	0% (0 of 2)	**5% (1 of 19)**	**80% (4 of 5)**	**92%**
$\Sigma PEC\text{-}Q_{EXTMETALS(1\%OC)}$	24	314	340	**10% (2 of 20)**	**75% (3 of 4)**	**88%**	No Data	**10% (2 of 20)**	**75% (3 of 4)**	**88%**
Cu:Al	19	0.096	0.112	12% (2 of 16)	33% (1 of 3)	79%	0% (0 of 1)	12% (2 of 17)	50% (1 of 2)	84%
Basis for $TPST_{LI}$/$TPST_{HI}$ Values: 7-d *C. dubia* Reproduction										
Total Barium (mg/kg DW)	19	1010	1060	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	No Data	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Total Beryllium (mg/kg DW)	19	1.23	1.24	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Total Calcium (mg/kg DW)	19	39200	40000	**0% (0 of 16)**	**100% (3 of 3)**	**100%**	No Data	**0% (0 of 16)**	**100% (3 of 3)**	**100%**
Total Cobalt (mg/kg DW)	19	33.8	37.2	7% (1 of 15)	50% (2 of 4)	84%	0% (0 of 1)	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Total Iron (mg/kg DW)	19	139000	142000	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
SE Chromium (µmol/g)	19	0.749	0.867	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	100% (1 of 1)	12% (2 of 17)	50% (1 of 2)	84%
SE Zinc (µmol/g)	19	121	128	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	100% (1 of 1)	12% (2 of 17)	50% (1 of 2)	84%
Mean $PEC\text{-}Q_{METALS(1\%OC)}$	24	26.5	31.8	12% (2 of 17)	57% (4 of 7)	79%	0% (0 of 1)	**11% (2 of 18)**	**67% (4 of 6)**	**83%**
Mean $PEC\text{-}Q_{EXTMETALS}$	24	4.54	4.61	**5% (1 of 19)**	**100% (5 of 5)**	**96%**	No Data	**5% (1 of 19)**	**100% (5 of 5)**	**96%**
Mean $PEC\text{-}Q_{EXTMETALS(1\%OC)}$	24	22.1	27	12% (2 of 17)	57% (4 of 7)	79%	0% (0 of 1)	**11% (2 of 18)**	**67% (4 of 6)**	**83%**
$\Sigma PEC\text{-}Q_{METALS(1\%OC)}$	24	175	205	12% (2 of 17)	57% (4 of 7)	79%	No Data	12% (2 of 17)	57% (4 of 7)	79%

Table A7.2. Reliability of the thresholds for predicting sediment toxicity that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia*, 10-day toxicity tests with the midge, *Chironomus dilutus*, and 28-day toxicity tests with the amphipod, *Hyalella azteca* for slag-affected sediment samples.

Toxicity Test Endpoint Used to Develop the Relationship/ COPC, COPC Mixture, Slag Indicator	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Basis for $TPST_{LI}$/$TPST_{HI}$ Values: 7-d *C. dubia* Reproduction (continued)										
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	24	197	230	12% (2 of 17)	57% (4 of 7)	79%	No Data	12% (2 of 17)	57% (4 of 7)	79%
Cu:Al	19	0.103	0.112	12% (2 of 17)	50% (1 of 2)	84%	No Data	12% (2 of 17)	50% (1 of 2)	84%
Percent Sand	19	95.4	95.7	**0% (0 of 15)**	**75% (3 of 4)**	**95%**	100% (1 of 1)	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Basis for $TPST_{LI}$/$TPST_{HI}$ Values: 10-d *C. dilutus* Growth										
$\sum$SEM-AVS/f_{OC} (µmol/g)	21	6380	19200	29% (2 of 7)	64% (9 of 14)	67%	20% (1 of 5)	25% (3 of 12)	89% (8 of 9)	81%
Mean PEC-$Q_{METALS(1\%OC)}$	21	3.59	9.83	25% (2 of 8)	69% (9 of 13)	71%	25% (1 of 4)	25% (3 of 12)	89% (8 of 9)	81%
ΣPEC-$Q_{METALS(1\%OC)}$	21	22.9	60.3	25% (2 of 8)	69% (9 of 13)	71%	25% (1 of 4)	25% (3 of 12)	89% (8 of 9)	81%
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	21	26.7	67.7	25% (2 of 8)	69% (9 of 13)	71%	25% (1 of 4)	25% (3 of 12)	89% (8 of 9)	81%
Percent Sand	21	87.8	91.4	14% (1 of 7)	71% (10 of 14)	76%	60% (3 of 5)	33% (4 of 12)	78% (7 of 9)	71%
Basis for $TPST_{LI}$/$TPST_{HI}$ Values: 10-d *C. dilutus* Biomass										
Total Barium (mg/kg DW)	19	297	567	50% (1 of 2)	76% (13 of 17)	74%	67% (8 of 12)	64% (9 of 14)	100% (5 of 5)	53%
Total Calcium (mg/kg DW)	19	17700	30300	100% (1 of 1)	72% (13 of 18)	68%	64% (7 of 11)	67% (8 of 12)	86% (6 of 7)	53%
Total Copper (mg/kg DW)	21	303	613	**17% (1 of 6)**	**93% (14 of 15)**	**90%**	88% (7 of 8)	57% (8 of 14)	100% (7 of 7)	62%
Total Manganese (mg/kg DW)	19	528	1120	25% (1 of 4)	87% (13 of 15)	84%	75% (6 of 8)	58% (7 of 12)	100% (7 of 7)	63%
Mean PEC-Q	19	0.397	0.85	25% (1 of 4)	87% (13 of 15)	84%	78% (7 of 9)	62% (8 of 13)	100% (6 of 6)	58%
ΣPEC-$Q_{EXTMETALS}$	21	12.1	22.4	25% (2 of 8)	100% (13 of 13)	90%	100% (6 of 6)	57% (8 of 14)	100% (7 of 7)	62%
Cu:Al	19	0.0407	0.0645	**0% (0 of 4)**	**93% (14 of 15)**	**95%**	83% (5 of 6)	50% (5 of 10)	100% (9 of 9)	74%
Percent Sand	21	86.5	90.7	**14% (1 of 7)**	**100% (14 of 14)**	**95%**	100% (3 of 3)	40% (4 of 10)	100% (11 of 11)	81%
Basis for $TPST_{LI}$/$TPST_{HI}$ Values: 28-d *H. azteca* Growth										
Total Chromium (mg/kg DW)	19	80.9	85.9	**12% (2 of 16)**	**100% (3 of 3)**	**89%**	No Data	**12% (2 of 16)**	**100% (3 of 3)**	**89%**
SE Chromium (µmol/g)	19	0.798	0.937	**18% (3 of 17)**	**100% (2 of 2)**	**84%**	No Data	**18% (3 of 17)**	**100% (2 of 2)**	**84%**
$\sum$SEM-AVS/f_{OC} (µmol/g)	21	67500	82800	**12% (2 of 17)**	**75% (3 of 4)**	**86%**	No Data	**12% (2 of 17)**	**75% (3 of 4)**	**86%**

Table A7.2. Reliability of the thresholds for predicting sediment toxicity that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia,* 10-day toxicity tests with the midge, *Chironomus dilutus,* and 28-day toxicity tests with the amphipod, *Hyalella azteca* for slag-affected sediment samples.

Toxicity Test Endpoint Used to Develop the Relationship/ COPC, COPC Mixture, Slag Indicator	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Basis for $TPST_{LI}/TPST_{HI}$ Values: 28-d *H. azteca* Growth (continued)										
Mean PEC-$Q_{METALS(1\%OC)}$	21	26.8	33.4	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	0% (0 of 1)	**12% (2 of 17)**	**75% (3 of 4)**	**86%**
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	21	22.5	28.7	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	50% (1 of 2)	**17% (3 of 18)**	**67% (2 of 3)**	**81%**
ΣPEC-$Q_{METALS(1\%OC)}$	21	184	220	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	0% (0 of 1)	**12% (2 of 17)**	**75% (3 of 4)**	**86%**
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	21	215	254	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	0% (0 of 1)	**12% (2 of 17)**	**75% (3 of 4)**	**86%**
Zn:Cd	21	12900	16700	**16% (3 of 19)**	**100% (2 of 2)**	**86%**	No Data	**16% (3 of 19)**	**100% (2 of 2)**	**86%**
Percent Sand	21	94.2	94.9	**0% (0 of 16)**	**100% (5 of 5)**	**100%**	100% (1 of 1)	**6% (1 of 17)**	**100% (4 of 4)**	**95%**
Basis for $TPST_{LI}/TPST_{HI}$ Values: 28-d *H. azteca* Biomass										
Total Chromium (mg/kg DW)	19	70.9	77.2	27% (4 of 15)	100% (4 of 4)	79%	100% (1 of 1)	31% (5 of 16)	100% (3 of 3)	74%
SE Chromium (µmol/g)	19	0.533	0.673	29% (4 of 14)	80% (4 of 5)	74%	50% (1 of 2)	31% (5 of 16)	100% (3 of 3)	74%
∑SEM-AVS/f_{OC} (µmol/g)	21	40300	53800	21% (3 of 14)	86% (6 of 7)	81%	No Data	21% (3 of 14)	86% (6 of 7)	81%
Mean PEC-$Q_{METALS(1\%OC)}$	21	15.7	21.2	**14% (2 of 14)**	**100% (7 of 7)**	**90%**	100% (2 of 2)	25% (4 of 16)	100% (5 of 5)	81%
Mean PEC-$Q_{EXTMETALS(1\%OC)}$	21	12.6	17.4	**14% (2 of 14)**	**100% (7 of 7)**	**90%**	100% (2 of 2)	25% (4 of 16)	100% (5 of 5)	81%
ΣPEC-$Q_{METALS(1\%OC)}$	21	117	151	**14% (2 of 14)**	**100% (7 of 7)**	**90%**	100% (2 of 2)	25% (4 of 16)	100% (5 of 5)	81%
ΣPEC-$Q_{EXTMETALS(1\%OC)}$	21	140	178	**14% (2 of 14)**	**100% (7 of 7)**	**90%**	100% (2 of 2)	25% (4 of 16)	100% (5 of 5)	81%
Percent Sand	21	92.5	93.4	21% (3 of 14)	86% (6 of 7)	81%	0% (0 of 1)	20% (3 of 15)	100% (6 of 6)	86%

COPC = chemical of potential concern; Class. = classification; d = day; TPST = threshold for predicting sediment toxicity; LI = low impact; HR = high impact; PEC-Q = probable effect concentration-quotients; OC = organic carbon; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides.

f_{OC} = fraction organic carbon; 1%OC = normalized to 1% organic carbon; Al = alumium; Cd = cadmium; Cu = copper; Zn = zinc; IOT = incidence of toxicity.

PEC-Q_{METALS} = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).

PEC-$Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.

[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.3. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Barium (mg/kg DW)										
Cladoceran 7-d Survival	19	812	937	7% (1 of 15)	50% (2 of 4)	84%	No Data	7% (1 of 15)	50% (2 of 4)	84%
Cladoceran 7-d Reproduction	19	812	937	7% (1 of 15)	50% (2 of 4)	84%	No Data	7% (1 of 15)	50% (2 of 4)	84%
Cladoceran 7-d All	19	812	937	13% (2 of 15)	50% (2 of 4)	79%	No Data	13% (2 of 15)	50% (2 of 4)	79%
Midge 10-d Survival	19	812	937	7% (1 of 15)	0% (0 of 4)	74%	No Data	7% (1 of 15)	0% (0 of 4)	74%
Midge 10-d Growth	19	812	937	40% (6 of 15)	100% (4 of 4)	68%	No Data	40% (6 of 15)	100% (4 of 4)	68%
Midge 10-d Biomass	19	812	937	67% (10 of 15)	100% (4 of 4)	47%	No Data	67% (10 of 15)	100% (4 of 4)	47%
Midge 10-d All	19	812	937	73% (11 of 15)	100% (4 of 4)	42%	No Data	73% (11 of 15)	100% (4 of 4)	42%
Amphipod 28-d Survival	19	812	937	73% (11 of 15)	75% (3 of 4)	37%	No Data	73% (11 of 15)	75% (3 of 4)	37%
Amphipod 28-d Growth	19	812	937	**13% (2 of 15)**	**75% (3 of 4)**	**84%**	No Data	**13% (2 of 15)**	**75% (3 of 4)**	**84%**
Amphipod 28-d Biomass	19	812	937	27% (4 of 15)	100% (4 of 4)	79%	No Data	27% (4 of 15)	100% (4 of 4)	79%
Amphipod 28-d All	19	812	937	73% (11 of 15)	100% (4 of 4)	42%	No Data	73% (11 of 15)	100% (4 of 4)	42%
All Endpoints	19	812	937	87% (13 of 15)	100% (4 of 4)	32%	No Data	87% (13 of 15)	100% (4 of 4)	32%
Total Beryllium (mg/kg DW)										
Cladoceran 7-d Survival	19	1.22	1.24	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Cladoceran 7-d Reproduction	19	1.22	1.24	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Cladoceran 7-d All	19	1.22	1.24	**12% (2 of 17)**	**100% (2 of 2)**	**89%**	No Data	**12% (2 of 17)**	**100% (2 of 2)**	**89%**
Midge 10-d Survival	19	1.22	1.24	6% (1 of 17)	0% (0 of 2)	84%	No Data	6% (1 of 17)	0% (0 of 2)	84%
Midge 10-d Growth	19	1.22	1.24	47% (8 of 17)	100% (2 of 2)	58%	No Data	47% (8 of 17)	100% (2 of 2)	58%
Midge 10-d Biomass	19	1.22	1.24	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Midge 10-d All	19	1.22	1.24	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
Amphipod 28-d Survival	19	1.22	1.24	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Amphipod 28-d Growth	19	1.22	1.24	**18% (3 of 17)**	**100% (2 of 2)**	**84%**	No Data	**18% (3 of 17)**	**100% (2 of 2)**	**84%**
Amphipod 28-d Biomass	19	1.22	1.24	35% (6 of 17)	100% (2 of 2)	68%	No Data	35% (6 of 17)	100% (2 of 2)	68%
Amphipod 28-d All	19	1.22	1.24	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
All Endpoints	19	1.22	1.24	88% (15 of 17)	100% (2 of 2)	21%	No Data	88% (15 of 17)	100% (2 of 2)	21%

Table A7.3. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Chromium (mg/kg DW)										
Cladoceran 7-d Survival	19	79.8	84.3	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	No Data	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d Reproduction	19	79.8	84.3	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	No Data	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d All	19	79.8	84.3	**12% (2 of 16)**	**67% (2 of 3)**	**84%**	No Data	**12% (2 of 16)**	**67% (2 of 3)**	**84%**
Midge 10-d Survival	19	79.8	84.3	6% (1 of 16)	0% (0 of 3)	79%	No Data	6% (1 of 16)	0% (0 of 3)	79%
Midge 10-d Growth	19	79.8	84.3	44% (7 of 16)	100% (3 of 3)	63%	No Data	44% (7 of 16)	100% (3 of 3)	63%
Midge 10-d Biomass	19	79.8	84.3	69% (11 of 16)	100% (3 of 3)	42%	No Data	69% (11 of 16)	100% (3 of 3)	42%
Midge 10-d All	19	79.8	84.3	75% (12 of 16)	100% (3 of 3)	37%	No Data	75% (12 of 16)	100% (3 of 3)	37%
Amphipod 28-d Survival	19	79.8	84.3	69% (11 of 16)	100% (3 of 3)	42%	No Data	69% (11 of 16)	100% (3 of 3)	42%
Amphipod 28-d Growth	19	79.8	84.3	**12% (2 of 16)**	**100% (3 of 3)**	**89%**	No Data	**12% (2 of 16)**	**100% (3 of 3)**	**89%**
Amphipod 28-d Biomass	19	79.8	84.3	31% (5 of 16)	100% (3 of 3)	74%	No Data	31% (5 of 16)	100% (3 of 3)	74%
Amphipod 28-d All	19	79.8	84.3	75% (12 of 16)	100% (3 of 3)	37%	No Data	75% (12 of 16)	100% (3 of 3)	37%
All Endpoints	19	79.8	84.3	88% (14 of 16)	100% (3 of 3)	26%	No Data	88% (14 of 16)	100% (3 of 3)	26%
Total Cobalt (mg/kg DW)										
Cladoceran 7-d Survival	19	28	34.3	7% (1 of 15)	50% (2 of 4)	84%	No Data	7% (1 of 15)	50% (2 of 4)	84%
Cladoceran 7-d Reproduction	19	28	34.3	7% (1 of 15)	50% (2 of 4)	84%	No Data	7% (1 of 15)	50% (2 of 4)	84%
Cladoceran 7-d All	19	28	34.3	13% (2 of 15)	50% (2 of 4)	79%	No Data	13% (2 of 15)	50% (2 of 4)	79%
Midge 10-d Survival	19	28	34.3	7% (1 of 15)	0% (0 of 4)	74%	No Data	7% (1 of 15)	0% (0 of 4)	74%
Midge 10-d Growth	19	28	34.3	40% (6 of 15)	100% (4 of 4)	68%	No Data	40% (6 of 15)	100% (4 of 4)	68%
Midge 10-d Biomass	19	28	34.3	67% (10 of 15)	100% (4 of 4)	47%	No Data	67% (10 of 15)	100% (4 of 4)	47%
Midge 10-d All	19	28	34.3	73% (11 of 15)	100% (4 of 4)	42%	No Data	73% (11 of 15)	100% (4 of 4)	42%
Amphipod 28-d Survival	19	28	34.3	73% (11 of 15)	75% (3 of 4)	37%	No Data	73% (11 of 15)	75% (3 of 4)	37%
Amphipod 28-d Growth	19	28	34.3	**13% (2 of 15)**	**75% (3 of 4)**	**84%**	No Data	**13% (2 of 15)**	**75% (3 of 4)**	**84%**
Amphipod 28-d Biomass	19	28	34.3	27% (4 of 15)	100% (4 of 4)	79%	No Data	27% (4 of 15)	100% (4 of 4)	79%
Amphipod 28-d All	19	28	34.3	73% (11 of 15)	100% (4 of 4)	42%	No Data	73% (11 of 15)	100% (4 of 4)	42%
All Endpoints	19	28	34.3	87% (13 of 15)	100% (4 of 4)	32%	No Data	87% (13 of 15)	100% (4 of 4)	32%

Table A7.3. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Copper (mg/kg DW)										
Cladoceran 7-d Survival	24	1090	1330	**6% (1 of 17)**	**57% (4 of 7)**	**83%**	0% (0 of 1)	**6% (1 of 18)**	**67% (4 of 6)**	**88%**
Cladoceran 7-d Reproduction	24	1090	1330	**6% (1 of 17)**	**71% (5 of 7)**	**88%**	0% (0 of 1)	**6% (1 of 18)**	**83% (5 of 6)**	**92%**
Cladoceran 7-d All	24	1090	1330	**12% (2 of 17)**	**71% (5 of 7)**	**83%**	0% (0 of 1)	**11% (2 of 18)**	**83% (5 of 6)**	**88%**
Midge 10-d Survival	21	1090	1330	6% (1 of 16)	0% (0 of 5)	71%	0% (0 of 1)	6% (1 of 17)	0% (0 of 4)	76%
Midge 10-d Growth	21	1090	1330	38% (6 of 16)	100% (5 of 5)	71%	100% (1 of 1)	41% (7 of 17)	100% (4 of 4)	67%
Midge 10-d Biomass	21	1090	1330	62% (10 of 16)	100% (5 of 5)	52%	100% (1 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Midge 10-d All	21	1090	1330	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
Amphipod 28-d Survival	21	1090	1330	69% (11 of 16)	80% (4 of 5)	43%	0% (0 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Amphipod 28-d Growth	21	1090	1330	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	0% (0 of 1)	**12% (2 of 17)**	**75% (3 of 4)**	**86%**
Amphipod 28-d Biomass	21	1090	1330	25% (4 of 16)	100% (5 of 5)	81%	100% (1 of 1)	29% (5 of 17)	100% (4 of 4)	76%
Amphipod 28-d All	21	1090	1330	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
All Endpoints	26	1090	1330	72% (13 of 18)	100% (8 of 8)	50%	100% (1 of 1)	74% (14 of 19)	100% (7 of 7)	46%
Total Iron (mg/kg DW)										
Cladoceran 7-d Survival	19	164000	166000	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Cladoceran 7-d Reproduction	19	164000	166000	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Cladoceran 7-d All	19	164000	166000	**12% (2 of 17)**	**100% (2 of 2)**	**89%**	No Data	**12% (2 of 17)**	**100% (2 of 2)**	**89%**
Midge 10-d Survival	19	164000	166000	6% (1 of 17)	0% (0 of 2)	84%	No Data	6% (1 of 17)	0% (0 of 2)	84%
Midge 10-d Growth	19	164000	166000	47% (8 of 17)	100% (2 of 2)	58%	No Data	47% (8 of 17)	100% (2 of 2)	58%
Midge 10-d Biomass	19	164000	166000	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Midge 10-d All	19	164000	166000	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
Amphipod 28-d Survival	19	164000	166000	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Amphipod 28-d Growth	19	164000	166000	**18% (3 of 17)**	**100% (2 of 2)**	**84%**	No Data	**18% (3 of 17)**	**100% (2 of 2)**	**84%**
Amphipod 28-d Biomass	19	164000	166000	35% (6 of 17)	100% (2 of 2)	68%	No Data	35% (6 of 17)	100% (2 of 2)	68%
Amphipod 28-d All	19	164000	166000	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
All Endpoints	19	164000	166000	88% (15 of 17)	100% (2 of 2)	21%	No Data	88% (15 of 17)	100% (2 of 2)	21%

Table A7.3. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$ [2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Vanadium (mg/kg DW)										
Cladoceran 7-d Survival	19	32.3	33.2	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Cladoceran 7-d Reproduction	19	32.3	33.2	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Cladoceran 7-d All	19	32.3	33.2	**12% (2 of 17)**	**100% (2 of 2)**	**89%**	No Data	**12% (2 of 17)**	**100% (2 of 2)**	**89%**
Midge 10-d Survival	19	32.3	33.2	6% (1 of 17)	0% (0 of 2)	84%	No Data	6% (1 of 17)	0% (0 of 2)	84%
Midge 10-d Growth	19	32.3	33.2	47% (8 of 17)	100% (2 of 2)	58%	No Data	47% (8 of 17)	100% (2 of 2)	58%
Midge 10-d Biomass	19	32.3	33.2	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Midge 10-d All	19	32.3	33.2	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
Amphipod 28-d Survival	19	32.3	33.2	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Amphipod 28-d Growth	19	32.3	33.2	**18% (3 of 17)**	**100% (2 of 2)**	**84%**	No Data	**18% (3 of 17)**	**100% (2 of 2)**	**84%**
Amphipod 28-d Biomass	19	32.3	33.2	35% (6 of 17)	100% (2 of 2)	68%	No Data	35% (6 of 17)	100% (2 of 2)	68%
Amphipod 28-d All	19	32.3	33.2	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
All Endpoints	19	32.3	33.2	88% (15 of 17)	100% (2 of 2)	21%	No Data	88% (15 of 17)	100% (2 of 2)	21%
Mean PEC-Q $_{EXTMETALS}$										
Cladoceran 7-d Survival	24	3.82	4.7	**6% (1 of 17)**	**57% (4 of 7)**	**83%**	0% (0 of 2)	**5% (1 of 19)**	**80% (4 of 5)**	**92%**
Cladoceran 7-d Reproduction	24	3.82	4.7	**6% (1 of 17)**	**71% (5 of 7)**	**88%**	0% (0 of 2)	**5% (1 of 19)**	**100% (5 of 5)**	**96%**
Cladoceran 7-d All	24	3.82	4.7	**12% (2 of 17)**	**71% (5 of 7)**	**83%**	0% (0 of 2)	**11% (2 of 19)**	**100% (5 of 5)**	**92%**
Midge 10-d Survival	21	3.82	4.7	6% (1 of 16)	0% (0 of 5)	71%	0% (0 of 2)	6% (1 of 18)	0% (0 of 3)	81%
Midge 10-d Growth	21	3.82	4.7	38% (6 of 16)	100% (5 of 5)	71%	100% (2 of 2)	44% (8 of 18)	100% (3 of 3)	62%
Midge 10-d Biomass	21	3.82	4.7	62% (10 of 16)	100% (5 of 5)	52%	100% (2 of 2)	67% (12 of 18)	100% (3 of 3)	43%
Midge 10-d All	21	3.82	4.7	69% (11 of 16)	100% (5 of 5)	48%	100% (2 of 2)	72% (13 of 18)	100% (3 of 3)	38%
Amphipod 28-d Survival	21	3.82	4.7	62% (10 of 16)	100% (5 of 5)	52%	100% (2 of 2)	67% (12 of 18)	100% (3 of 3)	43%
Amphipod 28-d Growth	21	3.82	4.7	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	50% (1 of 2)	**17% (3 of 18)**	**67% (2 of 3)**	**81%**
Amphipod 28-d Biomass	21	3.82	4.7	31% (5 of 16)	80% (4 of 5)	71%	50% (1 of 2)	33% (6 of 18)	100% (3 of 3)	71%
Amphipod 28-d All	21	3.82	4.7	69% (11 of 16)	100% (5 of 5)	48%	100% (2 of 2)	72% (13 of 18)	100% (3 of 3)	38%
All Endpoints	26	3.82	4.7	72% (13 of 18)	100% (8 of 8)	50%	100% (2 of 2)	75% (15 of 20)	100% (6 of 6)	42%

Table A7.3. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** $_{METALS}$*										
Cladoceran 7-d Survival	24	32.5	35.8	**6% (1 of 17)**	**57% (4 of 7)**	**83%**	0% (0 of 2)	**5% (1 of 19)**	**80% (4 of 5)**	**92%**
Cladoceran 7-d Reproduction	24	32.5	35.8	**6% (1 of 17)**	**71% (5 of 7)**	**88%**	0% (0 of 2)	**5% (1 of 19)**	**100% (5 of 5)**	**96%**
Cladoceran 7-d All	24	32.5	35.8	**12% (2 of 17)**	**71% (5 of 7)**	**83%**	0% (0 of 2)	**11% (2 of 19)**	**100% (5 of 5)**	**92%**
Midge 10-d Survival	21	32.5	35.8	6% (1 of 16)	0% (0 of 5)	71%	0% (0 of 2)	6% (1 of 18)	0% (0 of 3)	81%
Midge 10-d Growth	21	32.5	35.8	38% (6 of 16)	100% (5 of 5)	71%	100% (2 of 2)	44% (8 of 18)	100% (3 of 3)	62%
Midge 10-d Biomass	21	32.5	35.8	62% (10 of 16)	100% (5 of 5)	52%	100% (2 of 2)	67% (12 of 18)	100% (3 of 3)	43%
Midge 10-d All	21	32.5	35.8	69% (11 of 16)	100% (5 of 5)	48%	100% (2 of 2)	72% (13 of 18)	100% (3 of 3)	38%
Amphipod 28-d Survival	21	32.5	35.8	62% (10 of 16)	100% (5 of 5)	52%	100% (2 of 2)	67% (12 of 18)	100% (3 of 3)	43%
Amphipod 28-d Growth	21	32.5	35.8	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	50% (1 of 2)	**17% (3 of 18)**	**67% (2 of 3)**	**81%**
Amphipod 28-d Biomass	21	32.5	35.8	31% (5 of 16)	80% (4 of 5)	71%	50% (1 of 2)	33% (6 of 18)	100% (3 of 3)	71%
Amphipod 28-d All	21	32.5	35.8	69% (11 of 16)	100% (5 of 5)	48%	100% (2 of 2)	72% (13 of 18)	100% (3 of 3)	38%
All Endpoints	26	32.5	35.8	72% (13 of 18)	100% (8 of 8)	50%	100% (2 of 2)	75% (15 of 20)	100% (6 of 6)	42%
***ΣPEC-Q** $_{METALS(1\%OC)}$*										
Cladoceran 7-d Survival	24	257	291	**11% (2 of 19)**	**60% (3 of 5)**	**83%**	0% (0 of 1)	**10% (2 of 20)**	**75% (3 of 4)**	**88%**
Cladoceran 7-d Reproduction	24	257	291	**11% (2 of 19)**	**80% (4 of 5)**	**88%**	100% (1 of 1)	**15% (3 of 20)**	**75% (3 of 4)**	**83%**
Cladoceran 7-d All	24	257	291	**16% (3 of 19)**	**80% (4 of 5)**	**83%**	100% (1 of 1)	20% (4 of 20)	75% (3 of 4)	79%
Midge 10-d Survival	21	257	291	6% (1 of 18)	0% (0 of 3)	81%	No Data	6% (1 of 18)	0% (0 of 3)	81%
Midge 10-d Growth	21	257	291	44% (8 of 18)	100% (3 of 3)	62%	No Data	44% (8 of 18)	100% (3 of 3)	62%
Midge 10-d Biomass	21	257	291	67% (12 of 18)	100% (3 of 3)	43%	No Data	67% (12 of 18)	100% (3 of 3)	43%
Midge 10-d All	21	257	291	72% (13 of 18)	100% (3 of 3)	38%	No Data	72% (13 of 18)	100% (3 of 3)	38%
Amphipod 28-d Survival	21	257	291	67% (12 of 18)	100% (3 of 3)	43%	No Data	67% (12 of 18)	100% (3 of 3)	43%
Amphipod 28-d Growth	21	257	291	**17% (3 of 18)**	**67% (2 of 3)**	**81%**	No Data	**17% (3 of 18)**	**67% (2 of 3)**	**81%**
Amphipod 28-d Biomass	21	257	291	33% (6 of 18)	100% (3 of 3)	71%	No Data	33% (6 of 18)	100% (3 of 3)	71%
Amphipod 28-d All	21	257	291	72% (13 of 18)	100% (3 of 3)	38%	No Data	72% (13 of 18)	100% (3 of 3)	38%
All Endpoints	26	257	291	75% (15 of 20)	100% (6 of 6)	42%	100% (1 of 1)	76% (16 of 21)	100% (5 of 5)	38%

Table A7.3. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
$\Sigma PEC\text{-}Q_{EXTMETALS}$										
Cladoceran 7-d Survival	24	38.6	41.8	**6% (1 of 17)**	**57% (4 of 7)**	**83%**	0% (0 of 2)	**5% (1 of 19)**	**80% (4 of 5)**	**92%**
Cladoceran 7-d Reproduction	24	38.6	41.8	**6% (1 of 17)**	**71% (5 of 7)**	**88%**	0% (0 of 2)	**5% (1 of 19)**	**100% (5 of 5)**	**96%**
Cladoceran 7-d All	24	38.6	41.8	**12% (2 of 17)**	**71% (5 of 7)**	**83%**	0% (0 of 2)	**11% (2 of 19)**	**100% (5 of 5)**	**92%**
Midge 10-d Survival	21	38.6	41.8	6% (1 of 16)	0% (0 of 5)	71%	0% (0 of 2)	6% (1 of 18)	0% (0 of 3)	81%
Midge 10-d Growth	21	38.6	41.8	38% (6 of 16)	100% (5 of 5)	71%	100% (2 of 2)	44% (8 of 18)	100% (3 of 3)	62%
Midge 10-d Biomass	21	38.6	41.8	62% (10 of 16)	100% (5 of 5)	52%	100% (2 of 2)	67% (12 of 18)	100% (3 of 3)	43%
Midge 10-d All	21	38.6	41.8	69% (11 of 16)	100% (5 of 5)	48%	100% (2 of 2)	72% (13 of 18)	100% (3 of 3)	38%
Amphipod 28-d Survival	21	38.6	41.8	62% (10 of 16)	100% (5 of 5)	52%	100% (2 of 2)	67% (12 of 18)	100% (3 of 3)	43%
Amphipod 28-d Growth	21	38.6	41.8	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	50% (1 of 2)	**17% (3 of 18)**	**67% (2 of 3)**	**81%**
Amphipod 28-d Biomass	21	38.6	41.8	31% (5 of 16)	80% (4 of 5)	71%	50% (1 of 2)	33% (6 of 18)	100% (3 of 3)	71%
Amphipod 28-d All	21	38.6	41.8	69% (11 of 16)	100% (5 of 5)	48%	100% (2 of 2)	72% (13 of 18)	100% (3 of 3)	38%
All Endpoints	26	38.6	41.8	72% (13 of 18)	100% (8 of 8)	50%	100% (2 of 2)	75% (15 of 20)	100% (6 of 6)	42%
$\Sigma PEC\text{-}Q_{EXTMETALS(1\%OC)}$										
Cladoceran 7-d Survival	24	314	340	**10% (2 of 20)**	**75% (3 of 4)**	**88%**	No Data	**10% (2 of 20)**	**75% (3 of 4)**	**88%**
Cladoceran 7-d Reproduction	24	314	340	**15% (3 of 20)**	**75% (3 of 4)**	**83%**	No Data	**15% (3 of 20)**	**75% (3 of 4)**	**83%**
Cladoceran 7-d All	24	314	340	20% (4 of 20)	75% (3 of 4)	79%	No Data	20% (4 of 20)	75% (3 of 4)	79%
Midge 10-d Survival	21	314	340	5% (1 of 19)	0% (0 of 2)	86%	No Data	5% (1 of 19)	0% (0 of 2)	86%
Midge 10-d Growth	21	314	340	47% (9 of 19)	100% (2 of 2)	57%	No Data	47% (9 of 19)	100% (2 of 2)	57%
Midge 10-d Biomass	21	314	340	68% (13 of 19)	100% (2 of 2)	38%	No Data	68% (13 of 19)	100% (2 of 2)	38%
Midge 10-d All	21	314	340	74% (14 of 19)	100% (2 of 2)	33%	No Data	74% (14 of 19)	100% (2 of 2)	33%
Amphipod 28-d Survival	21	314	340	68% (13 of 19)	100% (2 of 2)	38%	No Data	68% (13 of 19)	100% (2 of 2)	38%
Amphipod 28-d Growth	21	314	340	**16% (3 of 19)**	**100% (2 of 2)**	**86%**	No Data	**16% (3 of 19)**	**100% (2 of 2)**	**86%**
Amphipod 28-d Biomass	21	314	340	37% (7 of 19)	100% (2 of 2)	67%	No Data	37% (7 of 19)	100% (2 of 2)	67%
Amphipod 28-d All	21	314	340	74% (14 of 19)	100% (2 of 2)	33%	No Data	74% (14 of 19)	100% (2 of 2)	33%
All Endpoints	26	314	340	77% (17 of 22)	100% (4 of 4)	35%	No Data	77% (17 of 22)	100% (4 of 4)	35%

Table A7.3. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Cu:Al										
Cladoceran 7-d Survival	19	0.096	0.112	12% (2 of 16)	33% (1 of 3)	79%	0% (0 of 1)	12% (2 of 17)	50% (1 of 2)	84%
Cladoceran 7-d Reproduction	19	0.096	0.112	12% (2 of 16)	33% (1 of 3)	79%	0% (0 of 1)	12% (2 of 17)	50% (1 of 2)	84%
Cladoceran 7-d All	19	0.096	0.112	19% (3 of 16)	33% (1 of 3)	74%	0% (0 of 1)	18% (3 of 17)	50% (1 of 2)	79%
Midge 10-d Survival	19	0.096	0.112	6% (1 of 16)	0% (0 of 3)	79%	0% (0 of 1)	6% (1 of 17)	0% (0 of 2)	84%
Midge 10-d Growth	19	0.096	0.112	44% (7 of 16)	100% (3 of 3)	63%	100% (1 of 1)	47% (8 of 17)	100% (2 of 2)	58%
Midge 10-d Biomass	19	0.096	0.112	69% (11 of 16)	100% (3 of 3)	42%	100% (1 of 1)	71% (12 of 17)	100% (2 of 2)	37%
Midge 10-d All	19	0.096	0.112	75% (12 of 16)	100% (3 of 3)	37%	100% (1 of 1)	76% (13 of 17)	100% (2 of 2)	32%
Amphipod 28-d Survival	19	0.096	0.112	75% (12 of 16)	67% (2 of 3)	32%	0% (0 of 1)	71% (12 of 17)	100% (2 of 2)	37%
Amphipod 28-d Growth	19	0.096	0.112	19% (3 of 16)	67% (2 of 3)	79%	0% (0 of 1)	**18% (3 of 17)**	**100% (2 of 2)**	**84%**
Amphipod 28-d Biomass	19	0.096	0.112	31% (5 of 16)	100% (3 of 3)	74%	100% (1 of 1)	35% (6 of 17)	100% (2 of 2)	68%
Amphipod 28-d All	19	0.096	0.112	75% (12 of 16)	100% (3 of 3)	37%	100% (1 of 1)	76% (13 of 17)	100% (2 of 2)	32%
All Endpoints	19	0.096	0.112	88% (14 of 16)	100% (3 of 3)	26%	100% (1 of 1)	88% (15 of 17)	100% (2 of 2)	21%

Class. = classification; COPC = chemical of potential concern; TPST = threshold for predicting sediment toxicity; LI = low impact; HR = high impact; PEC-Q = probable effect concentration-quotients; OC = organic carbon; Al = alumium; Cu = copper; d = day; IOT = incidence of toxicity.
$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).
$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.4. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Barium (mg/kg DW)										
Cladoceran 7-d Survival	37	812	937	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	812	937	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	812	937	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	812	937	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	812	937	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	812	937	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	812	937	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	812	937	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	812	937	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	812	937	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	812	937	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	812	937	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Total Beryllium (mg/kg DW)										
Cladoceran 7-d Survival	37	1.22	1.24	9% (3 of 33)	0% (0 of 4)	81%	No Data	9% (3 of 33)	0% (0 of 4)	81%
Cladoceran 7-d Reproduction	37	1.22	1.24	6% (2 of 33)	25% (1 of 4)	86%	No Data	6% (2 of 33)	25% (1 of 4)	86%
Cladoceran 7-d All	37	1.22	1.24	12% (4 of 33)	25% (1 of 4)	81%	No Data	12% (4 of 33)	25% (1 of 4)	81%
Midge 10-d Survival	37	1.22	1.24	24% (8 of 33)	25% (1 of 4)	70%	No Data	24% (8 of 33)	25% (1 of 4)	70%
Midge 10-d Growth	37	1.22	1.24	45% (15 of 33)	75% (3 of 4)	57%	No Data	45% (15 of 33)	75% (3 of 4)	57%
Midge 10-d Biomass	37	1.22	1.24	73% (24 of 33)	100% (4 of 4)	35%	No Data	73% (24 of 33)	100% (4 of 4)	35%
Midge 10-d All	37	1.22	1.24	76% (25 of 33)	100% (4 of 4)	32%	No Data	76% (25 of 33)	100% (4 of 4)	32%
Amphipod 28-d Survival	37	1.22	1.24	36% (12 of 33)	0% (0 of 4)	57%	No Data	36% (12 of 33)	0% (0 of 4)	57%
Amphipod 28-d Growth	37	1.22	1.24	6% (2 of 33)	25% (1 of 4)	86%	No Data	6% (2 of 33)	25% (1 of 4)	86%
Amphipod 28-d Biomass	37	1.22	1.24	15% (5 of 33)	25% (1 of 4)	78%	No Data	15% (5 of 33)	25% (1 of 4)	78%
Amphipod 28-d All	37	1.22	1.24	42% (14 of 33)	25% (1 of 4)	54%	No Data	42% (14 of 33)	25% (1 of 4)	54%
All Endpoints	37	1.22	1.24	76% (25 of 33)	100% (4 of 4)	32%	No Data	76% (25 of 33)	100% (4 of 4)	32%

Table A7.4. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Chromium (mg/kg DW)										
Cladoceran 7-d Survival	37	79.8	84.3	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	79.8	84.3	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	79.8	84.3	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	79.8	84.3	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	79.8	84.3	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	79.8	84.3	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	79.8	84.3	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	79.8	84.3	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	79.8	84.3	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	79.8	84.3	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	79.8	84.3	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	79.8	84.3	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Total Cobalt (mg/kg DW)										
Cladoceran 7-d Survival	37	28	34.3	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	28	34.3	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	28	34.3	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	28	34.3	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	28	34.3	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	28	34.3	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	28	34.3	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	28	34.3	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	28	34.3	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	28	34.3	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	28	34.3	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	28	34.3	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%

Table A7.4. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Copper (mg/kg DW)										
Cladoceran 7-d Survival	43	1090	1330	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	1090	1330	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	1090	1330	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	1090	1330	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	1090	1330	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	1090	1330	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	1090	1330	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	1090	1330	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	1090	1330	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	1090	1330	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	1090	1330	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	1090	1330	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%
Total Iron (mg/kg DW)										
Cladoceran 7-d Survival	37	164000	166000	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	164000	166000	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	164000	166000	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	164000	166000	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	164000	166000	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	164000	166000	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	164000	166000	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	164000	166000	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	164000	166000	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	164000	166000	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	164000	166000	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	164000	166000	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%

Table A7.4. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Vanadium (mg/kg DW)										
Cladoceran 7-d Survival	37	32.3	33.2	10% (3 of 29)	0% (0 of 8)	70%	No Data	10% (3 of 29)	0% (0 of 8)	70%
Cladoceran 7-d Reproduction	37	32.3	33.2	7% (2 of 29)	12% (1 of 8)	76%	No Data	7% (2 of 29)	12% (1 of 8)	76%
Cladoceran 7-d All	37	32.3	33.2	14% (4 of 29)	12% (1 of 8)	70%	No Data	14% (4 of 29)	12% (1 of 8)	70%
Midge 10-d Survival	37	32.3	33.2	17% (5 of 29)	50% (4 of 8)	76%	No Data	17% (5 of 29)	50% (4 of 8)	76%
Midge 10-d Growth	37	32.3	33.2	48% (14 of 29)	50% (4 of 8)	51%	No Data	48% (14 of 29)	50% (4 of 8)	51%
Midge 10-d Biomass	37	32.3	33.2	72% (21 of 29)	88% (7 of 8)	41%	No Data	72% (21 of 29)	88% (7 of 8)	41%
Midge 10-d All	37	32.3	33.2	76% (22 of 29)	88% (7 of 8)	38%	No Data	76% (22 of 29)	88% (7 of 8)	38%
Amphipod 28-d Survival	37	32.3	33.2	31% (9 of 29)	38% (3 of 8)	62%	No Data	31% (9 of 29)	38% (3 of 8)	62%
Amphipod 28-d Growth	37	32.3	33.2	3% (1 of 29)	25% (2 of 8)	81%	No Data	3% (1 of 29)	25% (2 of 8)	81%
Amphipod 28-d Biomass	37	32.3	33.2	14% (4 of 29)	25% (2 of 8)	73%	No Data	14% (4 of 29)	25% (2 of 8)	73%
Amphipod 28-d All	37	32.3	33.2	38% (11 of 29)	50% (4 of 8)	59%	No Data	38% (11 of 29)	50% (4 of 8)	59%
All Endpoints	37	32.3	33.2	76% (22 of 29)	88% (7 of 8)	38%	No Data	76% (22 of 29)	88% (7 of 8)	38%
Mean PEC-Q $_{EXT\ METAL}$										
Cladoceran 7-d Survival	43	3.82	4.7	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	3.82	4.7	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	3.82	4.7	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	3.82	4.7	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	3.82	4.7	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	3.82	4.7	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	3.82	4.7	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	3.82	4.7	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	3.82	4.7	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	3.82	4.7	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	3.82	4.7	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	3.82	4.7	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.4. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** METALS*										
Cladoceran 7-d Survival	43	32.5	35.8	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	32.5	35.8	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	32.5	35.8	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	32.5	35.8	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	32.5	35.8	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	32.5	35.8	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	32.5	35.8	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	32.5	35.8	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	32.5	35.8	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	32.5	35.8	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	32.5	35.8	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	32.5	35.8	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%
***ΣPEC-Q** METALS(1%OC)*										
Cladoceran 7-d Survival	43	257	291	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	257	291	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	257	291	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	257	291	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	257	291	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	257	291	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	257	291	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	257	291	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	257	291	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	257	291	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	257	291	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	257	291	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.4. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** EXTMETALS*										
Cladoceran 7-d Survival	43	38.6	41.8	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	38.6	41.8	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	38.6	41.8	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	38.6	41.8	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	38.6	41.8	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	38.6	41.8	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	38.6	41.8	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	38.6	41.8	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	38.6	41.8	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	38.6	41.8	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	38.6	41.8	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	38.6	41.8	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%
***ΣPEC-Q** EXTMETALS(1%OC)*										
Cladoceran 7-d Survival	43	314	340	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	314	340	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	314	340	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	314	340	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	314	340	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	314	340	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	314	340	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	314	340	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	314	340	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	314	340	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	314	340	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	314	340	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.4. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Cu:Al										
Cladoceran 7-d Survival	37	0.096	0.112	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	0.096	0.112	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	0.096	0.112	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	0.096	0.112	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	0.096	0.112	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	0.096	0.112	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	0.096	0.112	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	0.096	0.112	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	0.096	0.112	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	0.096	0.112	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	0.096	0.112	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	0.096	0.112	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%

Class. = classification; COPC = chemical of potential concern; TPST = threshold for predicting sediment toxicity; LI = low impact; HR = high impact; PEC-Q = probable effect concentration-quotients; OC = organic carbon; Al = alumium; Cu = copper; d = day; IOT = incidence of toxicity.
$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).
$PEC\text{-}Q_{EXT\ METALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.5. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in all sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Barium (mg/kg DW)										
Cladoceran 7-d Survival	56	812	937	8% (4 of 52)	50% (2 of 4)	89%	No Data	8% (4 of 52)	50% (2 of 4)	89%
Cladoceran 7-d Reproduction	56	812	937	8% (4 of 52)	50% (2 of 4)	89%	No Data	8% (4 of 52)	50% (2 of 4)	89%
Cladoceran 7-d All	56	812	937	13% (7 of 52)	50% (2 of 4)	84%	No Data	13% (7 of 52)	50% (2 of 4)	84%
Midge 10-d Survival	56	812	937	19% (10 of 52)	0% (0 of 4)	75%	No Data	19% (10 of 52)	0% (0 of 4)	75%
Midge 10-d Growth	56	812	937	46% (24 of 52)	100% (4 of 4)	57%	No Data	46% (24 of 52)	100% (4 of 4)	57%
Midge 10-d Biomass	56	812	937	73% (38 of 52)	100% (4 of 4)	32%	No Data	73% (38 of 52)	100% (4 of 4)	32%
Midge 10-d All	56	812	937	77% (40 of 52)	100% (4 of 4)	29%	No Data	77% (40 of 52)	100% (4 of 4)	29%
Amphipod 28-d Survival	56	812	937	44% (23 of 52)	75% (3 of 4)	57%	No Data	44% (23 of 52)	75% (3 of 4)	57%
Amphipod 28-d Growth	56	812	937	**10% (5 of 52)**	**75% (3 of 4)**	**89%**	No Data	**10% (5 of 52)**	**75% (3 of 4)**	**89%**
Amphipod 28-d Biomass	56	812	937	**19% (10 of 52)**	**100% (4 of 4)**	**82%**	No Data	**19% (10 of 52)**	**100% (4 of 4)**	**82%**
Amphipod 28-d All	56	812	937	50% (26 of 52)	100% (4 of 4)	54%	No Data	50% (26 of 52)	100% (4 of 4)	54%
All Endpoints	56	812	937	81% (42 of 52)	100% (4 of 4)	25%	No Data	81% (42 of 52)	100% (4 of 4)	25%
Total Beryllium (mg/kg DW)										
Cladoceran 7-d Survival	56	1.22	1.24	8% (4 of 50)	33% (2 of 6)	86%	No Data	8% (4 of 50)	33% (2 of 6)	86%
Cladoceran 7-d Reproduction	56	1.22	1.24	6% (3 of 50)	50% (3 of 6)	89%	No Data	6% (3 of 50)	50% (3 of 6)	89%
Cladoceran 7-d All	56	1.22	1.24	12% (6 of 50)	50% (3 of 6)	84%	No Data	12% (6 of 50)	50% (3 of 6)	84%
Midge 10-d Survival	56	1.22	1.24	18% (9 of 50)	17% (1 of 6)	75%	No Data	18% (9 of 50)	17% (1 of 6)	75%
Midge 10-d Growth	56	1.22	1.24	46% (23 of 50)	83% (5 of 6)	57%	No Data	46% (23 of 50)	83% (5 of 6)	57%
Midge 10-d Biomass	56	1.22	1.24	72% (36 of 50)	100% (6 of 6)	36%	No Data	72% (36 of 50)	100% (6 of 6)	36%
Midge 10-d All	56	1.22	1.24	76% (38 of 50)	100% (6 of 6)	32%	No Data	76% (38 of 50)	100% (6 of 6)	32%
Amphipod 28-d Survival	56	1.22	1.24	48% (24 of 50)	33% (2 of 6)	50%	No Data	48% (24 of 50)	33% (2 of 6)	50%
Amphipod 28-d Growth	56	1.22	1.24	10% (5 of 50)	50% (3 of 6)	86%	No Data	10% (5 of 50)	50% (3 of 6)	86%
Amphipod 28-d Biomass	56	1.22	1.24	22% (11 of 50)	50% (3 of 6)	75%	No Data	22% (11 of 50)	50% (3 of 6)	75%
Amphipod 28-d All	56	1.22	1.24	54% (27 of 50)	50% (3 of 6)	46%	No Data	54% (27 of 50)	50% (3 of 6)	46%
All Endpoints	56	1.22	1.24	80% (40 of 50)	100% (6 of 6)	29%	No Data	80% (40 of 50)	100% (6 of 6)	29%

Table A7.5. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in all sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Chromium (mg/kg DW)										
Cladoceran 7-d Survival	56	79.8	84.3	**8% (4 of 53)**	**67% (2 of 3)**	**91%**	No Data	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d Reproduction	56	79.8	84.3	**8% (4 of 53)**	**67% (2 of 3)**	**91%**	No Data	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d All	56	79.8	84.3	**13% (7 of 53)**	**67% (2 of 3)**	**86%**	No Data	**13% (7 of 53)**	**67% (2 of 3)**	**86%**
Midge 10-d Survival	56	79.8	84.3	19% (10 of 53)	0% (0 of 3)	77%	No Data	19% (10 of 53)	0% (0 of 3)	77%
Midge 10-d Growth	56	79.8	84.3	47% (25 of 53)	100% (3 of 3)	55%	No Data	47% (25 of 53)	100% (3 of 3)	55%
Midge 10-d Biomass	56	79.8	84.3	74% (39 of 53)	100% (3 of 3)	30%	No Data	74% (39 of 53)	100% (3 of 3)	30%
Midge 10-d All	56	79.8	84.3	77% (41 of 53)	100% (3 of 3)	27%	No Data	77% (41 of 53)	100% (3 of 3)	27%
Amphipod 28-d Survival	56	79.8	84.3	43% (23 of 53)	100% (3 of 3)	59%	No Data	43% (23 of 53)	100% (3 of 3)	59%
Amphipod 28-d Growth	56	79.8	84.3	**9% (5 of 53)**	**100% (3 of 3)**	**91%**	No Data	**9% (5 of 53)**	**100% (3 of 3)**	**91%**
Amphipod 28-d Biomass	56	79.8	84.3	21% (11 of 53)	100% (3 of 3)	80%	No Data	21% (11 of 53)	100% (3 of 3)	80%
Amphipod 28-d All	56	79.8	84.3	51% (27 of 53)	100% (3 of 3)	52%	No Data	51% (27 of 53)	100% (3 of 3)	52%
All Endpoints	56	79.8	84.3	81% (43 of 53)	100% (3 of 3)	23%	No Data	81% (43 of 53)	100% (3 of 3)	23%
Total Cobalt (mg/kg DW)										
Cladoceran 7-d Survival	56	28	34.3	8% (4 of 52)	50% (2 of 4)	89%	No Data	8% (4 of 52)	50% (2 of 4)	89%
Cladoceran 7-d Reproduction	56	28	34.3	8% (4 of 52)	50% (2 of 4)	89%	No Data	8% (4 of 52)	50% (2 of 4)	89%
Cladoceran 7-d All	56	28	34.3	13% (7 of 52)	50% (2 of 4)	84%	No Data	13% (7 of 52)	50% (2 of 4)	84%
Midge 10-d Survival	56	28	34.3	19% (10 of 52)	0% (0 of 4)	75%	No Data	19% (10 of 52)	0% (0 of 4)	75%
Midge 10-d Growth	56	28	34.3	46% (24 of 52)	100% (4 of 4)	57%	No Data	46% (24 of 52)	100% (4 of 4)	57%
Midge 10-d Biomass	56	28	34.3	73% (38 of 52)	100% (4 of 4)	32%	No Data	73% (38 of 52)	100% (4 of 4)	32%
Midge 10-d All	56	28	34.3	77% (40 of 52)	100% (4 of 4)	29%	No Data	77% (40 of 52)	100% (4 of 4)	29%
Amphipod 28-d Survival	56	28	34.3	44% (23 of 52)	75% (3 of 4)	57%	No Data	44% (23 of 52)	75% (3 of 4)	57%
Amphipod 28-d Growth	56	28	34.3	**10% (5 of 52)**	**75% (3 of 4)**	**89%**	No Data	**10% (5 of 52)**	**75% (3 of 4)**	**89%**
Amphipod 28-d Biomass	56	28	34.3	**19% (10 of 52)**	**100% (4 of 4)**	**82%**	No Data	**19% (10 of 52)**	**100% (4 of 4)**	**82%**
Amphipod 28-d All	56	28	34.3	50% (26 of 52)	100% (4 of 4)	54%	No Data	50% (26 of 52)	100% (4 of 4)	54%
All Endpoints	56	28	34.3	81% (42 of 52)	100% (4 of 4)	25%	No Data	81% (42 of 52)	100% (4 of 4)	25%

Table A7.5. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in all sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Copper (mg/kg DW)										
Cladoceran 7-d Survival	67	1090	1330	**8% (5 of 60)**	**57% (4 of 7)**	**88%**	0% (0 of 1)	**8% (5 of 61)**	**67% (4 of 6)**	**90%**
Cladoceran 7-d Reproduction	67	1090	1330	**10% (6 of 60)**	**71% (5 of 7)**	**88%**	0% (0 of 1)	**10% (6 of 61)**	**83% (5 of 6)**	**90%**
Cladoceran 7-d All	67	1090	1330	**17% (10 of 60)**	**71% (5 of 7)**	**82%**	0% (0 of 1)	**16% (10 of 61)**	**83% (5 of 6)**	**84%**
Midge 10-d Survival	64	1090	1330	17% (10 of 59)	0% (0 of 5)	77%	0% (0 of 1)	17% (10 of 60)	0% (0 of 4)	78%
Midge 10-d Growth	64	1090	1330	46% (27 of 59)	100% (5 of 5)	58%	100% (1 of 1)	47% (28 of 60)	100% (4 of 4)	56%
Midge 10-d Biomass	64	1090	1330	69% (41 of 59)	100% (5 of 5)	36%	100% (1 of 1)	70% (42 of 60)	100% (4 of 4)	34%
Midge 10-d All	64	1090	1330	73% (43 of 59)	100% (5 of 5)	33%	100% (1 of 1)	73% (44 of 60)	100% (4 of 4)	31%
Amphipod 28-d Survival	64	1090	1330	44% (26 of 59)	80% (4 of 5)	58%	0% (0 of 1)	43% (26 of 60)	100% (4 of 4)	59%
Amphipod 28-d Growth	64	1090	1330	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	0% (0 of 1)	**8% (5 of 60)**	**75% (3 of 4)**	**91%**
Amphipod 28-d Biomass	64	1090	1330	**19% (11 of 59)**	**100% (5 of 5)**	**83%**	100% (1 of 1)	20% (12 of 60)	100% (4 of 4)	81%
Amphipod 28-d All	64	1090	1330	49% (29 of 59)	100% (5 of 5)	55%	100% (1 of 1)	50% (30 of 60)	100% (4 of 4)	53%
All Endpoints	75	1090	1330	73% (49 of 67)	100% (8 of 8)	35%	100% (1 of 1)	74% (50 of 68)	100% (7 of 7)	33%
Total Iron (mg/kg DW)										
Cladoceran 7-d Survival	56	164000	166000	**7% (4 of 54)**	**100% (2 of 2)**	**93%**	No Data	**7% (4 of 54)**	**100% (2 of 2)**	**93%**
Cladoceran 7-d Reproduction	56	164000	166000	**7% (4 of 54)**	**100% (2 of 2)**	**93%**	No Data	**7% (4 of 54)**	**100% (2 of 2)**	**93%**
Cladoceran 7-d All	56	164000	166000	**13% (7 of 54)**	**100% (2 of 2)**	**88%**	No Data	**13% (7 of 54)**	**100% (2 of 2)**	**88%**
Midge 10-d Survival	56	164000	166000	19% (10 of 54)	0% (0 of 2)	79%	No Data	19% (10 of 54)	0% (0 of 2)	79%
Midge 10-d Growth	56	164000	166000	48% (26 of 54)	100% (2 of 2)	54%	No Data	48% (26 of 54)	100% (2 of 2)	54%
Midge 10-d Biomass	56	164000	166000	74% (40 of 54)	100% (2 of 2)	29%	No Data	74% (40 of 54)	100% (2 of 2)	29%
Midge 10-d All	56	164000	166000	78% (42 of 54)	100% (2 of 2)	25%	No Data	78% (42 of 54)	100% (2 of 2)	25%
Amphipod 28-d Survival	56	164000	166000	44% (24 of 54)	100% (2 of 2)	57%	No Data	44% (24 of 54)	100% (2 of 2)	57%
Amphipod 28-d Growth	56	164000	166000	**11% (6 of 54)**	**100% (2 of 2)**	**89%**	No Data	**11% (6 of 54)**	**100% (2 of 2)**	**89%**
Amphipod 28-d Biomass	56	164000	166000	22% (12 of 54)	100% (2 of 2)	79%	No Data	22% (12 of 54)	100% (2 of 2)	79%
Amphipod 28-d All	56	164000	166000	52% (28 of 54)	100% (2 of 2)	50%	No Data	52% (28 of 54)	100% (2 of 2)	50%
All Endpoints	56	164000	166000	81% (44 of 54)	100% (2 of 2)	21%	No Data	81% (44 of 54)	100% (2 of 2)	21%

Table A7.5. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in all sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Vanadium (mg/kg DW)										
Cladoceran 7-d Survival	56	32.3	33.2	9% (4 of 46)	20% (2 of 10)	79%	No Data	9% (4 of 46)	20% (2 of 10)	79%
Cladoceran 7-d Reproduction	56	32.3	33.2	7% (3 of 46)	30% (3 of 10)	82%	No Data	7% (3 of 46)	30% (3 of 10)	82%
Cladoceran 7-d All	56	32.3	33.2	13% (6 of 46)	30% (3 of 10)	77%	No Data	13% (6 of 46)	30% (3 of 10)	77%
Midge 10-d Survival	56	32.3	33.2	13% (6 of 46)	40% (4 of 10)	79%	No Data	13% (6 of 46)	40% (4 of 10)	79%
Midge 10-d Growth	56	32.3	33.2	48% (22 of 46)	60% (6 of 10)	54%	No Data	48% (22 of 46)	60% (6 of 10)	54%
Midge 10-d Biomass	56	32.3	33.2	72% (33 of 46)	90% (9 of 10)	39%	No Data	72% (33 of 46)	90% (9 of 10)	39%
Midge 10-d All	56	32.3	33.2	76% (35 of 46)	90% (9 of 10)	36%	No Data	76% (35 of 46)	90% (9 of 10)	36%
Amphipod 28-d Survival	56	32.3	33.2	46% (21 of 46)	50% (5 of 10)	54%	No Data	46% (21 of 46)	50% (5 of 10)	54%
Amphipod 28-d Growth	56	32.3	33.2	9% (4 of 46)	40% (4 of 10)	82%	No Data	9% (4 of 46)	40% (4 of 10)	82%
Amphipod 28-d Biomass	56	32.3	33.2	22% (10 of 46)	40% (4 of 10)	71%	No Data	22% (10 of 46)	40% (4 of 10)	71%
Amphipod 28-d All	56	32.3	33.2	52% (24 of 46)	60% (6 of 10)	50%	No Data	52% (24 of 46)	60% (6 of 10)	50%
All Endpoints	56	32.3	33.2	80% (37 of 46)	90% (9 of 10)	32%	No Data	80% (37 of 46)	90% (9 of 10)	32%
Mean PEC-Q $_{EXT\ METAL}$										
Cladoceran 7-d Survival	67	3.82	4.7	**8% (5 of 60)**	**57% (4 of 7)**	**88%**	0% (0 of 2)	**8% (5 of 62)**	**80% (4 of 5)**	**91%**
Cladoceran 7-d Reproduction	67	3.82	4.7	**10% (6 of 60)**	**71% (5 of 7)**	**88%**	0% (0 of 2)	**10% (6 of 62)**	**100% (5 of 5)**	**91%**
Cladoceran 7-d All	67	3.82	4.7	**17% (10 of 60)**	**71% (5 of 7)**	**82%**	0% (0 of 2)	**16% (10 of 62)**	**100% (5 of 5)**	**85%**
Midge 10-d Survival	64	3.82	4.7	17% (10 of 59)	0% (0 of 5)	77%	0% (0 of 2)	16% (10 of 61)	0% (0 of 3)	80%
Midge 10-d Growth	64	3.82	4.7	46% (27 of 59)	100% (5 of 5)	58%	100% (2 of 2)	48% (29 of 61)	100% (3 of 3)	55%
Midge 10-d Biomass	64	3.82	4.7	69% (41 of 59)	100% (5 of 5)	36%	100% (2 of 2)	70% (43 of 61)	100% (3 of 3)	33%
Midge 10-d All	64	3.82	4.7	73% (43 of 59)	100% (5 of 5)	33%	100% (2 of 2)	74% (45 of 61)	100% (3 of 3)	30%
Amphipod 28-d Survival	64	3.82	4.7	42% (25 of 59)	100% (5 of 5)	61%	100% (2 of 2)	44% (27 of 61)	100% (3 of 3)	58%
Amphipod 28-d Growth	64	3.82	4.7	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	50% (1 of 2)	**10% (6 of 61)**	**67% (2 of 3)**	**89%**
Amphipod 28-d Biomass	64	3.82	4.7	20% (12 of 59)	80% (4 of 5)	80%	50% (1 of 2)	21% (13 of 61)	100% (3 of 3)	80%
Amphipod 28-d All	64	3.82	4.7	49% (29 of 59)	100% (5 of 5)	55%	100% (2 of 2)	51% (31 of 61)	100% (3 of 3)	52%
All Endpoints	75	3.82	4.7	73% (49 of 67)	100% (8 of 8)	35%	100% (2 of 2)	74% (51 of 69)	100% (6 of 6)	32%

Table A7.5. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in all sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** $_{METALS}$*										
Cladoceran 7-d Survival	67	32.5	35.8	**8% (5 of 60)**	**57% (4 of 7)**	**88%**	0% (0 of 2)	**8% (5 of 62)**	**80% (4 of 5)**	**91%**
Cladoceran 7-d Reproduction	67	32.5	35.8	**10% (6 of 60)**	**71% (5 of 7)**	**88%**	0% (0 of 2)	**10% (6 of 62)**	**100% (5 of 5)**	**91%**
Cladoceran 7-d All	67	32.5	35.8	**17% (10 of 60)**	**71% (5 of 7)**	**82%**	0% (0 of 2)	**16% (10 of 62)**	**100% (5 of 5)**	**85%**
Midge 10-d Survival	64	32.5	35.8	17% (10 of 59)	0% (0 of 5)	77%	0% (0 of 2)	16% (10 of 61)	0% (0 of 3)	80%
Midge 10-d Growth	64	32.5	35.8	46% (27 of 59)	100% (5 of 5)	58%	100% (2 of 2)	48% (29 of 61)	100% (3 of 3)	55%
Midge 10-d Biomass	64	32.5	35.8	69% (41 of 59)	100% (5 of 5)	36%	100% (2 of 2)	70% (43 of 61)	100% (3 of 3)	33%
Midge 10-d All	64	32.5	35.8	73% (43 of 59)	100% (5 of 5)	33%	100% (2 of 2)	74% (45 of 61)	100% (3 of 3)	30%
Amphipod 28-d Survival	64	32.5	35.8	42% (25 of 59)	100% (5 of 5)	61%	100% (2 of 2)	44% (27 of 61)	100% (3 of 3)	58%
Amphipod 28-d Growth	64	32.5	35.8	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	50% (1 of 2)	**10% (6 of 61)**	**67% (2 of 3)**	**89%**
Amphipod 28-d Biomass	64	32.5	35.8	20% (12 of 59)	80% (4 of 5)	80%	50% (1 of 2)	21% (13 of 61)	100% (3 of 3)	80%
Amphipod 28-d All	64	32.5	35.8	49% (29 of 59)	100% (5 of 5)	55%	100% (2 of 2)	51% (31 of 61)	100% (3 of 3)	52%
All Endpoints	75	32.5	35.8	73% (49 of 67)	100% (8 of 8)	35%	100% (2 of 2)	74% (51 of 69)	100% (6 of 6)	32%
***ΣPEC-Q** $_{METALS(1\%OC)}$*										
Cladoceran 7-d Survival	67	257	291	**10% (6 of 62)**	**60% (3 of 5)**	**88%**	0% (0 of 1)	**10% (6 of 63)**	**75% (3 of 4)**	**90%**
Cladoceran 7-d Reproduction	67	257	291	**11% (7 of 62)**	**80% (4 of 5)**	**88%**	100% (1 of 1)	**13% (8 of 63)**	**75% (3 of 4)**	**87%**
Cladoceran 7-d All	67	257	291	**18% (11 of 62)**	**80% (4 of 5)**	**82%**	100% (1 of 1)	**19% (12 of 63)**	**75% (3 of 4)**	**81%**
Midge 10-d Survival	64	257	291	16% (10 of 61)	0% (0 of 3)	80%	No Data	16% (10 of 61)	0% (0 of 3)	80%
Midge 10-d Growth	64	257	291	48% (29 of 61)	100% (3 of 3)	55%	No Data	48% (29 of 61)	100% (3 of 3)	55%
Midge 10-d Biomass	64	257	291	70% (43 of 61)	100% (3 of 3)	33%	No Data	70% (43 of 61)	100% (3 of 3)	33%
Midge 10-d All	64	257	291	74% (45 of 61)	100% (3 of 3)	30%	No Data	74% (45 of 61)	100% (3 of 3)	30%
Amphipod 28-d Survival	64	257	291	44% (27 of 61)	100% (3 of 3)	58%	No Data	44% (27 of 61)	100% (3 of 3)	58%
Amphipod 28-d Growth	64	257	291	**10% (6 of 61)**	**67% (2 of 3)**	**89%**	No Data	**10% (6 of 61)**	**67% (2 of 3)**	**89%**
Amphipod 28-d Biomass	64	257	291	21% (13 of 61)	100% (3 of 3)	80%	No Data	21% (13 of 61)	100% (3 of 3)	80%
Amphipod 28-d All	64	257	291	51% (31 of 61)	100% (3 of 3)	52%	No Data	51% (31 of 61)	100% (3 of 3)	52%
All Endpoints	75	257	291	74% (51 of 69)	100% (6 of 6)	32%	100% (1 of 1)	74% (52 of 70)	100% (5 of 5)	31%

Table A7.5. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in all sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** EXTMETALS*										
Cladoceran 7-d Survival	67	38.6	41.8	**8% (5 of 60)**	**57% (4 of 7)**	**88%**	0% (0 of 2)	**8% (5 of 62)**	**80% (4 of 5)**	**91%**
Cladoceran 7-d Reproduction	67	38.6	41.8	**10% (6 of 60)**	**71% (5 of 7)**	**88%**	0% (0 of 2)	**10% (6 of 62)**	**100% (5 of 5)**	**91%**
Cladoceran 7-d All	67	38.6	41.8	**17% (10 of 60)**	**71% (5 of 7)**	**82%**	0% (0 of 2)	**16% (10 of 62)**	**100% (5 of 5)**	**85%**
Midge 10-d Survival	64	38.6	41.8	17% (10 of 59)	0% (0 of 5)	77%	0% (0 of 2)	16% (10 of 61)	0% (0 of 3)	80%
Midge 10-d Growth	64	38.6	41.8	46% (27 of 59)	100% (5 of 5)	58%	100% (2 of 2)	48% (29 of 61)	100% (3 of 3)	55%
Midge 10-d Biomass	64	38.6	41.8	69% (41 of 59)	100% (5 of 5)	36%	100% (2 of 2)	70% (43 of 61)	100% (3 of 3)	33%
Midge 10-d All	64	38.6	41.8	73% (43 of 59)	100% (5 of 5)	33%	100% (2 of 2)	74% (45 of 61)	100% (3 of 3)	30%
Amphipod 28-d Survival	64	38.6	41.8	42% (25 of 59)	100% (5 of 5)	61%	100% (2 of 2)	44% (27 of 61)	100% (3 of 3)	58%
Amphipod 28-d Growth	64	38.6	41.8	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	50% (1 of 2)	**10% (6 of 61)**	**67% (2 of 3)**	**89%**
Amphipod 28-d Biomass	64	38.6	41.8	20% (12 of 59)	80% (4 of 5)	80%	50% (1 of 2)	21% (13 of 61)	100% (3 of 3)	80%
Amphipod 28-d All	64	38.6	41.8	49% (29 of 59)	100% (5 of 5)	55%	100% (2 of 2)	51% (31 of 61)	100% (3 of 3)	52%
All Endpoints	75	38.6	41.8	73% (49 of 67)	100% (8 of 8)	35%	100% (2 of 2)	74% (51 of 69)	100% (6 of 6)	32%
***ΣPEC-Q** EXTMETALS(1%OC)*										
Cladoceran 7-d Survival	67	314	340	**10% (6 of 63)**	**75% (3 of 4)**	**90%**	No Data	**10% (6 of 63)**	**75% (3 of 4)**	**90%**
Cladoceran 7-d Reproduction	67	314	340	**13% (8 of 63)**	**75% (3 of 4)**	**87%**	No Data	**13% (8 of 63)**	**75% (3 of 4)**	**87%**
Cladoceran 7-d All	67	314	340	**19% (12 of 63)**	**75% (3 of 4)**	**81%**	No Data	**19% (12 of 63)**	**75% (3 of 4)**	**81%**
Midge 10-d Survival	64	314	340	16% (10 of 62)	0% (0 of 2)	81%	No Data	16% (10 of 62)	0% (0 of 2)	81%
Midge 10-d Growth	64	314	340	48% (30 of 62)	100% (2 of 2)	53%	No Data	48% (30 of 62)	100% (2 of 2)	53%
Midge 10-d Biomass	64	314	340	71% (44 of 62)	100% (2 of 2)	31%	No Data	71% (44 of 62)	100% (2 of 2)	31%
Midge 10-d All	64	314	340	74% (46 of 62)	100% (2 of 2)	28%	No Data	74% (46 of 62)	100% (2 of 2)	28%
Amphipod 28-d Survival	64	314	340	45% (28 of 62)	100% (2 of 2)	56%	No Data	45% (28 of 62)	100% (2 of 2)	56%
Amphipod 28-d Growth	64	314	340	**10% (6 of 62)**	**100% (2 of 2)**	**91%**	No Data	**10% (6 of 62)**	**100% (2 of 2)**	**91%**
Amphipod 28-d Biomass	64	314	340	23% (14 of 62)	100% (2 of 2)	78%	No Data	23% (14 of 62)	100% (2 of 2)	78%
Amphipod 28-d All	64	314	340	52% (32 of 62)	100% (2 of 2)	50%	No Data	52% (32 of 62)	100% (2 of 2)	50%
All Endpoints	75	314	340	75% (53 of 71)	100% (4 of 4)	29%	No Data	75% (53 of 71)	100% (4 of 4)	29%

Table A7.5. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Ceriodaphnia dubia* (endpoint: survival), in all sediments in the Upper Columbia River.

COPC,COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Cu:Al										
Cladoceran 7-d Survival	56	0.096	0.112	9% (5 of 53)	33% (1 of 3)	88%	0% (0 of 1)	9% (5 of 54)	50% (1 of 2)	89%
Cladoceran 7-d Reproduction	56	0.096	0.112	9% (5 of 53)	33% (1 of 3)	88%	0% (0 of 1)	9% (5 of 54)	50% (1 of 2)	89%
Cladoceran 7-d All	56	0.096	0.112	15% (8 of 53)	33% (1 of 3)	82%	0% (0 of 1)	15% (8 of 54)	50% (1 of 2)	84%
Midge 10-d Survival	56	0.096	0.112	19% (10 of 53)	0% (0 of 3)	77%	0% (0 of 1)	19% (10 of 54)	0% (0 of 2)	79%
Midge 10-d Growth	56	0.096	0.112	47% (25 of 53)	100% (3 of 3)	55%	100% (1 of 1)	48% (26 of 54)	100% (2 of 2)	54%
Midge 10-d Biomass	56	0.096	0.112	74% (39 of 53)	100% (3 of 3)	30%	100% (1 of 1)	74% (40 of 54)	100% (2 of 2)	29%
Midge 10-d All	56	0.096	0.112	77% (41 of 53)	100% (3 of 3)	27%	100% (1 of 1)	78% (42 of 54)	100% (2 of 2)	25%
Amphipod 28-d Survival	56	0.096	0.112	45% (24 of 53)	67% (2 of 3)	55%	0% (0 of 1)	44% (24 of 54)	100% (2 of 2)	57%
Amphipod 28-d Growth	56	0.096	0.112	**11% (6 of 53)**	**67% (2 of 3)**	**88%**	0% (0 of 1)	**11% (6 of 54)**	**100% (2 of 2)**	**89%**
Amphipod 28-d Biomass	56	0.096	0.112	21% (11 of 53)	100% (3 of 3)	80%	100% (1 of 1)	22% (12 of 54)	100% (2 of 2)	79%
Amphipod 28-d All	56	0.096	0.112	51% (27 of 53)	100% (3 of 3)	52%	100% (1 of 1)	52% (28 of 54)	100% (2 of 2)	50%
All Endpoints	56	0.096	0.112	81% (43 of 53)	100% (3 of 3)	23%	100% (1 of 1)	81% (44 of 54)	100% (2 of 2)	21%

Class. = classification; COPC = chemical of potential concern; TPST = threshold for predicting sediment toxicity; LI = low impact; HR = high impact; PEC-Q = probable effect concentration-quotients; OC = organic carbon; Al = alumium; Cu = copper; d = day; IOT = incidence of toxicity.

$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).

$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.

1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.

[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.6. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Barium (mg/kg DW)										
Cladoceran 7-d Survival	19	1010	1060	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	No Data	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d Reproduction	19	1010	1060	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	No Data	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d All	19	1010	1060	**12% (2 of 16)**	**67% (2 of 3)**	**84%**	No Data	**12% (2 of 16)**	**67% (2 of 3)**	**84%**
Midge 10-d Survival	19	1010	1060	6% (1 of 16)	0% (0 of 3)	79%	No Data	6% (1 of 16)	0% (0 of 3)	79%
Midge 10-d Growth	19	1010	1060	44% (7 of 16)	100% (3 of 3)	63%	No Data	44% (7 of 16)	100% (3 of 3)	63%
Midge 10-d Biomass	19	1010	1060	69% (11 of 16)	100% (3 of 3)	42%	No Data	69% (11 of 16)	100% (3 of 3)	42%
Midge 10-d All	19	1010	1060	75% (12 of 16)	100% (3 of 3)	37%	No Data	75% (12 of 16)	100% (3 of 3)	37%
Amphipod 28-d Survival	19	1010	1060	69% (11 of 16)	100% (3 of 3)	42%	No Data	69% (11 of 16)	100% (3 of 3)	42%
Amphipod 28-d Growth	19	1010	1060	**12% (2 of 16)**	**100% (3 of 3)**	**89%**	No Data	**12% (2 of 16)**	**100% (3 of 3)**	**89%**
Amphipod 28-d Biomass	19	1010	1060	31% (5 of 16)	100% (3 of 3)	74%	No Data	31% (5 of 16)	100% (3 of 3)	74%
Amphipod 28-d All	19	1010	1060	75% (12 of 16)	100% (3 of 3)	37%	No Data	75% (12 of 16)	100% (3 of 3)	37%
All Endpoints	19	1010	1060	88% (14 of 16)	100% (3 of 3)	26%	No Data	88% (14 of 16)	100% (3 of 3)	26%
Total Beryllium (mg/kg DW)										
Cladoceran 7-d Survival	19	1.23	1.24	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Cladoceran 7-d Reproduction	19	1.23	1.24	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Cladoceran 7-d All	19	1.23	1.24	**12% (2 of 17)**	**100% (2 of 2)**	**89%**	No Data	**12% (2 of 17)**	**100% (2 of 2)**	**89%**
Midge 10-d Survival	19	1.23	1.24	6% (1 of 17)	0% (0 of 2)	84%	No Data	6% (1 of 17)	0% (0 of 2)	84%
Midge 10-d Growth	19	1.23	1.24	47% (8 of 17)	100% (2 of 2)	58%	No Data	47% (8 of 17)	100% (2 of 2)	58%
Midge 10-d Biomass	19	1.23	1.24	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Midge 10-d All	19	1.23	1.24	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
Amphipod 28-d Survival	19	1.23	1.24	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Amphipod 28-d Growth	19	1.23	1.24	**18% (3 of 17)**	**100% (2 of 2)**	**84%**	No Data	**18% (3 of 17)**	**100% (2 of 2)**	**84%**
Amphipod 28-d Biomass	19	1.23	1.24	35% (6 of 17)	100% (2 of 2)	68%	No Data	35% (6 of 17)	100% (2 of 2)	68%
Amphipod 28-d All	19	1.23	1.24	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
All Endpoints	19	1.23	1.24	88% (15 of 17)	100% (2 of 2)	21%	No Data	88% (15 of 17)	100% (2 of 2)	21%

Table A7.6. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Calcium (mg/kg DW)										
Cladoceran 7-d Survival	19	39200	40000	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	No Data	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d Reproduction	19	39200	40000	**0% (0 of 16)**	**100% (3 of 3)**	**100%**	No Data	**0% (0 of 16)**	**100% (3 of 3)**	**100%**
Cladoceran 7-d All	19	39200	40000	**6% (1 of 16)**	**100% (3 of 3)**	**95%**	No Data	**6% (1 of 16)**	**100% (3 of 3)**	**95%**
Midge 10-d Survival	19	39200	40000	6% (1 of 16)	0% (0 of 3)	79%	No Data	6% (1 of 16)	0% (0 of 3)	79%
Midge 10-d Growth	19	39200	40000	44% (7 of 16)	100% (3 of 3)	63%	No Data	44% (7 of 16)	100% (3 of 3)	63%
Midge 10-d Biomass	19	39200	40000	69% (11 of 16)	100% (3 of 3)	42%	No Data	69% (11 of 16)	100% (3 of 3)	42%
Midge 10-d All	19	39200	40000	75% (12 of 16)	100% (3 of 3)	37%	No Data	75% (12 of 16)	100% (3 of 3)	37%
Amphipod 28-d Survival	19	39200	40000	69% (11 of 16)	100% (3 of 3)	42%	No Data	69% (11 of 16)	100% (3 of 3)	42%
Amphipod 28-d Growth	19	39200	40000	**12% (2 of 16)**	**100% (3 of 3)**	**89%**	No Data	**12% (2 of 16)**	**100% (3 of 3)**	**89%**
Amphipod 28-d Biomass	19	39200	40000	31% (5 of 16)	100% (3 of 3)	74%	No Data	31% (5 of 16)	100% (3 of 3)	74%
Amphipod 28-d All	19	39200	40000	75% (12 of 16)	100% (3 of 3)	37%	No Data	75% (12 of 16)	100% (3 of 3)	37%
All Endpoints	19	39200	40000	88% (14 of 16)	100% (3 of 3)	26%	No Data	88% (14 of 16)	100% (3 of 3)	26%
Total Cobalt (mg/kg DW)										
Cladoceran 7-d Survival	19	33.8	37.2	7% (1 of 15)	50% (2 of 4)	84%	0% (0 of 1)	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d Reproduction	19	33.8	37.2	7% (1 of 15)	50% (2 of 4)	84%	0% (0 of 1)	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d All	19	33.8	37.2	13% (2 of 15)	50% (2 of 4)	79%	0% (0 of 1)	**12% (2 of 16)**	**67% (2 of 3)**	**84%**
Midge 10-d Survival	19	33.8	37.2	7% (1 of 15)	0% (0 of 4)	74%	0% (0 of 1)	6% (1 of 16)	0% (0 of 3)	79%
Midge 10-d Growth	19	33.8	37.2	40% (6 of 15)	100% (4 of 4)	68%	100% (1 of 1)	44% (7 of 16)	100% (3 of 3)	63%
Midge 10-d Biomass	19	33.8	37.2	67% (10 of 15)	100% (4 of 4)	47%	100% (1 of 1)	69% (11 of 16)	100% (3 of 3)	42%
Midge 10-d All	19	33.8	37.2	73% (11 of 15)	100% (4 of 4)	42%	100% (1 of 1)	75% (12 of 16)	100% (3 of 3)	37%
Amphipod 28-d Survival	19	33.8	37.2	73% (11 of 15)	75% (3 of 4)	37%	0% (0 of 1)	69% (11 of 16)	100% (3 of 3)	42%
Amphipod 28-d Growth	19	33.8	37.2	**13% (2 of 15)**	**75% (3 of 4)**	**84%**	0% (0 of 1)	**12% (2 of 16)**	**100% (3 of 3)**	**89%**
Amphipod 28-d Biomass	19	33.8	37.2	27% (4 of 15)	100% (4 of 4)	79%	100% (1 of 1)	31% (5 of 16)	100% (3 of 3)	74%
Amphipod 28-d All	19	33.8	37.2	73% (11 of 15)	100% (4 of 4)	42%	100% (1 of 1)	75% (12 of 16)	100% (3 of 3)	37%
All Endpoints	19	33.8	37.2	87% (13 of 15)	100% (4 of 4)	32%	100% (1 of 1)	88% (14 of 16)	100% (3 of 3)	26%

Table A7.6. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Iron (mg/kg DW)										
Cladoceran 7-d Survival	19	139000	142000	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Cladoceran 7-d Reproduction	19	139000	142000	**6% (1 of 17)**	**100% (2 of 2)**	**95%**	No Data	**6% (1 of 17)**	**100% (2 of 2)**	**95%**
Cladoceran 7-d All	19	139000	142000	**12% (2 of 17)**	**100% (2 of 2)**	**89%**	No Data	**12% (2 of 17)**	**100% (2 of 2)**	**89%**
Midge 10-d Survival	19	139000	142000	6% (1 of 17)	0% (0 of 2)	84%	No Data	6% (1 of 17)	0% (0 of 2)	84%
Midge 10-d Growth	19	139000	142000	47% (8 of 17)	100% (2 of 2)	58%	No Data	47% (8 of 17)	100% (2 of 2)	58%
Midge 10-d Biomass	19	139000	142000	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Midge 10-d All	19	139000	142000	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
Amphipod 28-d Survival	19	139000	142000	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Amphipod 28-d Growth	19	139000	142000	**18% (3 of 17)**	**100% (2 of 2)**	**84%**	No Data	**18% (3 of 17)**	**100% (2 of 2)**	**84%**
Amphipod 28-d Biomass	19	139000	142000	35% (6 of 17)	100% (2 of 2)	68%	No Data	35% (6 of 17)	100% (2 of 2)	68%
Amphipod 28-d All	19	139000	142000	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
All Endpoints	19	139000	142000	88% (15 of 17)	100% (2 of 2)	21%	No Data	88% (15 of 17)	100% (2 of 2)	21%
SE Chromium (µmol/g)										
Cladoceran 7-d Survival	19	0.749	0.867	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	100% (1 of 1)	12% (2 of 17)	50% (1 of 2)	84%
Cladoceran 7-d Reproduction	19	0.749	0.867	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	100% (1 of 1)	12% (2 of 17)	50% (1 of 2)	84%
Cladoceran 7-d All	19	0.749	0.867	**12% (2 of 16)**	**67% (2 of 3)**	**84%**	100% (1 of 1)	18% (3 of 17)	50% (1 of 2)	79%
Midge 10-d Survival	19	0.749	0.867	6% (1 of 16)	0% (0 of 3)	79%	0% (0 of 1)	6% (1 of 17)	0% (0 of 2)	84%
Midge 10-d Growth	19	0.749	0.867	44% (7 of 16)	100% (3 of 3)	63%	100% (1 of 1)	47% (8 of 17)	100% (2 of 2)	58%
Midge 10-d Biomass	19	0.749	0.867	69% (11 of 16)	100% (3 of 3)	42%	100% (1 of 1)	71% (12 of 17)	100% (2 of 2)	37%
Midge 10-d All	19	0.749	0.867	75% (12 of 16)	100% (3 of 3)	37%	100% (1 of 1)	76% (13 of 17)	100% (2 of 2)	32%
Amphipod 28-d Survival	19	0.749	0.867	69% (11 of 16)	100% (3 of 3)	42%	100% (1 of 1)	71% (12 of 17)	100% (2 of 2)	37%
Amphipod 28-d Growth	19	0.749	0.867	**12% (2 of 16)**	**100% (3 of 3)**	**89%**	100% (1 of 1)	**18% (3 of 17)**	**100% (2 of 2)**	**84%**
Amphipod 28-d Biomass	19	0.749	0.867	31% (5 of 16)	100% (3 of 3)	74%	100% (1 of 1)	35% (6 of 17)	100% (2 of 2)	68%
Amphipod 28-d All	19	0.749	0.867	75% (12 of 16)	100% (3 of 3)	37%	100% (1 of 1)	76% (13 of 17)	100% (2 of 2)	32%
All Endpoints	19	0.749	0.867	88% (14 of 16)	100% (3 of 3)	26%	100% (1 of 1)	88% (15 of 17)	100% (2 of 2)	21%

Table A7.6. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
SE Zinc (µmol/g)										
Cladoceran 7-d Survival	19	121	128	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	100% (1 of 1)	12% (2 of 17)	50% (1 of 2)	84%
Cladoceran 7-d Reproduction	19	121	128	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	100% (1 of 1)	12% (2 of 17)	50% (1 of 2)	84%
Cladoceran 7-d All	19	121	128	**12% (2 of 16)**	**67% (2 of 3)**	**84%**	100% (1 of 1)	18% (3 of 17)	50% (1 of 2)	79%
Midge 10-d Survival	21	121	128	6% (1 of 17)	0% (0 of 4)	76%	0% (0 of 1)	6% (1 of 18)	0% (0 of 3)	81%
Midge 10-d Growth	21	121	128	41% (7 of 17)	100% (4 of 4)	67%	100% (1 of 1)	44% (8 of 18)	100% (3 of 3)	62%
Midge 10-d Biomass	21	121	128	65% (11 of 17)	100% (4 of 4)	48%	100% (1 of 1)	67% (12 of 18)	100% (3 of 3)	43%
Midge 10-d All	21	121	128	71% (12 of 17)	100% (4 of 4)	43%	100% (1 of 1)	72% (13 of 18)	100% (3 of 3)	38%
Amphipod 28-d Survival	21	121	128	65% (11 of 17)	100% (4 of 4)	48%	100% (1 of 1)	67% (12 of 18)	100% (3 of 3)	43%
Amphipod 28-d Growth	21	121	128	**12% (2 of 17)**	**75% (3 of 4)**	**86%**	100% (1 of 1)	**17% (3 of 18)**	**67% (2 of 3)**	**81%**
Amphipod 28-d Biomass	21	121	128	29% (5 of 17)	100% (4 of 4)	76%	100% (1 of 1)	33% (6 of 18)	100% (3 of 3)	71%
Amphipod 28-d All	21	121	128	71% (12 of 17)	100% (4 of 4)	43%	100% (1 of 1)	72% (13 of 18)	100% (3 of 3)	38%
All Endpoints	21	121	128	82% (14 of 17)	100% (4 of 4)	33%	100% (1 of 1)	83% (15 of 18)	100% (3 of 3)	29%
Mean PEC-Q $_{METALS(1\%OC)}$										
Cladoceran 7-d Survival	24	26.5	31.8	12% (2 of 17)	43% (3 of 7)	75%	0% (0 of 1)	11% (2 of 18)	50% (3 of 6)	79%
Cladoceran 7-d Reproduction	24	26.5	31.8	12% (2 of 17)	57% (4 of 7)	79%	0% (0 of 1)	**11% (2 of 18)**	**67% (4 of 6)**	**83%**
Cladoceran 7-d All	24	26.5	31.8	18% (3 of 17)	57% (4 of 7)	75%	0% (0 of 1)	17% (3 of 18)	67% (4 of 6)	79%
Midge 10-d Survival	21	26.5	31.8	6% (1 of 16)	0% (0 of 5)	71%	0% (0 of 1)	6% (1 of 17)	0% (0 of 4)	76%
Midge 10-d Growth	21	26.5	31.8	38% (6 of 16)	100% (5 of 5)	71%	100% (1 of 1)	41% (7 of 17)	100% (4 of 4)	67%
Midge 10-d Biomass	21	26.5	31.8	62% (10 of 16)	100% (5 of 5)	52%	100% (1 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Midge 10-d All	21	26.5	31.8	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
Amphipod 28-d Survival	21	26.5	31.8	69% (11 of 16)	80% (4 of 5)	43%	0% (0 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Amphipod 28-d Growth	21	26.5	31.8	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	0% (0 of 1)	**12% (2 of 17)**	**75% (3 of 4)**	**86%**
Amphipod 28-d Biomass	21	26.5	31.8	25% (4 of 16)	100% (5 of 5)	81%	100% (1 of 1)	29% (5 of 17)	100% (4 of 4)	76%
Amphipod 28-d All	21	26.5	31.8	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
All Endpoints	26	26.5	31.8	72% (13 of 18)	100% (8 of 8)	50%	100% (1 of 1)	74% (14 of 19)	100% (7 of 7)	46%

Table A7.6. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***Mean PEC-Q** $_{EXTMETALS}$*										
Cladoceran 7-d Survival	24	4.54	4.61	**5% (1 of 19)**	**80% (4 of 5)**	**92%**	No Data	**5% (1 of 19)**	**80% (4 of 5)**	**92%**
Cladoceran 7-d Reproduction	24	4.54	4.61	**5% (1 of 19)**	**100% (5 of 5)**	**96%**	No Data	**5% (1 of 19)**	**100% (5 of 5)**	**96%**
Cladoceran 7-d All	24	4.54	4.61	**11% (2 of 19)**	**100% (5 of 5)**	**92%**	No Data	**11% (2 of 19)**	**100% (5 of 5)**	**92%**
Midge 10-d Survival	21	4.54	4.61	6% (1 of 18)	0% (0 of 3)	81%	No Data	6% (1 of 18)	0% (0 of 3)	81%
Midge 10-d Growth	21	4.54	4.61	44% (8 of 18)	100% (3 of 3)	62%	No Data	44% (8 of 18)	100% (3 of 3)	62%
Midge 10-d Biomass	21	4.54	4.61	67% (12 of 18)	100% (3 of 3)	43%	No Data	67% (12 of 18)	100% (3 of 3)	43%
Midge 10-d All	21	4.54	4.61	72% (13 of 18)	100% (3 of 3)	38%	No Data	72% (13 of 18)	100% (3 of 3)	38%
Amphipod 28-d Survival	21	4.54	4.61	67% (12 of 18)	100% (3 of 3)	43%	No Data	67% (12 of 18)	100% (3 of 3)	43%
Amphipod 28-d Growth	21	4.54	4.61	**17% (3 of 18)**	**67% (2 of 3)**	**81%**	No Data	**17% (3 of 18)**	**67% (2 of 3)**	**81%**
Amphipod 28-d Biomass	21	4.54	4.61	33% (6 of 18)	100% (3 of 3)	71%	No Data	33% (6 of 18)	100% (3 of 3)	71%
Amphipod 28-d All	21	4.54	4.61	72% (13 of 18)	100% (3 of 3)	38%	No Data	72% (13 of 18)	100% (3 of 3)	38%
All Endpoints	26	4.54	4.61	75% (15 of 20)	100% (6 of 6)	42%	No Data	75% (15 of 20)	100% (6 of 6)	42%
***Mean PEC-Q** $_{EXTMETALS(1\%OC)}$*										
Cladoceran 7-d Survival	24	22.1	27	12% (2 of 17)	43% (3 of 7)	75%	0% (0 of 1)	11% (2 of 18)	50% (3 of 6)	79%
Cladoceran 7-d Reproduction	24	22.1	27	12% (2 of 17)	57% (4 of 7)	79%	0% (0 of 1)	**11% (2 of 18)**	**67% (4 of 6)**	**83%**
Cladoceran 7-d All	24	22.1	27	18% (3 of 17)	57% (4 of 7)	75%	0% (0 of 1)	17% (3 of 18)	67% (4 of 6)	79%
Midge 10-d Survival	21	22.1	27	6% (1 of 16)	0% (0 of 5)	71%	0% (0 of 1)	6% (1 of 17)	0% (0 of 4)	76%
Midge 10-d Growth	21	22.1	27	38% (6 of 16)	100% (5 of 5)	71%	100% (1 of 1)	41% (7 of 17)	100% (4 of 4)	67%
Midge 10-d Biomass	21	22.1	27	62% (10 of 16)	100% (5 of 5)	52%	100% (1 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Midge 10-d All	21	22.1	27	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
Amphipod 28-d Survival	21	22.1	27	69% (11 of 16)	80% (4 of 5)	43%	0% (0 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Amphipod 28-d Growth	21	22.1	27	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	0% (0 of 1)	**12% (2 of 17)**	**75% (3 of 4)**	**86%**
Amphipod 28-d Biomass	21	22.1	27	25% (4 of 16)	100% (5 of 5)	81%	100% (1 of 1)	29% (5 of 17)	100% (4 of 4)	76%
Amphipod 28-d All	21	22.1	27	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
All Endpoints	26	22.1	27	72% (13 of 18)	100% (8 of 8)	50%	100% (1 of 1)	74% (14 of 19)	100% (7 of 7)	46%

Table A7.6. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** $_{METALS(1\%OC)}$*										
Cladoceran 7-d Survival	24	175	205	12% (2 of 17)	43% (3 of 7)	75%	No Data	12% (2 of 17)	43% (3 of 7)	75%
Cladoceran 7-d Reproduction	24	175	205	12% (2 of 17)	57% (4 of 7)	79%	No Data	12% (2 of 17)	57% (4 of 7)	79%
Cladoceran 7-d All	24	175	205	18% (3 of 17)	57% (4 of 7)	75%	No Data	18% (3 of 17)	57% (4 of 7)	75%
Midge 10-d Survival	21	175	205	6% (1 of 16)	0% (0 of 5)	71%	No Data	6% (1 of 16)	0% (0 of 5)	71%
Midge 10-d Growth	21	175	205	38% (6 of 16)	100% (5 of 5)	71%	No Data	38% (6 of 16)	100% (5 of 5)	71%
Midge 10-d Biomass	21	175	205	62% (10 of 16)	100% (5 of 5)	52%	No Data	62% (10 of 16)	100% (5 of 5)	52%
Midge 10-d All	21	175	205	69% (11 of 16)	100% (5 of 5)	48%	No Data	69% (11 of 16)	100% (5 of 5)	48%
Amphipod 28-d Survival	21	175	205	69% (11 of 16)	80% (4 of 5)	43%	No Data	69% (11 of 16)	80% (4 of 5)	43%
Amphipod 28-d Growth	21	175	205	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	No Data	**12% (2 of 16)**	**60% (3 of 5)**	**81%**
Amphipod 28-d Biomass	21	175	205	25% (4 of 16)	100% (5 of 5)	81%	No Data	25% (4 of 16)	100% (5 of 5)	81%
Amphipod 28-d All	21	175	205	69% (11 of 16)	100% (5 of 5)	48%	No Data	69% (11 of 16)	100% (5 of 5)	48%
All Endpoints	26	175	205	72% (13 of 18)	100% (8 of 8)	50%	No Data	72% (13 of 18)	100% (8 of 8)	50%
***ΣPEC-Q** $_{EXTMETALS(1\%OC)}$*										
Cladoceran 7-d Survival	24	197	230	12% (2 of 17)	43% (3 of 7)	75%	No Data	12% (2 of 17)	43% (3 of 7)	75%
Cladoceran 7-d Reproduction	24	197	230	12% (2 of 17)	57% (4 of 7)	79%	No Data	12% (2 of 17)	57% (4 of 7)	79%
Cladoceran 7-d All	24	197	230	18% (3 of 17)	57% (4 of 7)	75%	No Data	18% (3 of 17)	57% (4 of 7)	75%
Midge 10-d Survival	21	197	230	6% (1 of 16)	0% (0 of 5)	71%	No Data	6% (1 of 16)	0% (0 of 5)	71%
Midge 10-d Growth	21	197	230	38% (6 of 16)	100% (5 of 5)	71%	No Data	38% (6 of 16)	100% (5 of 5)	71%
Midge 10-d Biomass	21	197	230	62% (10 of 16)	100% (5 of 5)	52%	No Data	62% (10 of 16)	100% (5 of 5)	52%
Midge 10-d All	21	197	230	69% (11 of 16)	100% (5 of 5)	48%	No Data	69% (11 of 16)	100% (5 of 5)	48%
Amphipod 28-d Survival	21	197	230	69% (11 of 16)	80% (4 of 5)	43%	No Data	69% (11 of 16)	80% (4 of 5)	43%
Amphipod 28-d Growth	21	197	230	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	No Data	**12% (2 of 16)**	**60% (3 of 5)**	**81%**
Amphipod 28-d Biomass	21	197	230	25% (4 of 16)	100% (5 of 5)	81%	No Data	25% (4 of 16)	100% (5 of 5)	81%
Amphipod 28-d All	21	197	230	69% (11 of 16)	100% (5 of 5)	48%	No Data	69% (11 of 16)	100% (5 of 5)	48%
All Endpoints	26	197	230	72% (13 of 18)	100% (8 of 8)	50%	No Data	72% (13 of 18)	100% (8 of 8)	50%

Table A7.6. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Cu:Al										
Cladoceran 7-d Survival	19	0.103	0.112	12% (2 of 17)	50% (1 of 2)	84%	No Data	12% (2 of 17)	50% (1 of 2)	84%
Cladoceran 7-d Reproduction	19	0.103	0.112	12% (2 of 17)	50% (1 of 2)	84%	No Data	12% (2 of 17)	50% (1 of 2)	84%
Cladoceran 7-d All	19	0.103	0.112	18% (3 of 17)	50% (1 of 2)	79%	No Data	18% (3 of 17)	50% (1 of 2)	79%
Midge 10-d Survival	19	0.103	0.112	6% (1 of 17)	0% (0 of 2)	84%	No Data	6% (1 of 17)	0% (0 of 2)	84%
Midge 10-d Growth	19	0.103	0.112	47% (8 of 17)	100% (2 of 2)	58%	No Data	47% (8 of 17)	100% (2 of 2)	58%
Midge 10-d Biomass	19	0.103	0.112	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Midge 10-d All	19	0.103	0.112	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
Amphipod 28-d Survival	19	0.103	0.112	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Amphipod 28-d Growth	19	0.103	0.112	**18% (3 of 17)**	**100% (2 of 2)**	**84%**	No Data	**18% (3 of 17)**	**100% (2 of 2)**	**84%**
Amphipod 28-d Biomass	19	0.103	0.112	35% (6 of 17)	100% (2 of 2)	68%	No Data	35% (6 of 17)	100% (2 of 2)	68%
Amphipod 28-d All	19	0.103	0.112	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
All Endpoints	19	0.103	0.112	88% (15 of 17)	100% (2 of 2)	21%	No Data	88% (15 of 17)	100% (2 of 2)	21%
Percent Sand (%)										
Cladoceran 7-d Survival	19	95.4	95.7	7% (1 of 15)	50% (2 of 4)	84%	0% (0 of 1)	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d Reproduction	19	95.4	95.7	**0% (0 of 15)**	**75% (3 of 4)**	**95%**	100% (1 of 1)	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d All	19	95.4	95.7	**7% (1 of 15)**	**75% (3 of 4)**	**89%**	100% (1 of 1)	**12% (2 of 16)**	**67% (2 of 3)**	**84%**
Midge 10-d Survival	21	95.4	95.7	6% (1 of 17)	0% (0 of 4)	76%	0% (0 of 1)	6% (1 of 18)	0% (0 of 3)	81%
Midge 10-d Growth	21	95.4	95.7	41% (7 of 17)	100% (4 of 4)	67%	100% (1 of 1)	44% (8 of 18)	100% (3 of 3)	62%
Midge 10-d Biomass	21	95.4	95.7	65% (11 of 17)	100% (4 of 4)	48%	100% (1 of 1)	67% (12 of 18)	100% (3 of 3)	43%
Midge 10-d All	21	95.4	95.7	71% (12 of 17)	100% (4 of 4)	43%	100% (1 of 1)	72% (13 of 18)	100% (3 of 3)	38%
Amphipod 28-d Survival	21	95.4	95.7	65% (11 of 17)	100% (4 of 4)	48%	100% (1 of 1)	67% (12 of 18)	100% (3 of 3)	43%
Amphipod 28-d Growth	21	95.4	95.7	**6% (1 of 17)**	**100% (4 of 4)**	**95%**	100% (1 of 1)	**11% (2 of 18)**	**100% (3 of 3)**	**90%**
Amphipod 28-d Biomass	21	95.4	95.7	29% (5 of 17)	100% (4 of 4)	76%	100% (1 of 1)	33% (6 of 18)	100% (3 of 3)	71%
Amphipod 28-d All	21	95.4	95.7	71% (12 of 17)	100% (4 of 4)	43%	100% (1 of 1)	72% (13 of 18)	100% (3 of 3)	38%
All Endpoints	21	95.4	95.7	82% (14 of 17)	100% (4 of 4)	33%	100% (1 of 1)	83% (15 of 18)	100% (3 of 3)	29%

Table A7.6. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SE = simultaneously extracted; Al = alumium; Cd = cadmium; Cu = copper; Zn = zinc; d = day; IOT = incidence of toxicity.
$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).
$PEC\text{-}Q_{EXT\ METALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.7. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Barium (mg/kg DW)										
Cladoceran 7-d Survival	37	1010	1060	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	1010	1060	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	1010	1060	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	1010	1060	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	1010	1060	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	1010	1060	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	1010	1060	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	1010	1060	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	1010	1060	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	1010	1060	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	1010	1060	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	1010	1060	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Total Beryllium (mg/kg DW)										
Cladoceran 7-d Survival	37	1.23	1.24	9% (3 of 33)	0% (0 of 4)	81%	No Data	9% (3 of 33)	0% (0 of 4)	81%
Cladoceran 7-d Reproduction	37	1.23	1.24	6% (2 of 33)	25% (1 of 4)	86%	No Data	6% (2 of 33)	25% (1 of 4)	86%
Cladoceran 7-d All	37	1.23	1.24	12% (4 of 33)	25% (1 of 4)	81%	No Data	12% (4 of 33)	25% (1 of 4)	81%
Midge 10-d Survival	37	1.23	1.24	24% (8 of 33)	25% (1 of 4)	70%	No Data	24% (8 of 33)	25% (1 of 4)	70%
Midge 10-d Growth	37	1.23	1.24	45% (15 of 33)	75% (3 of 4)	57%	No Data	45% (15 of 33)	75% (3 of 4)	57%
Midge 10-d Biomass	37	1.23	1.24	73% (24 of 33)	100% (4 of 4)	35%	No Data	73% (24 of 33)	100% (4 of 4)	35%
Midge 10-d All	37	1.23	1.24	76% (25 of 33)	100% (4 of 4)	32%	No Data	76% (25 of 33)	100% (4 of 4)	32%
Amphipod 28-d Survival	37	1.23	1.24	36% (12 of 33)	0% (0 of 4)	57%	No Data	36% (12 of 33)	0% (0 of 4)	57%
Amphipod 28-d Growth	37	1.23	1.24	6% (2 of 33)	25% (1 of 4)	86%	No Data	6% (2 of 33)	25% (1 of 4)	86%
Amphipod 28-d Biomass	37	1.23	1.24	15% (5 of 33)	25% (1 of 4)	78%	No Data	15% (5 of 33)	25% (1 of 4)	78%
Amphipod 28-d All	37	1.23	1.24	42% (14 of 33)	25% (1 of 4)	54%	No Data	42% (14 of 33)	25% (1 of 4)	54%
All Endpoints	37	1.23	1.24	76% (25 of 33)	100% (4 of 4)	32%	No Data	76% (25 of 33)	100% (4 of 4)	32%

Table A7.7. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Calcium (mg/kg DW)										
Cladoceran 7-d Survival	37	39200	40000	9% (3 of 34)	0% (0 of 3)	84%	No Data	9% (3 of 34)	0% (0 of 3)	84%
Cladoceran 7-d Reproduction	37	39200	40000	9% (3 of 34)	0% (0 of 3)	84%	No Data	9% (3 of 34)	0% (0 of 3)	84%
Cladoceran 7-d All	37	39200	40000	15% (5 of 34)	0% (0 of 3)	78%	No Data	15% (5 of 34)	0% (0 of 3)	78%
Midge 10-d Survival	37	39200	40000	26% (9 of 34)	0% (0 of 3)	68%	No Data	26% (9 of 34)	0% (0 of 3)	68%
Midge 10-d Growth	37	39200	40000	53% (18 of 34)	0% (0 of 3)	43%	No Data	53% (18 of 34)	0% (0 of 3)	43%
Midge 10-d Biomass	37	39200	40000	82% (28 of 34)	0% (0 of 3)	16%	No Data	82% (28 of 34)	0% (0 of 3)	16%
Midge 10-d All	37	39200	40000	85% (29 of 34)	0% (0 of 3)	14%	No Data	85% (29 of 34)	0% (0 of 3)	14%
Amphipod 28-d Survival	37	39200	40000	35% (12 of 34)	0% (0 of 3)	59%	No Data	35% (12 of 34)	0% (0 of 3)	59%
Amphipod 28-d Growth	37	39200	40000	9% (3 of 34)	0% (0 of 3)	84%	No Data	9% (3 of 34)	0% (0 of 3)	84%
Amphipod 28-d Biomass	37	39200	40000	18% (6 of 34)	0% (0 of 3)	76%	No Data	18% (6 of 34)	0% (0 of 3)	76%
Amphipod 28-d All	37	39200	40000	44% (15 of 34)	0% (0 of 3)	51%	No Data	44% (15 of 34)	0% (0 of 3)	51%
All Endpoints	37	39200	40000	85% (29 of 34)	0% (0 of 3)	14%	No Data	85% (29 of 34)	0% (0 of 3)	14%
Total Cobalt (mg/kg DW)										
Cladoceran 7-d Survival	37	33.8	37.2	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	33.8	37.2	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	33.8	37.2	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	33.8	37.2	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	33.8	37.2	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	33.8	37.2	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	33.8	37.2	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	33.8	37.2	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	33.8	37.2	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	33.8	37.2	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	33.8	37.2	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	33.8	37.2	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%

Table A7.7. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Iron (mg/kg DW)										
Cladoceran 7-d Survival	37	139000	142000	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	139000	142000	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	139000	142000	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	139000	142000	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	139000	142000	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	139000	142000	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	139000	142000	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	139000	142000	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	139000	142000	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	139000	142000	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	139000	142000	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	139000	142000	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
SE Chromium (µmol/g)										
Cladoceran 7-d Survival	37	0.749	0.867	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	0.749	0.867	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	0.749	0.867	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	0.749	0.867	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	0.749	0.867	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	0.749	0.867	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	0.749	0.867	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	0.749	0.867	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	0.749	0.867	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	0.749	0.867	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	0.749	0.867	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	0.749	0.867	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%

Table A7.7. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
SE Zinc (μmol/g)										
Cladoceran 7-d Survival	37	121	128	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	121	128	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	121	128	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	43	121	128	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	121	128	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	121	128	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	121	128	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	121	128	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	121	128	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	121	128	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	121	128	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	43	121	128	77% (33 of 43)	No Data	23%	No Data	77% (33 of 43)	No Data	23%
Mean PEC-Q $_{METAL(1\%OC)}$										
Cladoceran 7-d Survival	43	26.5	31.8	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	26.5	31.8	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	26.5	31.8	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	26.5	31.8	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	26.5	31.8	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	26.5	31.8	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	26.5	31.8	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	26.5	31.8	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	26.5	31.8	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	26.5	31.8	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	26.5	31.8	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	26.5	31.8	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.7. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***Mean PEC-Q** $_{EXTMETALS}$*										
Cladoceran 7-d Survival	43	4.54	4.61	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	4.54	4.61	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	4.54	4.61	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	4.54	4.61	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	4.54	4.61	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	4.54	4.61	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	4.54	4.61	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	4.54	4.61	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	4.54	4.61	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	4.54	4.61	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	4.54	4.61	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	4.54	4.61	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%
***Mean PEC-Q** $_{EXTMETAL(1\%OC)}$*										
Cladoceran 7-d Survival	43	22.1	27	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	22.1	27	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	22.1	27	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	22.1	27	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	22.1	27	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	22.1	27	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	22.1	27	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	22.1	27	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	22.1	27	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	22.1	27	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	22.1	27	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	22.1	27	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.7. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** $_{METALS(1\%OC)}$*										
Cladoceran 7-d Survival	43	175	205	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	175	205	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	175	205	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	175	205	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	175	205	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	175	205	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	175	205	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	175	205	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	175	205	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	175	205	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	175	205	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	175	205	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%
***ΣPEC-Q** $_{EXTMETALS(1\%OC)}$*										
Cladoceran 7-d Survival	43	197	230	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	197	230	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	197	230	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	197	230	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	197	230	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	197	230	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	197	230	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	197	230	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	197	230	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	197	230	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	197	230	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	197	230	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.7. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Cu:Al										
Cladoceran 7-d Survival	37	0.103	0.112	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	0.103	0.112	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	0.103	0.112	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	0.103	0.112	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	0.103	0.112	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	0.103	0.112	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	0.103	0.112	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	0.103	0.112	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	0.103	0.112	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	0.103	0.112	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	0.103	0.112	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	0.103	0.112	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Percent Sand (%)										
Cladoceran 7-d Survival	37	95.4	95.7	**6% (2 of 36)**	**100% (1 of 1)**	**95%**	No Data	**6% (2 of 36)**	**100% (1 of 1)**	**95%**
Cladoceran 7-d Reproduction	37	95.4	95.7	8% (3 of 36)	0% (0 of 1)	89%	No Data	8% (3 of 36)	0% (0 of 1)	89%
Cladoceran 7-d All	37	95.4	95.7	**11% (4 of 36)**	**100% (1 of 1)**	**89%**	No Data	**11% (4 of 36)**	**100% (1 of 1)**	**89%**
Midge 10-d Survival	43	95.4	95.7	21% (9 of 42)	0% (0 of 1)	77%	No Data	21% (9 of 42)	0% (0 of 1)	77%
Midge 10-d Growth	43	95.4	95.7	48% (20 of 42)	100% (1 of 1)	53%	No Data	48% (20 of 42)	100% (1 of 1)	53%
Midge 10-d Biomass	43	95.4	95.7	71% (30 of 42)	100% (1 of 1)	30%	No Data	71% (30 of 42)	100% (1 of 1)	30%
Midge 10-d All	43	95.4	95.7	74% (31 of 42)	100% (1 of 1)	28%	No Data	74% (31 of 42)	100% (1 of 1)	28%
Amphipod 28-d Survival	43	95.4	95.7	33% (14 of 42)	100% (1 of 1)	67%	No Data	33% (14 of 42)	100% (1 of 1)	67%
Amphipod 28-d Growth	43	95.4	95.7	7% (3 of 42)	0% (0 of 1)	91%	No Data	7% (3 of 42)	0% (0 of 1)	91%
Amphipod 28-d Biomass	43	95.4	95.7	17% (7 of 42)	0% (0 of 1)	81%	No Data	17% (7 of 42)	0% (0 of 1)	81%
Amphipod 28-d All	43	95.4	95.7	40% (17 of 42)	100% (1 of 1)	60%	No Data	40% (17 of 42)	100% (1 of 1)	60%
All Endpoints	43	95.4	95.7	76% (32 of 42)	100% (1 of 1)	26%	No Data	76% (32 of 42)	100% (1 of 1)	26%

Table A7.7. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SE = simultaneously extracted; Al = alumium; Cd = cadmium; Cu = copper; Zn = zinc; d = day; IOT = incidence of toxicity.

$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).

$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.

1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.

[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.8. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Barium (mg/kg DW)										
Cladoceran 7-d Survival	56	1010	1060	**8% (4 of 53)**	**67% (2 of 3)**	**91%**	No Data	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d Reproduction	56	1010	1060	**8% (4 of 53)**	**67% (2 of 3)**	**91%**	No Data	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d All	56	1010	1060	**13% (7 of 53)**	**67% (2 of 3)**	**86%**	No Data	**13% (7 of 53)**	**67% (2 of 3)**	**86%**
Midge 10-d Survival	56	1010	1060	19% (10 of 53)	0% (0 of 3)	77%	No Data	19% (10 of 53)	0% (0 of 3)	77%
Midge 10-d Growth	56	1010	1060	47% (25 of 53)	100% (3 of 3)	55%	No Data	47% (25 of 53)	100% (3 of 3)	55%
Midge 10-d Biomass	56	1010	1060	74% (39 of 53)	100% (3 of 3)	30%	No Data	74% (39 of 53)	100% (3 of 3)	30%
Midge 10-d All	56	1010	1060	77% (41 of 53)	100% (3 of 3)	27%	No Data	77% (41 of 53)	100% (3 of 3)	27%
Amphipod 28-d Survival	56	1010	1060	43% (23 of 53)	100% (3 of 3)	59%	No Data	43% (23 of 53)	100% (3 of 3)	59%
Amphipod 28-d Growth	56	1010	1060	**9% (5 of 53)**	**100% (3 of 3)**	**91%**	No Data	**9% (5 of 53)**	**100% (3 of 3)**	**91%**
Amphipod 28-d Biomass	56	1010	1060	21% (11 of 53)	100% (3 of 3)	80%	No Data	21% (11 of 53)	100% (3 of 3)	80%
Amphipod 28-d All	56	1010	1060	51% (27 of 53)	100% (3 of 3)	52%	No Data	51% (27 of 53)	100% (3 of 3)	52%
All Endpoints	56	1010	1060	81% (43 of 53)	100% (3 of 3)	23%	No Data	81% (43 of 53)	100% (3 of 3)	23%
Total Beryllium (mg/kg DW)										
Cladoceran 7-d Survival	56	1.23	1.24	8% (4 of 50)	33% (2 of 6)	86%	No Data	8% (4 of 50)	33% (2 of 6)	86%
Cladoceran 7-d Reproduction	56	1.23	1.24	6% (3 of 50)	50% (3 of 6)	89%	No Data	6% (3 of 50)	50% (3 of 6)	89%
Cladoceran 7-d All	56	1.23	1.24	12% (6 of 50)	50% (3 of 6)	84%	No Data	12% (6 of 50)	50% (3 of 6)	84%
Midge 10-d Survival	56	1.23	1.24	18% (9 of 50)	17% (1 of 6)	75%	No Data	18% (9 of 50)	17% (1 of 6)	75%
Midge 10-d Growth	56	1.23	1.24	46% (23 of 50)	83% (5 of 6)	57%	No Data	46% (23 of 50)	83% (5 of 6)	57%
Midge 10-d Biomass	56	1.23	1.24	72% (36 of 50)	100% (6 of 6)	36%	No Data	72% (36 of 50)	100% (6 of 6)	36%
Midge 10-d All	56	1.23	1.24	76% (38 of 50)	100% (6 of 6)	32%	No Data	76% (38 of 50)	100% (6 of 6)	32%
Amphipod 28-d Survival	56	1.23	1.24	48% (24 of 50)	33% (2 of 6)	50%	No Data	48% (24 of 50)	33% (2 of 6)	50%
Amphipod 28-d Growth	56	1.23	1.24	10% (5 of 50)	50% (3 of 6)	86%	No Data	10% (5 of 50)	50% (3 of 6)	86%
Amphipod 28-d Biomass	56	1.23	1.24	22% (11 of 50)	50% (3 of 6)	75%	No Data	22% (11 of 50)	50% (3 of 6)	75%
Amphipod 28-d All	56	1.23	1.24	54% (27 of 50)	50% (3 of 6)	46%	No Data	54% (27 of 50)	50% (3 of 6)	46%
All Endpoints	56	1.23	1.24	80% (40 of 50)	100% (6 of 6)	29%	No Data	80% (40 of 50)	100% (6 of 6)	29%

Table A7.8. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1] <$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Calcium (mg/kg DW)										
Cladoceran 7-d Survival	56	39200	40000	8% (4 of 50)	33% (2 of 6)	86%	No Data	8% (4 of 50)	33% (2 of 6)	86%
Cladoceran 7-d Reproduction	56	39200	40000	6% (3 of 50)	50% (3 of 6)	89%	No Data	6% (3 of 50)	50% (3 of 6)	89%
Cladoceran 7-d All	56	39200	40000	12% (6 of 50)	50% (3 of 6)	84%	No Data	12% (6 of 50)	50% (3 of 6)	84%
Midge 10-d Survival	56	39200	40000	20% (10 of 50)	0% (0 of 6)	71%	No Data	20% (10 of 50)	0% (0 of 6)	71%
Midge 10-d Growth	56	39200	40000	50% (25 of 50)	50% (3 of 6)	50%	No Data	50% (25 of 50)	50% (3 of 6)	50%
Midge 10-d Biomass	56	39200	40000	78% (39 of 50)	50% (3 of 6)	25%	No Data	78% (39 of 50)	50% (3 of 6)	25%
Midge 10-d All	56	39200	40000	82% (41 of 50)	50% (3 of 6)	21%	No Data	82% (41 of 50)	50% (3 of 6)	21%
Amphipod 28-d Survival	56	39200	40000	46% (23 of 50)	50% (3 of 6)	54%	No Data	46% (23 of 50)	50% (3 of 6)	54%
Amphipod 28-d Growth	56	39200	40000	10% (5 of 50)	50% (3 of 6)	86%	No Data	10% (5 of 50)	50% (3 of 6)	86%
Amphipod 28-d Biomass	56	39200	40000	22% (11 of 50)	50% (3 of 6)	75%	No Data	22% (11 of 50)	50% (3 of 6)	75%
Amphipod 28-d All	56	39200	40000	54% (27 of 50)	50% (3 of 6)	46%	No Data	54% (27 of 50)	50% (3 of 6)	46%
All Endpoints	56	39200	40000	86% (43 of 50)	50% (3 of 6)	18%	No Data	86% (43 of 50)	50% (3 of 6)	18%
Total Cobalt (mg/kg DW)										
Cladoceran 7-d Survival	56	33.8	37.2	8% (4 of 52)	50% (2 of 4)	89%	0% (0 of 1)	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d Reproduction	56	33.8	37.2	8% (4 of 52)	50% (2 of 4)	89%	0% (0 of 1)	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d All	56	33.8	37.2	13% (7 of 52)	50% (2 of 4)	84%	0% (0 of 1)	**13% (7 of 53)**	**67% (2 of 3)**	**86%**
Midge 10-d Survival	56	33.8	37.2	19% (10 of 52)	0% (0 of 4)	75%	0% (0 of 1)	19% (10 of 53)	0% (0 of 3)	77%
Midge 10-d Growth	56	33.8	37.2	46% (24 of 52)	100% (4 of 4)	57%	100% (1 of 1)	47% (25 of 53)	100% (3 of 3)	55%
Midge 10-d Biomass	56	33.8	37.2	73% (38 of 52)	100% (4 of 4)	32%	100% (1 of 1)	74% (39 of 53)	100% (3 of 3)	30%
Midge 10-d All	56	33.8	37.2	77% (40 of 52)	100% (4 of 4)	29%	100% (1 of 1)	77% (41 of 53)	100% (3 of 3)	27%
Amphipod 28-d Survival	56	33.8	37.2	44% (23 of 52)	75% (3 of 4)	57%	0% (0 of 1)	43% (23 of 53)	100% (3 of 3)	59%
Amphipod 28-d Growth	56	33.8	37.2	**10% (5 of 52)**	**75% (3 of 4)**	**89%**	0% (0 of 1)	**9% (5 of 53)**	**100% (3 of 3)**	**91%**
Amphipod 28-d Biomass	56	33.8	37.2	**19% (10 of 52)**	**100% (4 of 4)**	**82%**	100% (1 of 1)	21% (11 of 53)	100% (3 of 3)	80%
Amphipod 28-d All	56	33.8	37.2	50% (26 of 52)	100% (4 of 4)	54%	100% (1 of 1)	51% (27 of 53)	100% (3 of 3)	52%
All Endpoints	56	33.8	37.2	81% (42 of 52)	100% (4 of 4)	25%	100% (1 of 1)	81% (43 of 53)	100% (3 of 3)	23%

Table A7.8. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Iron (mg/kg DW)										
Cladoceran 7-d Survival	56	139000	142000	**7% (4 of 54)**	**100% (2 of 2)**	**93%**	No Data	**7% (4 of 54)**	**100% (2 of 2)**	**93%**
Cladoceran 7-d Reproduction	56	139000	142000	**7% (4 of 54)**	**100% (2 of 2)**	**93%**	No Data	**7% (4 of 54)**	**100% (2 of 2)**	**93%**
Cladoceran 7-d All	56	139000	142000	**13% (7 of 54)**	**100% (2 of 2)**	**88%**	No Data	**13% (7 of 54)**	**100% (2 of 2)**	**88%**
Midge 10-d Survival	56	139000	142000	19% (10 of 54)	0% (0 of 2)	79%	No Data	19% (10 of 54)	0% (0 of 2)	79%
Midge 10-d Growth	56	139000	142000	48% (26 of 54)	100% (2 of 2)	54%	No Data	48% (26 of 54)	100% (2 of 2)	54%
Midge 10-d Biomass	56	139000	142000	74% (40 of 54)	100% (2 of 2)	29%	No Data	74% (40 of 54)	100% (2 of 2)	29%
Midge 10-d All	56	139000	142000	78% (42 of 54)	100% (2 of 2)	25%	No Data	78% (42 of 54)	100% (2 of 2)	25%
Amphipod 28-d Survival	56	139000	142000	44% (24 of 54)	100% (2 of 2)	57%	No Data	44% (24 of 54)	100% (2 of 2)	57%
Amphipod 28-d Growth	56	139000	142000	**11% (6 of 54)**	**100% (2 of 2)**	**89%**	No Data	**11% (6 of 54)**	**100% (2 of 2)**	**89%**
Amphipod 28-d Biomass	56	139000	142000	22% (12 of 54)	100% (2 of 2)	79%	No Data	22% (12 of 54)	100% (2 of 2)	79%
Amphipod 28-d All	56	139000	142000	52% (28 of 54)	100% (2 of 2)	50%	No Data	52% (28 of 54)	100% (2 of 2)	50%
All Endpoints	56	139000	142000	81% (44 of 54)	100% (2 of 2)	21%	No Data	81% (44 of 54)	100% (2 of 2)	21%
SE Chromium (µmol/g)										
Cladoceran 7-d Survival	56	0.749	0.867	**8% (4 of 53)**	**67% (2 of 3)**	**91%**	100% (1 of 1)	9% (5 of 54)	50% (1 of 2)	89%
Cladoceran 7-d Reproduction	56	0.749	0.867	**8% (4 of 53)**	**67% (2 of 3)**	**91%**	100% (1 of 1)	9% (5 of 54)	50% (1 of 2)	89%
Cladoceran 7-d All	56	0.749	0.867	**13% (7 of 53)**	**67% (2 of 3)**	**86%**	100% (1 of 1)	15% (8 of 54)	50% (1 of 2)	84%
Midge 10-d Survival	56	0.749	0.867	19% (10 of 53)	0% (0 of 3)	77%	0% (0 of 1)	19% (10 of 54)	0% (0 of 2)	79%
Midge 10-d Growth	56	0.749	0.867	47% (25 of 53)	100% (3 of 3)	55%	100% (1 of 1)	48% (26 of 54)	100% (2 of 2)	54%
Midge 10-d Biomass	56	0.749	0.867	74% (39 of 53)	100% (3 of 3)	30%	100% (1 of 1)	74% (40 of 54)	100% (2 of 2)	29%
Midge 10-d All	56	0.749	0.867	77% (41 of 53)	100% (3 of 3)	27%	100% (1 of 1)	78% (42 of 54)	100% (2 of 2)	25%
Amphipod 28-d Survival	56	0.749	0.867	43% (23 of 53)	100% (3 of 3)	59%	100% (1 of 1)	44% (24 of 54)	100% (2 of 2)	57%
Amphipod 28-d Growth	56	0.749	0.867	**9% (5 of 53)**	**100% (3 of 3)**	**91%**	100% (1 of 1)	**11% (6 of 54)**	**100% (2 of 2)**	**89%**
Amphipod 28-d Biomass	56	0.749	0.867	21% (11 of 53)	100% (3 of 3)	80%	100% (1 of 1)	22% (12 of 54)	100% (2 of 2)	79%
Amphipod 28-d All	56	0.749	0.867	51% (27 of 53)	100% (3 of 3)	52%	100% (1 of 1)	52% (28 of 54)	100% (2 of 2)	50%
All Endpoints	56	0.749	0.867	81% (43 of 53)	100% (3 of 3)	23%	100% (1 of 1)	81% (44 of 54)	100% (2 of 2)	21%

Table A7.8. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
SE Zinc (µmol/g)										
Cladoceran 7-d Survival	56	121	128	**8% (4 of 53)**	**67% (2 of 3)**	**91%**	100% (1 of 1)	9% (5 of 54)	50% (1 of 2)	89%
Cladoceran 7-d Reproduction	56	121	128	**8% (4 of 53)**	**67% (2 of 3)**	**91%**	100% (1 of 1)	9% (5 of 54)	50% (1 of 2)	89%
Cladoceran 7-d All	56	121	128	**13% (7 of 53)**	**67% (2 of 3)**	**86%**	100% (1 of 1)	15% (8 of 54)	50% (1 of 2)	84%
Midge 10-d Survival	64	121	128	17% (10 of 60)	0% (0 of 4)	78%	0% (0 of 1)	16% (10 of 61)	0% (0 of 3)	80%
Midge 10-d Growth	64	121	128	47% (28 of 60)	100% (4 of 4)	56%	100% (1 of 1)	48% (29 of 61)	100% (3 of 3)	55%
Midge 10-d Biomass	64	121	128	70% (42 of 60)	100% (4 of 4)	34%	100% (1 of 1)	70% (43 of 61)	100% (3 of 3)	33%
Midge 10-d All	64	121	128	73% (44 of 60)	100% (4 of 4)	31%	100% (1 of 1)	74% (45 of 61)	100% (3 of 3)	30%
Amphipod 28-d Survival	64	121	128	43% (26 of 60)	100% (4 of 4)	59%	100% (1 of 1)	44% (27 of 61)	100% (3 of 3)	58%
Amphipod 28-d Growth	64	121	128	**8% (5 of 60)**	**75% (3 of 4)**	**91%**	100% (1 of 1)	**10% (6 of 61)**	**67% (2 of 3)**	**89%**
Amphipod 28-d Biomass	64	121	128	20% (12 of 60)	100% (4 of 4)	81%	100% (1 of 1)	21% (13 of 61)	100% (3 of 3)	80%
Amphipod 28-d All	64	121	128	50% (30 of 60)	100% (4 of 4)	53%	100% (1 of 1)	51% (31 of 61)	100% (3 of 3)	52%
All Endpoints	64	121	128	78% (47 of 60)	100% (4 of 4)	27%	100% (1 of 1)	79% (48 of 61)	100% (3 of 3)	25%
Mean PEC-Q $_{METAL(1\%OC)}$										
Cladoceran 7-d Survival	67	26.5	31.8	10% (6 of 60)	43% (3 of 7)	85%	0% (0 of 1)	10% (6 of 61)	50% (3 of 6)	87%
Cladoceran 7-d Reproduction	67	26.5	31.8	**12% (7 of 60)**	**57% (4 of 7)**	**85%**	0% (0 of 1)	**11% (7 of 61)**	**67% (4 of 6)**	**87%**
Cladoceran 7-d All	67	26.5	31.8	18% (11 of 60)	57% (4 of 7)	79%	0% (0 of 1)	**18% (11 of 61)**	**67% (4 of 6)**	**81%**
Midge 10-d Survival	64	26.5	31.8	17% (10 of 59)	0% (0 of 5)	77%	0% (0 of 1)	17% (10 of 60)	0% (0 of 4)	78%
Midge 10-d Growth	64	26.5	31.8	46% (27 of 59)	100% (5 of 5)	58%	100% (1 of 1)	47% (28 of 60)	100% (4 of 4)	56%
Midge 10-d Biomass	64	26.5	31.8	69% (41 of 59)	100% (5 of 5)	36%	100% (1 of 1)	70% (42 of 60)	100% (4 of 4)	34%
Midge 10-d All	64	26.5	31.8	73% (43 of 59)	100% (5 of 5)	33%	100% (1 of 1)	73% (44 of 60)	100% (4 of 4)	31%
Amphipod 28-d Survival	64	26.5	31.8	44% (26 of 59)	80% (4 of 5)	58%	0% (0 of 1)	43% (26 of 60)	100% (4 of 4)	59%
Amphipod 28-d Growth	64	26.5	31.8	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	0% (0 of 1)	**8% (5 of 60)**	**75% (3 of 4)**	**91%**
Amphipod 28-d Biomass	64	26.5	31.8	**19% (11 of 59)**	**100% (5 of 5)**	**83%**	100% (1 of 1)	20% (12 of 60)	100% (4 of 4)	81%
Amphipod 28-d All	64	26.5	31.8	49% (29 of 59)	100% (5 of 5)	55%	100% (1 of 1)	50% (30 of 60)	100% (4 of 4)	53%
All Endpoints	75	26.5	31.8	73% (49 of 67)	100% (8 of 8)	35%	100% (1 of 1)	74% (50 of 68)	100% (7 of 7)	33%

Table A7.8. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Mean PEC-Q $_{EXTMETALS}$										
Cladoceran 7-d Survival	67	4.54	4.61	**8% (5 of 62)**	**80% (4 of 5)**	**91%**	No Data	**8% (5 of 62)**	**80% (4 of 5)**	**91%**
Cladoceran 7-d Reproduction	67	4.54	4.61	**10% (6 of 62)**	**100% (5 of 5)**	**91%**	No Data	**10% (6 of 62)**	**100% (5 of 5)**	**91%**
Cladoceran 7-d All	67	4.54	4.61	**16% (10 of 62)**	**100% (5 of 5)**	**85%**	No Data	**16% (10 of 62)**	**100% (5 of 5)**	**85%**
Midge 10-d Survival	64	4.54	4.61	16% (10 of 61)	0% (0 of 3)	80%	No Data	16% (10 of 61)	0% (0 of 3)	80%
Midge 10-d Growth	64	4.54	4.61	48% (29 of 61)	100% (3 of 3)	55%	No Data	48% (29 of 61)	100% (3 of 3)	55%
Midge 10-d Biomass	64	4.54	4.61	70% (43 of 61)	100% (3 of 3)	33%	No Data	70% (43 of 61)	100% (3 of 3)	33%
Midge 10-d All	64	4.54	4.61	74% (45 of 61)	100% (3 of 3)	30%	No Data	74% (45 of 61)	100% (3 of 3)	30%
Amphipod 28-d Survival	64	4.54	4.61	44% (27 of 61)	100% (3 of 3)	58%	No Data	44% (27 of 61)	100% (3 of 3)	58%
Amphipod 28-d Growth	64	4.54	4.61	**10% (6 of 61)**	**67% (2 of 3)**	**89%**	No Data	**10% (6 of 61)**	**67% (2 of 3)**	**89%**
Amphipod 28-d Biomass	64	4.54	4.61	21% (13 of 61)	100% (3 of 3)	80%	No Data	21% (13 of 61)	100% (3 of 3)	80%
Amphipod 28-d All	64	4.54	4.61	51% (31 of 61)	100% (3 of 3)	52%	No Data	51% (31 of 61)	100% (3 of 3)	52%
All Endpoints	75	4.54	4.61	74% (51 of 69)	100% (6 of 6)	32%	No Data	74% (51 of 69)	100% (6 of 6)	32%
Mean PEC-Q $_{EXTMETALS(1\%OC)}$										
Cladoceran 7-d Survival	67	22.1	27	10% (6 of 60)	43% (3 of 7)	85%	0% (0 of 1)	10% (6 of 61)	50% (3 of 6)	87%
Cladoceran 7-d Reproduction	67	22.1	27	**12% (7 of 60)**	**57% (4 of 7)**	**85%**	0% (0 of 1)	**11% (7 of 61)**	**67% (4 of 6)**	**87%**
Cladoceran 7-d All	67	22.1	27	18% (11 of 60)	57% (4 of 7)	79%	0% (0 of 1)	**18% (11 of 61)**	**67% (4 of 6)**	**81%**
Midge 10-d Survival	64	22.1	27	17% (10 of 59)	0% (0 of 5)	77%	0% (0 of 1)	17% (10 of 60)	0% (0 of 4)	78%
Midge 10-d Growth	64	22.1	27	46% (27 of 59)	100% (5 of 5)	58%	100% (1 of 1)	47% (28 of 60)	100% (4 of 4)	56%
Midge 10-d Biomass	64	22.1	27	69% (41 of 59)	100% (5 of 5)	36%	100% (1 of 1)	70% (42 of 60)	100% (4 of 4)	34%
Midge 10-d All	64	22.1	27	73% (43 of 59)	100% (5 of 5)	33%	100% (1 of 1)	73% (44 of 60)	100% (4 of 4)	31%
Amphipod 28-d Survival	64	22.1	27	44% (26 of 59)	80% (4 of 5)	58%	0% (0 of 1)	43% (26 of 60)	100% (4 of 4)	59%
Amphipod 28-d Growth	64	22.1	27	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	0% (0 of 1)	**8% (5 of 60)**	**75% (3 of 4)**	**91%**
Amphipod 28-d Biomass	64	22.1	27	**19% (11 of 59)**	**100% (5 of 5)**	**83%**	100% (1 of 1)	20% (12 of 60)	100% (4 of 4)	81%
Amphipod 28-d All	64	22.1	27	49% (29 of 59)	100% (5 of 5)	55%	100% (1 of 1)	50% (30 of 60)	100% (4 of 4)	53%
All Endpoints	75	22.1	27	73% (49 of 67)	100% (8 of 8)	35%	100% (1 of 1)	74% (50 of 68)	100% (7 of 7)	33%

Table A7.8. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** $_{METALS(1\%OC)}$*										
Cladoceran 7-d Survival	67	175	205	10% (6 of 60)	43% (3 of 7)	85%	No Data	10% (6 of 60)	43% (3 of 7)	85%
Cladoceran 7-d Reproduction	67	175	205	**12% (7 of 60)**	**57% (4 of 7)**	**85%**	No Data	**12% (7 of 60)**	**57% (4 of 7)**	**85%**
Cladoceran 7-d All	67	175	205	18% (11 of 60)	57% (4 of 7)	79%	No Data	18% (11 of 60)	57% (4 of 7)	79%
Midge 10-d Survival	64	175	205	17% (10 of 59)	0% (0 of 5)	77%	No Data	17% (10 of 59)	0% (0 of 5)	77%
Midge 10-d Growth	64	175	205	46% (27 of 59)	100% (5 of 5)	58%	No Data	46% (27 of 59)	100% (5 of 5)	58%
Midge 10-d Biomass	64	175	205	69% (41 of 59)	100% (5 of 5)	36%	No Data	69% (41 of 59)	100% (5 of 5)	36%
Midge 10-d All	64	175	205	73% (43 of 59)	100% (5 of 5)	33%	No Data	73% (43 of 59)	100% (5 of 5)	33%
Amphipod 28-d Survival	64	175	205	44% (26 of 59)	80% (4 of 5)	58%	No Data	44% (26 of 59)	80% (4 of 5)	58%
Amphipod 28-d Growth	64	175	205	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	No Data	**8% (5 of 59)**	**60% (3 of 5)**	**89%**
Amphipod 28-d Biomass	64	175	205	**19% (11 of 59)**	**100% (5 of 5)**	**83%**	No Data	**19% (11 of 59)**	**100% (5 of 5)**	**83%**
Amphipod 28-d All	64	175	205	49% (29 of 59)	100% (5 of 5)	55%	No Data	49% (29 of 59)	100% (5 of 5)	55%
All Endpoints	75	175	205	73% (49 of 67)	100% (8 of 8)	35%	No Data	73% (49 of 67)	100% (8 of 8)	35%
***ΣPEC-Q** $_{EXTMETALS(1\%OC)}$*										
Cladoceran 7-d Survival	67	197	230	10% (6 of 60)	43% (3 of 7)	85%	No Data	10% (6 of 60)	43% (3 of 7)	85%
Cladoceran 7-d Reproduction	67	197	230	**12% (7 of 60)**	**57% (4 of 7)**	**85%**	No Data	**12% (7 of 60)**	**57% (4 of 7)**	**85%**
Cladoceran 7-d All	67	197	230	18% (11 of 60)	57% (4 of 7)	79%	No Data	18% (11 of 60)	57% (4 of 7)	79%
Midge 10-d Survival	64	197	230	17% (10 of 59)	0% (0 of 5)	77%	No Data	17% (10 of 59)	0% (0 of 5)	77%
Midge 10-d Growth	64	197	230	46% (27 of 59)	100% (5 of 5)	58%	No Data	46% (27 of 59)	100% (5 of 5)	58%
Midge 10-d Biomass	64	197	230	69% (41 of 59)	100% (5 of 5)	36%	No Data	69% (41 of 59)	100% (5 of 5)	36%
Midge 10-d All	64	197	230	73% (43 of 59)	100% (5 of 5)	33%	No Data	73% (43 of 59)	100% (5 of 5)	33%
Amphipod 28-d Survival	64	197	230	44% (26 of 59)	80% (4 of 5)	58%	No Data	44% (26 of 59)	80% (4 of 5)	58%
Amphipod 28-d Growth	64	197	230	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	No Data	**8% (5 of 59)**	**60% (3 of 5)**	**89%**
Amphipod 28-d Biomass	64	197	230	**19% (11 of 59)**	**100% (5 of 5)**	**83%**	No Data	**19% (11 of 59)**	**100% (5 of 5)**	**83%**
Amphipod 28-d All	64	197	230	49% (29 of 59)	100% (5 of 5)	55%	No Data	49% (29 of 59)	100% (5 of 5)	55%
All Endpoints	75	197	230	73% (49 of 67)	100% (8 of 8)	35%	No Data	73% (49 of 67)	100% (8 of 8)	35%

Table A7.8. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Cu:Al										
Cladoceran 7-d Survival	56	0.103	0.112	9% (5 of 54)	50% (1 of 2)	89%	No Data	9% (5 of 54)	50% (1 of 2)	89%
Cladoceran 7-d Reproduction	56	0.103	0.112	9% (5 of 54)	50% (1 of 2)	89%	No Data	9% (5 of 54)	50% (1 of 2)	89%
Cladoceran 7-d All	56	0.103	0.112	15% (8 of 54)	50% (1 of 2)	84%	No Data	15% (8 of 54)	50% (1 of 2)	84%
Midge 10-d Survival	56	0.103	0.112	19% (10 of 54)	0% (0 of 2)	79%	No Data	19% (10 of 54)	0% (0 of 2)	79%
Midge 10-d Growth	56	0.103	0.112	48% (26 of 54)	100% (2 of 2)	54%	No Data	48% (26 of 54)	100% (2 of 2)	54%
Midge 10-d Biomass	56	0.103	0.112	74% (40 of 54)	100% (2 of 2)	29%	No Data	74% (40 of 54)	100% (2 of 2)	29%
Midge 10-d All	56	0.103	0.112	78% (42 of 54)	100% (2 of 2)	25%	No Data	78% (42 of 54)	100% (2 of 2)	25%
Amphipod 28-d Survival	56	0.103	0.112	44% (24 of 54)	100% (2 of 2)	57%	No Data	44% (24 of 54)	100% (2 of 2)	57%
Amphipod 28-d Growth	56	0.103	0.112	**11% (6 of 54)**	**100% (2 of 2)**	**89%**	No Data	**11% (6 of 54)**	**100% (2 of 2)**	**89%**
Amphipod 28-d Biomass	56	0.103	0.112	22% (12 of 54)	100% (2 of 2)	79%	No Data	22% (12 of 54)	100% (2 of 2)	79%
Amphipod 28-d All	56	0.103	0.112	52% (28 of 54)	100% (2 of 2)	50%	No Data	52% (28 of 54)	100% (2 of 2)	50%
All Endpoints	56	0.103	0.112	81% (44 of 54)	100% (2 of 2)	21%	No Data	81% (44 of 54)	100% (2 of 2)	21%
Percent Sand (%)										
Cladoceran 7-d Survival	56	95.4	95.7	**6% (3 of 51)**	**60% (3 of 5)**	**91%**	0% (0 of 1)	**6% (3 of 52)**	**75% (3 of 4)**	**93%**
Cladoceran 7-d Reproduction	56	95.4	95.7	**6% (3 of 51)**	**60% (3 of 5)**	**91%**	100% (1 of 1)	8% (4 of 52)	50% (2 of 4)	89%
Cladoceran 7-d All	56	95.4	95.7	**10% (5 of 51)**	**80% (4 of 5)**	**89%**	100% (1 of 1)	**12% (6 of 52)**	**75% (3 of 4)**	**88%**
Midge 10-d Survival	64	95.4	95.7	17% (10 of 59)	0% (0 of 5)	77%	0% (0 of 1)	17% (10 of 60)	0% (0 of 4)	78%
Midge 10-d Growth	64	95.4	95.7	46% (27 of 59)	100% (5 of 5)	58%	100% (1 of 1)	47% (28 of 60)	100% (4 of 4)	56%
Midge 10-d Biomass	64	95.4	95.7	69% (41 of 59)	100% (5 of 5)	36%	100% (1 of 1)	70% (42 of 60)	100% (4 of 4)	34%
Midge 10-d All	64	95.4	95.7	73% (43 of 59)	100% (5 of 5)	33%	100% (1 of 1)	73% (44 of 60)	100% (4 of 4)	31%
Amphipod 28-d Survival	64	95.4	95.7	42% (25 of 59)	100% (5 of 5)	61%	100% (1 of 1)	43% (26 of 60)	100% (4 of 4)	59%
Amphipod 28-d Growth	64	95.4	95.7	**7% (4 of 59)**	**80% (4 of 5)**	**92%**	100% (1 of 1)	**8% (5 of 60)**	**75% (3 of 4)**	**91%**
Amphipod 28-d Biomass	64	95.4	95.7	20% (12 of 59)	80% (4 of 5)	80%	100% (1 of 1)	22% (13 of 60)	75% (3 of 4)	78%
Amphipod 28-d All	64	95.4	95.7	49% (29 of 59)	100% (5 of 5)	55%	100% (1 of 1)	50% (30 of 60)	100% (4 of 4)	53%
All Endpoints	64	95.4	95.7	78% (46 of 59)	100% (5 of 5)	28%	100% (1 of 1)	78% (47 of 60)	100% (4 of 4)	27%

Table A7.8. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 7-day toxicity tests with the cladoceran, *Chironomus dilutus* (endpoint: reproduction), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SE = simultaneously extracted; Al = alumium; Cd = cadmium; Cu = copper; Zn = zinc; d = day; IOT = incidence of toxicity.

$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).

$PEC\text{-}Q_{EXT\ METALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.

1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.

[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.9. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: growth), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPSTT_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
(ΣSEM-AVS)/f_{OC} (µmol/g)										
Cladoceran 7-d Survival	19	6380	19200	17% (1 of 6)	15% (2 of 13)	37%	0% (0 of 5)	9% (1 of 11)	25% (2 of 8)	63%
Cladoceran 7-d Reproduction	19	6380	19200	0% (0 of 6)	23% (3 of 13)	47%	0% (0 of 5)	0% (0 of 11)	38% (3 of 8)	74%
Cladoceran 7-d All	19	6380	19200	17% (1 of 6)	23% (3 of 13)	42%	0% (0 of 5)	9% (1 of 11)	38% (3 of 8)	68%
Midge 10-d Survival	21	6380	19200	0% (0 of 7)	7% (1 of 14)	38%	20% (1 of 5)	8% (1 of 12)	0% (0 of 9)	52%
Midge 10-d Growth	21	6380	19200	29% (2 of 7)	64% (9 of 14)	67%	20% (1 of 5)	25% (3 of 12)	89% (8 of 9)	81%
Midge 10-d Biomass	21	6380	19200	**14% (1 of 7)**	**100% (14 of 14)**	**95%**	100% (5 of 5)	50% (6 of 12)	100% (9 of 9)	71%
Midge 10-d All	21	6380	19200	29% (2 of 7)	100% (14 of 14)	90%	100% (5 of 5)	58% (7 of 12)	100% (9 of 9)	67%
Amphipod 28-d Survival	21	6380	19200	43% (3 of 7)	86% (12 of 14)	76%	80% (4 of 5)	58% (7 of 12)	89% (8 of 9)	62%
Amphipod 28-d Growth	21	6380	19200	0% (0 of 7)	36% (5 of 14)	57%	0% (0 of 5)	**0% (0 of 12)**	**56% (5 of 9)**	**81%**
Amphipod 28-d Biomass	21	6380	19200	0% (0 of 7)	64% (9 of 14)	76%	40% (2 of 5)	**17% (2 of 12)**	**78% (7 of 9)**	**81%**
Amphipod 28-d All	21	6380	19200	43% (3 of 7)	93% (13 of 14)	81%	80% (4 of 5)	58% (7 of 12)	100% (9 of 9)	67%
All Endpoints	21	6380	19200	57% (4 of 7)	100% (14 of 14)	81%	100% (5 of 5)	75% (9 of 12)	100% (9 of 9)	57%
Mean PEC-Q $_{METALS(1\%OC)}$										
Cladoceran 7-d Survival	24	3.59	9.83	11% (1 of 9)	27% (4 of 15)	50%	0% (0 of 4)	8% (1 of 13)	36% (4 of 11)	67%
Cladoceran 7-d Reproduction	24	3.59	9.83	0% (0 of 9)	40% (6 of 15)	62%	0% (0 of 4)	0% (0 of 13)	55% (6 of 11)	79%
Cladoceran 7-d All	24	3.59	9.83	11% (1 of 9)	40% (6 of 15)	58%	0% (0 of 4)	8% (1 of 13)	55% (6 of 11)	75%
Midge 10-d Survival	21	3.59	9.83	0% (0 of 8)	8% (1 of 13)	43%	25% (1 of 4)	8% (1 of 12)	0% (0 of 9)	52%
Midge 10-d Growth	21	3.59	9.83	25% (2 of 8)	69% (9 of 13)	71%	25% (1 of 4)	25% (3 of 12)	89% (8 of 9)	81%
Midge 10-d Biomass	21	3.59	9.83	25% (2 of 8)	100% (13 of 13)	90%	100% (4 of 4)	50% (6 of 12)	100% (9 of 9)	71%
Midge 10-d All	21	3.59	9.83	38% (3 of 8)	100% (13 of 13)	86%	100% (4 of 4)	58% (7 of 12)	100% (9 of 9)	67%
Amphipod 28-d Survival	21	3.59	9.83	50% (4 of 8)	85% (11 of 13)	71%	75% (3 of 4)	58% (7 of 12)	89% (8 of 9)	62%
Amphipod 28-d Growth	21	3.59	9.83	0% (0 of 8)	38% (5 of 13)	62%	0% (0 of 4)	**0% (0 of 12)**	**56% (5 of 9)**	**81%**
Amphipod 28-d Biomass	21	3.59	9.83	**0% (0 of 8)**	**69% (9 of 13)**	**81%**	50% (2 of 4)	**17% (2 of 12)**	**78% (7 of 9)**	**81%**
Amphipod 28-d All	21	3.59	9.83	50% (4 of 8)	92% (12 of 13)	76%	75% (3 of 4)	58% (7 of 12)	100% (9 of 9)	67%
All Endpoints	26	3.59	9.83	50% (5 of 10)	100% (16 of 16)	81%	100% (4 of 4)	64% (9 of 14)	100% (12 of 12)	65%

Table A7.9. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: growth), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPSTT_{HI}$	Incidence of Toxicity[1]							
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** $_{METALS(1\%OC)}$*										
Cladoceran 7-d Survival	24	22.9	60.3	11% (1 of 9)	27% (4 of 15)	50%	0% (0 of 4)	8% (1 of 13)	36% (4 of 11)	67%
Cladoceran 7-d Reproduction	24	22.9	60.3	0% (0 of 9)	40% (6 of 15)	62%	0% (0 of 4)	0% (0 of 13)	55% (6 of 11)	79%
Cladoceran 7-d All	24	22.9	60.3	11% (1 of 9)	40% (6 of 15)	58%	0% (0 of 4)	8% (1 of 13)	55% (6 of 11)	75%
Midge 10-d Survival	21	22.9	60.3	0% (0 of 8)	8% (1 of 13)	43%	25% (1 of 4)	8% (1 of 12)	0% (0 of 9)	52%
Midge 10-d Growth	21	22.9	60.3	25% (2 of 8)	69% (9 of 13)	71%	25% (1 of 4)	25% (3 of 12)	89% (8 of 9)	81%
Midge 10-d Biomass	21	22.9	60.3	25% (2 of 8)	100% (13 of 13)	90%	100% (4 of 4)	50% (6 of 12)	100% (9 of 9)	71%
Midge 10-d All	21	22.9	60.3	38% (3 of 8)	100% (13 of 13)	86%	100% (4 of 4)	58% (7 of 12)	100% (9 of 9)	67%
Amphipod 28-d Survival	21	22.9	60.3	50% (4 of 8)	85% (11 of 13)	71%	75% (3 of 4)	58% (7 of 12)	89% (8 of 9)	62%
Amphipod 28-d Growth	21	22.9	60.3	0% (0 of 8)	38% (5 of 13)	62%	0% (0 of 4)	**0% (0 of 12)**	**56% (5 of 9)**	**81%**
Amphipod 28-d Biomass	21	22.9	60.3	**0% (0 of 8)**	**69% (9 of 13)**	**81%**	50% (2 of 4)	**17% (2 of 12)**	**78% (7 of 9)**	**81%**
Amphipod 28-d All	21	22.9	60.3	50% (4 of 8)	92% (12 of 13)	76%	75% (3 of 4)	58% (7 of 12)	100% (9 of 9)	67%
All Endpoints	26	22.9	60.3	50% (5 of 10)	100% (16 of 16)	81%	100% (4 of 4)	64% (9 of 14)	100% (12 of 12)	65%
***ΣPEC-Q** $_{EXTMETALS(1\%OC)}$*										
Cladoceran 7-d Survival	24	26.7	67.7	11% (1 of 9)	27% (4 of 15)	50%	0% (0 of 4)	8% (1 of 13)	36% (4 of 11)	67%
Cladoceran 7-d Reproduction	24	26.7	67.7	0% (0 of 9)	40% (6 of 15)	62%	0% (0 of 4)	0% (0 of 13)	55% (6 of 11)	79%
Cladoceran 7-d All	24	26.7	67.7	11% (1 of 9)	40% (6 of 15)	58%	0% (0 of 4)	8% (1 of 13)	55% (6 of 11)	75%
Midge 10-d Survival	21	26.7	67.7	0% (0 of 8)	8% (1 of 13)	43%	25% (1 of 4)	8% (1 of 12)	0% (0 of 9)	52%
Midge 10-d Growth	21	26.7	67.7	25% (2 of 8)	69% (9 of 13)	71%	25% (1 of 4)	25% (3 of 12)	89% (8 of 9)	81%
Midge 10-d Biomass	21	26.7	67.7	25% (2 of 8)	100% (13 of 13)	90%	100% (4 of 4)	50% (6 of 12)	100% (9 of 9)	71%
Midge 10-d All	21	26.7	67.7	38% (3 of 8)	100% (13 of 13)	86%	100% (4 of 4)	58% (7 of 12)	100% (9 of 9)	67%
Amphipod 28-d Survival	21	26.7	67.7	50% (4 of 8)	85% (11 of 13)	71%	75% (3 of 4)	58% (7 of 12)	89% (8 of 9)	62%
Amphipod 28-d Growth	21	26.7	67.7	0% (0 of 8)	38% (5 of 13)	62%	0% (0 of 4)	**0% (0 of 12)**	**56% (5 of 9)**	**81%**
Amphipod 28-d Biomass	21	26.7	67.7	**0% (0 of 8)**	**69% (9 of 13)**	**81%**	50% (2 of 4)	**17% (2 of 12)**	**78% (7 of 9)**	**81%**
Amphipod 28-d All	21	26.7	67.7	50% (4 of 8)	92% (12 of 13)	76%	75% (3 of 4)	58% (7 of 12)	100% (9 of 9)	67%
All Endpoints	26	26.7	67.7	50% (5 of 10)	100% (16 of 16)	81%	100% (4 of 4)	64% (9 of 14)	100% (12 of 12)	65%

Table A7.9. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: growth), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPSTT_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Percent Sand (%)										
Cladoceran 7-d Survival	19	87.8	91.4	17% (1 of 6)	15% (2 of 13)	37%	0% (0 of 5)	9% (1 of 11)	25% (2 of 8)	63%
Cladoceran 7-d Reproduction	19	87.8	91.4	0% (0 of 6)	23% (3 of 13)	47%	0% (0 of 5)	0% (0 of 11)	38% (3 of 8)	74%
Cladoceran 7-d All	19	87.8	91.4	17% (1 of 6)	23% (3 of 13)	42%	0% (0 of 5)	9% (1 of 11)	38% (3 of 8)	68%
Midge 10-d Survival	21	87.8	91.4	0% (0 of 7)	7% (1 of 14)	38%	0% (0 of 5)	0% (0 of 12)	11% (1 of 9)	62%
Midge 10-d Growth	21	87.8	91.4	14% (1 of 7)	71% (10 of 14)	76%	60% (3 of 5)	33% (4 of 12)	78% (7 of 9)	71%
Midge 10-d Biomass	21	87.8	91.4	**14% (1 of 7)**	**100% (14 of 14)**	**95%**	100% (5 of 5)	50% (6 of 12)	100% (9 of 9)	71%
Midge 10-d All	21	87.8	91.4	29% (2 of 7)	100% (14 of 14)	90%	100% (5 of 5)	58% (7 of 12)	100% (9 of 9)	67%
Amphipod 28-d Survival	21	87.8	91.4	29% (2 of 7)	93% (13 of 14)	86%	100% (5 of 5)	58% (7 of 12)	89% (8 of 9)	62%
Amphipod 28-d Growth	21	87.8	91.4	0% (0 of 7)	36% (5 of 14)	57%	0% (0 of 5)	**0% (0 of 12)**	**56% (5 of 9)**	**81%**
Amphipod 28-d Biomass	21	87.8	91.4	0% (0 of 7)	64% (9 of 14)	76%	20% (1 of 5)	**8% (1 of 12)**	**89% (8 of 9)**	**90%**
Amphipod 28-d All	21	87.8	91.4	29% (2 of 7)	100% (14 of 14)	90%	100% (5 of 5)	58% (7 of 12)	100% (9 of 9)	67%
All Endpoints	21	87.8	91.4	57% (4 of 7)	100% (14 of 14)	81%	100% (5 of 5)	75% (9 of 12)	100% (9 of 9)	57%

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; d = day; IOT = incidence of toxicity.

$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).

$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.

1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.

[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.10. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: growth), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag indicator/ Sediment Toxicity Test	n	TPST$_{LI}$	TPSTT$_{HI}$	Incidence of Toxicity[1]						
				<TPST$_{LI}$	≥TPST$_{LI}$	Correct Class. Rate for TPST$_{LI}$	TPST$_{LI}$-TPST$_{HI}$[2]	≤TPST$_{HI}$	>TPST$_{HI}$	Correct Class. Rate for TPST$_{HI}$
(ΣSEM-AVS)/f$_{OC}$ (μmol/g)										
Cladoceran 7-d Survival	37	6380	19200	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	6380	19200	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	6380	19200	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	43	6380	19200	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	6380	19200	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	6380	19200	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	6380	19200	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	6380	19200	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	6380	19200	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	6380	19200	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	6380	19200	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	43	6380	19200	77% (33 of 43)	No Data	23%	No Data	77% (33 of 43)	No Data	23%
Mean PEC-Q$_{METALS(1\%OC)}$										
Cladoceran 7-d Survival	43	3.59	9.83	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	3.59	9.83	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	3.59	9.83	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	3.59	9.83	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	3.59	9.83	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	3.59	9.83	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	3.59	9.83	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	3.59	9.83	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	3.59	9.83	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	3.59	9.83	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	3.59	9.83	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	3.59	9.83	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.10. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: growth), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPSTT_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** $_{METALS(1\%OC)}$*										
Cladoceran 7-d Survival	43	22.9	60.3	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	22.9	60.3	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	22.9	60.3	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	22.9	60.3	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	22.9	60.3	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	22.9	60.3	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	22.9	60.3	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	22.9	60.3	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	22.9	60.3	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	22.9	60.3	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	22.9	60.3	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	22.9	60.3	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%
***ΣPEC-Q** $_{EXT\ METAL(1\%OC)}$*										
Cladoceran 7-d Survival	43	26.7	67.7	8% (3 of 40)	33% (1 of 3)	88%	33% (1 of 3)	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	26.7	67.7	10% (4 of 40)	33% (1 of 3)	86%	33% (1 of 3)	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	26.7	67.7	18% (7 of 40)	33% (1 of 3)	79%	33% (1 of 3)	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	26.7	67.7	20% (8 of 40)	33% (1 of 3)	77%	33% (1 of 3)	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	26.7	67.7	48% (19 of 40)	67% (2 of 3)	53%	67% (2 of 3)	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	26.7	67.7	70% (28 of 40)	100% (3 of 3)	35%	100% (3 of 3)	72% (31 of 43)	No Data	28%
Midge 10-d All	43	26.7	67.7	72% (29 of 40)	100% (3 of 3)	33%	100% (3 of 3)	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	26.7	67.7	35% (14 of 40)	33% (1 of 3)	63%	33% (1 of 3)	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	26.7	67.7	8% (3 of 40)	0% (0 of 3)	86%	0% (0 of 3)	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	26.7	67.7	15% (6 of 40)	33% (1 of 3)	81%	33% (1 of 3)	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	26.7	67.7	40% (16 of 40)	67% (2 of 3)	60%	67% (2 of 3)	42% (18 of 43)	No Data	58%
All Endpoints	49	26.7	67.7	72% (33 of 46)	100% (3 of 3)	33%	100% (3 of 3)	73% (36 of 49)	No Data	27%

Table A7.10. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: growth), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPSTT_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Percent Sand (%)										
Cladoceran 7-d Survival	37	87.8	91.4	6% (2 of 34)	33% (1 of 3)	89%	0% (0 of 1)	6% (2 of 35)	50% (1 of 2)	92%
Cladoceran 7-d Reproduction	37	87.8	91.4	9% (3 of 34)	0% (0 of 3)	84%	0% (0 of 1)	9% (3 of 35)	0% (0 of 2)	86%
Cladoceran 7-d All	37	87.8	91.4	12% (4 of 34)	33% (1 of 3)	84%	0% (0 of 1)	11% (4 of 35)	50% (1 of 2)	86%
Midge 10-d Survival	43	87.8	91.4	22% (9 of 40)	0% (0 of 3)	72%	0% (0 of 1)	22% (9 of 41)	0% (0 of 2)	74%
Midge 10-d Growth	43	87.8	91.4	45% (18 of 40)	100% (3 of 3)	58%	100% (1 of 1)	46% (19 of 41)	100% (2 of 2)	56%
Midge 10-d Biomass	43	87.8	91.4	70% (28 of 40)	100% (3 of 3)	35%	100% (1 of 1)	71% (29 of 41)	100% (2 of 2)	33%
Midge 10-d All	43	87.8	91.4	72% (29 of 40)	100% (3 of 3)	33%	100% (1 of 1)	73% (30 of 41)	100% (2 of 2)	30%
Amphipod 28-d Survival	43	87.8	91.4	32% (13 of 40)	67% (2 of 3)	67%	100% (1 of 1)	34% (14 of 41)	50% (1 of 2)	65%
Amphipod 28-d Growth	43	87.8	91.4	8% (3 of 40)	0% (0 of 3)	86%	0% (0 of 1)	7% (3 of 41)	0% (0 of 2)	88%
Amphipod 28-d Biomass	43	87.8	91.4	18% (7 of 40)	0% (0 of 3)	77%	0% (0 of 1)	17% (7 of 41)	0% (0 of 2)	79%
Amphipod 28-d All	43	87.8	91.4	40% (16 of 40)	67% (2 of 3)	60%	100% (1 of 1)	41% (17 of 41)	50% (1 of 2)	58%
All Endpoints	43	87.8	91.4	75% (30 of 40)	100% (3 of 3)	30%	100% (1 of 1)	76% (31 of 41)	100% (2 of 2)	28%

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; d = day; IOT = incidence of toxicity.
$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).
$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.11. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: growth), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPSTT_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
(ΣSEM-AVS)/f $_{OC}$ ***(µmol/g)***										
Cladoceran 7-d Survival	56	6380	19200	9% (4 of 43)	15% (2 of 13)	73%	0% (0 of 5)	8% (4 of 48)	25% (2 of 8)	82%
Cladoceran 7-d Reproduction	56	6380	19200	7% (3 of 43)	23% (3 of 13)	77%	0% (0 of 5)	6% (3 of 48)	38% (3 of 8)	86%
Cladoceran 7-d All	56	6380	19200	14% (6 of 43)	23% (3 of 13)	71%	0% (0 of 5)	12% (6 of 48)	38% (3 of 8)	80%
Midge 10-d Survival	64	6380	19200	18% (9 of 50)	7% (1 of 14)	66%	20% (1 of 5)	18% (10 of 55)	0% (0 of 9)	70%
Midge 10-d Growth	64	6380	19200	46% (23 of 50)	64% (9 of 14)	56%	20% (1 of 5)	44% (24 of 55)	89% (8 of 9)	61%
Midge 10-d Biomass	64	6380	19200	64% (32 of 50)	100% (14 of 14)	50%	100% (5 of 5)	67% (37 of 55)	100% (9 of 9)	42%
Midge 10-d All	64	6380	19200	68% (34 of 50)	100% (14 of 14)	47%	100% (5 of 5)	71% (39 of 55)	100% (9 of 9)	39%
Amphipod 28-d Survival	64	6380	19200	36% (18 of 50)	86% (12 of 14)	69%	80% (4 of 5)	40% (22 of 55)	89% (8 of 9)	64%
Amphipod 28-d Growth	64	6380	19200	6% (3 of 50)	36% (5 of 14)	81%	0% (0 of 5)	**5% (3 of 55)**	**56% (5 of 9)**	**89%**
Amphipod 28-d Biomass	64	6380	19200	**14% (7 of 50)**	**64% (9 of 14)**	**81%**	40% (2 of 5)	**16% (9 of 55)**	**78% (7 of 9)**	**83%**
Amphipod 28-d All	64	6380	19200	42% (21 of 50)	93% (13 of 14)	66%	80% (4 of 5)	45% (25 of 55)	100% (9 of 9)	61%
All Endpoints	64	6380	19200	74% (37 of 50)	100% (14 of 14)	42%	100% (5 of 5)	76% (42 of 55)	100% (9 of 9)	34%
Mean PEC-Q $_{METALS(1\%OC)}$										
Cladoceran 7-d Survival	67	3.59	9.83	10% (5 of 52)	27% (4 of 15)	76%	0% (0 of 4)	9% (5 of 56)	36% (4 of 11)	82%
Cladoceran 7-d Reproduction	67	3.59	9.83	10% (5 of 52)	40% (6 of 15)	79%	0% (0 of 4)	9% (5 of 56)	55% (6 of 11)	85%
Cladoceran 7-d All	67	3.59	9.83	17% (9 of 52)	40% (6 of 15)	73%	0% (0 of 4)	16% (9 of 56)	55% (6 of 11)	79%
Midge 10-d Survival	64	3.59	9.83	18% (9 of 51)	8% (1 of 13)	67%	25% (1 of 4)	18% (10 of 55)	0% (0 of 9)	70%
Midge 10-d Growth	64	3.59	9.83	45% (23 of 51)	69% (9 of 13)	58%	25% (1 of 4)	44% (24 of 55)	89% (8 of 9)	61%
Midge 10-d Biomass	64	3.59	9.83	65% (33 of 51)	100% (13 of 13)	48%	100% (4 of 4)	67% (37 of 55)	100% (9 of 9)	42%
Midge 10-d All	64	3.59	9.83	69% (35 of 51)	100% (13 of 13)	45%	100% (4 of 4)	71% (39 of 55)	100% (9 of 9)	39%
Amphipod 28-d Survival	64	3.59	9.83	37% (19 of 51)	85% (11 of 13)	67%	75% (3 of 4)	40% (22 of 55)	89% (8 of 9)	64%
Amphipod 28-d Growth	64	3.59	9.83	6% (3 of 51)	38% (5 of 13)	83%	0% (0 of 4)	**5% (3 of 55)**	**56% (5 of 9)**	**89%**
Amphipod 28-d Biomass	64	3.59	9.83	**14% (7 of 51)**	**69% (9 of 13)**	**83%**	50% (2 of 4)	**16% (9 of 55)**	**78% (7 of 9)**	**83%**
Amphipod 28-d All	64	3.59	9.83	43% (22 of 51)	92% (12 of 13)	64%	75% (3 of 4)	45% (25 of 55)	100% (9 of 9)	61%
All Endpoints	75	3.59	9.83	69% (41 of 59)	100% (16 of 16)	45%	100% (4 of 4)	71% (45 of 63)	100% (12 of 12)	40%

Table A7.11. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: growth), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPSTT_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
ΣPEC-Q $_{METALS(1\%OC)}$										
Cladoceran 7-d Survival	67	22.9	60.3	10% (5 of 52)	27% (4 of 15)	76%	0% (0 of 4)	9% (5 of 56)	36% (4 of 11)	82%
Cladoceran 7-d Reproduction	67	22.9	60.3	10% (5 of 52)	40% (6 of 15)	79%	0% (0 of 4)	9% (5 of 56)	55% (6 of 11)	85%
Cladoceran 7-d All	67	22.9	60.3	17% (9 of 52)	40% (6 of 15)	73%	0% (0 of 4)	16% (9 of 56)	55% (6 of 11)	79%
Midge 10-d Survival	64	22.9	60.3	18% (9 of 51)	8% (1 of 13)	67%	25% (1 of 4)	18% (10 of 55)	0% (0 of 9)	70%
Midge 10-d Growth	64	22.9	60.3	45% (23 of 51)	69% (9 of 13)	58%	25% (1 of 4)	44% (24 of 55)	89% (8 of 9)	61%
Midge 10-d Biomass	64	22.9	60.3	65% (33 of 51)	100% (13 of 13)	48%	100% (4 of 4)	67% (37 of 55)	100% (9 of 9)	42%
Midge 10-d All	64	22.9	60.3	69% (35 of 51)	100% (13 of 13)	45%	100% (4 of 4)	71% (39 of 55)	100% (9 of 9)	39%
Amphipod 28-d Survival	64	22.9	60.3	37% (19 of 51)	85% (11 of 13)	67%	75% (3 of 4)	40% (22 of 55)	89% (8 of 9)	64%
Amphipod 28-d Growth	64	22.9	60.3	6% (3 of 51)	38% (5 of 13)	83%	0% (0 of 4)	**5% (3 of 55)**	**56% (5 of 9)**	**89%**
Amphipod 28-d Biomass	64	22.9	60.3	**14% (7 of 51)**	**69% (9 of 13)**	**83%**	50% (2 of 4)	**16% (9 of 55)**	**78% (7 of 9)**	**83%**
Amphipod 28-d All	64	22.9	60.3	43% (22 of 51)	92% (12 of 13)	64%	75% (3 of 4)	45% (25 of 55)	100% (9 of 9)	61%
All Endpoints	75	22.9	60.3	69% (41 of 59)	100% (16 of 16)	45%	100% (4 of 4)	71% (45 of 63)	100% (12 of 12)	40%
ΣPEC-Q $_{EXTMETALS(1\%OC)}$										
Cladoceran 7-d Survival	67	26.7	67.7	8% (4 of 49)	28% (5 of 18)	75%	14% (1 of 7)	9% (5 of 56)	36% (4 of 11)	82%
Cladoceran 7-d Reproduction	67	26.7	67.7	8% (4 of 49)	39% (7 of 18)	78%	14% (1 of 7)	9% (5 of 56)	55% (6 of 11)	85%
Cladoceran 7-d All	67	26.7	67.7	16% (8 of 49)	39% (7 of 18)	72%	14% (1 of 7)	16% (9 of 56)	55% (6 of 11)	79%
Midge 10-d Survival	64	26.7	67.7	17% (8 of 48)	12% (2 of 16)	66%	29% (2 of 7)	18% (10 of 55)	0% (0 of 9)	70%
Midge 10-d Growth	64	26.7	67.7	44% (21 of 48)	69% (11 of 16)	59%	43% (3 of 7)	44% (24 of 55)	89% (8 of 9)	61%
Midge 10-d Biomass	64	26.7	67.7	62% (30 of 48)	100% (16 of 16)	53%	100% (7 of 7)	67% (37 of 55)	100% (9 of 9)	42%
Midge 10-d All	64	26.7	67.7	67% (32 of 48)	100% (16 of 16)	50%	100% (7 of 7)	71% (39 of 55)	100% (9 of 9)	39%
Amphipod 28-d Survival	64	26.7	67.7	38% (18 of 48)	75% (12 of 16)	66%	57% (4 of 7)	40% (22 of 55)	89% (8 of 9)	64%
Amphipod 28-d Growth	64	26.7	67.7	6% (3 of 48)	31% (5 of 16)	78%	0% (0 of 7)	**5% (3 of 55)**	**56% (5 of 9)**	**89%**
Amphipod 28-d Biomass	64	26.7	67.7	**12% (6 of 48)**	**62% (10 of 16)**	**81%**	43% (3 of 7)	**16% (9 of 55)**	**78% (7 of 9)**	**83%**
Amphipod 28-d All	64	26.7	67.7	42% (20 of 48)	88% (14 of 16)	66%	71% (5 of 7)	45% (25 of 55)	100% (9 of 9)	61%
All Endpoints	75	26.7	67.7	68% (38 of 56)	100% (19 of 19)	49%	100% (7 of 7)	71% (45 of 63)	100% (12 of 12)	40%

Table A7.11. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: growth), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPSTT_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Percent Sand (%)										
Cladoceran 7-d Survival	56	87.8	91.4	8% (3 of 40)	19% (3 of 16)	71%	0% (0 of 6)	7% (3 of 46)	30% (3 of 10)	82%
Cladoceran 7-d Reproduction	56	87.8	91.4	8% (3 of 40)	19% (3 of 16)	71%	0% (0 of 6)	7% (3 of 46)	30% (3 of 10)	82%
Cladoceran 7-d All	56	87.8	91.4	12% (5 of 40)	25% (4 of 16)	70%	0% (0 of 6)	11% (5 of 46)	40% (4 of 10)	80%
Midge 10-d Survival	64	87.8	91.4	19% (9 of 47)	6% (1 of 17)	61%	0% (0 of 6)	17% (9 of 53)	9% (1 of 11)	70%
Midge 10-d Growth	64	87.8	91.4	40% (19 of 47)	76% (13 of 17)	64%	67% (4 of 6)	43% (23 of 53)	82% (9 of 11)	61%
Midge 10-d Biomass	64	87.8	91.4	62% (29 of 47)	100% (17 of 17)	55%	100% (6 of 6)	66% (35 of 53)	100% (11 of 11)	45%
Midge 10-d All	64	87.8	91.4	66% (31 of 47)	100% (17 of 17)	52%	100% (6 of 6)	70% (37 of 53)	100% (11 of 11)	42%
Amphipod 28-d Survival	64	87.8	91.4	32% (15 of 47)	88% (15 of 17)	73%	100% (6 of 6)	40% (21 of 53)	82% (9 of 11)	64%
Amphipod 28-d Growth	64	87.8	91.4	6% (3 of 47)	29% (5 of 17)	77%	0% (0 of 6)	6% (3 of 53)	45% (5 of 11)	86%
Amphipod 28-d Biomass	64	87.8	91.4	15% (7 of 47)	53% (9 of 17)	77%	17% (1 of 6)	**15% (8 of 53)**	**73% (8 of 11)**	**83%**
Amphipod 28-d All	64	87.8	91.4	38% (18 of 47)	94% (16 of 17)	70%	100% (6 of 6)	45% (24 of 53)	91% (10 of 11)	61%
All Endpoints	64	87.8	91.4	72% (34 of 47)	100% (17 of 17)	47%	100% (6 of 6)	75% (40 of 53)	100% (11 of 11)	38%

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; d = day; IOT = incidence of toxicity.
$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).
$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.12. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Barium (mg/kg DW)										
Cladoceran 7-d Survival	19	297	567	0% (0 of 2)	18% (3 of 17)	26%	8% (1 of 12)	7% (1 of 14)	40% (2 of 5)	79%
Cladoceran 7-d Reproduction	19	297	567	0% (0 of 2)	18% (3 of 17)	26%	8% (1 of 12)	7% (1 of 14)	40% (2 of 5)	79%
Cladoceran 7-d All	19	297	567	0% (0 of 2)	24% (4 of 17)	32%	17% (2 of 12)	14% (2 of 14)	40% (2 of 5)	74%
Midge 10-d Survival	19	297	567	0% (0 of 2)	6% (1 of 17)	16%	8% (1 of 12)	7% (1 of 14)	0% (0 of 5)	68%
Midge 10-d Growth	19	297	567	0% (0 of 2)	59% (10 of 17)	63%	50% (6 of 12)	43% (6 of 14)	80% (4 of 5)	63%
Midge 10-d Biomass	19	297	567	50% (1 of 2)	76% (13 of 17)	74%	67% (8 of 12)	64% (9 of 14)	100% (5 of 5)	53%
Midge 10-d All	19	297	567	50% (1 of 2)	82% (14 of 17)	79%	75% (9 of 12)	71% (10 of 14)	100% (5 of 5)	47%
Amphipod 28-d Survival	19	297	567	50% (1 of 2)	76% (13 of 17)	74%	83% (10 of 12)	79% (11 of 14)	60% (3 of 5)	32%
Amphipod 28-d Growth	19	297	567	0% (0 of 2)	29% (5 of 17)	37%	17% (2 of 12)	14% (2 of 14)	60% (3 of 5)	79%
Amphipod 28-d Biomass	19	297	567	0% (0 of 2)	47% (8 of 17)	53%	33% (4 of 12)	29% (4 of 14)	80% (4 of 5)	74%
Amphipod 28-d All	19	297	567	50% (1 of 2)	82% (14 of 17)	79%	83% (10 of 12)	79% (11 of 14)	80% (4 of 5)	37%
All Endpoints	19	297	567	50% (1 of 2)	94% (16 of 17)	89%	92% (11 of 12)	86% (12 of 14)	100% (5 of 5)	37%
Total Calcium (mg/kg DW)										
Cladoceran 7-d Survival	19	17700	30300	0% (0 of 1)	17% (3 of 18)	21%	0% (0 of 11)	0% (0 of 12)	43% (3 of 7)	79%
Cladoceran 7-d Reproduction	19	17700	30300	0% (0 of 1)	17% (3 of 18)	21%	0% (0 of 11)	0% (0 of 12)	43% (3 of 7)	79%
Cladoceran 7-d All	19	17700	30300	0% (0 of 1)	22% (4 of 18)	26%	0% (0 of 11)	**0% (0 of 12)**	**57% (4 of 7)**	**84%**
Midge 10-d Survival	19	17700	30300	0% (0 of 1)	6% (1 of 18)	11%	9% (1 of 11)	8% (1 of 12)	0% (0 of 7)	58%
Midge 10-d Growth	19	17700	30300	0% (0 of 1)	56% (10 of 18)	58%	45% (5 of 11)	42% (5 of 12)	71% (5 of 7)	63%
Midge 10-d Biomass	19	17700	30300	100% (1 of 1)	72% (13 of 18)	68%	64% (7 of 11)	67% (8 of 12)	86% (6 of 7)	53%
Midge 10-d All	19	17700	30300	100% (1 of 1)	78% (14 of 18)	74%	73% (8 of 11)	75% (9 of 12)	86% (6 of 7)	47%
Amphipod 28-d Survival	19	17700	30300	100% (1 of 1)	72% (13 of 18)	68%	73% (8 of 11)	75% (9 of 12)	71% (5 of 7)	42%
Amphipod 28-d Growth	19	17700	30300	0% (0 of 1)	28% (5 of 18)	32%	9% (1 of 11)	8% (1 of 12)	57% (4 of 7)	79%
Amphipod 28-d Biomass	19	17700	30300	0% (0 of 1)	44% (8 of 18)	47%	27% (3 of 11)	25% (3 of 12)	71% (5 of 7)	74%
Amphipod 28-d All	19	17700	30300	100% (1 of 1)	78% (14 of 18)	74%	73% (8 of 11)	75% (9 of 12)	86% (6 of 7)	47%
All Endpoints	19	17700	30300	100% (1 of 1)	89% (16 of 18)	84%	82% (9 of 11)	83% (10 of 12)	100% (7 of 7)	47%

Table A7.12. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Copper (mg/kg DW)										
Cladoceran 7-d Survival	24	303	613	20% (1 of 5)	21% (4 of 19)	33%	0% (0 of 10)	7% (1 of 15)	44% (4 of 9)	75%
Cladoceran 7-d Reproduction	24	303	613	0% (0 of 5)	32% (6 of 19)	46%	10% (1 of 10)	7% (1 of 15)	56% (5 of 9)	79%
Cladoceran 7-d All	24	303	613	20% (1 of 5)	32% (6 of 19)	42%	10% (1 of 10)	13% (2 of 15)	56% (5 of 9)	75%
Midge 10-d Survival	21	303	613	0% (0 of 6)	7% (1 of 15)	33%	12% (1 of 8)	7% (1 of 14)	0% (0 of 7)	62%
Midge 10-d Growth	21	303	613	17% (1 of 6)	67% (10 of 15)	71%	50% (4 of 8)	36% (5 of 14)	86% (6 of 7)	71%
Midge 10-d Biomass	21	303	613	**17% (1 of 6)**	**93% (14 of 15)**	**90%**	88% (7 of 8)	57% (8 of 14)	100% (7 of 7)	62%
Midge 10-d All	21	303	613	33% (2 of 6)	93% (14 of 15)	86%	88% (7 of 8)	64% (9 of 14)	100% (7 of 7)	57%
Amphipod 28-d Survival	21	303	613	33% (2 of 6)	87% (13 of 15)	81%	100% (8 of 8)	71% (10 of 14)	71% (5 of 7)	43%
Amphipod 28-d Growth	21	303	613	0% (0 of 6)	33% (5 of 15)	52%	25% (2 of 8)	14% (2 of 14)	43% (3 of 7)	71%
Amphipod 28-d Biomass	21	303	613	0% (0 of 6)	60% (9 of 15)	71%	50% (4 of 8)	29% (4 of 14)	71% (5 of 7)	71%
Amphipod 28-d All	21	303	613	33% (2 of 6)	93% (14 of 15)	86%	100% (8 of 8)	71% (10 of 14)	86% (6 of 7)	48%
All Endpoints	26	303	613	50% (3 of 6)	90% (18 of 20)	81%	80% (8 of 10)	69% (11 of 16)	100% (10 of 10)	58%
Total Manganese (mg/kg DW)										
Cladoceran 7-d Survival	19	528	1120	25% (1 of 4)	13% (2 of 15)	26%	0% (0 of 8)	8% (1 of 12)	29% (2 of 7)	68%
Cladoceran 7-d Reproduction	19	528	1120	0% (0 of 4)	20% (3 of 15)	37%	12% (1 of 8)	8% (1 of 12)	29% (2 of 7)	68%
Cladoceran 7-d All	19	528	1120	25% (1 of 4)	20% (3 of 15)	32%	12% (1 of 8)	17% (2 of 12)	29% (2 of 7)	63%
Midge 10-d Survival	19	528	1120	0% (0 of 4)	7% (1 of 15)	26%	12% (1 of 8)	8% (1 of 12)	0% (0 of 7)	58%
Midge 10-d Growth	19	528	1120	25% (1 of 4)	60% (9 of 15)	63%	38% (3 of 8)	33% (4 of 12)	86% (6 of 7)	74%
Midge 10-d Biomass	19	528	1120	25% (1 of 4)	87% (13 of 15)	84%	75% (6 of 8)	58% (7 of 12)	100% (7 of 7)	63%
Midge 10-d All	19	528	1120	50% (2 of 4)	87% (13 of 15)	79%	75% (6 of 8)	67% (8 of 12)	100% (7 of 7)	58%
Amphipod 28-d Survival	19	528	1120	50% (2 of 4)	80% (12 of 15)	74%	88% (7 of 8)	75% (9 of 12)	71% (5 of 7)	42%
Amphipod 28-d Growth	19	528	1120	0% (0 of 4)	33% (5 of 15)	47%	12% (1 of 8)	8% (1 of 12)	57% (4 of 7)	79%
Amphipod 28-d Biomass	19	528	1120	0% (0 of 4)	53% (8 of 15)	63%	38% (3 of 8)	25% (3 of 12)	71% (5 of 7)	74%
Amphipod 28-d All	19	528	1120	50% (2 of 4)	87% (13 of 15)	79%	88% (7 of 8)	75% (9 of 12)	86% (6 of 7)	47%
All Endpoints	19	528	1120	75% (3 of 4)	93% (14 of 15)	79%	88% (7 of 8)	83% (10 of 12)	100% (7 of 7)	47%

Table A7.12. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Mean PEC-Q										
Cladoceran 7-d Survival	19	0.397	0.85	25% (1 of 4)	13% (2 of 15)	26%	0% (0 of 9)	8% (1 of 13)	33% (2 of 6)	74%
Cladoceran 7-d Reproduction	19	0.397	0.85	0% (0 of 4)	20% (3 of 15)	37%	11% (1 of 9)	8% (1 of 13)	33% (2 of 6)	74%
Cladoceran 7-d All	19	0.397	0.85	25% (1 of 4)	20% (3 of 15)	32%	11% (1 of 9)	15% (2 of 13)	33% (2 of 6)	68%
Midge 10-d Survival	19	0.397	0.85	0% (0 of 4)	7% (1 of 15)	26%	11% (1 of 9)	8% (1 of 13)	0% (0 of 6)	63%
Midge 10-d Growth	19	0.397	0.85	25% (1 of 4)	60% (9 of 15)	63%	44% (4 of 9)	38% (5 of 13)	83% (5 of 6)	68%
Midge 10-d Biomass	19	0.397	0.85	25% (1 of 4)	87% (13 of 15)	84%	78% (7 of 9)	62% (8 of 13)	100% (6 of 6)	58%
Midge 10-d All	19	0.397	0.85	50% (2 of 4)	87% (13 of 15)	79%	78% (7 of 9)	69% (9 of 13)	100% (6 of 6)	53%
Amphipod 28-d Survival	19	0.397	0.85	50% (2 of 4)	80% (12 of 15)	74%	89% (8 of 9)	77% (10 of 13)	67% (4 of 6)	37%
Amphipod 28-d Growth	19	0.397	0.85	0% (0 of 4)	33% (5 of 15)	47%	22% (2 of 9)	15% (2 of 13)	50% (3 of 6)	74%
Amphipod 28-d Biomass	19	0.397	0.85	0% (0 of 4)	53% (8 of 15)	63%	44% (4 of 9)	31% (4 of 13)	67% (4 of 6)	68%
Amphipod 28-d All	19	0.397	0.85	50% (2 of 4)	87% (13 of 15)	79%	89% (8 of 9)	77% (10 of 13)	83% (5 of 6)	42%
All Endpoints	19	0.397	0.85	75% (3 of 4)	93% (14 of 15)	79%	89% (8 of 9)	85% (11 of 13)	100% (6 of 6)	42%
ΣPEC-Q $_{EXTMETALS}$										
Cladoceran 7-d Survival	24	12.1	22.4	14% (1 of 7)	24% (4 of 17)	42%	0% (0 of 8)	7% (1 of 15)	44% (4 of 9)	75%
Cladoceran 7-d Reproduction	24	12.1	22.4	0% (0 of 7)	35% (6 of 17)	54%	12% (1 of 8)	7% (1 of 15)	56% (5 of 9)	79%
Cladoceran 7-d All	24	12.1	22.4	14% (1 of 7)	35% (6 of 17)	50%	12% (1 of 8)	13% (2 of 15)	56% (5 of 9)	75%
Midge 10-d Survival	21	12.1	22.4	0% (0 of 8)	8% (1 of 13)	43%	17% (1 of 6)	7% (1 of 14)	0% (0 of 7)	62%
Midge 10-d Growth	21	12.1	22.4	25% (2 of 8)	69% (9 of 13)	71%	50% (3 of 6)	36% (5 of 14)	86% (6 of 7)	71%
Midge 10-d Biomass	21	12.1	22.4	25% (2 of 8)	100% (13 of 13)	90%	100% (6 of 6)	57% (8 of 14)	100% (7 of 7)	62%
Midge 10-d All	21	12.1	22.4	38% (3 of 8)	100% (13 of 13)	86%	100% (6 of 6)	64% (9 of 14)	100% (7 of 7)	57%
Amphipod 28-d Survival	21	12.1	22.4	50% (4 of 8)	85% (11 of 13)	71%	100% (6 of 6)	71% (10 of 14)	71% (5 of 7)	43%
Amphipod 28-d Growth	21	12.1	22.4	0% (0 of 8)	38% (5 of 13)	62%	33% (2 of 6)	14% (2 of 14)	43% (3 of 7)	71%
Amphipod 28-d Biomass	21	12.1	22.4	12% (1 of 8)	62% (8 of 13)	71%	50% (3 of 6)	29% (4 of 14)	71% (5 of 7)	71%
Amphipod 28-d All	21	12.1	22.4	50% (4 of 8)	92% (12 of 13)	76%	100% (6 of 6)	71% (10 of 14)	86% (6 of 7)	48%
All Endpoints	26	12.1	22.4	62% (5 of 8)	89% (16 of 18)	73%	75% (6 of 8)	69% (11 of 16)	100% (10 of 10)	58%

Table A7.12. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Cu:Al										
Cladoceran 7-d Survival	19	0.0407	0.0645	25% (1 of 4)	13% (2 of 15)	26%	0% (0 of 6)	10% (1 of 10)	22% (2 of 9)	58%
Cladoceran 7-d Reproduction	19	0.0407	0.0645	0% (0 of 4)	20% (3 of 15)	37%	0% (0 of 6)	0% (0 of 10)	33% (3 of 9)	68%
Cladoceran 7-d All	19	0.0407	0.0645	25% (1 of 4)	20% (3 of 15)	32%	0% (0 of 6)	10% (1 of 10)	33% (3 of 9)	63%
Midge 10-d Survival	19	0.0407	0.0645	0% (0 of 4)	7% (1 of 15)	26%	0% (0 of 6)	0% (0 of 10)	11% (1 of 9)	58%
Midge 10-d Growth	19	0.0407	0.0645	25% (1 of 4)	60% (9 of 15)	63%	50% (3 of 6)	40% (4 of 10)	67% (6 of 9)	63%
Midge 10-d Biomass	19	0.0407	0.0645	**0% (0 of 4)**	**93% (14 of 15)**	**95%**	83% (5 of 6)	50% (5 of 10)	100% (9 of 9)	74%
Midge 10-d All	19	0.0407	0.0645	25% (1 of 4)	93% (14 of 15)	89%	83% (5 of 6)	60% (6 of 10)	100% (9 of 9)	68%
Amphipod 28-d Survival	19	0.0407	0.0645	25% (1 of 4)	87% (13 of 15)	84%	100% (6 of 6)	70% (7 of 10)	78% (7 of 9)	53%
Amphipod 28-d Growth	19	0.0407	0.0645	0% (0 of 4)	33% (5 of 15)	47%	17% (1 of 6)	10% (1 of 10)	44% (4 of 9)	68%
Amphipod 28-d Biomass	19	0.0407	0.0645	0% (0 of 4)	53% (8 of 15)	63%	33% (2 of 6)	20% (2 of 10)	67% (6 of 9)	74%
Amphipod 28-d All	19	0.0407	0.0645	25% (1 of 4)	93% (14 of 15)	89%	100% (6 of 6)	70% (7 of 10)	89% (8 of 9)	58%
All Endpoints	19	0.0407	0.0645	50% (2 of 4)	100% (15 of 15)	89%	100% (6 of 6)	80% (8 of 10)	100% (9 of 9)	58%
Percent Sand (%)										
Cladoceran 7-d Survival	19	86.5	90.7	17% (1 of 6)	15% (2 of 13)	37%	0% (0 of 3)	11% (1 of 9)	20% (2 of 10)	53%
Cladoceran 7-d Reproduction	19	86.5	90.7	0% (0 of 6)	23% (3 of 13)	47%	0% (0 of 3)	0% (0 of 9)	30% (3 of 10)	63%
Cladoceran 7-d All	19	86.5	90.7	17% (1 of 6)	23% (3 of 13)	42%	0% (0 of 3)	11% (1 of 9)	30% (3 of 10)	58%
Midge 10-d Survival	21	86.5	90.7	0% (0 of 7)	7% (1 of 14)	38%	0% (0 of 3)	0% (0 of 10)	9% (1 of 11)	52%
Midge 10-d Growth	21	86.5	90.7	14% (1 of 7)	71% (10 of 14)	76%	33% (1 of 3)	20% (2 of 10)	82% (9 of 11)	81%
Midge 10-d Biomass	21	86.5	90.7	**14% (1 of 7)**	**100% (14 of 14)**	**95%**	100% (3 of 3)	40% (4 of 10)	100% (11 of 11)	81%
Midge 10-d All	21	86.5	90.7	29% (2 of 7)	100% (14 of 14)	90%	100% (3 of 3)	50% (5 of 10)	100% (11 of 11)	76%
Amphipod 28-d Survival	21	86.5	90.7	29% (2 of 7)	93% (13 of 14)	86%	100% (3 of 3)	50% (5 of 10)	91% (10 of 11)	71%
Amphipod 28-d Growth	21	86.5	90.7	0% (0 of 7)	36% (5 of 14)	57%	0% (0 of 3)	0% (0 of 10)	45% (5 of 11)	71%
Amphipod 28-d Biomass	21	86.5	90.7	0% (0 of 7)	64% (9 of 14)	76%	0% (0 of 3)	**0% (0 of 10)**	**82% (9 of 11)**	**90%**
Amphipod 28-d All	21	86.5	90.7	29% (2 of 7)	100% (14 of 14)	90%	100% (3 of 3)	50% (5 of 10)	100% (11 of 11)	76%
All Endpoints	21	86.5	90.7	57% (4 of 7)	100% (14 of 14)	81%	100% (3 of 3)	70% (7 of 10)	100% (11 of 11)	67%

Table A7.12. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; Al = alumium; Cu = copper; d = day; IOT = incidence of toxicity.
Mean PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total polycyclic aromatic hydrocarbons; and, total polychlorinated biphenyls (Ingersoll et al. 2001).
$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.13. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), innon slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Barium (mg/kg DW)										
Cladoceran 7-d Survival	37	297	567	6% (2 of 34)	33% (1 of 3)	89%	33% (1 of 3)	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	297	567	9% (3 of 34)	0% (0 of 3)	84%	0% (0 of 3)	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	297	567	12% (4 of 34)	33% (1 of 3)	84%	33% (1 of 3)	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	297	567	26% (9 of 34)	0% (0 of 3)	68%	0% (0 of 3)	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	297	567	44% (15 of 34)	100% (3 of 3)	59%	100% (3 of 3)	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	297	567	74% (25 of 34)	100% (3 of 3)	32%	100% (3 of 3)	76% (28 of 37)	No Data	24%
Midge 10-d All	37	297	567	76% (26 of 34)	100% (3 of 3)	30%	100% (3 of 3)	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	297	567	32% (11 of 34)	33% (1 of 3)	65%	33% (1 of 3)	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	297	567	6% (2 of 34)	33% (1 of 3)	89%	33% (1 of 3)	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	297	567	**9% (3 of 34)**	**100% (3 of 3)**	**92%**	100% (3 of 3)	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	297	567	35% (12 of 34)	100% (3 of 3)	68%	100% (3 of 3)	41% (15 of 37)	No Data	59%
All Endpoints	37	297	567	76% (26 of 34)	100% (3 of 3)	30%	100% (3 of 3)	78% (29 of 37)	No Data	22%
Total Calcium (mg/kg DW)										
Cladoceran 7-d Survival	37	17700	30300	3% (1 of 31)	33% (2 of 6)	86%	100% (1 of 1)	6% (2 of 32)	20% (1 of 5)	84%
Cladoceran 7-d Reproduction	37	17700	30300	6% (2 of 31)	17% (1 of 6)	81%	100% (1 of 1)	9% (3 of 32)	0% (0 of 5)	78%
Cladoceran 7-d All	37	17700	30300	10% (3 of 31)	33% (2 of 6)	81%	100% (1 of 1)	12% (4 of 32)	20% (1 of 5)	78%
Midge 10-d Survival	37	17700	30300	29% (9 of 31)	0% (0 of 6)	59%	0% (0 of 1)	28% (9 of 32)	0% (0 of 5)	62%
Midge 10-d Growth	37	17700	30300	52% (16 of 31)	33% (2 of 6)	46%	100% (1 of 1)	53% (17 of 32)	20% (1 of 5)	43%
Midge 10-d Biomass	37	17700	30300	84% (26 of 31)	33% (2 of 6)	19%	100% (1 of 1)	84% (27 of 32)	20% (1 of 5)	16%
Midge 10-d All	37	17700	30300	87% (27 of 31)	33% (2 of 6)	16%	100% (1 of 1)	88% (28 of 32)	20% (1 of 5)	14%
Amphipod 28-d Survival	37	17700	30300	32% (10 of 31)	33% (2 of 6)	62%	100% (1 of 1)	34% (11 of 32)	20% (1 of 5)	59%
Amphipod 28-d Growth	37	17700	30300	10% (3 of 31)	0% (0 of 6)	76%	0% (0 of 1)	9% (3 of 32)	0% (0 of 5)	78%
Amphipod 28-d Biomass	37	17700	30300	16% (5 of 31)	17% (1 of 6)	73%	0% (0 of 1)	16% (5 of 32)	20% (1 of 5)	76%
Amphipod 28-d All	37	17700	30300	42% (13 of 31)	33% (2 of 6)	54%	100% (1 of 1)	44% (14 of 32)	20% (1 of 5)	51%
All Endpoints	37	17700	30300	87% (27 of 31)	33% (2 of 6)	16%	100% (1 of 1)	88% (28 of 32)	20% (1 of 5)	14%

Table A7.13. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), innon slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Copper (mg/kg DW)										
Cladoceran 7-d Survival	43	303	613	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	303	613	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	303	613	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	303	613	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	303	613	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	303	613	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	303	613	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	303	613	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	303	613	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	303	613	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	303	613	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	303	613	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%
Total Manganese (mg/kg DW)										
Cladoceran 7-d Survival	37	528	1120	9% (3 of 35)	0% (0 of 2)	86%	0% (0 of 2)	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	528	1120	9% (3 of 35)	0% (0 of 2)	86%	0% (0 of 2)	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	528	1120	14% (5 of 35)	0% (0 of 2)	81%	0% (0 of 2)	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	528	1120	23% (8 of 35)	50% (1 of 2)	76%	50% (1 of 2)	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	528	1120	46% (16 of 35)	100% (2 of 2)	57%	100% (2 of 2)	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	528	1120	74% (26 of 35)	100% (2 of 2)	30%	100% (2 of 2)	76% (28 of 37)	No Data	24%
Midge 10-d All	37	528	1120	77% (27 of 35)	100% (2 of 2)	27%	100% (2 of 2)	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	528	1120	31% (11 of 35)	50% (1 of 2)	68%	50% (1 of 2)	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	528	1120	9% (3 of 35)	0% (0 of 2)	86%	0% (0 of 2)	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	528	1120	17% (6 of 35)	0% (0 of 2)	78%	0% (0 of 2)	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	528	1120	40% (14 of 35)	50% (1 of 2)	59%	50% (1 of 2)	41% (15 of 37)	No Data	59%
All Endpoints	37	528	1120	77% (27 of 35)	100% (2 of 2)	27%	100% (2 of 2)	78% (29 of 37)	No Data	22%

Table A7.13. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), innon slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Mean PEC-Q										
Cladoceran 7-d Survival	39	0.397	0.85	**8% (3 of 38)**	**100% (1 of 1)**	**92%**	No Data	**8% (3 of 38)**	**100% (1 of 1)**	**92%**
Cladoceran 7-d Reproduction	39	0.397	0.85	8% (3 of 38)	0% (0 of 1)	90%	No Data	8% (3 of 38)	0% (0 of 1)	90%
Cladoceran 7-d All	39	0.397	0.85	**13% (5 of 38)**	**100% (1 of 1)**	**87%**	No Data	**13% (5 of 38)**	**100% (1 of 1)**	**87%**
Midge 10-d Survival	37	0.397	0.85	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	0.397	0.85	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	0.397	0.85	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	0.397	0.85	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	0.397	0.85	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	0.397	0.85	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	0.397	0.85	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	0.397	0.85	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	39	0.397	0.85	76% (29 of 38)	100% (1 of 1)	26%	No Data	76% (29 of 38)	100% (1 of 1)	26%
ΣPEC-Q $_{EXTMETALS}$										
Cladoceran 7-d Survival	43	12.1	22.4	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	12.1	22.4	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	12.1	22.4	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	12.1	22.4	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	12.1	22.4	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	12.1	22.4	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	12.1	22.4	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	12.1	22.4	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	12.1	22.4	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	12.1	22.4	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	12.1	22.4	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	12.1	22.4	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.13. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), innon slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Cu:Al										
Cladoceran 7-d Survival	37	0.0407	0.0645	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	0.0407	0.0645	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	0.0407	0.0645	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	0.0407	0.0645	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	0.0407	0.0645	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	0.0407	0.0645	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	0.0407	0.0645	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	0.0407	0.0645	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	0.0407	0.0645	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	0.0407	0.0645	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	0.0407	0.0645	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	0.0407	0.0645	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Percent Sand (%)										
Cladoceran 7-d Survival	37	86.5	90.7	6% (2 of 34)	33% (1 of 3)	89%	0% (0 of 1)	6% (2 of 35)	50% (1 of 2)	92%
Cladoceran 7-d Reproduction	37	86.5	90.7	9% (3 of 34)	0% (0 of 3)	84%	0% (0 of 1)	9% (3 of 35)	0% (0 of 2)	86%
Cladoceran 7-d All	37	86.5	90.7	12% (4 of 34)	33% (1 of 3)	84%	0% (0 of 1)	11% (4 of 35)	50% (1 of 2)	86%
Midge 10-d Survival	43	86.5	90.7	22% (9 of 40)	0% (0 of 3)	72%	0% (0 of 1)	22% (9 of 41)	0% (0 of 2)	74%
Midge 10-d Growth	43	86.5	90.7	45% (18 of 40)	100% (3 of 3)	58%	100% (1 of 1)	46% (19 of 41)	100% (2 of 2)	56%
Midge 10-d Biomass	43	86.5	90.7	70% (28 of 40)	100% (3 of 3)	35%	100% (1 of 1)	71% (29 of 41)	100% (2 of 2)	33%
Midge 10-d All	43	86.5	90.7	72% (29 of 40)	100% (3 of 3)	33%	100% (1 of 1)	73% (30 of 41)	100% (2 of 2)	30%
Amphipod 28-d Survival	43	86.5	90.7	32% (13 of 40)	67% (2 of 3)	67%	100% (1 of 1)	34% (14 of 41)	50% (1 of 2)	65%
Amphipod 28-d Growth	43	86.5	90.7	8% (3 of 40)	0% (0 of 3)	86%	0% (0 of 1)	7% (3 of 41)	0% (0 of 2)	88%
Amphipod 28-d Biomass	43	86.5	90.7	18% (7 of 40)	0% (0 of 3)	77%	0% (0 of 1)	17% (7 of 41)	0% (0 of 2)	79%
Amphipod 28-d All	43	86.5	90.7	40% (16 of 40)	67% (2 of 3)	60%	100% (1 of 1)	41% (17 of 41)	50% (1 of 2)	58%
All Endpoints	43	86.5	90.7	75% (30 of 40)	100% (3 of 3)	30%	100% (1 of 1)	76% (31 of 41)	100% (2 of 2)	28%

Table A7.13. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), innon slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; Al = alumium; Cu = copper; d = day; IOT = incidence of toxicity.
Mean PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total polycyclic aromatic hydrocarbons; and, total polychlorinated biphenyls (Ingersoll et al. 2001).
$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.14. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Barium (mg/kg DW)										
Cladoceran 7-d Survival	56	297	567	6% (2 of 36)	20% (4 of 20)	68%	13% (2 of 15)	8% (4 of 51)	40% (2 of 5)	88%
Cladoceran 7-d Reproduction	56	297	567	8% (3 of 36)	15% (3 of 20)	64%	7% (1 of 15)	8% (4 of 51)	40% (2 of 5)	88%
Cladoceran 7-d All	56	297	567	11% (4 of 36)	25% (5 of 20)	66%	20% (3 of 15)	14% (7 of 51)	40% (2 of 5)	82%
Midge 10-d Survival	56	297	567	25% (9 of 36)	5% (1 of 20)	50%	7% (1 of 15)	20% (10 of 51)	0% (0 of 5)	73%
Midge 10-d Growth	56	297	567	42% (15 of 36)	65% (13 of 20)	61%	60% (9 of 15)	47% (24 of 51)	80% (4 of 5)	55%
Midge 10-d Biomass	56	297	567	72% (26 of 36)	80% (16 of 20)	46%	73% (11 of 15)	73% (37 of 51)	100% (5 of 5)	34%
Midge 10-d All	56	297	567	75% (27 of 36)	85% (17 of 20)	46%	80% (12 of 15)	76% (39 of 51)	100% (5 of 5)	30%
Amphipod 28-d Survival	56	297	567	33% (12 of 36)	70% (14 of 20)	68%	73% (11 of 15)	45% (23 of 51)	60% (3 of 5)	55%
Amphipod 28-d Growth	56	297	567	**6% (2 of 36)**	**30% (6 of 20)**	**71%**	20% (3 of 15)	10% (5 of 51)	60% (3 of 5)	88%
Amphipod 28-d Biomass	56	297	567	**8% (3 of 36)**	**55% (11 of 20)**	**79%**	47% (7 of 15)	20% (10 of 51)	80% (4 of 5)	80%
Amphipod 28-d All	56	297	567	36% (13 of 36)	85% (17 of 20)	71%	87% (13 of 15)	51% (26 of 51)	80% (4 of 5)	52%
All Endpoints	56	297	567	75% (27 of 36)	95% (19 of 20)	50%	93% (14 of 15)	80% (41 of 51)	100% (5 of 5)	27%
Total Calcium (mg/kg DW)										
Cladoceran 7-d Survival	56	17700	30300	3% (1 of 32)	21% (5 of 24)	64%	8% (1 of 12)	5% (2 of 44)	33% (4 of 12)	82%
Cladoceran 7-d Reproduction	56	17700	30300	6% (2 of 32)	17% (4 of 24)	61%	8% (1 of 12)	7% (3 of 44)	25% (3 of 12)	79%
Cladoceran 7-d All	56	17700	30300	9% (3 of 32)	25% (6 of 24)	62%	8% (1 of 12)	9% (4 of 44)	42% (5 of 12)	80%
Midge 10-d Survival	56	17700	30300	28% (9 of 32)	4% (1 of 24)	43%	8% (1 of 12)	23% (10 of 44)	0% (0 of 12)	61%
Midge 10-d Growth	56	17700	30300	50% (16 of 32)	50% (12 of 24)	50%	50% (6 of 12)	50% (22 of 44)	50% (6 of 12)	50%
Midge 10-d Biomass	56	17700	30300	84% (27 of 32)	62% (15 of 24)	36%	67% (8 of 12)	80% (35 of 44)	58% (7 of 12)	29%
Midge 10-d All	56	17700	30300	88% (28 of 32)	67% (16 of 24)	36%	75% (9 of 12)	84% (37 of 44)	58% (7 of 12)	25%
Amphipod 28-d Survival	56	17700	30300	34% (11 of 32)	62% (15 of 24)	64%	75% (9 of 12)	45% (20 of 44)	50% (6 of 12)	54%
Amphipod 28-d Growth	56	17700	30300	9% (3 of 32)	21% (5 of 24)	61%	8% (1 of 12)	9% (4 of 44)	33% (4 of 12)	79%
Amphipod 28-d Biomass	56	17700	30300	16% (5 of 32)	38% (9 of 24)	64%	25% (3 of 12)	18% (8 of 44)	50% (6 of 12)	75%
Amphipod 28-d All	56	17700	30300	44% (14 of 32)	67% (16 of 24)	61%	75% (9 of 12)	52% (23 of 44)	58% (7 of 12)	50%
All Endpoints	56	17700	30300	88% (28 of 32)	75% (18 of 24)	39%	83% (10 of 12)	86% (38 of 44)	67% (8 of 12)	25%

Table A7.14. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Copper (mg/kg DW)										
Cladoceran 7-d Survival	67	303	613	10% (5 of 48)	21% (4 of 19)	70%	0% (0 of 10)	9% (5 of 58)	44% (4 of 9)	85%
Cladoceran 7-d Reproduction	67	303	613	**10% (5 of 48)**	**32% (6 of 19)**	**73%**	10% (1 of 10)	10% (6 of 58)	56% (5 of 9)	85%
Cladoceran 7-d All	67	303	613	19% (9 of 48)	32% (6 of 19)	67%	10% (1 of 10)	17% (10 of 58)	56% (5 of 9)	79%
Midge 10-d Survival	64	303	613	18% (9 of 49)	7% (1 of 15)	64%	12% (1 of 8)	18% (10 of 57)	0% (0 of 7)	73%
Midge 10-d Growth	64	303	613	45% (22 of 49)	67% (10 of 15)	58%	50% (4 of 8)	46% (26 of 57)	86% (6 of 7)	58%
Midge 10-d Biomass	64	303	613	65% (32 of 49)	93% (14 of 15)	48%	88% (7 of 8)	68% (39 of 57)	100% (7 of 7)	39%
Midge 10-d All	64	303	613	69% (34 of 49)	93% (14 of 15)	45%	88% (7 of 8)	72% (41 of 57)	100% (7 of 7)	36%
Amphipod 28-d Survival	64	303	613	35% (17 of 49)	87% (13 of 15)	70%	100% (8 of 8)	44% (25 of 57)	71% (5 of 7)	58%
Amphipod 28-d Growth	64	303	613	6% (3 of 49)	33% (5 of 15)	80%	25% (2 of 8)	9% (5 of 57)	43% (3 of 7)	86%
Amphipod 28-d Biomass	64	303	613	**14% (7 of 49)**	**60% (9 of 15)**	**80%**	50% (4 of 8)	**19% (11 of 57)**	**71% (5 of 7)**	**80%**
Amphipod 28-d All	64	303	613	41% (20 of 49)	93% (14 of 15)	67%	100% (8 of 8)	49% (28 of 57)	86% (6 of 7)	55%
All Endpoints	75	303	613	71% (39 of 55)	90% (18 of 20)	45%	80% (8 of 10)	72% (47 of 65)	100% (10 of 10)	37%
Total Manganese (mg/kg DW)										
Cladoceran 7-d Survival	56	528	1120	10% (4 of 39)	12% (2 of 17)	66%	0% (0 of 10)	8% (4 of 49)	29% (2 of 7)	84%
Cladoceran 7-d Reproduction	56	528	1120	8% (3 of 39)	18% (3 of 17)	70%	10% (1 of 10)	8% (4 of 49)	29% (2 of 7)	84%
Cladoceran 7-d All	56	528	1120	15% (6 of 39)	18% (3 of 17)	64%	10% (1 of 10)	14% (7 of 49)	29% (2 of 7)	79%
Midge 10-d Survival	56	528	1120	21% (8 of 39)	12% (2 of 17)	59%	20% (2 of 10)	20% (10 of 49)	0% (0 of 7)	70%
Midge 10-d Growth	56	528	1120	44% (17 of 39)	65% (11 of 17)	59%	50% (5 of 10)	45% (22 of 49)	86% (6 of 7)	59%
Midge 10-d Biomass	56	528	1120	69% (27 of 39)	88% (15 of 17)	48%	80% (8 of 10)	71% (35 of 49)	100% (7 of 7)	38%
Midge 10-d All	56	528	1120	74% (29 of 39)	88% (15 of 17)	45%	80% (8 of 10)	76% (37 of 49)	100% (7 of 7)	34%
Amphipod 28-d Survival	56	528	1120	33% (13 of 39)	76% (13 of 17)	70%	80% (8 of 10)	43% (21 of 49)	71% (5 of 7)	59%
Amphipod 28-d Growth	56	528	1120	**8% (3 of 39)**	**29% (5 of 17)**	**73%**	10% (1 of 10)	8% (4 of 49)	57% (4 of 7)	88%
Amphipod 28-d Biomass	56	528	1120	**15% (6 of 39)**	**47% (8 of 17)**	**73%**	30% (3 of 10)	18% (9 of 49)	71% (5 of 7)	80%
Amphipod 28-d All	56	528	1120	41% (16 of 39)	82% (14 of 17)	66%	80% (8 of 10)	49% (24 of 49)	86% (6 of 7)	55%
All Endpoints	56	528	1120	77% (30 of 39)	94% (16 of 17)	45%	90% (9 of 10)	80% (39 of 49)	100% (7 of 7)	30%

Table A7.14. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Mean PEC-Q										
Cladoceran 7-d Survival	58	0.397	0.85	10% (4 of 42)	19% (3 of 16)	71%	0% (0 of 9)	8% (4 of 51)	43% (3 of 7)	86%
Cladoceran 7-d Reproduction	58	0.397	0.85	7% (3 of 42)	19% (3 of 16)	72%	11% (1 of 9)	8% (4 of 51)	29% (2 of 7)	84%
Cladoceran 7-d All	58	0.397	0.85	14% (6 of 42)	25% (4 of 16)	69%	11% (1 of 9)	14% (7 of 51)	43% (3 of 7)	81%
Midge 10-d Survival	56	0.397	0.85	22% (9 of 41)	7% (1 of 15)	59%	11% (1 of 9)	20% (10 of 50)	0% (0 of 6)	71%
Midge 10-d Growth	56	0.397	0.85	46% (19 of 41)	60% (9 of 15)	55%	44% (4 of 9)	46% (23 of 50)	83% (5 of 6)	57%
Midge 10-d Biomass	56	0.397	0.85	71% (29 of 41)	87% (13 of 15)	45%	78% (7 of 9)	72% (36 of 50)	100% (6 of 6)	36%
Midge 10-d All	56	0.397	0.85	76% (31 of 41)	87% (13 of 15)	41%	78% (7 of 9)	76% (38 of 50)	100% (6 of 6)	32%
Amphipod 28-d Survival	56	0.397	0.85	34% (14 of 41)	80% (12 of 15)	70%	89% (8 of 9)	44% (22 of 50)	67% (4 of 6)	57%
Amphipod 28-d Growth	56	0.397	0.85	7% (3 of 41)	33% (5 of 15)	77%	22% (2 of 9)	10% (5 of 50)	50% (3 of 6)	86%
Amphipod 28-d Biomass	56	0.397	0.85	15% (6 of 41)	53% (8 of 15)	77%	44% (4 of 9)	20% (10 of 50)	67% (4 of 6)	79%
Amphipod 28-d All	56	0.397	0.85	41% (17 of 41)	87% (13 of 15)	66%	89% (8 of 9)	50% (25 of 50)	83% (5 of 6)	54%
All Endpoints	58	0.397	0.85	76% (32 of 42)	94% (15 of 16)	43%	89% (8 of 9)	78% (40 of 51)	100% (7 of 7)	31%
***ΣPEC-Q** $_{EXTMETALS}$*										
Cladoceran 7-d Survival	67	12.1	22.4	10% (5 of 50)	24% (4 of 17)	73%	0% (0 of 8)	9% (5 of 58)	44% (4 of 9)	85%
Cladoceran 7-d Reproduction	67	12.1	22.4	**10% (5 of 50)**	**35% (6 of 17)**	**76%**	12% (1 of 8)	10% (6 of 58)	56% (5 of 9)	85%
Cladoceran 7-d All	67	12.1	22.4	18% (9 of 50)	35% (6 of 17)	70%	12% (1 of 8)	17% (10 of 58)	56% (5 of 9)	79%
Midge 10-d Survival	64	12.1	22.4	18% (9 of 51)	8% (1 of 13)	67%	17% (1 of 6)	18% (10 of 57)	0% (0 of 7)	73%
Midge 10-d Growth	64	12.1	22.4	45% (23 of 51)	69% (9 of 13)	58%	50% (3 of 6)	46% (26 of 57)	86% (6 of 7)	58%
Midge 10-d Biomass	64	12.1	22.4	65% (33 of 51)	100% (13 of 13)	48%	100% (6 of 6)	68% (39 of 57)	100% (7 of 7)	39%
Midge 10-d All	64	12.1	22.4	69% (35 of 51)	100% (13 of 13)	45%	100% (6 of 6)	72% (41 of 57)	100% (7 of 7)	36%
Amphipod 28-d Survival	64	12.1	22.4	37% (19 of 51)	85% (11 of 13)	67%	100% (6 of 6)	44% (25 of 57)	71% (5 of 7)	58%
Amphipod 28-d Growth	64	12.1	22.4	6% (3 of 51)	38% (5 of 13)	83%	33% (2 of 6)	9% (5 of 57)	43% (3 of 7)	86%
Amphipod 28-d Biomass	64	12.1	22.4	**16% (8 of 51)**	**62% (8 of 13)**	**80%**	50% (3 of 6)	**19% (11 of 57)**	**71% (5 of 7)**	**80%**
Amphipod 28-d All	64	12.1	22.4	43% (22 of 51)	92% (12 of 13)	64%	100% (6 of 6)	49% (28 of 57)	86% (6 of 7)	55%
All Endpoints	75	12.1	22.4	72% (41 of 57)	89% (16 of 18)	43%	75% (6 of 8)	72% (47 of 65)	100% (10 of 10)	37%

Table A7.14. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Cu:Al										
Cladoceran 7-d Survival	56	0.0407	0.0645	10% (4 of 41)	13% (2 of 15)	70%	0% (0 of 6)	9% (4 of 47)	22% (2 of 9)	80%
Cladoceran 7-d Reproduction	56	0.0407	0.0645	7% (3 of 41)	20% (3 of 15)	73%	0% (0 of 6)	6% (3 of 47)	33% (3 of 9)	84%
Cladoceran 7-d All	56	0.0407	0.0645	15% (6 of 41)	20% (3 of 15)	68%	0% (0 of 6)	13% (6 of 47)	33% (3 of 9)	79%
Midge 10-d Survival	56	0.0407	0.0645	22% (9 of 41)	7% (1 of 15)	59%	0% (0 of 6)	19% (9 of 47)	11% (1 of 9)	70%
Midge 10-d Growth	56	0.0407	0.0645	46% (19 of 41)	60% (9 of 15)	55%	50% (3 of 6)	47% (22 of 47)	67% (6 of 9)	55%
Midge 10-d Biomass	56	0.0407	0.0645	68% (28 of 41)	93% (14 of 15)	48%	83% (5 of 6)	70% (33 of 47)	100% (9 of 9)	41%
Midge 10-d All	56	0.0407	0.0645	73% (30 of 41)	93% (14 of 15)	45%	83% (5 of 6)	74% (35 of 47)	100% (9 of 9)	38%
Amphipod 28-d Survival	56	0.0407	0.0645	32% (13 of 41)	87% (13 of 15)	73%	100% (6 of 6)	40% (19 of 47)	78% (7 of 9)	62%
Amphipod 28-d Growth	56	0.0407	0.0645	7% (3 of 41)	33% (5 of 15)	77%	17% (1 of 6)	9% (4 of 47)	44% (4 of 9)	84%
Amphipod 28-d Biomass	56	0.0407	0.0645	**15% (6 of 41)**	**53% (8 of 15)**	**77%**	33% (2 of 6)	17% (8 of 47)	67% (6 of 9)	80%
Amphipod 28-d All	56	0.0407	0.0645	39% (16 of 41)	93% (14 of 15)	70%	100% (6 of 6)	47% (22 of 47)	89% (8 of 9)	59%
All Endpoints	56	0.0407	0.0645	76% (31 of 41)	100% (15 of 15)	45%	100% (6 of 6)	79% (37 of 47)	100% (9 of 9)	34%
Percent Sand (%)										
Cladoceran 7-d Survival	56	86.5	90.7	8% (3 of 40)	19% (3 of 16)	71%	0% (0 of 4)	7% (3 of 44)	25% (3 of 12)	79%
Cladoceran 7-d Reproduction	56	86.5	90.7	8% (3 of 40)	19% (3 of 16)	71%	0% (0 of 4)	7% (3 of 44)	25% (3 of 12)	79%
Cladoceran 7-d All	56	86.5	90.7	12% (5 of 40)	25% (4 of 16)	70%	0% (0 of 4)	11% (5 of 44)	33% (4 of 12)	77%
Midge 10-d Survival	64	86.5	90.7	19% (9 of 47)	6% (1 of 17)	61%	0% (0 of 4)	18% (9 of 51)	8% (1 of 13)	67%
Midge 10-d Growth	64	86.5	90.7	40% (19 of 47)	76% (13 of 17)	64%	50% (2 of 4)	41% (21 of 51)	85% (11 of 13)	64%
Midge 10-d Biomass	64	86.5	90.7	62% (29 of 47)	100% (17 of 17)	55%	100% (4 of 4)	65% (33 of 51)	100% (13 of 13)	48%
Midge 10-d All	64	86.5	90.7	66% (31 of 47)	100% (17 of 17)	52%	100% (4 of 4)	69% (35 of 51)	100% (13 of 13)	45%
Amphipod 28-d Survival	64	86.5	90.7	32% (15 of 47)	88% (15 of 17)	73%	100% (4 of 4)	37% (19 of 51)	85% (11 of 13)	67%
Amphipod 28-d Growth	64	86.5	90.7	6% (3 of 47)	29% (5 of 17)	77%	0% (0 of 4)	6% (3 of 51)	38% (5 of 13)	83%
Amphipod 28-d Biomass	64	86.5	90.7	**15% (7 of 47)**	**53% (9 of 17)**	**77%**	0% (0 of 4)	14% (7 of 51)	69% (9 of 13)	83%
Amphipod 28-d All	64	86.5	90.7	38% (18 of 47)	94% (16 of 17)	70%	100% (4 of 4)	43% (22 of 51)	92% (12 of 13)	64%
All Endpoints	64	86.5	90.7	72% (34 of 47)	100% (17 of 17)	47%	100% (4 of 4)	75% (38 of 51)	100% (13 of 13)	41%

Table A7.14. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 10-day toxicity tests with the midge, *Chironomus dilutus* (endpoint: biomass), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; Al = alumium; Cu = copper; d = day; IOT = incidence of toxicity.
Mean PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total polycyclic aromatic hydrocarbons; and, total polychlorinated biphenyls (Ingersoll et al. 2001).
$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.15. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Chromium (mg/kg DW)										
Cladoceran 7-d Survival	19	80.9	85.9	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	No Data	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d Reproduction	19	80.9	85.9	**6% (1 of 16)**	**67% (2 of 3)**	**89%**	No Data	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d All	19	80.9	85.9	**12% (2 of 16)**	**67% (2 of 3)**	**84%**	No Data	**12% (2 of 16)**	**67% (2 of 3)**	**84%**
Midge 10-d Survival	19	80.9	85.9	6% (1 of 16)	0% (0 of 3)	79%	No Data	6% (1 of 16)	0% (0 of 3)	79%
Midge 10-d Growth	19	80.9	85.9	44% (7 of 16)	100% (3 of 3)	63%	No Data	44% (7 of 16)	100% (3 of 3)	63%
Midge 10-d Biomass	19	80.9	85.9	69% (11 of 16)	100% (3 of 3)	42%	No Data	69% (11 of 16)	100% (3 of 3)	42%
Midge 10-d All	19	80.9	85.9	75% (12 of 16)	100% (3 of 3)	37%	No Data	75% (12 of 16)	100% (3 of 3)	37%
Amphipod 28-d Survival	19	80.9	85.9	69% (11 of 16)	100% (3 of 3)	42%	No Data	69% (11 of 16)	100% (3 of 3)	42%
Amphipod 28-d Growth	19	80.9	85.9	**12% (2 of 16)**	**100% (3 of 3)**	**89%**	No Data	**12% (2 of 16)**	**100% (3 of 3)**	**89%**
Amphipod 28-d Biomass	19	80.9	85.9	31% (5 of 16)	100% (3 of 3)	74%	No Data	31% (5 of 16)	100% (3 of 3)	74%
Amphipod 28-d All	19	80.9	85.9	75% (12 of 16)	100% (3 of 3)	37%	No Data	75% (12 of 16)	100% (3 of 3)	37%
All Endpoints	19	80.9	85.9	88% (14 of 16)	100% (3 of 3)	26%	No Data	88% (14 of 16)	100% (3 of 3)	26%
SE Chromium (µmol/g)										
Cladoceran 7-d Survival	19	0.798	0.937	**12% (2 of 17)**	**50% (1 of 2)**	**84%**	No Data	12% (2 of 17)	50% (1 of 2)	84%
Cladoceran 7-d Reproduction	19	0.798	0.937	**12% (2 of 17)**	**50% (1 of 2)**	**84%**	No Data	12% (2 of 17)	50% (1 of 2)	84%
Cladoceran 7-d All	19	0.798	0.937	18% (3 of 17)	50% (1 of 2)	79%	No Data	18% (3 of 17)	50% (1 of 2)	79%
Midge 10-d Survival	19	0.798	0.937	6% (1 of 17)	0% (0 of 2)	84%	No Data	6% (1 of 17)	0% (0 of 2)	84%
Midge 10-d Growth	19	0.798	0.937	47% (8 of 17)	100% (2 of 2)	58%	No Data	47% (8 of 17)	100% (2 of 2)	58%
Midge 10-d Biomass	19	0.798	0.937	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Midge 10-d All	19	0.798	0.937	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
Amphipod 28-d Survival	19	0.798	0.937	71% (12 of 17)	100% (2 of 2)	37%	No Data	71% (12 of 17)	100% (2 of 2)	37%
Amphipod 28-d Growth	19	0.798	0.937	**18% (3 of 17)**	**100% (2 of 2)**	**84%**	No Data	**18% (3 of 17)**	**100% (2 of 2)**	**84%**
Amphipod 28-d Biomass	19	0.798	0.937	35% (6 of 17)	100% (2 of 2)	68%	No Data	35% (6 of 17)	100% (2 of 2)	68%
Amphipod 28-d All	19	0.798	0.937	76% (13 of 17)	100% (2 of 2)	32%	No Data	76% (13 of 17)	100% (2 of 2)	32%
All Endpoints	19	0.798	0.937	88% (15 of 17)	100% (2 of 2)	21%	No Data	88% (15 of 17)	100% (2 of 2)	21%

Table A7.15. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Σ(SEM-AVS)/f $_{OC}$ ***(µmol/g)***										
Cladoceran 7-d Survival	19	67500	82800	12% (2 of 16)	33% (1 of 3)	79%	No Data	12% (2 of 16)	33% (1 of 3)	79%
Cladoceran 7-d Reproduction	19	67500	82800	12% (2 of 16)	33% (1 of 3)	79%	No Data	12% (2 of 16)	33% (1 of 3)	79%
Cladoceran 7-d All	19	67500	82800	19% (3 of 16)	33% (1 of 3)	74%	No Data	19% (3 of 16)	33% (1 of 3)	74%
Midge 10-d Survival	21	67500	82800	6% (1 of 17)	0% (0 of 4)	76%	No Data	6% (1 of 17)	0% (0 of 4)	76%
Midge 10-d Growth	21	67500	82800	41% (7 of 17)	100% (4 of 4)	67%	No Data	41% (7 of 17)	100% (4 of 4)	67%
Midge 10-d Biomass	21	67500	82800	65% (11 of 17)	100% (4 of 4)	48%	No Data	65% (11 of 17)	100% (4 of 4)	48%
Midge 10-d All	21	67500	82800	71% (12 of 17)	100% (4 of 4)	43%	No Data	71% (12 of 17)	100% (4 of 4)	43%
Amphipod 28-d Survival	21	67500	82800	65% (11 of 17)	100% (4 of 4)	48%	No Data	65% (11 of 17)	100% (4 of 4)	48%
Amphipod 28-d Growth	21	67500	82800	**12% (2 of 17)**	**75% (3 of 4)**	**86%**	No Data	**12% (2 of 17)**	**75% (3 of 4)**	**86%**
Amphipod 28-d Biomass	21	67500	82800	29% (5 of 17)	100% (4 of 4)	76%	No Data	29% (5 of 17)	100% (4 of 4)	76%
Amphipod 28-d All	21	67500	82800	71% (12 of 17)	100% (4 of 4)	43%	No Data	71% (12 of 17)	100% (4 of 4)	43%
All Endpoints	21	67500	82800	82% (14 of 17)	100% (4 of 4)	33%	No Data	82% (14 of 17)	100% (4 of 4)	33%
Mean PEC-Q $_{METALS(1\%OC)}$										
Cladoceran 7-d Survival	24	26.8	33.4	12% (2 of 17)	43% (3 of 7)	75%	0% (0 of 1)	11% (2 of 18)	50% (3 of 6)	79%
Cladoceran 7-d Reproduction	24	26.8	33.4	12% (2 of 17)	57% (4 of 7)	79%	0% (0 of 1)	11% (2 of 18)	67% (4 of 6)	83%
Cladoceran 7-d All	24	26.8	33.4	18% (3 of 17)	57% (4 of 7)	75%	0% (0 of 1)	17% (3 of 18)	67% (4 of 6)	79%
Midge 10-d Survival	21	26.8	33.4	6% (1 of 16)	0% (0 of 5)	71%	0% (0 of 1)	6% (1 of 17)	0% (0 of 4)	76%
Midge 10-d Growth	21	26.8	33.4	38% (6 of 16)	100% (5 of 5)	71%	100% (1 of 1)	41% (7 of 17)	100% (4 of 4)	67%
Midge 10-d Biomass	21	26.8	33.4	62% (10 of 16)	100% (5 of 5)	52%	100% (1 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Midge 10-d All	21	26.8	33.4	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
Amphipod 28-d Survival	21	26.8	33.4	69% (11 of 16)	80% (4 of 5)	43%	0% (0 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Amphipod 28-d Growth	21	26.8	33.4	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	0% (0 of 1)	**12% (2 of 17)**	**75% (3 of 4)**	**86%**
Amphipod 28-d Biomass	21	26.8	33.4	25% (4 of 16)	100% (5 of 5)	81%	100% (1 of 1)	29% (5 of 17)	100% (4 of 4)	76%
Amphipod 28-d All	21	26.8	33.4	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
All Endpoints	26	26.8	33.4	72% (13 of 18)	100% (8 of 8)	50%	100% (1 of 1)	74% (14 of 19)	100% (7 of 7)	46%

Table A7.15. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***Mean PEC-Q** EXT METAL(1%OC)*										
Cladoceran 7-d Survival	24	22.5	28.7	12% (2 of 17)	43% (3 of 7)	75%	0% (0 of 2)	11% (2 of 19)	60% (3 of 5)	83%
Cladoceran 7-d Reproduction	24	22.5	28.7	12% (2 of 17)	57% (4 of 7)	79%	0% (0 of 2)	11% (2 of 19)	80% (4 of 5)	88%
Cladoceran 7-d All	24	22.5	28.7	18% (3 of 17)	57% (4 of 7)	75%	0% (0 of 2)	16% (3 of 19)	80% (4 of 5)	83%
Midge 10-d Survival	21	22.5	28.7	6% (1 of 16)	0% (0 of 5)	71%	0% (0 of 2)	6% (1 of 18)	0% (0 of 3)	81%
Midge 10-d Growth	21	22.5	28.7	38% (6 of 16)	100% (5 of 5)	71%	100% (2 of 2)	44% (8 of 18)	100% (3 of 3)	62%
Midge 10-d Biomass	21	22.5	28.7	62% (10 of 16)	100% (5 of 5)	52%	100% (2 of 2)	67% (12 of 18)	100% (3 of 3)	43%
Midge 10-d All	21	22.5	28.7	69% (11 of 16)	100% (5 of 5)	48%	100% (2 of 2)	72% (13 of 18)	100% (3 of 3)	38%
Amphipod 28-d Survival	21	22.5	28.7	69% (11 of 16)	80% (4 of 5)	43%	50% (1 of 2)	67% (12 of 18)	100% (3 of 3)	43%
Amphipod 28-d Growth	21	22.5	28.7	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	50% (1 of 2)	**17% (3 of 18)**	**67% (2 of 3)**	**81%**
Amphipod 28-d Biomass	21	22.5	28.7	25% (4 of 16)	100% (5 of 5)	81%	100% (2 of 2)	33% (6 of 18)	100% (3 of 3)	71%
Amphipod 28-d All	21	22.5	28.7	69% (11 of 16)	100% (5 of 5)	48%	100% (2 of 2)	72% (13 of 18)	100% (3 of 3)	38%
All Endpoints	26	22.5	28.7	72% (13 of 18)	100% (8 of 8)	50%	100% (2 of 2)	75% (15 of 20)	100% (6 of 6)	42%
***ΣPEC-Q** METAL(S1%OC)*										
Cladoceran 7-d Survival	24	184	220	12% (2 of 17)	43% (3 of 7)	75%	0% (0 of 1)	11% (2 of 18)	50% (3 of 6)	79%
Cladoceran 7-d Reproduction	24	184	220	12% (2 of 17)	57% (4 of 7)	79%	0% (0 of 1)	11% (2 of 18)	67% (4 of 6)	83%
Cladoceran 7-d All	24	184	220	18% (3 of 17)	57% (4 of 7)	75%	0% (0 of 1)	17% (3 of 18)	67% (4 of 6)	79%
Midge 10-d Survival	21	184	220	6% (1 of 16)	0% (0 of 5)	71%	0% (0 of 1)	6% (1 of 17)	0% (0 of 4)	76%
Midge 10-d Growth	21	184	220	38% (6 of 16)	100% (5 of 5)	71%	100% (1 of 1)	41% (7 of 17)	100% (4 of 4)	67%
Midge 10-d Biomass	21	184	220	62% (10 of 16)	100% (5 of 5)	52%	100% (1 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Midge 10-d All	21	184	220	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
Amphipod 28-d Survival	21	184	220	69% (11 of 16)	80% (4 of 5)	43%	0% (0 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Amphipod 28-d Growth	21	184	220	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	0% (0 of 1)	**12% (2 of 17)**	**75% (3 of 4)**	**86%**
Amphipod 28-d Biomass	21	184	220	25% (4 of 16)	100% (5 of 5)	81%	100% (1 of 1)	29% (5 of 17)	100% (4 of 4)	76%
Amphipod 28-d All	21	184	220	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
All Endpoints	26	184	220	72% (13 of 18)	100% (8 of 8)	50%	100% (1 of 1)	74% (14 of 19)	100% (7 of 7)	46%

Table A7.15. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** EXTMETALS(1%OC)*										
Cladoceran 7-d Survival	24	215	254	12% (2 of 17)	43% (3 of 7)	75%	0% (0 of 1)	11% (2 of 18)	50% (3 of 6)	79%
Cladoceran 7-d Reproduction	24	215	254	12% (2 of 17)	57% (4 of 7)	79%	0% (0 of 1)	**11% (2 of 18)**	**67% (4 of 6)**	**83%**
Cladoceran 7-d All	24	215	254	18% (3 of 17)	57% (4 of 7)	75%	0% (0 of 1)	17% (3 of 18)	67% (4 of 6)	79%
Midge 10-d Survival	21	215	254	6% (1 of 16)	0% (0 of 5)	71%	0% (0 of 1)	6% (1 of 17)	0% (0 of 4)	76%
Midge 10-d Growth	21	215	254	38% (6 of 16)	100% (5 of 5)	71%	100% (1 of 1)	41% (7 of 17)	100% (4 of 4)	67%
Midge 10-d Biomass	21	215	254	62% (10 of 16)	100% (5 of 5)	52%	100% (1 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Midge 10-d All	21	215	254	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
Amphipod 28-d Survival	21	215	254	69% (11 of 16)	80% (4 of 5)	43%	0% (0 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Amphipod 28-d Growth	21	215	254	**12% (2 of 16)**	**60% (3 of 5)**	**81%**	0% (0 of 1)	**12% (2 of 17)**	**75% (3 of 4)**	**86%**
Amphipod 28-d Biomass	21	215	254	25% (4 of 16)	100% (5 of 5)	81%	100% (1 of 1)	29% (5 of 17)	100% (4 of 4)	76%
Amphipod 28-d All	21	215	254	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
All Endpoints	26	215	254	72% (13 of 18)	100% (8 of 8)	50%	100% (1 of 1)	74% (14 of 19)	100% (7 of 7)	46%
Zn:Cd										
Cladoceran 7-d Survival	24	12900	16700	19% (4 of 21)	33% (1 of 3)	75%	0% (0 of 1)	18% (4 of 22)	50% (1 of 2)	79%
Cladoceran 7-d Reproduction	24	12900	16700	19% (4 of 21)	67% (2 of 3)	79%	100% (1 of 1)	23% (5 of 22)	50% (1 of 2)	75%
Cladoceran 7-d All	24	12900	16700	24% (5 of 21)	67% (2 of 3)	75%	100% (1 of 1)	27% (6 of 22)	50% (1 of 2)	71%
Midge 10-d Survival	21	12900	16700	5% (1 of 19)	0% (0 of 2)	86%	No Data	5% (1 of 19)	0% (0 of 2)	86%
Midge 10-d Growth	21	12900	16700	47% (9 of 19)	100% (2 of 2)	57%	No Data	47% (9 of 19)	100% (2 of 2)	57%
Midge 10-d Biomass	21	12900	16700	68% (13 of 19)	100% (2 of 2)	38%	No Data	68% (13 of 19)	100% (2 of 2)	38%
Midge 10-d All	21	12900	16700	74% (14 of 19)	100% (2 of 2)	33%	No Data	74% (14 of 19)	100% (2 of 2)	33%
Amphipod 28-d Survival	21	12900	16700	68% (13 of 19)	100% (2 of 2)	38%	No Data	68% (13 of 19)	100% (2 of 2)	38%
Amphipod 28-d Growth	21	12900	16700	**16% (3 of 19)**	**100% (2 of 2)**	**86%**	No Data	**16% (3 of 19)**	**100% (2 of 2)**	**86%**
Amphipod 28-d Biomass	21	12900	16700	37% (7 of 19)	100% (2 of 2)	67%	No Data	37% (7 of 19)	100% (2 of 2)	67%
Amphipod 28-d All	21	12900	16700	74% (14 of 19)	100% (2 of 2)	33%	No Data	74% (14 of 19)	100% (2 of 2)	33%
All Endpoints	26	12900	16700	78% (18 of 23)	100% (3 of 3)	31%	100% (1 of 1)	79% (19 of 24)	100% (2 of 2)	27%

Table A7.15. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Percent Sand (%)										
Cladoceran 7-d Survival	19	94.2	94.9	7% (1 of 14)	40% (2 of 5)	79%	0% (0 of 1)	7% (1 of 15)	50% (2 of 4)	84%
Cladoceran 7-d Reproduction	19	94.2	94.9	**0% (0 of 14)**	**60% (3 of 5)**	**89%**	0% (0 of 1)	**0% (0 of 15)**	**75% (3 of 4)**	**95%**
Cladoceran 7-d All	19	94.2	94.9	**7% (1 of 14)**	**60% (3 of 5)**	**84%**	0% (0 of 1)	**7% (1 of 15)**	**75% (3 of 4)**	**89%**
Midge 10-d Survival	21	94.2	94.9	6% (1 of 16)	0% (0 of 5)	71%	0% (0 of 1)	6% (1 of 17)	0% (0 of 4)	76%
Midge 10-d Growth	21	94.2	94.9	38% (6 of 16)	100% (5 of 5)	71%	100% (1 of 1)	41% (7 of 17)	100% (4 of 4)	67%
Midge 10-d Biomass	21	94.2	94.9	62% (10 of 16)	100% (5 of 5)	52%	100% (1 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Midge 10-d All	21	94.2	94.9	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
Amphipod 28-d Survival	21	94.2	94.9	62% (10 of 16)	100% (5 of 5)	52%	100% (1 of 1)	65% (11 of 17)	100% (4 of 4)	48%
Amphipod 28-d Growth	21	94.2	94.9	**0% (0 of 16)**	**100% (5 of 5)**	**100%**	100% (1 of 1)	**6% (1 of 17)**	**100% (4 of 4)**	**95%**
Amphipod 28-d Biomass	21	94.2	94.9	25% (4 of 16)	100% (5 of 5)	81%	100% (1 of 1)	29% (5 of 17)	100% (4 of 4)	76%
Amphipod 28-d All	21	94.2	94.9	69% (11 of 16)	100% (5 of 5)	48%	100% (1 of 1)	71% (12 of 17)	100% (4 of 4)	43%
All Endpoints	21	94.2	94.9	81% (13 of 16)	100% (5 of 5)	38%	100% (1 of 1)	82% (14 of 17)	100% (4 of 4)	33%

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; Cd = cadmium; Zn = zinc; d = day; IOT = incidence of toxicity.
$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).
$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.16. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Chromium (mg/kg DW)										
Cladoceran 7-d Survival	37	80.9	85.9	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	80.9	85.9	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	80.9	85.9	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	80.9	85.9	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	80.9	85.9	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	80.9	85.9	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	80.9	85.9	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	80.9	85.9	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	80.9	85.9	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	80.9	85.9	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	80.9	85.9	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	80.9	85.9	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
SE Chromium (µmol/g)										
Cladoceran 7-d Survival	37	0.798	0.937	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	0.798	0.937	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	0.798	0.937	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	0.798	0.937	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	0.798	0.937	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	0.798	0.937	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	0.798	0.937	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	0.798	0.937	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	0.798	0.937	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	0.798	0.937	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	0.798	0.937	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	0.798	0.937	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%

Table A7.16. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Σ(SEM-AVS)/f $_{OC}$ ***(µmol/g)***										
Cladoceran 7-d Survival	37	67500	82800	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	67500	82800	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	67500	82800	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	43	67500	82800	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	67500	82800	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	67500	82800	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	67500	82800	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	67500	82800	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	67500	82800	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	67500	82800	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	67500	82800	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	43	67500	82800	77% (33 of 43)	No Data	23%	No Data	77% (33 of 43)	No Data	23%
Mean PEC-Q $_{METALS(1\%OC)}$										
Cladoceran 7-d Survival	43	26.8	33.4	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	26.8	33.4	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	26.8	33.4	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	26.8	33.4	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	26.8	33.4	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	26.8	33.4	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	26.8	33.4	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	26.8	33.4	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	26.8	33.4	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	26.8	33.4	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	26.8	33.4	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	26.8	33.4	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.16. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Mean PEC-Q $_{EXTMETALS(1\%OC)}$										
Cladoceran 7-d Survival	43	22.5	28.7	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	22.5	28.7	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	22.5	28.7	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	22.5	28.7	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	22.5	28.7	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	22.5	28.7	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	22.5	28.7	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	22.5	28.7	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	22.5	28.7	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	22.5	28.7	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	22.5	28.7	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	22.5	28.7	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%
ΣPEC-Q $_{METAL(S1\%OC)}$										
Cladoceran 7-d Survival	43	184	220	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	184	220	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	184	220	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	184	220	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	184	220	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	184	220	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	184	220	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	184	220	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	184	220	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	184	220	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	184	220	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	184	220	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.16. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
ΣPEC-Q $_{EXTMETALS(1\%OC)}$										
Cladoceran 7-d Survival	43	215	254	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	215	254	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	215	254	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	215	254	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	215	254	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	215	254	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	215	254	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	215	254	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	215	254	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	215	254	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	215	254	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	215	254	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%
Zn:Cd										
Cladoceran 7-d Survival	43	12900	16700	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	12900	16700	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	12900	16700	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	12900	16700	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	12900	16700	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	12900	16700	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	12900	16700	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	12900	16700	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	12900	16700	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	12900	16700	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	12900	16700	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	12900	16700	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.16. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Percent Sand (%)										
Cladoceran 7-d Survival	37	94.2	94.9	6% (2 of 35)	50% (1 of 2)	92%	0% (0 of 1)	6% (2 of 36)	100% (1 of 1)	95%
Cladoceran 7-d Reproduction	37	94.2	94.9	9% (3 of 35)	0% (0 of 2)	86%	0% (0 of 1)	8% (3 of 36)	0% (0 of 1)	89%
Cladoceran 7-d All	37	94.2	94.9	11% (4 of 35)	50% (1 of 2)	86%	0% (0 of 1)	11% (4 of 36)	100% (1 of 1)	89%
Midge 10-d Survival	43	94.2	94.9	22% (9 of 41)	0% (0 of 2)	74%	0% (0 of 1)	21% (9 of 42)	0% (0 of 1)	77%
Midge 10-d Growth	43	94.2	94.9	46% (19 of 41)	100% (2 of 2)	56%	100% (1 of 1)	48% (20 of 42)	100% (1 of 1)	53%
Midge 10-d Biomass	43	94.2	94.9	71% (29 of 41)	100% (2 of 2)	33%	100% (1 of 1)	71% (30 of 42)	100% (1 of 1)	30%
Midge 10-d All	43	94.2	94.9	73% (30 of 41)	100% (2 of 2)	30%	100% (1 of 1)	74% (31 of 42)	100% (1 of 1)	28%
Amphipod 28-d Survival	43	94.2	94.9	34% (14 of 41)	50% (1 of 2)	65%	0% (0 of 1)	33% (14 of 42)	100% (1 of 1)	67%
Amphipod 28-d Growth	43	94.2	94.9	7% (3 of 41)	0% (0 of 2)	88%	0% (0 of 1)	7% (3 of 42)	0% (0 of 1)	91%
Amphipod 28-d Biomass	43	94.2	94.9	17% (7 of 41)	0% (0 of 2)	79%	0% (0 of 1)	17% (7 of 42)	0% (0 of 1)	81%
Amphipod 28-d All	43	94.2	94.9	41% (17 of 41)	50% (1 of 2)	58%	0% (0 of 1)	40% (17 of 42)	100% (1 of 1)	60%
All Endpoints	43	94.2	94.9	76% (31 of 41)	100% (2 of 2)	28%	100% (1 of 1)	76% (32 of 42)	100% (1 of 1)	26%

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; Cd = cadmium; Zn = zinc; d = day; IOT = incidence of toxicity.
$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).
$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.17. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Chromium (mg/kg DW)										
Cladoceran 7-d Survival	56	80.9	85.9	**8% (4 of 53)**	**67% (2 of 3)**	**91%**	No Data	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d Reproduction	56	80.9	85.9	**8% (4 of 53)**	**67% (2 of 3)**	**91%**	No Data	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d All	56	80.9	85.9	**13% (7 of 53)**	**67% (2 of 3)**	**86%**	No Data	**13% (7 of 53)**	**67% (2 of 3)**	**86%**
Midge 10-d Survival	56	80.9	85.9	19% (10 of 53)	0% (0 of 3)	77%	No Data	19% (10 of 53)	0% (0 of 3)	77%
Midge 10-d Growth	56	80.9	85.9	47% (25 of 53)	100% (3 of 3)	55%	No Data	47% (25 of 53)	100% (3 of 3)	55%
Midge 10-d Biomass	56	80.9	85.9	74% (39 of 53)	100% (3 of 3)	30%	No Data	74% (39 of 53)	100% (3 of 3)	30%
Midge 10-d All	56	80.9	85.9	77% (41 of 53)	100% (3 of 3)	27%	No Data	77% (41 of 53)	100% (3 of 3)	27%
Amphipod 28-d Survival	56	80.9	85.9	43% (23 of 53)	100% (3 of 3)	59%	No Data	43% (23 of 53)	100% (3 of 3)	59%
Amphipod 28-d Growth	56	80.9	85.9	**9% (5 of 53)**	**100% (3 of 3)**	**91%**	No Data	**9% (5 of 53)**	**100% (3 of 3)**	**91%**
Amphipod 28-d Biomass	56	80.9	85.9	21% (11 of 53)	100% (3 of 3)	80%	No Data	21% (11 of 53)	100% (3 of 3)	80%
Amphipod 28-d All	56	80.9	85.9	51% (27 of 53)	100% (3 of 3)	52%	No Data	51% (27 of 53)	100% (3 of 3)	52%
All Endpoints	56	80.9	85.9	81% (43 of 53)	100% (3 of 3)	23%	No Data	81% (43 of 53)	100% (3 of 3)	23%
SE Chromium (µmol/g)										
Cladoceran 7-d Survival	56	0.798	0.937	**9% (5 of 54)**	**50% (1 of 2)**	**89%**	No Data	**9% (5 of 54)**	**50% (1 of 2)**	**89%**
Cladoceran 7-d Reproduction	56	0.798	0.937	**9% (5 of 54)**	**50% (1 of 2)**	**89%**	No Data	**9% (5 of 54)**	**50% (1 of 2)**	**89%**
Cladoceran 7-d All	56	0.798	0.937	**15% (8 of 54)**	**50% (1 of 2)**	**84%**	No Data	**15% (8 of 54)**	**50% (1 of 2)**	**84%**
Midge 10-d Survival	56	0.798	0.937	19% (10 of 54)	0% (0 of 2)	79%	No Data	19% (10 of 54)	0% (0 of 2)	79%
Midge 10-d Growth	56	0.798	0.937	48% (26 of 54)	100% (2 of 2)	54%	No Data	48% (26 of 54)	100% (2 of 2)	54%
Midge 10-d Biomass	56	0.798	0.937	74% (40 of 54)	100% (2 of 2)	29%	No Data	74% (40 of 54)	100% (2 of 2)	29%
Midge 10-d All	56	0.798	0.937	78% (42 of 54)	100% (2 of 2)	25%	No Data	78% (42 of 54)	100% (2 of 2)	25%
Amphipod 28-d Survival	56	0.798	0.937	44% (24 of 54)	100% (2 of 2)	57%	No Data	44% (24 of 54)	100% (2 of 2)	57%
Amphipod 28-d Growth	56	0.798	0.937	**11% (6 of 54)**	**100% (2 of 2)**	**89%**	No Data	**11% (6 of 54)**	**100% (2 of 2)**	**89%**
Amphipod 28-d Biomass	56	0.798	0.937	22% (12 of 54)	100% (2 of 2)	79%	No Data	22% (12 of 54)	100% (2 of 2)	79%
Amphipod 28-d All	56	0.798	0.937	52% (28 of 54)	100% (2 of 2)	50%	No Data	52% (28 of 54)	100% (2 of 2)	50%
All Endpoints	56	0.798	0.937	81% (44 of 54)	100% (2 of 2)	21%	No Data	81% (44 of 54)	100% (2 of 2)	21%

Table A7.17. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Σ(SEM-AVS)/f $_{OC}$ ***(µmol/g)***										
Cladoceran 7-d Survival	56	67500	82800	9% (5 of 53)	33% (1 of 3)	88%	No Data	9% (5 of 53)	33% (1 of 3)	88%
Cladoceran 7-d Reproduction	56	67500	82800	9% (5 of 53)	33% (1 of 3)	88%	No Data	9% (5 of 53)	33% (1 of 3)	88%
Cladoceran 7-d All	56	67500	82800	15% (8 of 53)	33% (1 of 3)	82%	No Data	15% (8 of 53)	33% (1 of 3)	82%
Midge 10-d Survival	64	67500	82800	17% (10 of 60)	0% (0 of 4)	78%	No Data	17% (10 of 60)	0% (0 of 4)	78%
Midge 10-d Growth	64	67500	82800	47% (28 of 60)	100% (4 of 4)	56%	No Data	47% (28 of 60)	100% (4 of 4)	56%
Midge 10-d Biomass	64	67500	82800	70% (42 of 60)	100% (4 of 4)	34%	No Data	70% (42 of 60)	100% (4 of 4)	34%
Midge 10-d All	64	67500	82800	73% (44 of 60)	100% (4 of 4)	31%	No Data	73% (44 of 60)	100% (4 of 4)	31%
Amphipod 28-d Survival	64	67500	82800	43% (26 of 60)	100% (4 of 4)	59%	No Data	43% (26 of 60)	100% (4 of 4)	59%
Amphipod 28-d Growth	64	67500	82800	**8% (5 of 60)**	**75% (3 of 4)**	**91%**	No Data	**8% (5 of 60)**	**75% (3 of 4)**	**91%**
Amphipod 28-d Biomass	64	67500	82800	**20% (12 of 60)**	**100% (4 of 4)**	**81%**	No Data	20% (12 of 60)	100% (4 of 4)	81%
Amphipod 28-d All	64	67500	82800	50% (30 of 60)	100% (4 of 4)	53%	No Data	50% (30 of 60)	100% (4 of 4)	53%
All Endpoints	64	67500	82800	78% (47 of 60)	100% (4 of 4)	27%	No Data	78% (47 of 60)	100% (4 of 4)	27%
Mean PEC-Q $_{METAL(1\%OC)}$										
Cladoceran 7-d Survival	67	26.8	33.4	10% (6 of 60)	43% (3 of 7)	85%	0% (0 of 1)	10% (6 of 61)	50% (3 of 6)	87%
Cladoceran 7-d Reproduction	67	26.8	33.4	**12% (7 of 60)**	**57% (4 of 7)**	**85%**	0% (0 of 1)	**11% (7 of 61)**	**67% (4 of 6)**	**87%**
Cladoceran 7-d All	67	26.8	33.4	18% (11 of 60)	57% (4 of 7)	79%	0% (0 of 1)	18% (11 of 61)	67% (4 of 6)	81%
Midge 10-d Survival	64	26.8	33.4	17% (10 of 59)	0% (0 of 5)	77%	0% (0 of 1)	17% (10 of 60)	0% (0 of 4)	78%
Midge 10-d Growth	64	26.8	33.4	46% (27 of 59)	100% (5 of 5)	58%	100% (1 of 1)	47% (28 of 60)	100% (4 of 4)	56%
Midge 10-d Biomass	64	26.8	33.4	69% (41 of 59)	100% (5 of 5)	36%	100% (1 of 1)	70% (42 of 60)	100% (4 of 4)	34%
Midge 10-d All	64	26.8	33.4	73% (43 of 59)	100% (5 of 5)	33%	100% (1 of 1)	73% (44 of 60)	100% (4 of 4)	31%
Amphipod 28-d Survival	64	26.8	33.4	44% (26 of 59)	80% (4 of 5)	58%	0% (0 of 1)	43% (26 of 60)	100% (4 of 4)	59%
Amphipod 28-d Growth	64	26.8	33.4	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	0% (0 of 1)	**8% (5 of 60)**	**75% (3 of 4)**	**91%**
Amphipod 28-d Biomass	64	26.8	33.4	**19% (11 of 59)**	**100% (5 of 5)**	**83%**	100% (1 of 1)	**20% (12 of 60)**	**100% (4 of 4)**	**81%**
Amphipod 28-d All	64	26.8	33.4	49% (29 of 59)	100% (5 of 5)	55%	100% (1 of 1)	50% (30 of 60)	100% (4 of 4)	53%
All Endpoints	75	26.8	33.4	73% (49 of 67)	100% (8 of 8)	35%	100% (1 of 1)	74% (50 of 68)	100% (7 of 7)	33%

Table A7.17. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***Mean PEC-Q** EXTMETALS(1%OC)*										
Cladoceran 7-d Survival	67	22.5	28.7	10% (6 of 60)	43% (3 of 7)	85%	0% (0 of 2)	10% (6 of 62)	60% (3 of 5)	88%
Cladoceran 7-d Reproduction	67	22.5	28.7	**12% (7 of 60)**	**57% (4 of 7)**	**85%**	0% (0 of 2)	**11% (7 of 62)**	**80% (4 of 5)**	**88%**
Cladoceran 7-d All	67	22.5	28.7	18% (11 of 60)	57% (4 of 7)	79%	0% (0 of 2)	18% (11 of 62)	80% (4 of 5)	82%
Midge 10-d Survival	64	22.5	28.7	17% (10 of 59)	0% (0 of 5)	77%	0% (0 of 2)	16% (10 of 61)	0% (0 of 3)	80%
Midge 10-d Growth	64	22.5	28.7	46% (27 of 59)	100% (5 of 5)	58%	100% (2 of 2)	48% (29 of 61)	100% (3 of 3)	55%
Midge 10-d Biomass	64	22.5	28.7	69% (41 of 59)	100% (5 of 5)	36%	100% (2 of 2)	70% (43 of 61)	100% (3 of 3)	33%
Midge 10-d All	64	22.5	28.7	73% (43 of 59)	100% (5 of 5)	33%	100% (2 of 2)	74% (45 of 61)	100% (3 of 3)	30%
Amphipod 28-d Survival	64	22.5	28.7	44% (26 of 59)	80% (4 of 5)	58%	50% (1 of 2)	44% (27 of 61)	100% (3 of 3)	58%
Amphipod 28-d Growth	64	22.5	28.7	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	50% (1 of 2)	**10% (6 of 61)**	**67% (2 of 3)**	**89%**
Amphipod 28-d Biomass	64	22.5	28.7	**19% (11 of 59)**	**100% (5 of 5)**	**83%**	100% (2 of 2)	**21% (13 of 61)**	**100% (3 of 3)**	**80%**
Amphipod 28-d All	64	22.5	28.7	49% (29 of 59)	100% (5 of 5)	55%	100% (2 of 2)	51% (31 of 61)	100% (3 of 3)	52%
All Endpoints	75	22.5	28.7	73% (49 of 67)	100% (8 of 8)	35%	100% (2 of 2)	74% (51 of 69)	100% (6 of 6)	32%
***ΣPEC-Q** METALS(1%OC)*										
Cladoceran 7-d Survival	67	184	220	10% (6 of 60)	43% (3 of 7)	85%	0% (0 of 1)	10% (6 of 61)	50% (3 of 6)	87%
Cladoceran 7-d Reproduction	67	184	220	**12% (7 of 60)**	**57% (4 of 7)**	**85%**	0% (0 of 1)	**11% (7 of 61)**	**67% (4 of 6)**	**87%**
Cladoceran 7-d All	67	184	220	18% (11 of 60)	57% (4 of 7)	79%	0% (0 of 1)	18% (11 of 61)	67% (4 of 6)	81%
Midge 10-d Survival	64	184	220	17% (10 of 59)	0% (0 of 5)	77%	0% (0 of 1)	17% (10 of 60)	0% (0 of 4)	78%
Midge 10-d Growth	64	184	220	46% (27 of 59)	100% (5 of 5)	58%	100% (1 of 1)	47% (28 of 60)	100% (4 of 4)	56%
Midge 10-d Biomass	64	184	220	69% (41 of 59)	100% (5 of 5)	36%	100% (1 of 1)	70% (42 of 60)	100% (4 of 4)	34%
Midge 10-d All	64	184	220	73% (43 of 59)	100% (5 of 5)	33%	100% (1 of 1)	73% (44 of 60)	100% (4 of 4)	31%
Amphipod 28-d Survival	64	184	220	44% (26 of 59)	80% (4 of 5)	58%	0% (0 of 1)	43% (26 of 60)	100% (4 of 4)	59%
Amphipod 28-d Growth	64	184	220	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	0% (0 of 1)	**8% (5 of 60)**	**75% (3 of 4)**	**91%**
Amphipod 28-d Biomass	64	184	220	**19% (11 of 59)**	**100% (5 of 5)**	**83%**	100% (1 of 1)	**20% (12 of 60)**	**100% (4 of 4)**	**81%**
Amphipod 28-d All	64	184	220	49% (29 of 59)	100% (5 of 5)	55%	100% (1 of 1)	50% (30 of 60)	100% (4 of 4)	53%
All Endpoints	75	184	220	73% (49 of 67)	100% (8 of 8)	35%	100% (1 of 1)	74% (50 of 68)	100% (7 of 7)	33%

Table A7.17. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
ΣPEC-Q $_{EXT\ ETALS(1\%OC)}$										
Cladoceran 7-d Survival	67	215	254	10% (6 of 60)	43% (3 of 7)	85%	**0% (0 of 1)**	**10% (6 of 61)**	**50% (3 of 6)**	**87%**
Cladoceran 7-d Reproduction	67	215	254	**12% (7 of 60)**	**57% (4 of 7)**	**85%**	0% (0 of 1)	**11% (7 of 61)**	**67% (4 of 6)**	**87%**
Cladoceran 7-d All	67	215	254	**18% (11 of 60)**	**57% (4 of 7)**	**79%**	**0% (0 of 1)**	**18% (11 of 61)**	**67% (4 of 6)**	**81%**
Midge 10-d Survival	64	215	254	17% (10 of 59)	0% (0 of 5)	77%	0% (0 of 1)	17% (10 of 60)	0% (0 of 4)	78%
Midge 10-d Growth	64	215	254	46% (27 of 59)	100% (5 of 5)	58%	100% (1 of 1)	47% (28 of 60)	100% (4 of 4)	56%
Midge 10-d Biomass	64	215	254	69% (41 of 59)	100% (5 of 5)	36%	100% (1 of 1)	70% (42 of 60)	100% (4 of 4)	34%
Midge 10-d All	64	215	254	73% (43 of 59)	100% (5 of 5)	33%	100% (1 of 1)	73% (44 of 60)	100% (4 of 4)	31%
Amphipod 28-d Survival	64	215	254	44% (26 of 59)	80% (4 of 5)	58%	0% (0 of 1)	43% (26 of 60)	100% (4 of 4)	59%
Amphipod 28-d Growth	64	215	254	**8% (5 of 59)**	**60% (3 of 5)**	**89%**	0% (0 of 1)	**8% (5 of 60)**	**75% (3 of 4)**	**91%**
Amphipod 28-d Biomass	64	215	254	**19% (11 of 59)**	**100% (5 of 5)**	**83%**	100% (1 of 1)	**20% (12 of 60)**	**100% (4 of 4)**	**81%**
Amphipod 28-d All	64	215	254	49% (29 of 59)	100% (5 of 5)	55%	100% (1 of 1)	50% (30 of 60)	100% (4 of 4)	53%
All Endpoints	75	215	254	73% (49 of 67)	100% (8 of 8)	35%	100% (1 of 1)	74% (50 of 68)	100% (7 of 7)	33%
Zn:Cd										
Cladoceran 7-d Survival	67	12900	16700	12% (8 of 64)	33% (1 of 3)	85%	0% (0 of 1)	**12% (8 of 65)**	**50% (1 of 2)**	**87%**
Cladoceran 7-d Reproduction	67	12900	16700	**14% (9 of 64)**	**67% (2 of 3)**	**85%**	100% (1 of 1)	**15% (10 of 65)**	**50% (1 of 2)**	**84%**
Cladoceran 7-d All	67	12900	16700	20% (13 of 64)	67% (2 of 3)	79%	100% (1 of 1)	22% (14 of 65)	50% (1 of 2)	78%
Midge 10-d Survival	64	12900	16700	16% (10 of 62)	0% (0 of 2)	81%	No Data	16% (10 of 62)	0% (0 of 2)	81%
Midge 10-d Growth	64	12900	16700	48% (30 of 62)	100% (2 of 2)	53%	No Data	48% (30 of 62)	100% (2 of 2)	53%
Midge 10-d Biomass	64	12900	16700	71% (44 of 62)	100% (2 of 2)	31%	No Data	71% (44 of 62)	100% (2 of 2)	31%
Midge 10-d All	64	12900	16700	74% (46 of 62)	100% (2 of 2)	28%	No Data	74% (46 of 62)	100% (2 of 2)	28%
Amphipod 28-d Survival	64	12900	16700	45% (28 of 62)	100% (2 of 2)	56%	No Data	45% (28 of 62)	100% (2 of 2)	56%
Amphipod 28-d Growth	64	12900	16700	**10% (6 of 62)**	**100% (2 of 2)**	**91%**	No Data	**10% (6 of 62)**	**100% (2 of 2)**	**91%**
Amphipod 28-d Biomass	64	12900	16700	23% (14 of 62)	100% (2 of 2)	78%	No Data	23% (14 of 62)	100% (2 of 2)	78%
Amphipod 28-d All	64	12900	16700	52% (32 of 62)	100% (2 of 2)	50%	No Data	52% (32 of 62)	100% (2 of 2)	50%
All Endpoints	75	12900	16700	75% (54 of 72)	100% (3 of 3)	28%	100% (1 of 1)	75% (55 of 73)	100% (2 of 2)	27%

Table A7.17. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: growth), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Percent Sand (%)										
Cladoceran 7-d Survival	56	94.2	94.9	6% (3 of 49)	43% (3 of 7)	88%	0% (0 of 2)	**6% (3 of 51)**	**60% (3 of 5)**	**91%**
Cladoceran 7-d Reproduction	56	94.2	94.9	6% (3 of 49)	43% (3 of 7)	88%	0% (0 of 2)	**6% (3 of 51)**	**60% (3 of 5)**	**91%**
Cladoceran 7-d All	56	94.2	94.9	10% (5 of 49)	57% (4 of 7)	86%	0% (0 of 2)	**10% (5 of 51)**	**80% (4 of 5)**	**89%**
Midge 10-d Survival	64	94.2	94.9	18% (10 of 57)	0% (0 of 7)	73%	0% (0 of 2)	17% (10 of 59)	0% (0 of 5)	77%
Midge 10-d Growth	64	94.2	94.9	44% (25 of 57)	100% (7 of 7)	61%	100% (2 of 2)	46% (27 of 59)	100% (5 of 5)	58%
Midge 10-d Biomass	64	94.2	94.9	68% (39 of 57)	100% (7 of 7)	39%	100% (2 of 2)	69% (41 of 59)	100% (5 of 5)	36%
Midge 10-d All	64	94.2	94.9	72% (41 of 57)	100% (7 of 7)	36%	100% (2 of 2)	73% (43 of 59)	100% (5 of 5)	33%
Amphipod 28-d Survival	64	94.2	94.9	42% (24 of 57)	86% (6 of 7)	61%	50% (1 of 2)	42% (25 of 59)	100% (5 of 5)	61%
Amphipod 28-d Growth	64	94.2	94.9	**5% (3 of 57)**	**71% (5 of 7)**	**92%**	50% (1 of 2)	**7% (4 of 59)**	**80% (4 of 5)**	**92%**
Amphipod 28-d Biomass	64	94.2	94.9	**19% (11 of 57)**	**71% (5 of 7)**	**80%**	50% (1 of 2)	**20% (12 of 59)**	**80% (4 of 5)**	**80%**
Amphipod 28-d All	64	94.2	94.9	49% (28 of 57)	86% (6 of 7)	55%	50% (1 of 2)	49% (29 of 59)	100% (5 of 5)	55%
All Endpoints	64	94.2	94.9	77% (44 of 57)	100% (7 of 7)	31%	100% (2 of 2)	78% (46 of 59)	100% (5 of 5)	28%

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; Cd = cadmium; Zn = zinc; d = day; IOT = incidence of toxicity.

$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).

$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.

1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.

[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.18. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Chromium (mg/kg DW)										
Cladoceran 7-d Survival	19	70.9	77.2	7% (1 of 15)	50% (2 of 4)	84%	0% (0 of 1)	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d Reproduction	19	70.9	77.2	7% (1 of 15)	50% (2 of 4)	84%	0% (0 of 1)	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d All	19	70.9	77.2	13% (2 of 15)	50% (2 of 4)	79%	0% (0 of 1)	**12% (2 of 16)**	**67% (2 of 3)**	**84%**
Midge 10-d Survival	19	70.9	77.2	7% (1 of 15)	0% (0 of 4)	74%	0% (0 of 1)	6% (1 of 16)	0% (0 of 3)	79%
Midge 10-d Growth	19	70.9	77.2	40% (6 of 15)	100% (4 of 4)	68%	100% (1 of 1)	44% (7 of 16)	100% (3 of 3)	63%
Midge 10-d Biomass	19	70.9	77.2	67% (10 of 15)	100% (4 of 4)	47%	100% (1 of 1)	69% (11 of 16)	100% (3 of 3)	42%
Midge 10-d All	19	70.9	77.2	73% (11 of 15)	100% (4 of 4)	42%	100% (1 of 1)	75% (12 of 16)	100% (3 of 3)	37%
Amphipod 28-d Survival	19	70.9	77.2	73% (11 of 15)	75% (3 of 4)	37%	0% (0 of 1)	69% (11 of 16)	100% (3 of 3)	42%
Amphipod 28-d Growth	19	70.9	77.2	**13% (2 of 15)**	**75% (3 of 4)**	**84%**	0% (0 of 1)	**12% (2 of 16)**	**100% (3 of 3)**	**89%**
Amphipod 28-d Biomass	19	70.9	77.2	27% (4 of 15)	100% (4 of 4)	79%	100% (1 of 1)	31% (5 of 16)	100% (3 of 3)	74%
Amphipod 28-d All	19	70.9	77.2	73% (11 of 15)	100% (4 of 4)	42%	100% (1 of 1)	75% (12 of 16)	100% (3 of 3)	37%
All Endpoints	19	70.9	77.2	87% (13 of 15)	100% (4 of 4)	32%	100% (1 of 1)	88% (14 of 16)	100% (3 of 3)	26%
SE Chromium (µmol/g)										
Cladoceran 7-d Survival	19	0.533	0.673	7% (1 of 14)	40% (2 of 5)	79%	0% (0 of 2)	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d Reproduction	19	0.533	0.673	7% (1 of 14)	40% (2 of 5)	79%	0% (0 of 2)	**6% (1 of 16)**	**67% (2 of 3)**	**89%**
Cladoceran 7-d All	19	0.533	0.673	14% (2 of 14)	40% (2 of 5)	74%	0% (0 of 2)	**12% (2 of 16)**	**67% (2 of 3)**	**84%**
Midge 10-d Survival	19	0.533	0.673	7% (1 of 14)	0% (0 of 5)	68%	0% (0 of 2)	6% (1 of 16)	0% (0 of 3)	79%
Midge 10-d Growth	19	0.533	0.673	36% (5 of 14)	100% (5 of 5)	74%	100% (2 of 2)	44% (7 of 16)	100% (3 of 3)	63%
Midge 10-d Biomass	19	0.533	0.673	64% (9 of 14)	100% (5 of 5)	53%	100% (2 of 2)	69% (11 of 16)	100% (3 of 3)	42%
Midge 10-d All	19	0.533	0.673	71% (10 of 14)	100% (5 of 5)	47%	100% (2 of 2)	75% (12 of 16)	100% (3 of 3)	37%
Amphipod 28-d Survival	19	0.533	0.673	71% (10 of 14)	80% (4 of 5)	42%	50% (1 of 2)	69% (11 of 16)	100% (3 of 3)	42%
Amphipod 28-d Growth	19	0.533	0.673	14% (2 of 14)	60% (3 of 5)	79%	0% (0 of 2)	**12% (2 of 16)**	**100% (3 of 3)**	**89%**
Amphipod 28-d Biomass	19	0.533	0.673	29% (4 of 14)	80% (4 of 5)	74%	50% (1 of 2)	31% (5 of 16)	100% (3 of 3)	74%
Amphipod 28-d All	19	0.533	0.673	71% (10 of 14)	100% (5 of 5)	47%	100% (2 of 2)	75% (12 of 16)	100% (3 of 3)	37%
All Endpoints	19	0.533	0.673	86% (12 of 14)	100% (5 of 5)	37%	100% (2 of 2)	88% (14 of 16)	100% (3 of 3)	26%

Table A7.18. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Σ(SEM-AVS)/f $_{OC}$ (µmol/g)										
Cladoceran 7-d Survival	19	40300	53800	15% (2 of 13)	17% (1 of 6)	63%	No Data	15% (2 of 13)	17% (1 of 6)	63%
Cladoceran 7-d Reproduction	19	40300	53800	8% (1 of 13)	33% (2 of 6)	74%	No Data	8% (1 of 13)	33% (2 of 6)	74%
Cladoceran 7-d All	19	40300	53800	15% (2 of 13)	33% (2 of 6)	68%	No Data	15% (2 of 13)	33% (2 of 6)	68%
Midge 10-d Survival	21	40300	53800	7% (1 of 14)	0% (0 of 7)	62%	No Data	7% (1 of 14)	0% (0 of 7)	62%
Midge 10-d Growth	21	40300	53800	36% (5 of 14)	86% (6 of 7)	71%	No Data	36% (5 of 14)	86% (6 of 7)	71%
Midge 10-d Biomass	21	40300	53800	57% (8 of 14)	100% (7 of 7)	62%	No Data	57% (8 of 14)	100% (7 of 7)	62%
Midge 10-d All	21	40300	53800	64% (9 of 14)	100% (7 of 7)	57%	No Data	64% (9 of 14)	100% (7 of 7)	57%
Amphipod 28-d Survival	21	40300	53800	64% (9 of 14)	86% (6 of 7)	52%	No Data	64% (9 of 14)	86% (6 of 7)	52%
Amphipod 28-d Growth	21	40300	53800	**7% (1 of 14)**	**57% (4 of 7)**	**81%**	No Data	**7% (1 of 14)**	**57% (4 of 7)**	**81%**
Amphipod 28-d Biomass	21	40300	53800	21% (3 of 14)	86% (6 of 7)	81%	No Data	21% (3 of 14)	86% (6 of 7)	81%
Amphipod 28-d All	21	40300	53800	64% (9 of 14)	100% (7 of 7)	57%	No Data	64% (9 of 14)	100% (7 of 7)	57%
All Endpoints	21	40300	53800	79% (11 of 14)	100% (7 of 7)	48%	No Data	79% (11 of 14)	100% (7 of 7)	48%
Mean PEC-Q $_{METALS(1\%OC)}$										
Cladoceran 7-d Survival	24	15.7	21.2	7% (1 of 15)	44% (4 of 9)	75%	50% (1 of 2)	12% (2 of 17)	43% (3 of 7)	75%
Cladoceran 7-d Reproduction	24	15.7	21.2	**0% (0 of 15)**	**67% (6 of 9)**	**88%**	100% (2 of 2)	12% (2 of 17)	57% (4 of 7)	79%
Cladoceran 7-d All	24	15.7	21.2	**7% (1 of 15)**	**67% (6 of 9)**	**83%**	100% (2 of 2)	18% (3 of 17)	57% (4 of 7)	75%
Midge 10-d Survival	21	15.7	21.2	7% (1 of 14)	0% (0 of 7)	62%	0% (0 of 2)	6% (1 of 16)	0% (0 of 5)	71%
Midge 10-d Growth	21	15.7	21.2	29% (4 of 14)	100% (7 of 7)	81%	100% (2 of 2)	38% (6 of 16)	100% (5 of 5)	71%
Midge 10-d Biomass	21	15.7	21.2	57% (8 of 14)	100% (7 of 7)	62%	100% (2 of 2)	62% (10 of 16)	100% (5 of 5)	52%
Midge 10-d All	21	15.7	21.2	64% (9 of 14)	100% (7 of 7)	57%	100% (2 of 2)	69% (11 of 16)	100% (5 of 5)	48%
Amphipod 28-d Survival	21	15.7	21.2	64% (9 of 14)	86% (6 of 7)	52%	100% (2 of 2)	69% (11 of 16)	80% (4 of 5)	43%
Amphipod 28-d Growth	21	15.7	21.2	**0% (0 of 14)**	**71% (5 of 7)**	**90%**	100% (2 of 2)	**12% (2 of 16)**	**60% (3 of 5)**	**81%**
Amphipod 28-d Biomass	21	15.7	21.2	**14% (2 of 14)**	**100% (7 of 7)**	**90%**	100% (2 of 2)	25% (4 of 16)	100% (5 of 5)	81%
Amphipod 28-d All	21	15.7	21.2	64% (9 of 14)	100% (7 of 7)	57%	100% (2 of 2)	69% (11 of 16)	100% (5 of 5)	48%
All Endpoints	26	15.7	21.2	69% (11 of 16)	100% (10 of 10)	58%	100% (2 of 2)	72% (13 of 18)	100% (8 of 8)	50%

Table A7.18. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***Mean PEC-Q** $_{EXTMETALS(1\%OC)}$*										
Cladoceran 7-d Survival	24	12.6	17.4	7% (1 of 15)	44% (4 of 9)	75%	50% (1 of 2)	12% (2 of 17)	43% (3 of 7)	75%
Cladoceran 7-d Reproduction	24	12.6	17.4	**0% (0 of 15)**	**67% (6 of 9)**	**88%**	100% (2 of 2)	12% (2 of 17)	57% (4 of 7)	79%
Cladoceran 7-d All	24	12.6	17.4	**7% (1 of 15)**	**67% (6 of 9)**	**83%**	100% (2 of 2)	18% (3 of 17)	57% (4 of 7)	75%
Midge 10-d Survival	21	12.6	17.4	7% (1 of 14)	0% (0 of 7)	62%	0% (0 of 2)	6% (1 of 16)	0% (0 of 5)	71%
Midge 10-d Growth	21	12.6	17.4	29% (4 of 14)	100% (7 of 7)	81%	100% (2 of 2)	38% (6 of 16)	100% (5 of 5)	71%
Midge 10-d Biomass	21	12.6	17.4	57% (8 of 14)	100% (7 of 7)	62%	100% (2 of 2)	62% (10 of 16)	100% (5 of 5)	52%
Midge 10-d All	21	12.6	17.4	64% (9 of 14)	100% (7 of 7)	57%	100% (2 of 2)	69% (11 of 16)	100% (5 of 5)	48%
Amphipod 28-d Survival	21	12.6	17.4	64% (9 of 14)	86% (6 of 7)	52%	100% (2 of 2)	69% (11 of 16)	80% (4 of 5)	43%
Amphipod 28-d Growth	21	12.6	17.4	**0% (0 of 14)**	**71% (5 of 7)**	**90%**	100% (2 of 2)	**12% (2 of 16)**	**60% (3 of 5)**	**81%**
Amphipod 28-d Biomass	21	12.6	17.4	**14% (2 of 14)**	**100% (7 of 7)**	**90%**	100% (2 of 2)	25% (4 of 16)	100% (5 of 5)	81%
Amphipod 28-d All	21	12.6	17.4	64% (9 of 14)	100% (7 of 7)	57%	100% (2 of 2)	69% (11 of 16)	100% (5 of 5)	48%
All Endpoints	26	12.6	17.4	69% (11 of 16)	100% (10 of 10)	58%	100% (2 of 2)	72% (13 of 18)	100% (8 of 8)	50%
***ΣPEC-Q** $_{METALS(1\%OC)}$*										
Cladoceran 7-d Survival	24	117	151	7% (1 of 15)	44% (4 of 9)	75%	50% (1 of 2)	12% (2 of 17)	43% (3 of 7)	75%
Cladoceran 7-d Reproduction	24	117	151	**0% (0 of 15)**	**67% (6 of 9)**	**88%**	100% (2 of 2)	12% (2 of 17)	57% (4 of 7)	79%
Cladoceran 7-d All	24	117	151	**7% (1 of 15)**	**67% (6 of 9)**	**83%**	100% (2 of 2)	18% (3 of 17)	57% (4 of 7)	75%
Midge 10-d Survival	21	117	151	7% (1 of 14)	0% (0 of 7)	62%	0% (0 of 2)	6% (1 of 16)	0% (0 of 5)	71%
Midge 10-d Growth	21	117	151	29% (4 of 14)	100% (7 of 7)	81%	100% (2 of 2)	38% (6 of 16)	100% (5 of 5)	71%
Midge 10-d Biomass	21	117	151	57% (8 of 14)	100% (7 of 7)	62%	100% (2 of 2)	62% (10 of 16)	100% (5 of 5)	52%
Midge 10-d All	21	117	151	64% (9 of 14)	100% (7 of 7)	57%	100% (2 of 2)	69% (11 of 16)	100% (5 of 5)	48%
Amphipod 28-d Survival	21	117	151	64% (9 of 14)	86% (6 of 7)	52%	100% (2 of 2)	69% (11 of 16)	80% (4 of 5)	43%
Amphipod 28-d Growth	21	117	151	**0% (0 of 14)**	**71% (5 of 7)**	**90%**	100% (2 of 2)	**12% (2 of 16)**	**60% (3 of 5)**	**81%**
Amphipod 28-d Biomass	21	117	151	**14% (2 of 14)**	**100% (7 of 7)**	**90%**	100% (2 of 2)	25% (4 of 16)	100% (5 of 5)	81%
Amphipod 28-d All	21	117	151	64% (9 of 14)	100% (7 of 7)	57%	100% (2 of 2)	69% (11 of 16)	100% (5 of 5)	48%
All Endpoints	26	117	151	69% (11 of 16)	100% (10 of 10)	58%	100% (2 of 2)	72% (13 of 18)	100% (8 of 8)	50%

Table A7.18. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** $_{EXTMETALS(1\%OC)}$*										
Cladoceran 7-d Survival	24	140	178	7% (1 of 15)	44% (4 of 9)	75%	50% (1 of 2)	12% (2 of 17)	43% (3 of 7)	75%
Cladoceran 7-d Reproduction	24	140	178	**0% (0 of 15)**	**67% (6 of 9)**	**88%**	100% (2 of 2)	12% (2 of 17)	57% (4 of 7)	79%
Cladoceran 7-d All	24	140	178	**7% (1 of 15)**	**67% (6 of 9)**	**83%**	100% (2 of 2)	18% (3 of 17)	57% (4 of 7)	75%
Midge 10-d Survival	21	140	178	7% (1 of 14)	0% (0 of 7)	62%	0% (0 of 2)	6% (1 of 16)	0% (0 of 5)	71%
Midge 10-d Growth	21	140	178	29% (4 of 14)	100% (7 of 7)	81%	100% (2 of 2)	38% (6 of 16)	100% (5 of 5)	71%
Midge 10-d Biomass	21	140	178	57% (8 of 14)	100% (7 of 7)	62%	100% (2 of 2)	62% (10 of 16)	100% (5 of 5)	52%
Midge 10-d All	21	140	178	64% (9 of 14)	100% (7 of 7)	57%	100% (2 of 2)	69% (11 of 16)	100% (5 of 5)	48%
Amphipod 28-d Survival	21	140	178	64% (9 of 14)	86% (6 of 7)	52%	100% (2 of 2)	69% (11 of 16)	80% (4 of 5)	43%
Amphipod 28-d Growth	21	140	178	**0% (0 of 14)**	**71% (5 of 7)**	**90%**	100% (2 of 2)	**12% (2 of 16)**	**60% (3 of 5)**	**81%**
Amphipod 28-d Biomass	21	140	178	**14% (2 of 14)**	**100% (7 of 7)**	**90%**	100% (2 of 2)	25% (4 of 16)	100% (5 of 5)	81%
Amphipod 28-d All	21	140	178	64% (9 of 14)	100% (7 of 7)	57%	100% (2 of 2)	69% (11 of 16)	100% (5 of 5)	48%
All Endpoints	26	140	178	69% (11 of 16)	100% (10 of 10)	58%	100% (2 of 2)	72% (13 of 18)	100% (8 of 8)	50%
Percent Sand (%)										
Cladoceran 7-d Survival	19	92.5	93.4	8% (1 of 12)	29% (2 of 7)	68%	0% (0 of 1)	8% (1 of 13)	33% (2 of 6)	74%
Cladoceran 7-d Reproduction	19	92.5	93.4	0% (0 of 12)	43% (3 of 7)	79%	0% (0 of 1)	0% (0 of 13)	50% (3 of 6)	84%
Cladoceran 7-d All	19	92.5	93.4	8% (1 of 12)	43% (3 of 7)	74%	0% (0 of 1)	8% (1 of 13)	50% (3 of 6)	79%
Midge 10-d Survival	21	92.5	93.4	7% (1 of 14)	0% (0 of 7)	62%	0% (0 of 1)	7% (1 of 15)	0% (0 of 6)	67%
Midge 10-d Growth	21	92.5	93.4	36% (5 of 14)	86% (6 of 7)	71%	0% (0 of 1)	33% (5 of 15)	100% (6 of 6)	76%
Midge 10-d Biomass	21	92.5	93.4	57% (8 of 14)	100% (7 of 7)	62%	100% (1 of 1)	60% (9 of 15)	100% (6 of 6)	57%
Midge 10-d All	21	92.5	93.4	64% (9 of 14)	100% (7 of 7)	57%	100% (1 of 1)	67% (10 of 15)	100% (6 of 6)	52%
Amphipod 28-d Survival	21	92.5	93.4	64% (9 of 14)	86% (6 of 7)	52%	100% (1 of 1)	67% (10 of 15)	83% (5 of 6)	48%
Amphipod 28-d Growth	21	92.5	93.4	**0% (0 of 14)**	**71% (5 of 7)**	**90%**	0% (0 of 1)	**0% (0 of 15)**	**83% (5 of 6)**	**95%**
Amphipod 28-d Biomass	21	92.5	93.4	21% (3 of 14)	86% (6 of 7)	81%	0% (0 of 1)	20% (3 of 15)	100% (6 of 6)	86%
Amphipod 28-d All	21	92.5	93.4	64% (9 of 14)	100% (7 of 7)	57%	100% (1 of 1)	67% (10 of 15)	100% (6 of 6)	52%
All Endpoints	21	92.5	93.4	79% (11 of 14)	100% (7 of 7)	48%	100% (1 of 1)	80% (12 of 15)	100% (6 of 6)	43%

Table A7.18. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; d = day; IOT = incidence of toxicity.
$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).
$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.19. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Chromium (mg/kg DW)										
Cladoceran 7-d Survival	37	70.9	77.2	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	70.9	77.2	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	70.9	77.2	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	70.9	77.2	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	70.9	77.2	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	70.9	77.2	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	70.9	77.2	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	70.9	77.2	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	70.9	77.2	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	70.9	77.2	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	70.9	77.2	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	70.9	77.2	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
SE Chromium (µmol/g)										
Cladoceran 7-d Survival	37	0.533	0.673	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	0.533	0.673	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	0.533	0.673	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	37	0.533	0.673	24% (9 of 37)	No Data	76%	No Data	24% (9 of 37)	No Data	76%
Midge 10-d Growth	37	0.533	0.673	49% (18 of 37)	No Data	51%	No Data	49% (18 of 37)	No Data	51%
Midge 10-d Biomass	37	0.533	0.673	76% (28 of 37)	No Data	24%	No Data	76% (28 of 37)	No Data	24%
Midge 10-d All	37	0.533	0.673	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%
Amphipod 28-d Survival	37	0.533	0.673	32% (12 of 37)	No Data	68%	No Data	32% (12 of 37)	No Data	68%
Amphipod 28-d Growth	37	0.533	0.673	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Amphipod 28-d Biomass	37	0.533	0.673	16% (6 of 37)	No Data	84%	No Data	16% (6 of 37)	No Data	84%
Amphipod 28-d All	37	0.533	0.673	41% (15 of 37)	No Data	59%	No Data	41% (15 of 37)	No Data	59%
All Endpoints	37	0.533	0.673	78% (29 of 37)	No Data	22%	No Data	78% (29 of 37)	No Data	22%

Table A7.19. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Σ(SEM-AVS)/f$_{OC}$ (µmol/g)										
Cladoceran 7-d Survival	37	40300	53800	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d Reproduction	37	40300	53800	8% (3 of 37)	No Data	92%	No Data	8% (3 of 37)	No Data	92%
Cladoceran 7-d All	37	40300	53800	14% (5 of 37)	No Data	86%	No Data	14% (5 of 37)	No Data	86%
Midge 10-d Survival	43	40300	53800	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	40300	53800	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	40300	53800	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	40300	53800	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	40300	53800	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	40300	53800	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	40300	53800	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	40300	53800	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	43	40300	53800	77% (33 of 43)	No Data	23%	No Data	77% (33 of 43)	No Data	23%
Mean PEC-Q$_{METALS(1\%OC)}$										
Cladoceran 7-d Survival	43	15.7	21.2	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	15.7	21.2	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	15.7	21.2	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	15.7	21.2	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	15.7	21.2	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	15.7	21.2	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	15.7	21.2	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	15.7	21.2	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	15.7	21.2	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	15.7	21.2	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	15.7	21.2	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	15.7	21.2	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.19. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***Mean PEC-Q** $_{EXTMETALS(1\%OC)}$*										
Cladoceran 7-d Survival	43	12.6	17.4	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	12.6	17.4	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	12.6	17.4	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	12.6	17.4	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	12.6	17.4	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	12.6	17.4	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	12.6	17.4	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	12.6	17.4	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	12.6	17.4	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	12.6	17.4	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	12.6	17.4	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	12.6	17.4	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%
***ΣPEC-Q** $_{METALS(1\%OC)}$*										
Cladoceran 7-d Survival	43	117	151	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	117	151	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	117	151	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	117	151	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	117	151	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	117	151	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	117	151	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	117	151	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	117	151	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	117	151	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	117	151	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	117	151	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%

Table A7.19. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** EXT METAL(1%OC)*										
Cladoceran 7-d Survival	43	140	178	9% (4 of 43)	No Data	91%	No Data	9% (4 of 43)	No Data	91%
Cladoceran 7-d Reproduction	43	140	178	12% (5 of 43)	No Data	88%	No Data	12% (5 of 43)	No Data	88%
Cladoceran 7-d All	43	140	178	19% (8 of 43)	No Data	81%	No Data	19% (8 of 43)	No Data	81%
Midge 10-d Survival	43	140	178	21% (9 of 43)	No Data	79%	No Data	21% (9 of 43)	No Data	79%
Midge 10-d Growth	43	140	178	49% (21 of 43)	No Data	51%	No Data	49% (21 of 43)	No Data	51%
Midge 10-d Biomass	43	140	178	72% (31 of 43)	No Data	28%	No Data	72% (31 of 43)	No Data	28%
Midge 10-d All	43	140	178	74% (32 of 43)	No Data	26%	No Data	74% (32 of 43)	No Data	26%
Amphipod 28-d Survival	43	140	178	35% (15 of 43)	No Data	65%	No Data	35% (15 of 43)	No Data	65%
Amphipod 28-d Growth	43	140	178	7% (3 of 43)	No Data	93%	No Data	7% (3 of 43)	No Data	93%
Amphipod 28-d Biomass	43	140	178	16% (7 of 43)	No Data	84%	No Data	16% (7 of 43)	No Data	84%
Amphipod 28-d All	43	140	178	42% (18 of 43)	No Data	58%	No Data	42% (18 of 43)	No Data	58%
All Endpoints	49	140	178	73% (36 of 49)	No Data	27%	No Data	73% (36 of 49)	No Data	27%
Percent Sand (%)										
Cladoceran 7-d Survival	37	92.5	93.4	6% (2 of 35)	50% (1 of 2)	92%	No Data	6% (2 of 35)	50% (1 of 2)	92%
Cladoceran 7-d Reproduction	37	92.5	93.4	9% (3 of 35)	0% (0 of 2)	86%	No Data	9% (3 of 35)	0% (0 of 2)	86%
Cladoceran 7-d All	37	92.5	93.4	11% (4 of 35)	50% (1 of 2)	86%	No Data	11% (4 of 35)	50% (1 of 2)	86%
Midge 10-d Survival	43	92.5	93.4	22% (9 of 41)	0% (0 of 2)	74%	No Data	22% (9 of 41)	0% (0 of 2)	74%
Midge 10-d Growth	43	92.5	93.4	46% (19 of 41)	100% (2 of 2)	56%	No Data	46% (19 of 41)	100% (2 of 2)	56%
Midge 10-d Biomass	43	92.5	93.4	71% (29 of 41)	100% (2 of 2)	33%	No Data	71% (29 of 41)	100% (2 of 2)	33%
Midge 10-d All	43	92.5	93.4	73% (30 of 41)	100% (2 of 2)	30%	No Data	73% (30 of 41)	100% (2 of 2)	30%
Amphipod 28-d Survival	43	92.5	93.4	34% (14 of 41)	50% (1 of 2)	65%	No Data	34% (14 of 41)	50% (1 of 2)	65%
Amphipod 28-d Growth	43	92.5	93.4	7% (3 of 41)	0% (0 of 2)	88%	No Data	7% (3 of 41)	0% (0 of 2)	88%
Amphipod 28-d Biomass	43	92.5	93.4	17% (7 of 41)	0% (0 of 2)	79%	No Data	17% (7 of 41)	0% (0 of 2)	79%
Amphipod 28-d All	43	92.5	93.4	41% (17 of 41)	50% (1 of 2)	58%	No Data	41% (17 of 41)	50% (1 of 2)	58%
All Endpoints	43	92.5	93.4	76% (31 of 41)	100% (2 of 2)	28%	No Data	76% (31 of 41)	100% (2 of 2)	28%

Table A7.19. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in non slag and potentially slag-affected sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; d = day; IOT = incidence of toxicity.
$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).
$PEC\text{-}Q_{EXT\ METAL}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.20. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Chromium (mg/kg DW)										
Cladoceran 7-d Survival	56	70.9	77.2	8% (4 of 52)	50% (2 of 4)	89%	0% (0 of 1)	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d Reproduction	56	70.9	77.2	8% (4 of 52)	50% (2 of 4)	89%	0% (0 of 1)	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d All	56	70.9	77.2	13% (7 of 52)	50% (2 of 4)	84%	0% (0 of 1)	**13% (7 of 53)**	**67% (2 of 3)**	**86%**
Midge 10-d Survival	56	70.9	77.2	19% (10 of 52)	0% (0 of 4)	75%	0% (0 of 1)	19% (10 of 53)	0% (0 of 3)	77%
Midge 10-d Growth	56	70.9	77.2	46% (24 of 52)	100% (4 of 4)	57%	100% (1 of 1)	47% (25 of 53)	100% (3 of 3)	55%
Midge 10-d Biomass	56	70.9	77.2	73% (38 of 52)	100% (4 of 4)	32%	100% (1 of 1)	74% (39 of 53)	100% (3 of 3)	30%
Midge 10-d All	56	70.9	77.2	77% (40 of 52)	100% (4 of 4)	29%	100% (1 of 1)	77% (41 of 53)	100% (3 of 3)	27%
Amphipod 28-d Survival	56	70.9	77.2	44% (23 of 52)	75% (3 of 4)	57%	0% (0 of 1)	43% (23 of 53)	100% (3 of 3)	59%
Amphipod 28-d Growth	56	70.9	77.2	**10% (5 of 52)**	**75% (3 of 4)**	**89%**	0% (0 of 1)	**9% (5 of 53)**	**100% (3 of 3)**	**91%**
Amphipod 28-d Biomass	56	70.9	77.2	**19% (10 of 52)**	**100% (4 of 4)**	**82%**	100% (1 of 1)	21% (11 of 53)	100% (3 of 3)	80%
Amphipod 28-d All	56	70.9	77.2	50% (26 of 52)	100% (4 of 4)	54%	100% (1 of 1)	51% (27 of 53)	100% (3 of 3)	52%
All Endpoints	56	70.9	77.2	81% (42 of 52)	100% (4 of 4)	25%	100% (1 of 1)	81% (43 of 53)	100% (3 of 3)	23%
SE Chromium (µmol/g)										
Cladoceran 7-d Survival	56	0.533	0.673	8% (4 of 51)	40% (2 of 5)	88%	0% (0 of 2)	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d Reproduction	56	0.533	0.673	8% (4 of 51)	40% (2 of 5)	88%	0% (0 of 2)	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d All	56	0.533	0.673	14% (7 of 51)	40% (2 of 5)	82%	0% (0 of 2)	**13% (7 of 53)**	**67% (2 of 3)**	**86%**
Midge 10-d Survival	56	0.533	0.673	20% (10 of 51)	0% (0 of 5)	73%	0% (0 of 2)	19% (10 of 53)	0% (0 of 3)	77%
Midge 10-d Growth	56	0.533	0.673	45% (23 of 51)	100% (5 of 5)	59%	100% (2 of 2)	47% (25 of 53)	100% (3 of 3)	55%
Midge 10-d Biomass	56	0.533	0.673	73% (37 of 51)	100% (5 of 5)	34%	100% (2 of 2)	74% (39 of 53)	100% (3 of 3)	30%
Midge 10-d All	56	0.533	0.673	76% (39 of 51)	100% (5 of 5)	30%	100% (2 of 2)	77% (41 of 53)	100% (3 of 3)	27%
Amphipod 28-d Survival	56	0.533	0.673	43% (22 of 51)	80% (4 of 5)	59%	50% (1 of 2)	43% (23 of 53)	100% (3 of 3)	59%
Amphipod 28-d Growth	56	0.533	0.673	**10% (5 of 51)**	**60% (3 of 5)**	**88%**	0% (0 of 2)	**9% (5 of 53)**	**100% (3 of 3)**	**91%**
Amphipod 28-d Biomass	56	0.533	0.673	**20% (10 of 51)**	**80% (4 of 5)**	**80%**	50% (1 of 2)	21% (11 of 53)	100% (3 of 3)	80%
Amphipod 28-d All	56	0.533	0.673	49% (25 of 51)	100% (5 of 5)	55%	100% (2 of 2)	51% (27 of 53)	100% (3 of 3)	52%
All Endpoints	56	0.533	0.673	80% (41 of 51)	100% (5 of 5)	27%	100% (2 of 2)	81% (43 of 53)	100% (3 of 3)	23%

Table A7.20. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Σ(SEM-AVS)/f $_{OC}$ ***(µmol/g)***										
Cladoceran 7-d Survival	56	40300	53800	10% (5 of 50)	17% (1 of 6)	82%	No Data	10% (5 of 50)	17% (1 of 6)	82%
Cladoceran 7-d Reproduction	56	40300	53800	8% (4 of 50)	33% (2 of 6)	86%	No Data	8% (4 of 50)	33% (2 of 6)	86%
Cladoceran 7-d All	56	40300	53800	14% (7 of 50)	33% (2 of 6)	80%	No Data	14% (7 of 50)	33% (2 of 6)	80%
Midge 10-d Survival	64	40300	53800	18% (10 of 57)	0% (0 of 7)	73%	No Data	18% (10 of 57)	0% (0 of 7)	73%
Midge 10-d Growth	64	40300	53800	46% (26 of 57)	86% (6 of 7)	58%	No Data	46% (26 of 57)	86% (6 of 7)	58%
Midge 10-d Biomass	64	40300	53800	68% (39 of 57)	100% (7 of 7)	39%	No Data	68% (39 of 57)	100% (7 of 7)	39%
Midge 10-d All	64	40300	53800	72% (41 of 57)	100% (7 of 7)	36%	No Data	72% (41 of 57)	100% (7 of 7)	36%
Amphipod 28-d Survival	64	40300	53800	42% (24 of 57)	86% (6 of 7)	61%	No Data	42% (24 of 57)	86% (6 of 7)	61%
Amphipod 28-d Growth	64	40300	53800	**7% (4 of 57)**	**57% (4 of 7)**	**89%**	No Data	**7% (4 of 57)**	**57% (4 of 7)**	**89%**
Amphipod 28-d Biomass	64	40300	53800	**18% (10 of 57)**	**86% (6 of 7)**	**83%**	No Data	**18% (10 of 57)**	**86% (6 of 7)**	**83%**
Amphipod 28-d All	64	40300	53800	47% (27 of 57)	100% (7 of 7)	58%	No Data	47% (27 of 57)	100% (7 of 7)	58%
All Endpoints	64	40300	53800	77% (44 of 57)	100% (7 of 7)	31%	No Data	77% (44 of 57)	100% (7 of 7)	31%
Mean PEC-Q $_{METALS(1\%OC)}$										
Cladoceran 7-d Survival	67	15.7	21.2	9% (5 of 58)	44% (4 of 9)	85%	50% (1 of 2)	10% (6 of 60)	43% (3 of 7)	85%
Cladoceran 7-d Reproduction	67	15.7	21.2	**9% (5 of 58)**	**67% (6 of 9)**	**88%**	100% (2 of 2)	**12% (7 of 60)**	**57% (4 of 7)**	**85%**
Cladoceran 7-d All	67	15.7	21.2	**16% (9 of 58)**	**67% (6 of 9)**	**82%**	100% (2 of 2)	18% (11 of 60)	57% (4 of 7)	79%
Midge 10-d Survival	64	15.7	21.2	18% (10 of 57)	0% (0 of 7)	73%	0% (0 of 2)	17% (10 of 59)	0% (0 of 5)	77%
Midge 10-d Growth	64	15.7	21.2	44% (25 of 57)	100% (7 of 7)	61%	100% (2 of 2)	46% (27 of 59)	100% (5 of 5)	58%
Midge 10-d Biomass	64	15.7	21.2	68% (39 of 57)	100% (7 of 7)	39%	100% (2 of 2)	69% (41 of 59)	100% (5 of 5)	36%
Midge 10-d All	64	15.7	21.2	72% (41 of 57)	100% (7 of 7)	36%	100% (2 of 2)	73% (43 of 59)	100% (5 of 5)	33%
Amphipod 28-d Survival	64	15.7	21.2	42% (24 of 57)	86% (6 of 7)	61%	100% (2 of 2)	44% (26 of 59)	80% (4 of 5)	58%
Amphipod 28-d Growth	64	15.7	21.2	**5% (3 of 57)**	**71% (5 of 7)**	**92%**	100% (2 of 2)	**8% (5 of 59)**	**60% (3 of 5)**	**89%**
Amphipod 28-d Biomass	64	15.7	21.2	**16% (9 of 57)**	**100% (7 of 7)**	**86%**	100% (2 of 2)	**19% (11 of 59)**	**100% (5 of 5)**	**83%**
Amphipod 28-d All	64	15.7	21.2	47% (27 of 57)	100% (7 of 7)	58%	100% (2 of 2)	49% (29 of 59)	100% (5 of 5)	55%
All Endpoints	75	15.7	21.2	72% (47 of 65)	100% (10 of 10)	37%	100% (2 of 2)	73% (49 of 67)	100% (8 of 8)	35%

Table A7.20. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***Mean PEC-Q** $_{EXTMETALS(1\%OC)}$*										
Cladoceran 7-d Survival	67	12.6	17.4	9% (5 of 58)	44% (4 of 9)	85%	50% (1 of 2)	10% (6 of 60)	43% (3 of 7)	85%
Cladoceran 7-d Reproduction	67	12.6	17.4	**9% (5 of 58)**	**67% (6 of 9)**	**88%**	100% (2 of 2)	**12% (7 of 60)**	**57% (4 of 7)**	**85%**
Cladoceran 7-d All	67	12.6	17.4	**16% (9 of 58)**	**67% (6 of 9)**	**82%**	100% (2 of 2)	18% (11 of 60)	57% (4 of 7)	79%
Midge 10-d Survival	64	12.6	17.4	18% (10 of 57)	0% (0 of 7)	73%	0% (0 of 2)	17% (10 of 59)	0% (0 of 5)	77%
Midge 10-d Growth	64	12.6	17.4	44% (25 of 57)	100% (7 of 7)	61%	100% (2 of 2)	46% (27 of 59)	100% (5 of 5)	58%
Midge 10-d Biomass	64	12.6	17.4	68% (39 of 57)	100% (7 of 7)	39%	100% (2 of 2)	69% (41 of 59)	100% (5 of 5)	36%
Midge 10-d All	64	12.6	17.4	72% (41 of 57)	100% (7 of 7)	36%	100% (2 of 2)	73% (43 of 59)	100% (5 of 5)	33%
Amphipod 28-d Survival	64	12.6	17.4	42% (24 of 57)	86% (6 of 7)	61%	100% (2 of 2)	44% (26 of 59)	80% (4 of 5)	58%
Amphipod 28-d Growth	64	12.6	17.4	**5% (3 of 57)**	**71% (5 of 7)**	**92%**	100% (2 of 2)	**8% (5 of 59)**	**60% (3 of 5)**	**89%**
Amphipod 28-d Biomass	64	12.6	17.4	**16% (9 of 57)**	**100% (7 of 7)**	**86%**	100% (2 of 2)	**19% (11 of 59)**	**100% (5 of 5)**	**83%**
Amphipod 28-d All	64	12.6	17.4	47% (27 of 57)	100% (7 of 7)	58%	100% (2 of 2)	49% (29 of 59)	100% (5 of 5)	55%
All Endpoints	75	12.6	17.4	72% (47 of 65)	100% (10 of 10)	37%	100% (2 of 2)	73% (49 of 67)	100% (8 of 8)	35%
***ΣPEC-Q** $_{METALS(1\%OC)}$*										
Cladoceran 7-d Survival	67	117	151	9% (5 of 58)	44% (4 of 9)	85%	50% (1 of 2)	10% (6 of 60)	43% (3 of 7)	85%
Cladoceran 7-d Reproduction	67	117	151	**9% (5 of 58)**	**67% (6 of 9)**	**88%**	100% (2 of 2)	**12% (7 of 60)**	**57% (4 of 7)**	**85%**
Cladoceran 7-d All	67	117	151	**16% (9 of 58)**	**67% (6 of 9)**	**82%**	100% (2 of 2)	18% (11 of 60)	57% (4 of 7)	79%
Midge 10-d Survival	64	117	151	18% (10 of 57)	0% (0 of 7)	73%	0% (0 of 2)	17% (10 of 59)	0% (0 of 5)	77%
Midge 10-d Growth	64	117	151	44% (25 of 57)	100% (7 of 7)	61%	100% (2 of 2)	46% (27 of 59)	100% (5 of 5)	58%
Midge 10-d Biomass	64	117	151	68% (39 of 57)	100% (7 of 7)	39%	100% (2 of 2)	69% (41 of 59)	100% (5 of 5)	36%
Midge 10-d All	64	117	151	72% (41 of 57)	100% (7 of 7)	36%	100% (2 of 2)	73% (43 of 59)	100% (5 of 5)	33%
Amphipod 28-d Survival	64	117	151	42% (24 of 57)	86% (6 of 7)	61%	100% (2 of 2)	44% (26 of 59)	80% (4 of 5)	58%
Amphipod 28-d Growth	64	117	151	**5% (3 of 57)**	**71% (5 of 7)**	**92%**	100% (2 of 2)	**8% (5 of 59)**	**60% (3 of 5)**	**89%**
Amphipod 28-d Biomass	64	117	151	**16% (9 of 57)**	**100% (7 of 7)**	**86%**	100% (2 of 2)	**19% (11 of 59)**	**100% (5 of 5)**	**83%**
Amphipod 28-d All	64	117	151	47% (27 of 57)	100% (7 of 7)	58%	100% (2 of 2)	49% (29 of 59)	100% (5 of 5)	55%
All Endpoints	75	117	151	72% (47 of 65)	100% (10 of 10)	37%	100% (2 of 2)	73% (49 of 67)	100% (8 of 8)	35%

Table A7.20. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
***ΣPEC-Q** EXTMETALS(1%OC)*										
Cladoceran 7-d Survival	67	140	178	9% (5 of 58)	44% (4 of 9)	85%	50% (1 of 2)	10% (6 of 60)	43% (3 of 7)	85%
Cladoceran 7-d Reproduction	67	140	178	**9% (5 of 58)**	**67% (6 of 9)**	**88%**	100% (2 of 2)	**12% (7 of 60)**	**57% (4 of 7)**	**85%**
Cladoceran 7-d All	67	140	178	**16% (9 of 58)**	**67% (6 of 9)**	**82%**	100% (2 of 2)	18% (11 of 60)	57% (4 of 7)	79%
Midge 10-d Survival	64	140	178	18% (10 of 57)	0% (0 of 7)	73%	0% (0 of 2)	17% (10 of 59)	0% (0 of 5)	77%
Midge 10-d Growth	64	140	178	44% (25 of 57)	100% (7 of 7)	61%	100% (2 of 2)	46% (27 of 59)	100% (5 of 5)	58%
Midge 10-d Biomass	64	140	178	68% (39 of 57)	100% (7 of 7)	39%	100% (2 of 2)	69% (41 of 59)	100% (5 of 5)	36%
Midge 10-d All	64	140	178	72% (41 of 57)	100% (7 of 7)	36%	100% (2 of 2)	73% (43 of 59)	100% (5 of 5)	33%
Amphipod 28-d Survival	64	140	178	42% (24 of 57)	86% (6 of 7)	61%	100% (2 of 2)	44% (26 of 59)	80% (4 of 5)	58%
Amphipod 28-d Growth	64	140	178	**5% (3 of 57)**	**71% (5 of 7)**	**92%**	100% (2 of 2)	**8% (5 of 59)**	**60% (3 of 5)**	**89%**
Amphipod 28-d Biomass	64	140	178	**16% (9 of 57)**	**100% (7 of 7)**	**86%**	100% (2 of 2)	**19% (11 of 59)**	**100% (5 of 5)**	**83%**
Amphipod 28-d All	64	140	178	47% (27 of 57)	100% (7 of 7)	58%	100% (2 of 2)	49% (29 of 59)	100% (5 of 5)	55%
All Endpoints	75	140	178	72% (47 of 65)	100% (10 of 10)	37%	100% (2 of 2)	73% (49 of 67)	100% (8 of 8)	35%
Percent Sand (%)										
Cladoceran 7-d Survival	56	92.5	93.4	6% (3 of 47)	33% (3 of 9)	84%	0% (0 of 1)	6% (3 of 48)	38% (3 of 8)	86%
Cladoceran 7-d Reproduction	56	92.5	93.4	6% (3 of 47)	33% (3 of 9)	84%	0% (0 of 1)	6% (3 of 48)	38% (3 of 8)	86%
Cladoceran 7-d All	56	92.5	93.4	11% (5 of 47)	44% (4 of 9)	82%	0% (0 of 1)	10% (5 of 48)	50% (4 of 8)	84%
Midge 10-d Survival	64	92.5	93.4	18% (10 of 55)	0% (0 of 9)	70%	0% (0 of 1)	18% (10 of 56)	0% (0 of 8)	72%
Midge 10-d Growth	64	92.5	93.4	44% (24 of 55)	89% (8 of 9)	61%	0% (0 of 1)	43% (24 of 56)	100% (8 of 8)	62%
Midge 10-d Biomass	64	92.5	93.4	67% (37 of 55)	100% (9 of 9)	42%	100% (1 of 1)	68% (38 of 56)	100% (8 of 8)	41%
Midge 10-d All	64	92.5	93.4	71% (39 of 55)	100% (9 of 9)	39%	100% (1 of 1)	71% (40 of 56)	100% (8 of 8)	38%
Amphipod 28-d Survival	64	92.5	93.4	42% (23 of 55)	78% (7 of 9)	61%	100% (1 of 1)	43% (24 of 56)	75% (6 of 8)	59%
Amphipod 28-d Growth	64	92.5	93.4	**5% (3 of 55)**	**56% (5 of 9)**	**89%**	0% (0 of 1)	**5% (3 of 56)**	**62% (5 of 8)**	**91%**
Amphipod 28-d Biomass	64	92.5	93.4	**18% (10 of 55)**	**67% (6 of 9)**	**80%**	0% (0 of 1)	**18% (10 of 56)**	**75% (6 of 8)**	**81%**
Amphipod 28-d All	64	92.5	93.4	47% (26 of 55)	89% (8 of 9)	58%	100% (1 of 1)	48% (27 of 56)	88% (7 of 8)	56%
All Endpoints	64	92.5	93.4	76% (42 of 55)	100% (9 of 9)	34%	100% (1 of 1)	77% (43 of 56)	100% (8 of 8)	33%

Table A7.20. Predictive ability of the thresholds for predicting sediment toxicity (TPST) that were derived based on the results of 28-day toxicity tests with the amphipod, *Hyalella azteca* (endpoint: biomass), in all sediments in the Upper Columbia River.

COPC, COPC Mixture, Slag Indicator/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; OC = organic carbon; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon; d = day; IOT = incidence of toxicity.
$PEC\text{-}Q_{METALS}$ = were calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, zinc (Ingersoll *et al.* 2001).
$PEC\text{-}Q_{EXTMETALS}$ = were calculated based on the following metals: antimony, arsenic, cadmium, chromium, copper, iron, nickel, lead, manganese, zinc.
1%OC = normalized to 1% organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.21. Predictive ability of the sediment quality standards established by the Confederated Tribes of the Colville Reservation (MacDonald and Ingersoll 2002) applied to all sediments in the Upper Columbia River.

COPC Mixture/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Mean PEC-Q										
Cladoceran 7-d Survival	58	0.1	1	7% (2 of 30)	18% (5 of 28)	57%	10% (2 of 21)	8% (4 of 51)	43% (3 of 7)	86%
Cladoceran 7-d Reproduction	58	0.1	1	10% (3 of 30)	11% (3 of 28)	52%	5% (1 of 21)	8% (4 of 51)	29% (2 of 7)	84%
Cladoceran 7-d All	58	0.1	1	13% (4 of 30)	21% (6 of 28)	55%	14% (3 of 21)	14% (7 of 51)	43% (3 of 7)	81%
Midge 10-d Survival	56	0.1	1	28% (8 of 29)	7% (2 of 27)	41%	10% (2 of 21)	20% (10 of 50)	0% (0 of 6)	71%
Midge 10-d Growth	56	0.1	1	45% (13 of 29)	56% (15 of 27)	55%	48% (10 of 21)	46% (23 of 50)	83% (5 of 6)	57%
Midge 10-d Biomass	56	0.1	1	72% (21 of 29)	78% (21 of 27)	52%	71% (15 of 21)	72% (36 of 50)	100% (6 of 6)	36%
Midge 10-d All	56	0.1	1	76% (22 of 29)	81% (22 of 27)	52%	76% (16 of 21)	76% (38 of 50)	100% (6 of 6)	32%
Amphipod 28-d Survival	56	0.1	1	34% (10 of 29)	59% (16 of 27)	62%	57% (12 of 21)	44% (22 of 50)	67% (4 of 6)	57%
Amphipod 28-d Growth	56	0.1	1	3% (1 of 29)	26% (7 of 27)	62%	19% (4 of 21)	10% (5 of 50)	50% (3 of 6)	86%
Amphipod 28-d Biomass	56	0.1	1	**7% (2 of 29)**	**44% (12 of 27)**	**70%**	38% (8 of 21)	20% (10 of 50)	67% (4 of 6)	79%
Amphipod 28-d All	56	0.1	1	38% (11 of 29)	70% (19 of 27)	66%	67% (14 of 21)	50% (25 of 50)	83% (5 of 6)	54%
All Endpoints	58	0.1	1	73% (22 of 30)	89% (25 of 28)	57%	86% (18 of 21)	78% (40 of 51)	100% (7 of 7)	31%

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; PEC-Q = probable effect concentration-quotients; TPST = threshold for predicting sediment toxicity; d = day; IOT = incidence of toxicity.
Mean PEC-Q was calculated based on the following metals: arsenic, cadmium, chromium, copper, nickel, lead, and zinc; total polycyclic aromatic hydrocarbons; and, total polychlorinated biphenyls (Ingersoll et al. 2001).

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.
[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.22. Predictive ability of the benthic sediment quality values established for fresh water sediments in Washington, Oregon, and Idaho (WDOE 2011) applied to all sediments in the Upper Columbia River.

COPC/ Sediment Toxicity Test	n	$TPST_{Li}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Antimony (mg/kg DW)										
Cladoceran 7-d Survival	56	0.3	12	No Data	11% (6 of 56)	11%	9% (4 of 43)	9% (4 of 43)	15% (2 of 13)	73%
Cladoceran 7-d Reproduction	56	0.3	12	No Data	11% (6 of 56)	11%	7% (3 of 43)	7% (3 of 43)	23% (3 of 13)	77%
Cladoceran 7-d All	56	0.3	12	No Data	16% (9 of 56)	16%	14% (6 of 43)	14% (6 of 43)	23% (3 of 13)	71%
Midge 10-d Survival	56	0.3	12	No Data	18% (10 of 56)	18%	21% (9 of 43)	21% (9 of 43)	8% (1 of 13)	62%
Midge 10-d Growth	56	0.3	12	No Data	50% (28 of 56)	50%	47% (20 of 43)	47% (20 of 43)	62% (8 of 13)	55%
Midge 10-d Biomass	56	0.3	12	No Data	75% (42 of 56)	75%	70% (30 of 43)	70% (30 of 43)	92% (12 of 13)	45%
Midge 10-d All	56	0.3	12	No Data	79% (44 of 56)	79%	74% (32 of 43)	74% (32 of 43)	92% (12 of 13)	41%
Amphipod 28-d Survival	56	0.3	12	No Data	46% (26 of 56)	46%	35% (15 of 43)	35% (15 of 43)	85% (11 of 13)	70%
Amphipod 28-d Growth	56	0.3	12	No Data	14% (8 of 56)	14%	9% (4 of 43)	9% (4 of 43)	31% (4 of 13)	77%
Amphipod 28-d Biomass	56	0.3	12	No Data	25% (14 of 56)	25%	16% (7 of 43)	16% (7 of 43)	54% (7 of 13)	77%
Amphipod 28-d All	56	0.3	12	No Data	54% (30 of 56)	54%	42% (18 of 43)	42% (18 of 43)	92% (12 of 13)	66%
All Endpoints	56	0.3	12	No Data	82% (46 of 56)	82%	77% (33 of 43)	77% (33 of 43)	100% (13 of 13)	41%
Total Cadmium (mg/kg DW)										
Cladoceran 7-d Survival	67	2.1	5.4	13% (6 of 46)	14% (3 of 21)	64%	12% (2 of 17)	13% (8 of 63)	25% (1 of 4)	84%
Cladoceran 7-d Reproduction	67	2.1	5.4	17% (8 of 46)	14% (3 of 21)	61%	6% (1 of 17)	14% (9 of 63)	50% (2 of 4)	84%
Cladoceran 7-d All	67	2.1	5.4	20% (9 of 46)	29% (6 of 21)	64%	18% (3 of 17)	**19% (12 of 63)**	**75% (3 of 4)**	**81%**
Midge 10-d Survival	64	2.1	5.4	20% (9 of 44)	5% (1 of 20)	56%	6% (1 of 18)	16% (10 of 62)	0% (0 of 2)	81%
Midge 10-d Growth	64	2.1	5.4	48% (21 of 44)	55% (11 of 20)	53%	50% (9 of 18)	48% (30 of 62)	100% (2 of 2)	53%
Midge 10-d Biomass	64	2.1	5.4	73% (32 of 44)	70% (14 of 20)	41%	67% (12 of 18)	71% (44 of 62)	100% (2 of 2)	31%
Midge 10-d All	64	2.1	5.4	75% (33 of 44)	75% (15 of 20)	41%	72% (13 of 18)	74% (46 of 62)	100% (2 of 2)	28%
Amphipod 28-d Survival	64	2.1	5.4	45% (20 of 44)	50% (10 of 20)	53%	50% (9 of 18)	47% (29 of 62)	50% (1 of 2)	53%
Amphipod 28-d Growth	64	2.1	5.4	11% (5 of 44)	15% (3 of 20)	66%	17% (3 of 18)	13% (8 of 62)	0% (0 of 2)	84%
Amphipod 28-d Biomass	64	2.1	5.4	20% (9 of 44)	35% (7 of 20)	66%	39% (7 of 18)	26% (16 of 62)	0% (0 of 2)	72%
Amphipod 28-d All	64	2.1	5.4	50% (22 of 44)	60% (12 of 20)	53%	61% (11 of 18)	53% (33 of 62)	50% (1 of 2)	47%
All Endpoints	75	2.1	5.4	76% (37 of 49)	77% (20 of 26)	43%	75% (15 of 20)	75% (52 of 69)	83% (5 of 6)	29%

Table A7.22. Predictive ability of the benthic sediment quality values established for fresh water sediments in Washington, Oregon, and Idaho (WDOE 2011) applied to all sediments in the Upper Columbia River.

COPC/ Sediment Toxicity Test	n	$TPST_{Li}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Copper (mg/kg DW)										
Cladoceran 7-d Survival	67	400	1200	9% (5 of 54)	31% (4 of 13)	79%	0% (0 of 6)	**8% (5 of 60)**	**57% (4 of 7)**	**88%**
Cladoceran 7-d Reproduction	67	400	1200	11% (6 of 54)	38% (5 of 13)	79%	0% (0 of 6)	**10% (6 of 60)**	**71% (5 of 7)**	**88%**
Cladoceran 7-d All	67	400	1200	19% (10 of 54)	38% (5 of 13)	73%	0% (0 of 6)	**17% (10 of 60)**	**71% (5 of 7)**	**82%**
Midge 10-d Survival	64	400	1200	18% (10 of 55)	0% (0 of 9)	70%	0% (0 of 4)	17% (10 of 59)	0% (0 of 5)	77%
Midge 10-d Growth	64	400	1200	47% (26 of 55)	67% (6 of 9)	55%	25% (1 of 4)	46% (27 of 59)	100% (5 of 5)	58%
Midge 10-d Biomass	64	400	1200	67% (37 of 55)	100% (9 of 9)	42%	100% (4 of 4)	69% (41 of 59)	100% (5 of 5)	36%
Midge 10-d All	64	400	1200	71% (39 of 55)	100% (9 of 9)	39%	100% (4 of 4)	73% (43 of 59)	100% (5 of 5)	33%
Amphipod 28-d Survival	64	400	1200	42% (23 of 55)	78% (7 of 9)	61%	75% (3 of 4)	44% (26 of 59)	80% (4 of 5)	58%
Amphipod 28-d Growth	64	400	1200	9% (5 of 55)	33% (3 of 9)	83%	0% (0 of 4)	**8% (5 of 59)**	**60% (3 of 5)**	**89%**
Amphipod 28-d Biomass	64	400	1200	20% (11 of 55)	56% (5 of 9)	77%	0% (0 of 4)	**19% (11 of 59)**	**100% (5 of 5)**	**83%**
Amphipod 28-d All	64	400	1200	47% (26 of 55)	89% (8 of 9)	58%	75% (3 of 4)	49% (29 of 59)	100% (5 of 5)	55%
All Endpoints	75	400	1200	74% (45 of 61)	86% (12 of 14)	37%	67% (4 of 6)	73% (49 of 67)	100% (8 of 8)	35%
Total Lead (mg/kg DW)										
Cladoceran 7-d Survival	67	360	1300	12% (8 of 64)	33% (1 of 3)	85%	50% (1 of 2)	14% (9 of 66)	0% (0 of 1)	85%
Cladoceran 7-d Reproduction	67	360	1300	17% (11 of 64)	0% (0 of 3)	79%	0% (0 of 2)	17% (11 of 66)	0% (0 of 1)	82%
Cladoceran 7-d All	67	360	1300	22% (14 of 64)	33% (1 of 3)	76%	50% (1 of 2)	23% (15 of 66)	0% (0 of 1)	76%
Midge 10-d Survival	64	360	1300	16% (10 of 61)	0% (0 of 3)	80%	0% (0 of 2)	16% (10 of 63)	0% (0 of 1)	83%
Midge 10-d Growth	64	360	1300	48% (29 of 61)	100% (3 of 3)	55%	100% (2 of 2)	49% (31 of 63)	100% (1 of 1)	52%
Midge 10-d Biomass	64	360	1300	70% (43 of 61)	100% (3 of 3)	33%	100% (2 of 2)	71% (45 of 63)	100% (1 of 1)	30%
Midge 10-d All	64	360	1300	74% (45 of 61)	100% (3 of 3)	30%	100% (2 of 2)	75% (47 of 63)	100% (1 of 1)	27%
Amphipod 28-d Survival	64	360	1300	44% (27 of 61)	100% (3 of 3)	58%	100% (2 of 2)	46% (29 of 63)	100% (1 of 1)	55%
Amphipod 28-d Growth	64	360	1300	13% (8 of 61)	0% (0 of 3)	83%	0% (0 of 2)	13% (8 of 63)	0% (0 of 1)	86%
Amphipod 28-d Biomass	64	360	1300	25% (15 of 61)	33% (1 of 3)	73%	50% (1 of 2)	25% (16 of 63)	0% (0 of 1)	73%
Amphipod 28-d All	64	360	1300	51% (31 of 61)	100% (3 of 3)	52%	100% (2 of 2)	52% (33 of 63)	100% (1 of 1)	48%
All Endpoints	75	360	1300	76% (53 of 70)	80% (4 of 5)	28%	75% (3 of 4)	76% (56 of 74)	100% (1 of 1)	25%

Table A7.22. Predictive ability of the benthic sediment quality values established for fresh water sediments in Washington, Oregon, and Idaho (WDOE 2011) applied to all sediments in the Upper Columbia River.

COPC/ Sediment Toxicity Test	n	$TPST_{Li}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				<$TPST_{LI}$	≥$TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	≤$TPST_{HI}$	>$TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
Total Zinc (mg/kg)										
Cladoceran 7-d Survival	67	3200	4200	9% (5 of 55)	33% (4 of 12)	81%	0% (0 of 1)	9% (5 of 56)	36% (4 of 11)	82%
Cladoceran 7-d Reproduction	67	3200	4200	11% (6 of 55)	42% (5 of 12)	81%	0% (0 of 1)	11% (6 of 56)	45% (5 of 11)	82%
Cladoceran 7-d All	67	3200	4200	18% (10 of 55)	42% (5 of 12)	75%	0% (0 of 1)	18% (10 of 56)	45% (5 of 11)	76%
Midge 10-d Survival	64	3200	4200	18% (10 of 55)	0% (0 of 9)	70%	No Data	18% (10 of 55)	0% (0 of 9)	70%
Midge 10-d Growth	64	3200	4200	45% (25 of 55)	78% (7 of 9)	58%	No Data	45% (25 of 55)	78% (7 of 9)	58%
Midge 10-d Biomass	64	3200	4200	67% (37 of 55)	100% (9 of 9)	42%	No Data	67% (37 of 55)	100% (9 of 9)	42%
Midge 10-d All	64	3200	4200	71% (39 of 55)	100% (9 of 9)	39%	No Data	71% (39 of 55)	100% (9 of 9)	39%
Amphipod 28-d Survival	64	3200	4200	42% (23 of 55)	78% (7 of 9)	61%	No Data	42% (23 of 55)	78% (7 of 9)	61%
Amphipod 28-d Growth	64	3200	4200	7% (4 of 55)	44% (4 of 9)	86%	No Data	7% (4 of 55)	44% (4 of 9)	86%
Amphipod 28-d Biomass	64	3200	4200	**18% (10 of 55)**	**67% (6 of 9)**	**80%**	No Data	**18% (10 of 55)**	**67% (6 of 9)**	**80%**
Amphipod 28-d All	64	3200	4200	47% (26 of 55)	89% (8 of 9)	58%	No Data	47% (26 of 55)	89% (8 of 9)	58%
All Endpoints	75	3200	4200	73% (45 of 62)	92% (12 of 13)	39%	0% (0 of 1)	71% (45 of 63)	100% (12 of 12)	40%

Class. = classification; COPC = chemical of potential concern; LI = low impact; HI = high impact; TPST = threshold for predicting sediment toxicity; d = day; IOT = incidence of toxicity.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.

[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Table A7.23. Predictive ability of the equilibrium partitioning sediment benchmarks for metal mixtures (USEPA 2005) applied to all sediments in the Upper Columbia River.

COPC Mixture/ Sediment Toxicity Test	n	$TPST_{LI}$	$TPST_{HI}$	Incidence of Toxicity[1]						
				$<TPST_{LI}$	$\geq TPST_{LI}$	Correct Class. Rate for $TPST_{LI}$	$TPST_{LI}$-$TPST_{HI}$[2]	$\leq TPST_{HI}$	$>TPST_{HI}$	Correct Class. Rate for $TPST_{HI}$
SEM-AVS (µmol/g)										
Cladoceran 7-d Survival	56	1.7	120	8% (2 of 26)	13% (4 of 30)	50%	7% (2 of 27)	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d Reproduction	56	1.7	120	12% (3 of 26)	10% (3 of 30)	46%	4% (1 of 27)	**8% (4 of 53)**	**67% (2 of 3)**	**91%**
Cladoceran 7-d All	56	1.7	120	15% (4 of 26)	17% (5 of 30)	48%	11% (3 of 27)	**13% (7 of 53)**	**67% (2 of 3)**	**86%**
Midge 10-d Survival	64	1.7	120	24% (7 of 29)	9% (3 of 35)	39%	10% (3 of 31)	17% (10 of 60)	0% (0 of 4)	78%
Midge 10-d Growth	64	1.7	120	45% (13 of 29)	54% (19 of 35)	55%	48% (15 of 31)	47% (28 of 60)	100% (4 of 4)	56%
Midge 10-d Biomass	64	1.7	120	69% (20 of 29)	74% (26 of 35)	55%	71% (22 of 31)	70% (42 of 60)	100% (4 of 4)	34%
Midge 10-d All	64	1.7	120	72% (21 of 29)	77% (27 of 35)	55%	74% (23 of 31)	73% (44 of 60)	100% (4 of 4)	31%
Amphipod 28-d Survival	64	1.7	120	38% (11 of 29)	54% (19 of 35)	58%	48% (15 of 31)	43% (26 of 60)	100% (4 of 4)	59%
Amphipod 28-d Growth	64	1.7	120	3% (1 of 29)	20% (7 of 35)	55%	13% (4 of 31)	**8% (5 of 60)**	**75% (3 of 4)**	**91%**
Amphipod 28-d Biomass	64	1.7	120	7% (2 of 29)	40% (14 of 35)	64%	32% (10 of 31)	20% (12 of 60)	100% (4 of 4)	81%
Amphipod 28-d All	64	1.7	120	41% (12 of 29)	63% (22 of 35)	61%	58% (18 of 31)	50% (30 of 60)	100% (4 of 4)	53%
All Endpoints	64	1.7	120	72% (21 of 29)	86% (30 of 35)	59%	84% (26 of 31)	78% (47 of 60)	100% (4 of 4)	27%
Σ(SEM-AVS)/f_{OC} (µmol/g)										
Cladoceran 7-d Survival	56	130	3000	0% (0 of 8)	12% (6 of 48)	25%	12% (4 of 33)	10% (4 of 41)	13% (2 of 15)	70%
Cladoceran 7-d Reproduction	56	130	3000	0% (0 of 8)	12% (6 of 48)	25%	9% (3 of 33)	7% (3 of 41)	20% (3 of 15)	73%
Cladoceran 7-d All	56	130	3000	0% (0 of 8)	19% (9 of 48)	30%	18% (6 of 33)	15% (6 of 41)	20% (3 of 15)	68%
Midge 10-d Survival	64	130	3000	20% (2 of 10)	15% (8 of 54)	25%	18% (7 of 38)	19% (9 of 48)	6% (1 of 16)	62%
Midge 10-d Growth	64	130	3000	0% (0 of 10)	59% (32 of 54)	66%	58% (22 of 38)	46% (22 of 48)	62% (10 of 16)	56%
Midge 10-d Biomass	64	130	3000	20% (2 of 10)	81% (44 of 54)	81%	76% (29 of 38)	65% (31 of 48)	94% (15 of 16)	50%
Midge 10-d All	64	130	3000	20% (2 of 10)	85% (46 of 54)	84%	82% (31 of 38)	69% (33 of 48)	94% (15 of 16)	47%
Amphipod 28-d Survival	64	130	3000	10% (1 of 10)	54% (29 of 54)	59%	42% (16 of 38)	35% (17 of 48)	81% (13 of 16)	69%
Amphipod 28-d Growth	64	130	3000	10% (1 of 10)	13% (7 of 54)	25%	5% (2 of 38)	6% (3 of 48)	31% (5 of 16)	78%
Amphipod 28-d Biomass	64	130	3000	10% (1 of 10)	28% (15 of 54)	38%	16% (6 of 38)	15% (7 of 48)	56% (9 of 16)	78%
Amphipod 28-d All	64	130	3000	10% (1 of 10)	61% (33 of 54)	66%	50% (19 of 38)	42% (20 of 48)	88% (14 of 16)	66%
All Endpoints	64	130	3000	20% (2 of 10)	91% (49 of 54)	89%	89% (34 of 38)	75% (36 of 48)	94% (15 of 16)	42%

COPC = chemical of potential concern; Class. = classification; LI = low impact; HI = high impact; TPST = threshold for predicting sediment toxicity; d = day; IOT = incidence of toxicity; SEM-AVS = simultaneously extracted metals minus acid volatile sulfides; f_{OC} = fraction organic carbon.

[1]Bolded results indicate that the TPST met all three evaluation criteria: IOT below the TPST <20%; IOT above the TPST >50%; and, correct classification rate for the TPST ≥80%.

[2]$TPST_{LI}$-$TPST_{HI}$ includes those samples that are greater than or equal to the $TPST_{LI}$ and less than or equal to the $TPST_{HI}$.

Appendix 8

Results of Supplemental Data Analysis

Figure A8.1. Relationship between control or reference−adjusted survival of the cladoceran (*Ceriodaphnia dubia*) and estimated slag content (based on the Cu:Al slag identification method) of sediments in the Upper Columbia River.

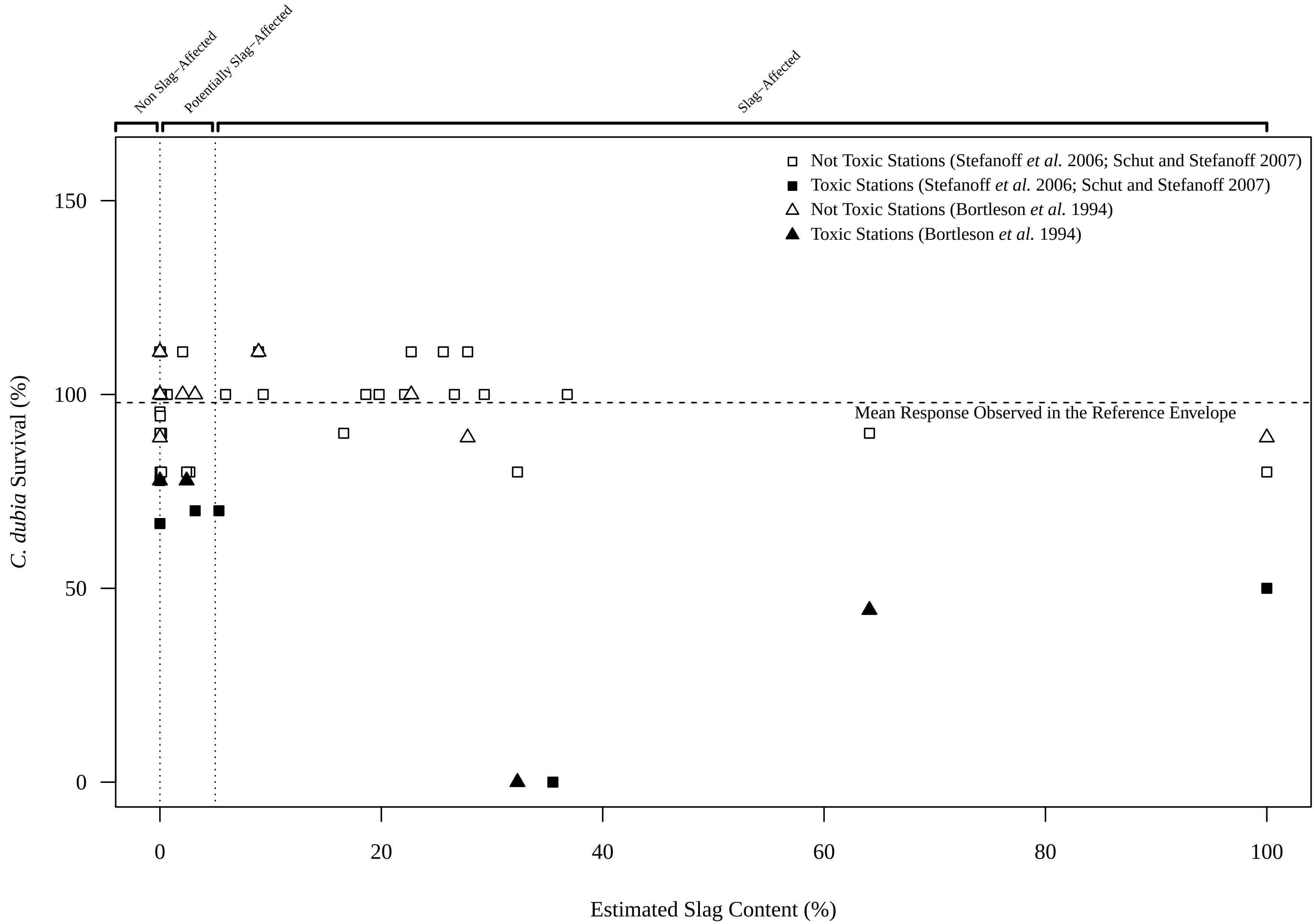


Figure A8.2. Relationship between control or reference−adjusted reproduction of the cladoceran (*Ceriodaphnia dubia*) and estimated slag content (based on the Cu:Al slag identification method) of sediments in the Upper Columbia River.

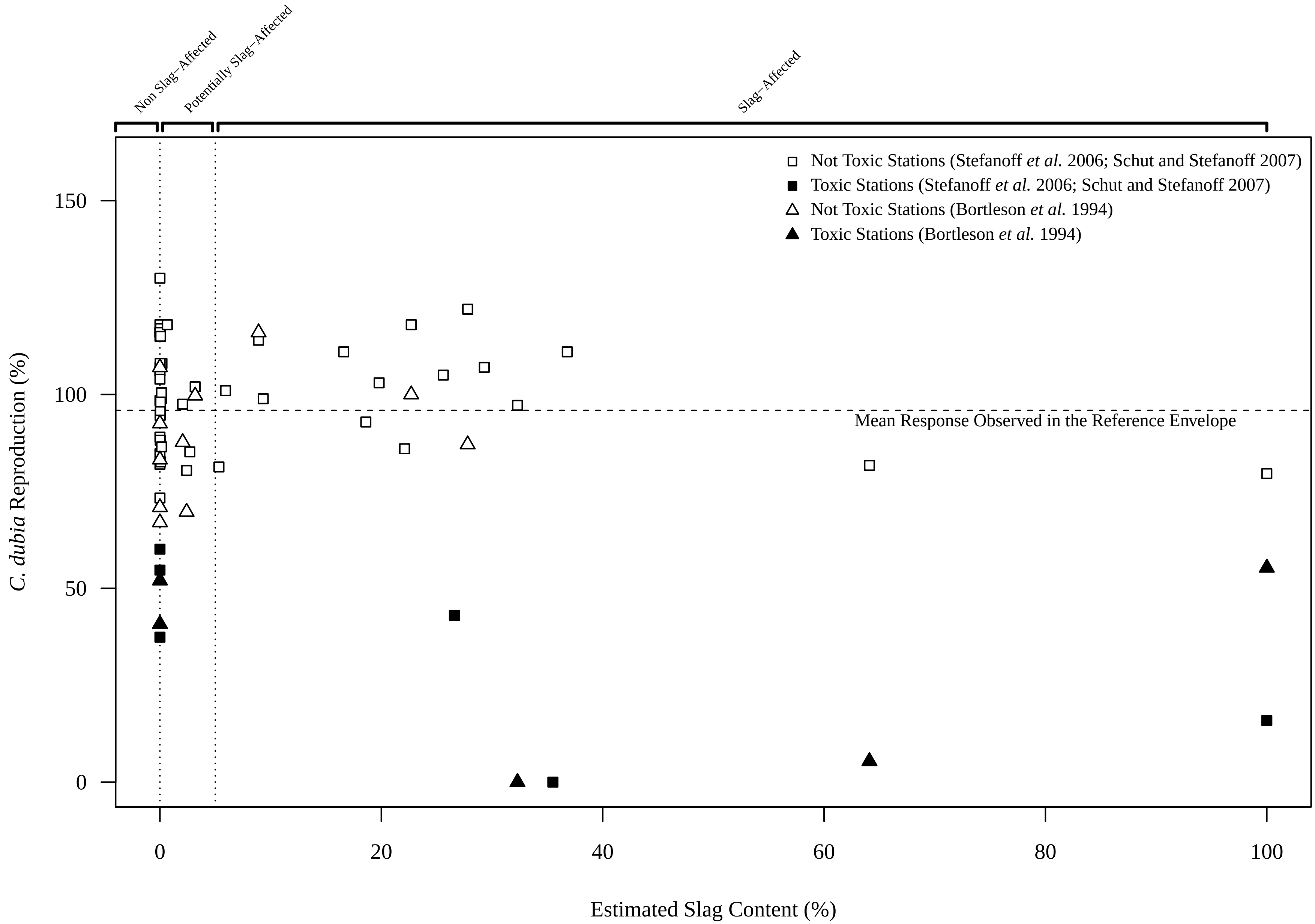


Figure A8.3. Relationship between control or reference−adjusted survival of the midge (*Chironomus dilutus*) and estimated slag content (based on the Cu:Al slag identification method) of sediments in the Upper Columbia River.

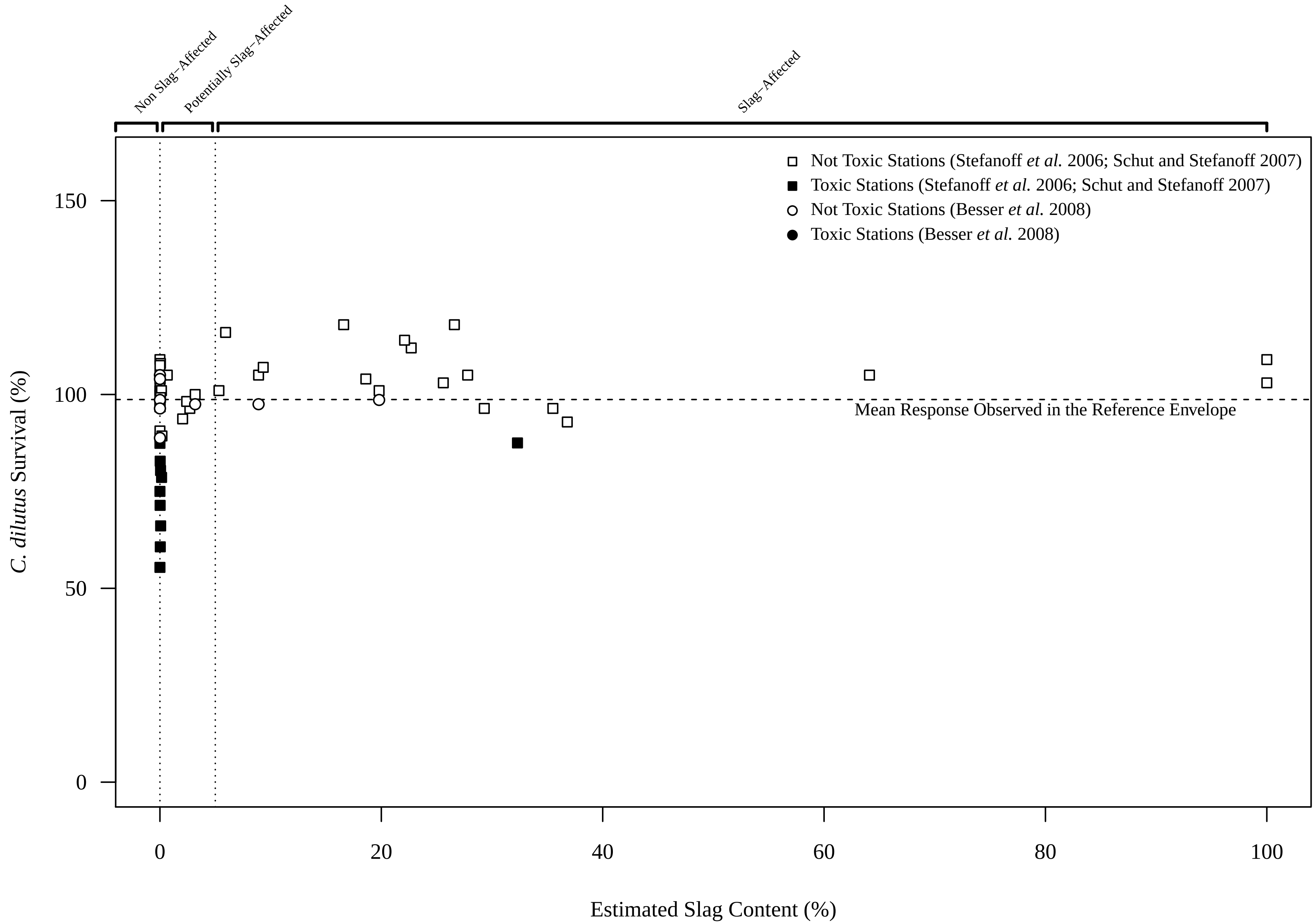


Figure A8.4. Relationship between control or reference−adjusted growth of the midge (*Chironomus dilutus*) and estimated slag content (based on the Cu:Al slag identification method) of sediments in the Upper Columbia River.

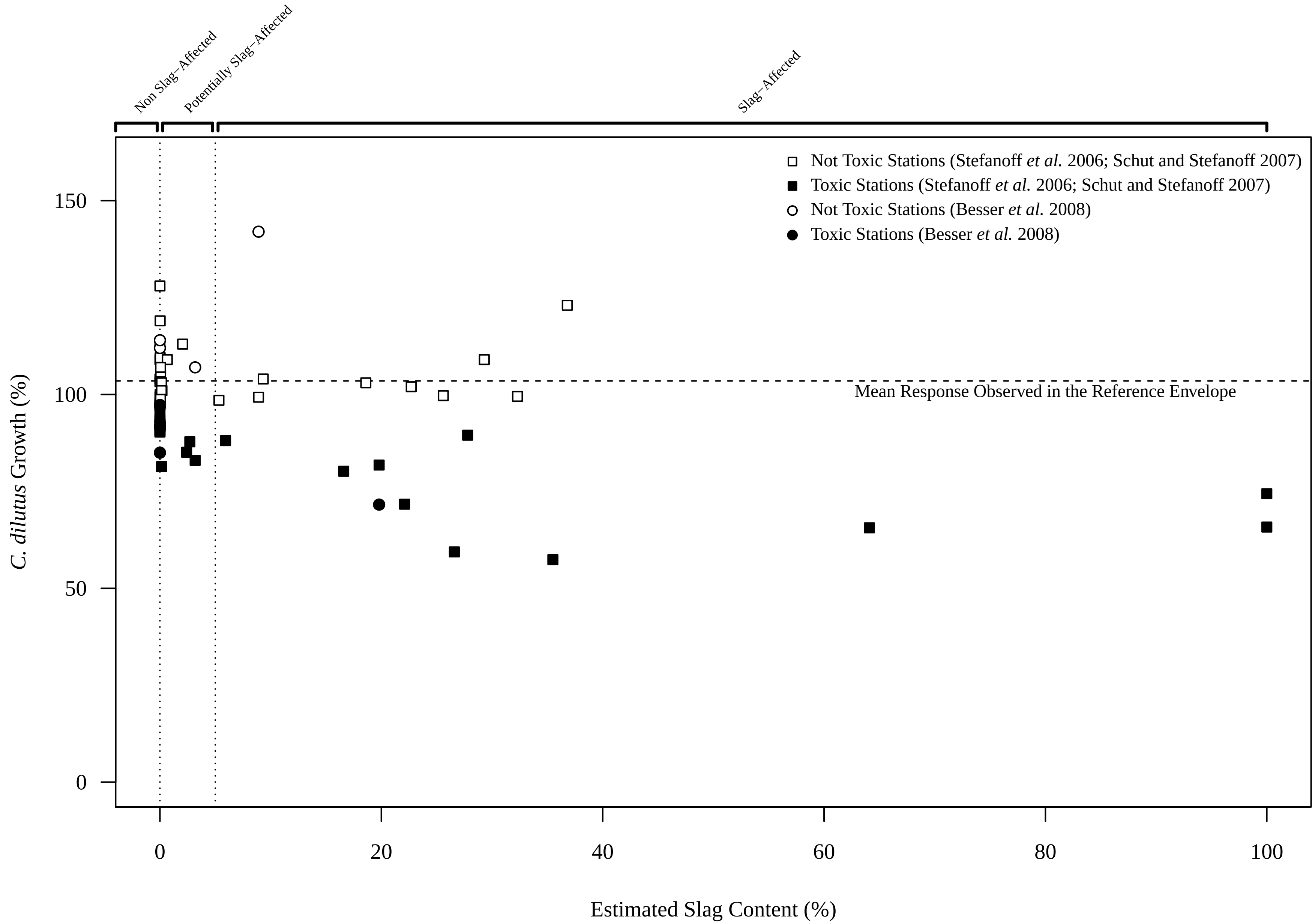


Figure A8.5. Relationship between control or reference−adjusted biomass of the midge (*Chironomus dilutus*) and estimated slag content (based on the Cu:Al slag identification method) of sediments in the Upper Columbia River.

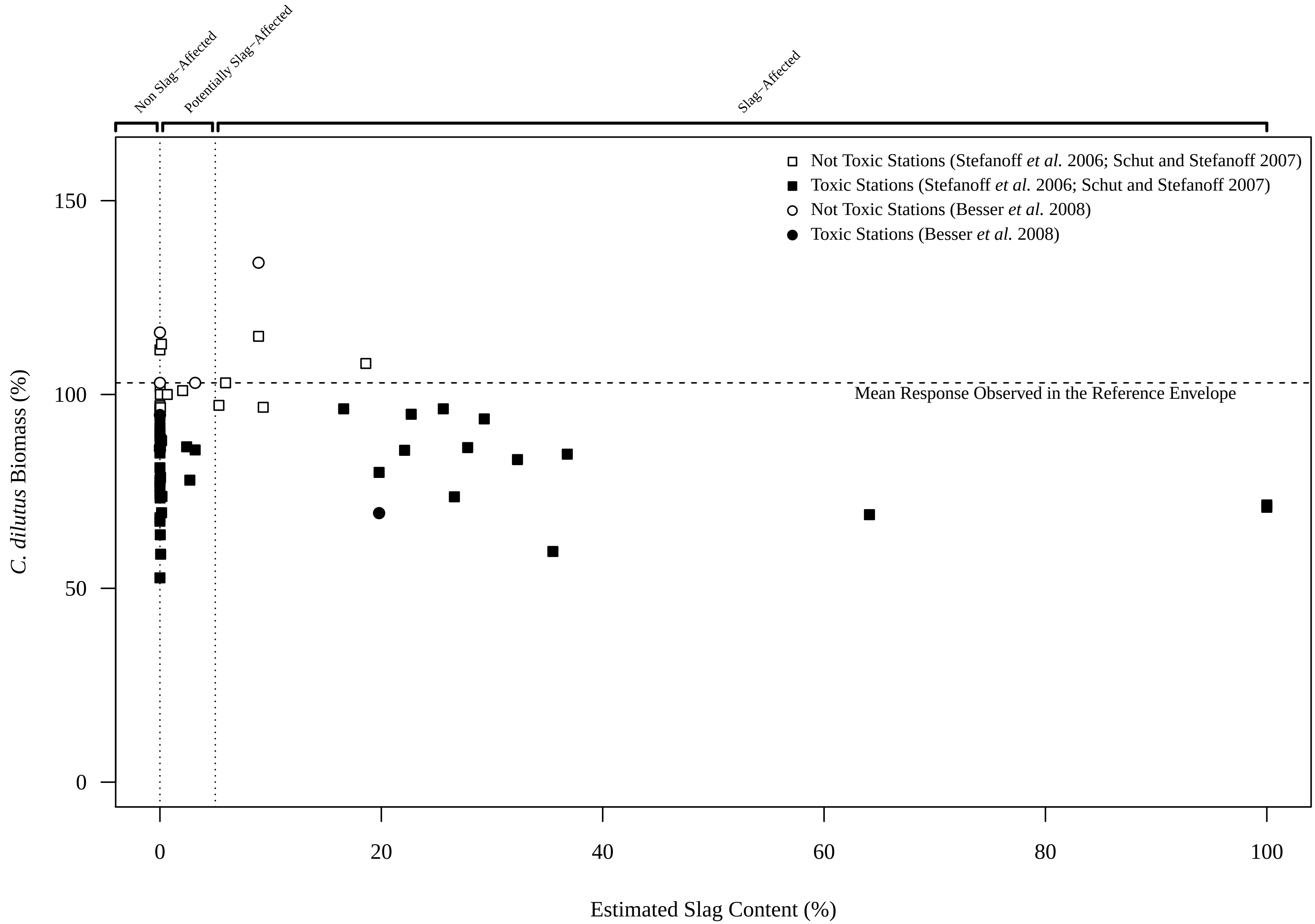


Figure A8.6. Relationship between control or reference−adjusted survival of the amphipod (*Hyalella azteca*) and estimated slag content (based on the Cu:Al slag identification method) of sediments in the Upper Columbia River.

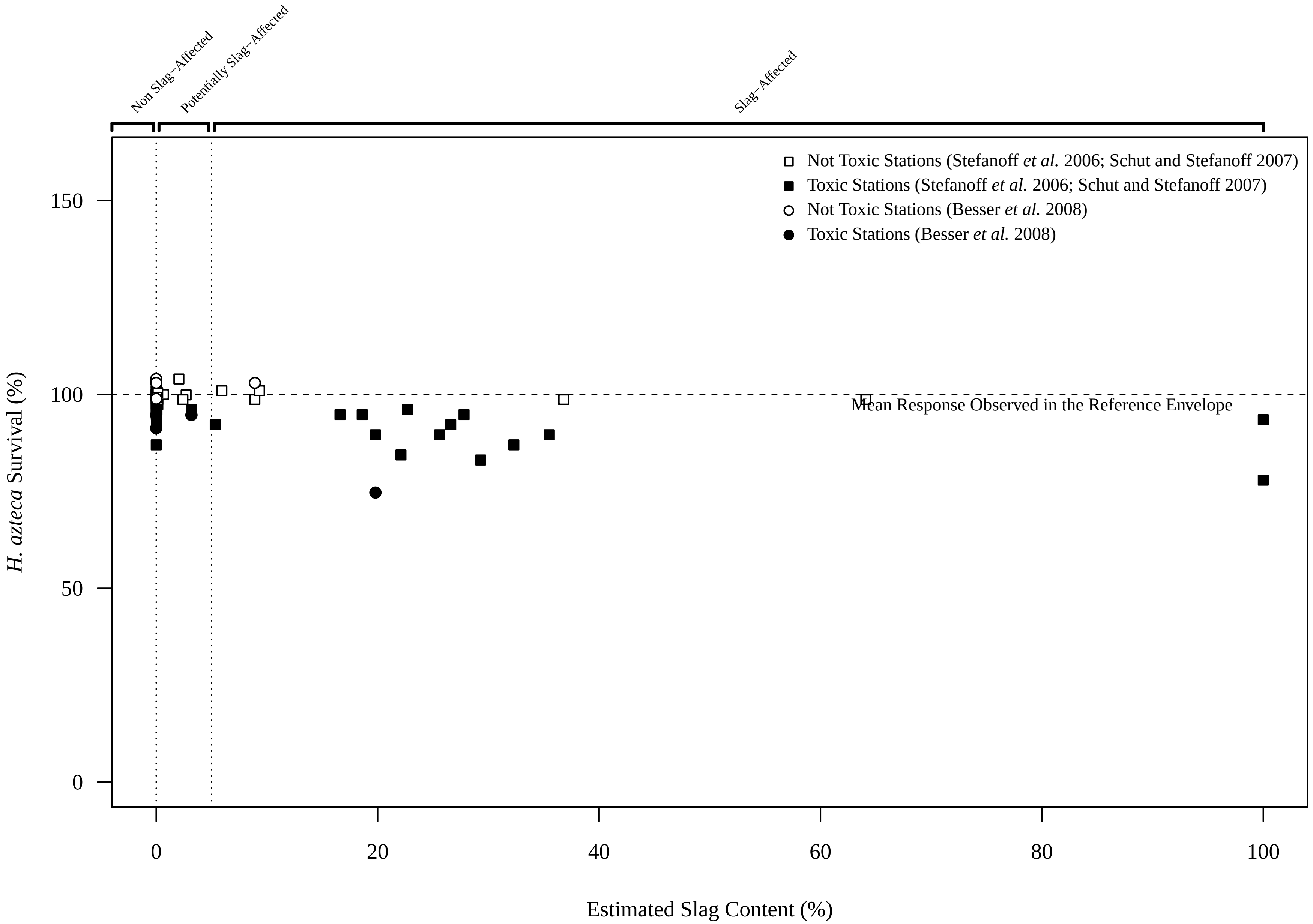


Figure A8.7. Relationship between control or reference−adjusted growth of the amphipod (*Hyalella azteca*) and estimated slag content (based on the Cu:Al slag identification method) of sediments in the Upper Columbia River.

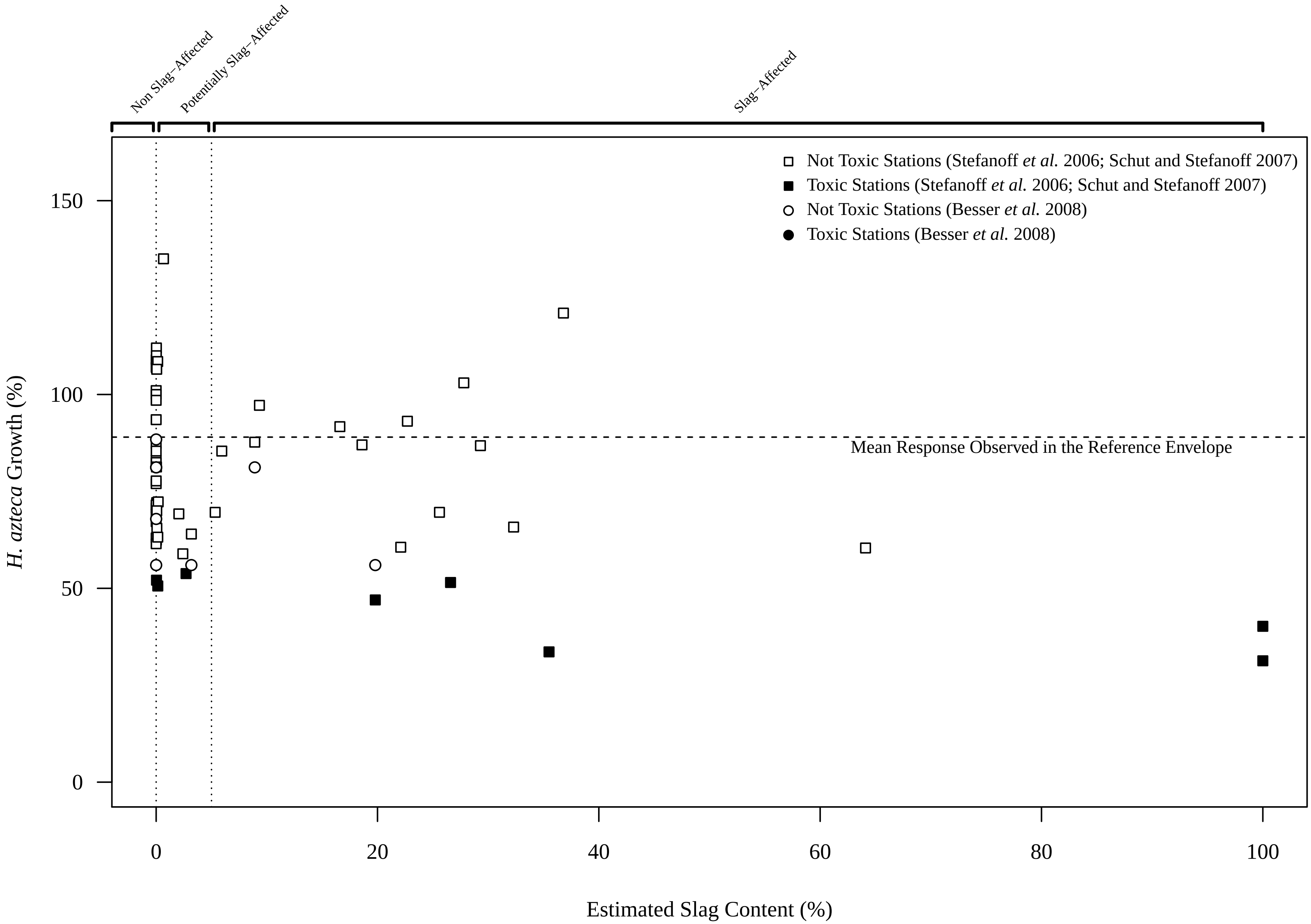


Figure A8.8. Relationship between control or reference−adjusted biomass of the amphipod (*Hyalella azteca*) and estimated slag content (based on the Cu:Al slag identification method) in the Upper Columbia River.

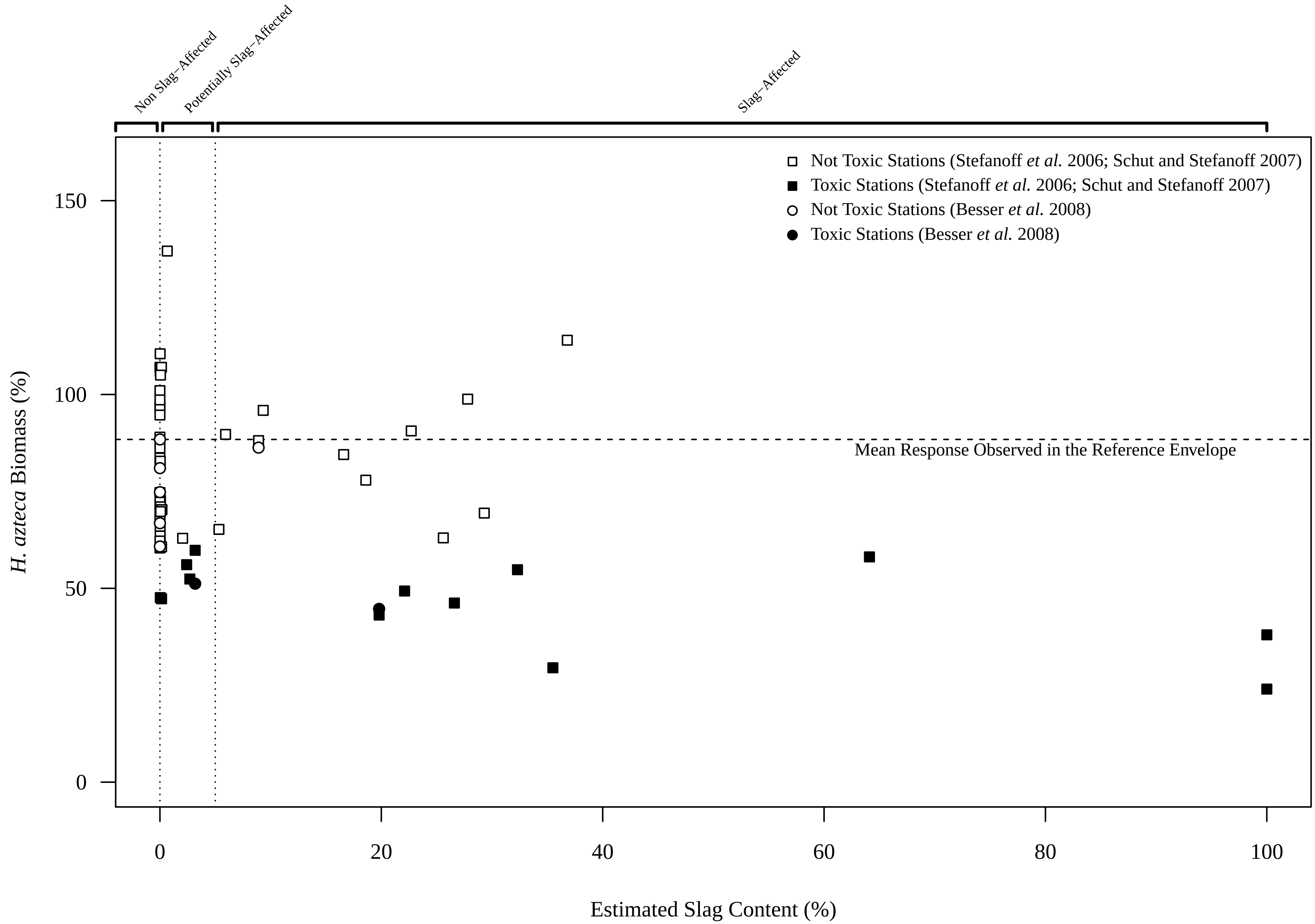


Figure A8.9. Relationship between control or reference−adjusted survival of the cladoceran (*Ceriodaphnia dubia*) and estimated slag content (based on the Cu:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

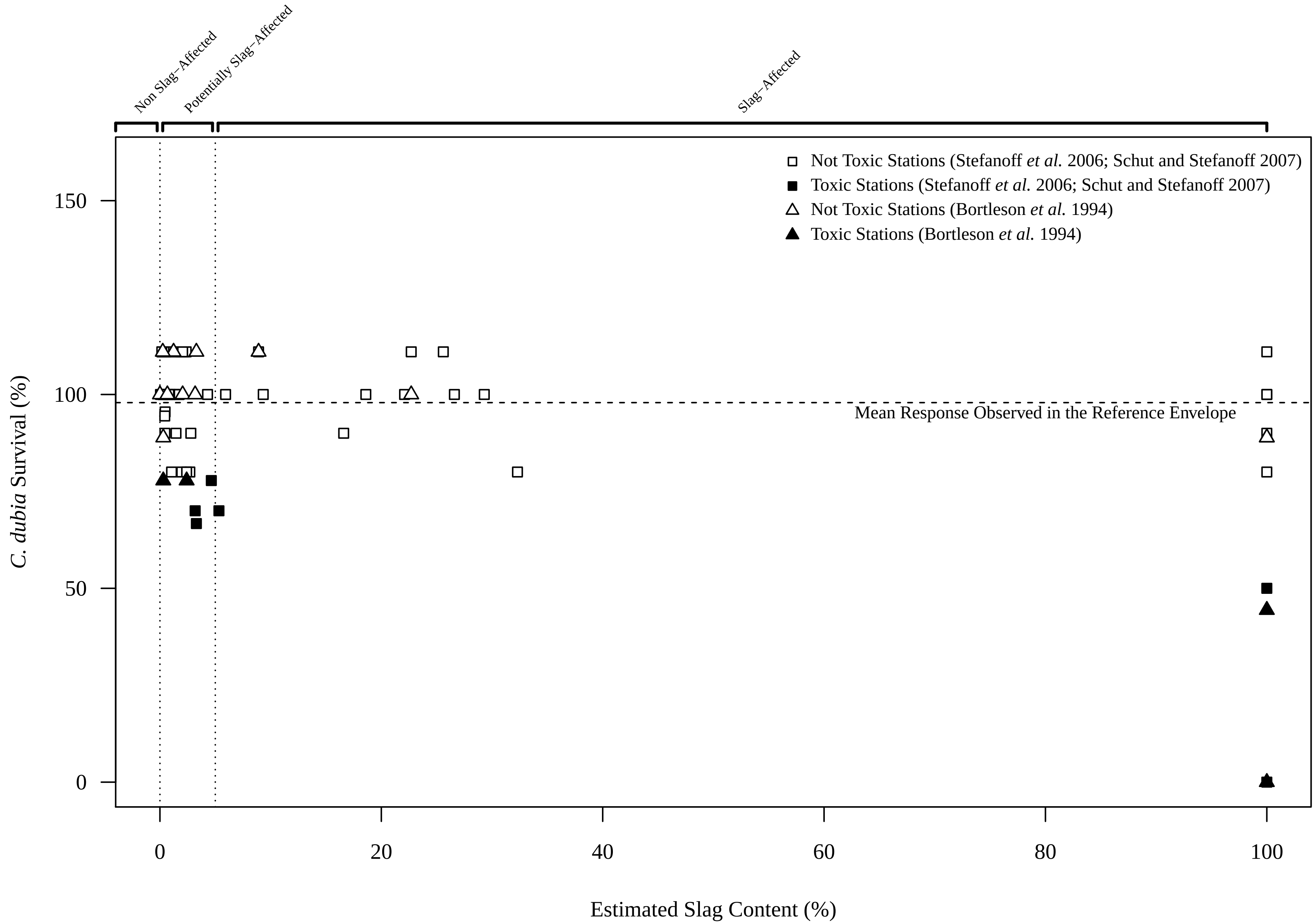


Figure A8.10. Relationship between control or reference−adjusted reproduction of the cladoceran (*Ceriodaphnia dubia*) and estimated slag content (based on the Cu:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

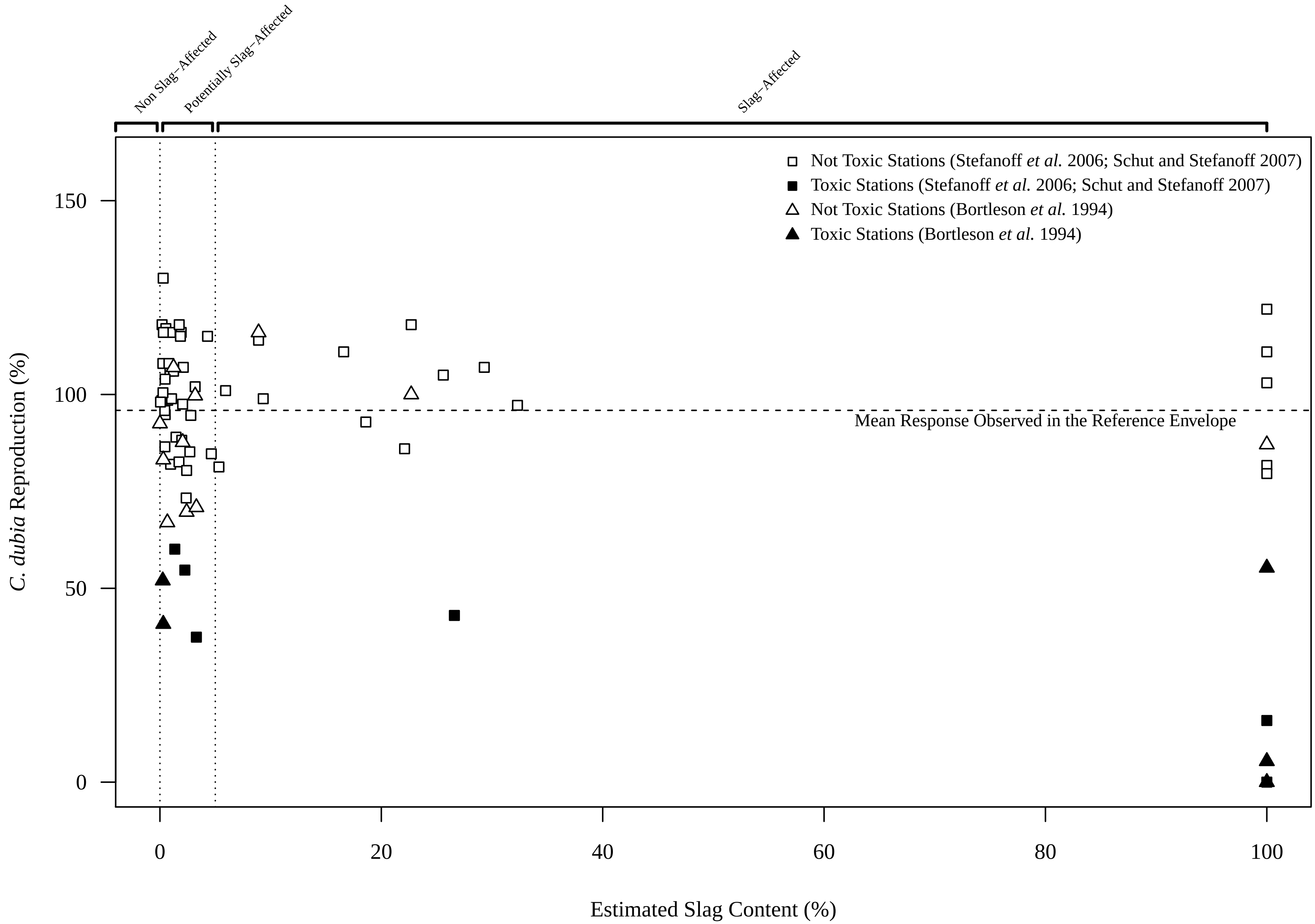


Figure A8.11. Relationship between control or reference−adjusted survival of the midge (*Chironomus dilutus*) and estimated slag content (based on the Cu:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

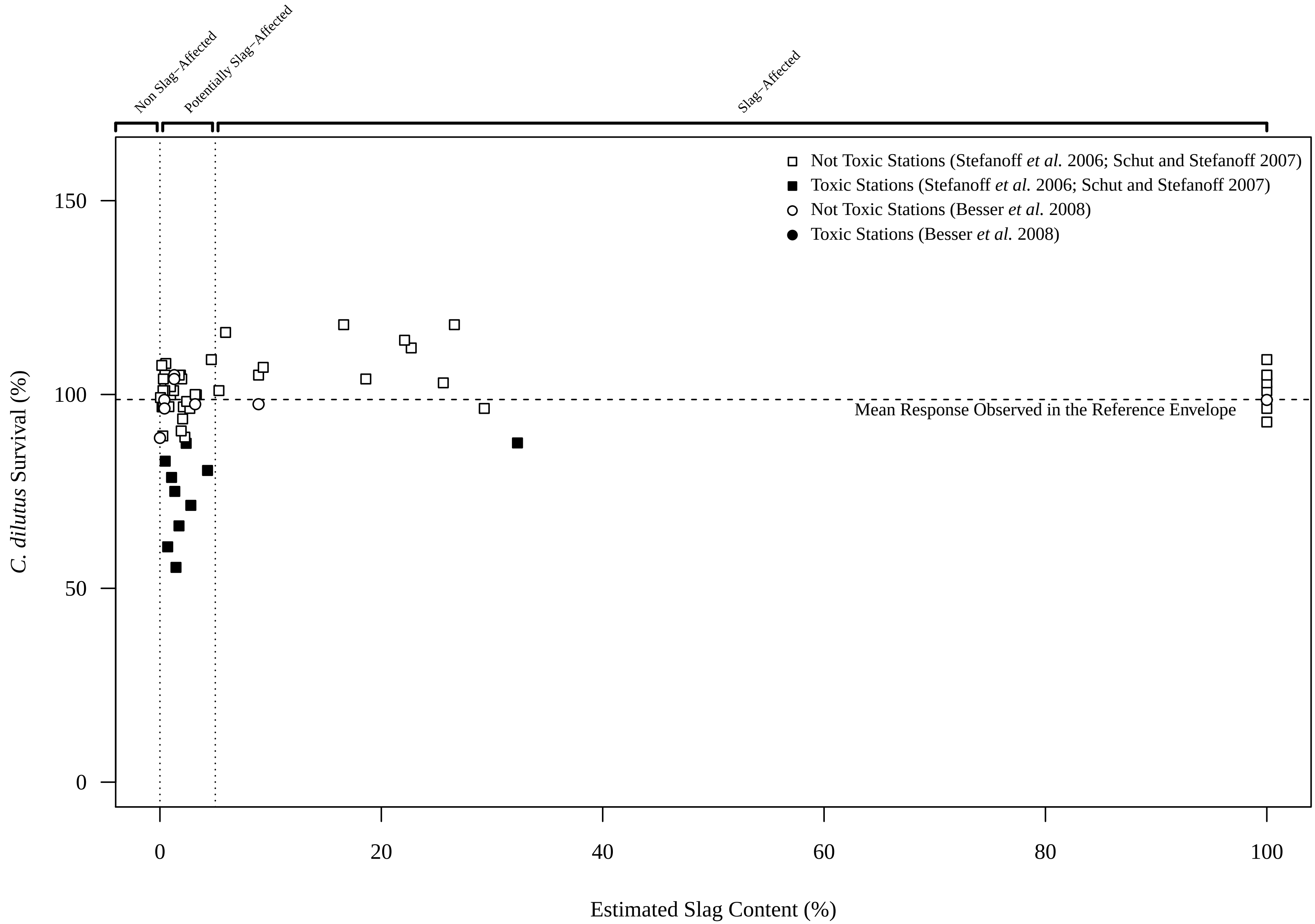


Figure A8.12. Relationship between control or reference−adjusted growth of the midge (*Chironomus dilutus*) and estimated slag content (based on the Cu:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

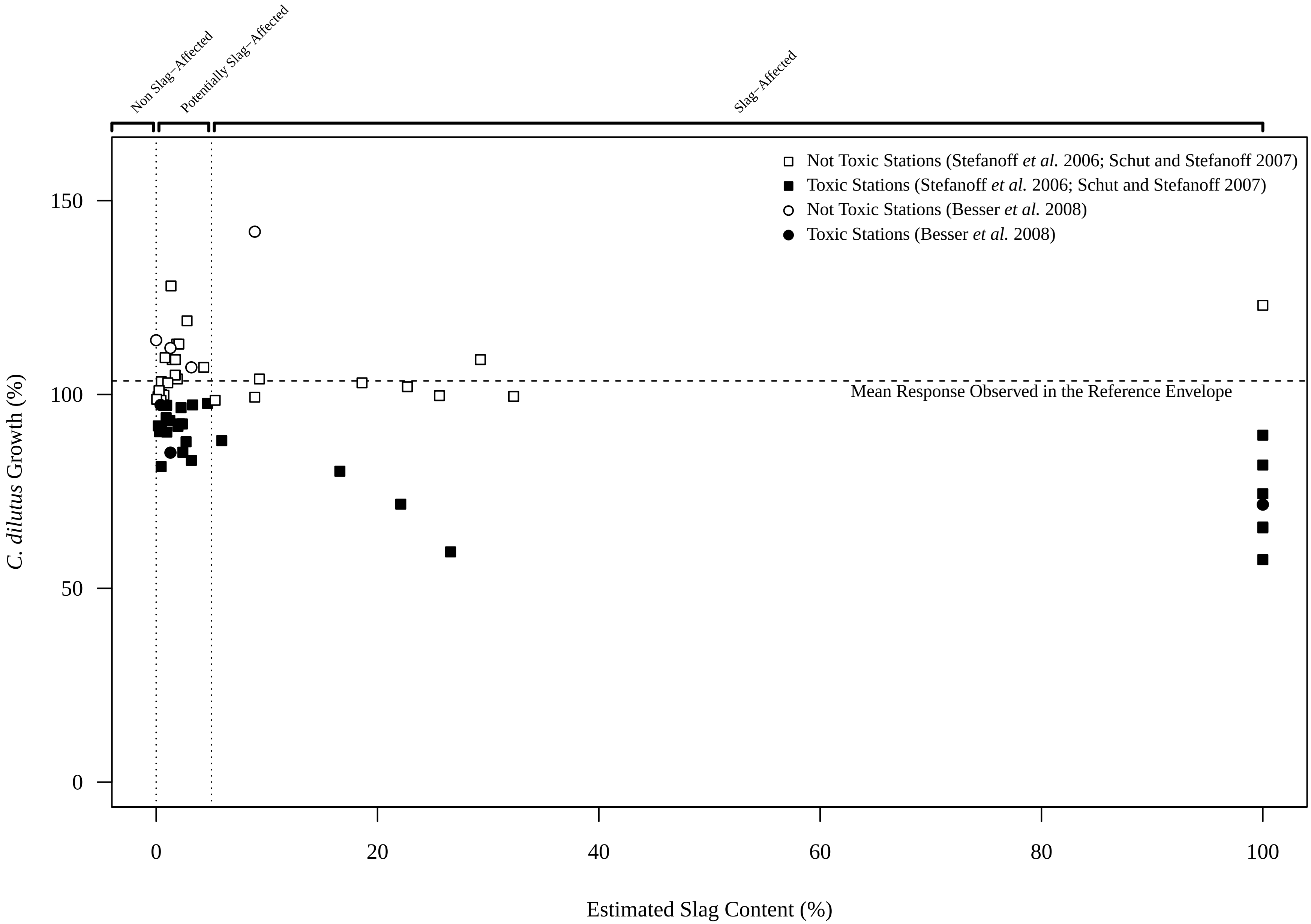


Figure A8.13. Relationship between control or reference−adjusted biomass of the midge (*Chironomus dilutus*) and estimated slag content (based on the Cu:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

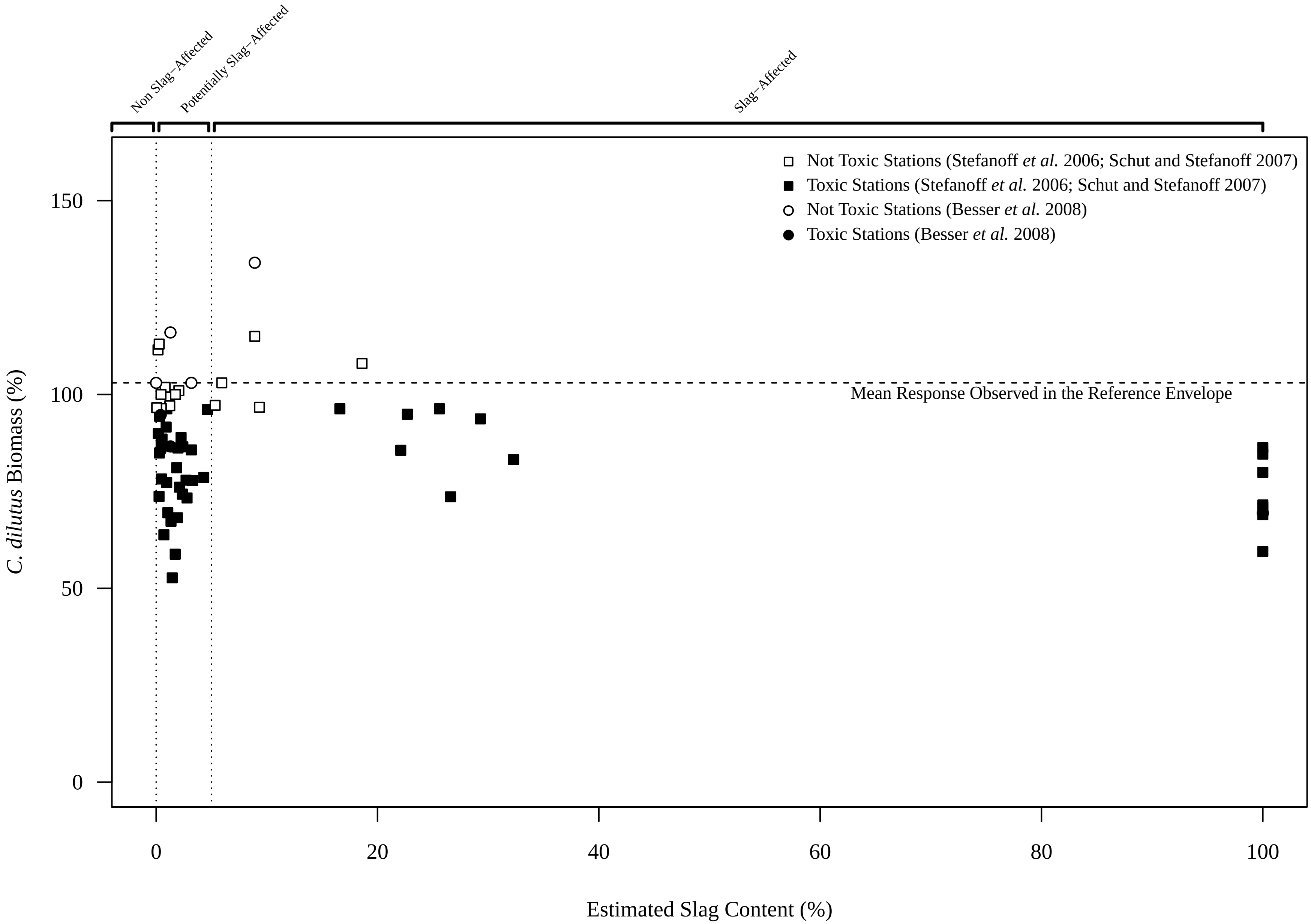


Figure A8.14. Relationship between control or reference−adjusted survival of the amphipod (*Hyalella azteca*) and estimated slag content (based on the Cu:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

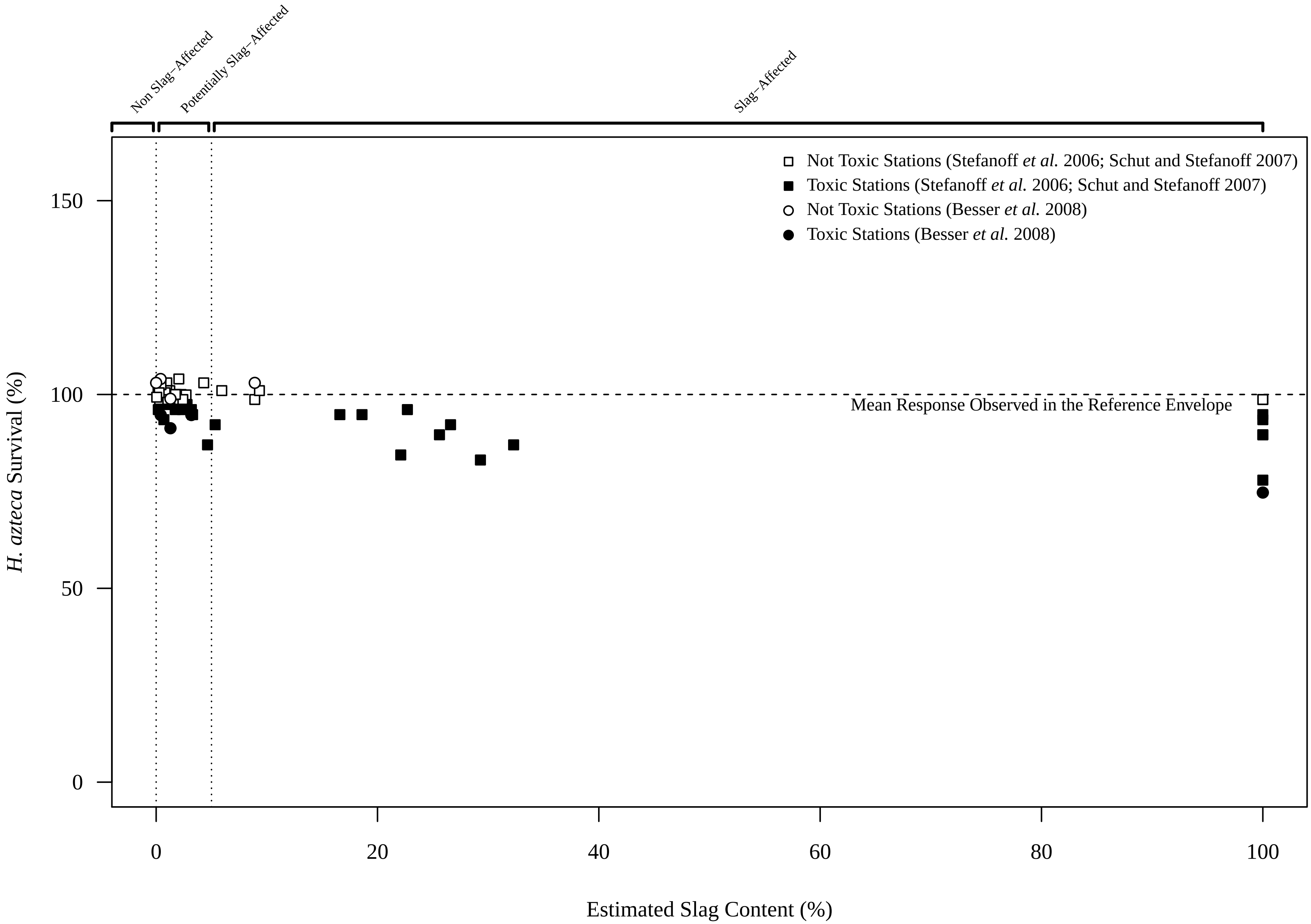


Figure A8.15. Relationship between control or reference−adjusted growth of the amphipod (*Hyalella azteca*) and estimated slag content (based on the Cu:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

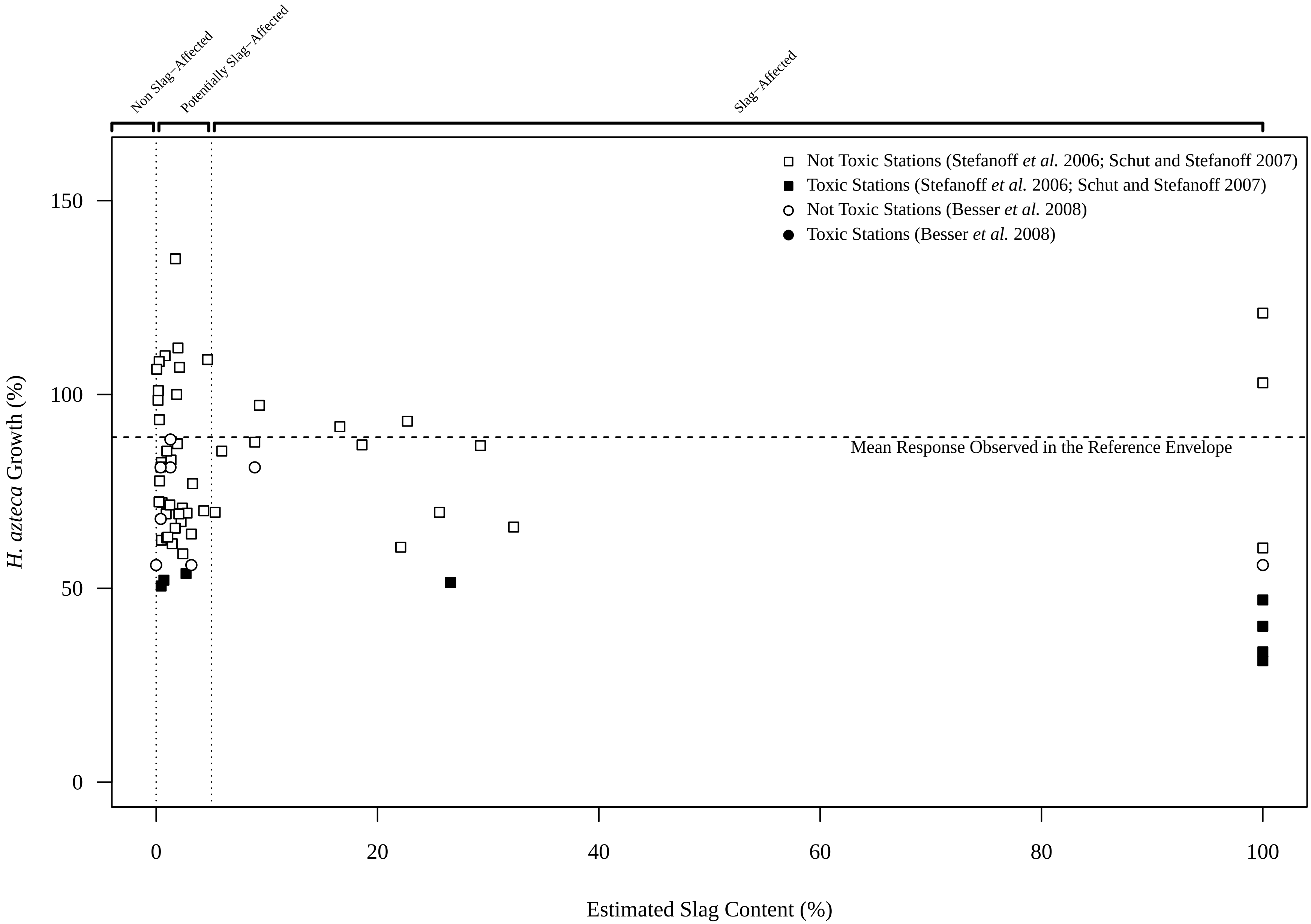


Figure A8.16. Relationship between control or reference−adjusted biomass of the amphipod (*Hyalella azteca*) and estimated slag content (based on the Cu:Al and Zn:Cd slag identification method) in the Upper Columbia River.

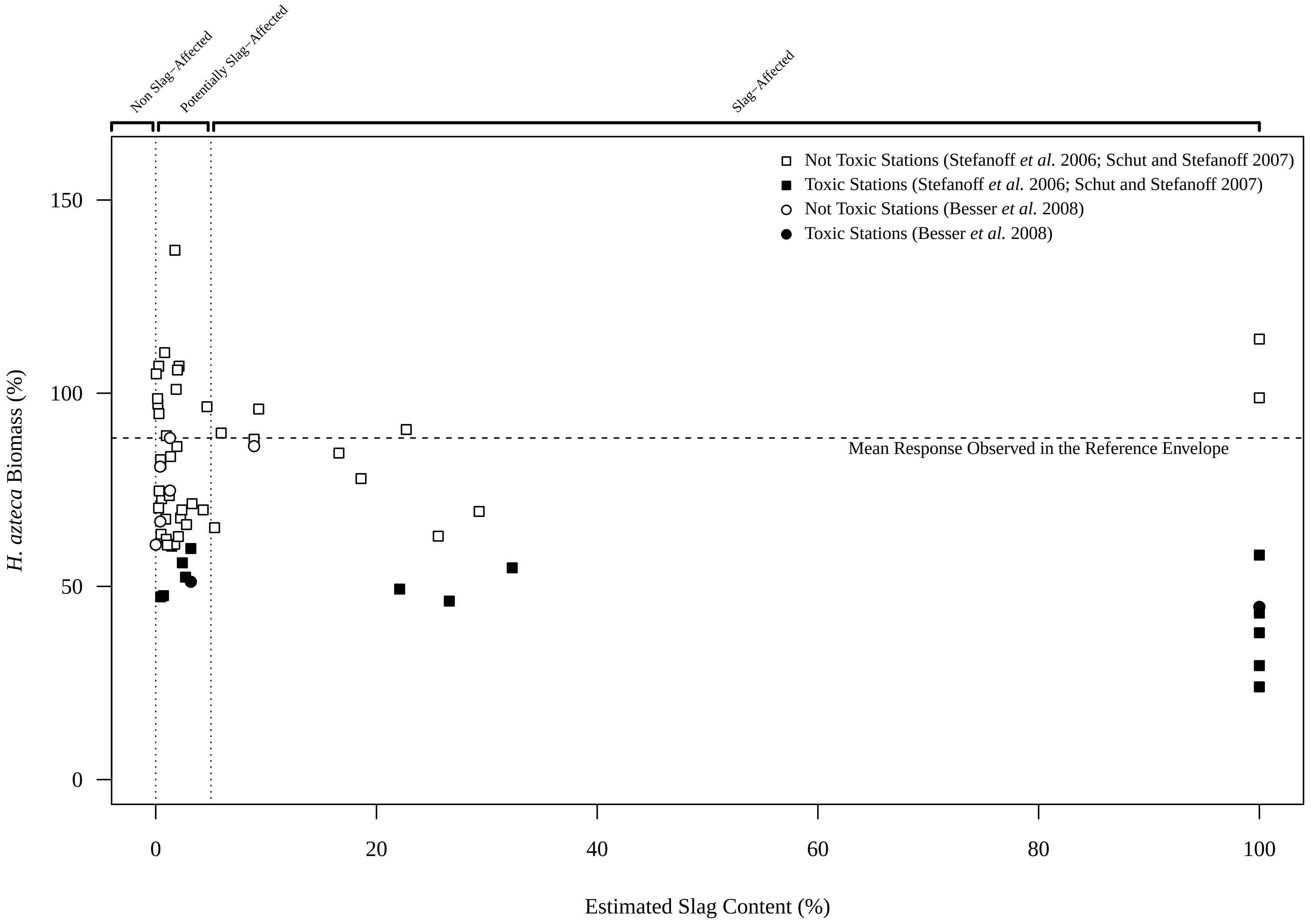


Figure A8.17. Relationship between control or reference−adjusted survival of the cladoceran (*Ceriodaphnia dubia*) and estimated slag content (based on the Fe:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

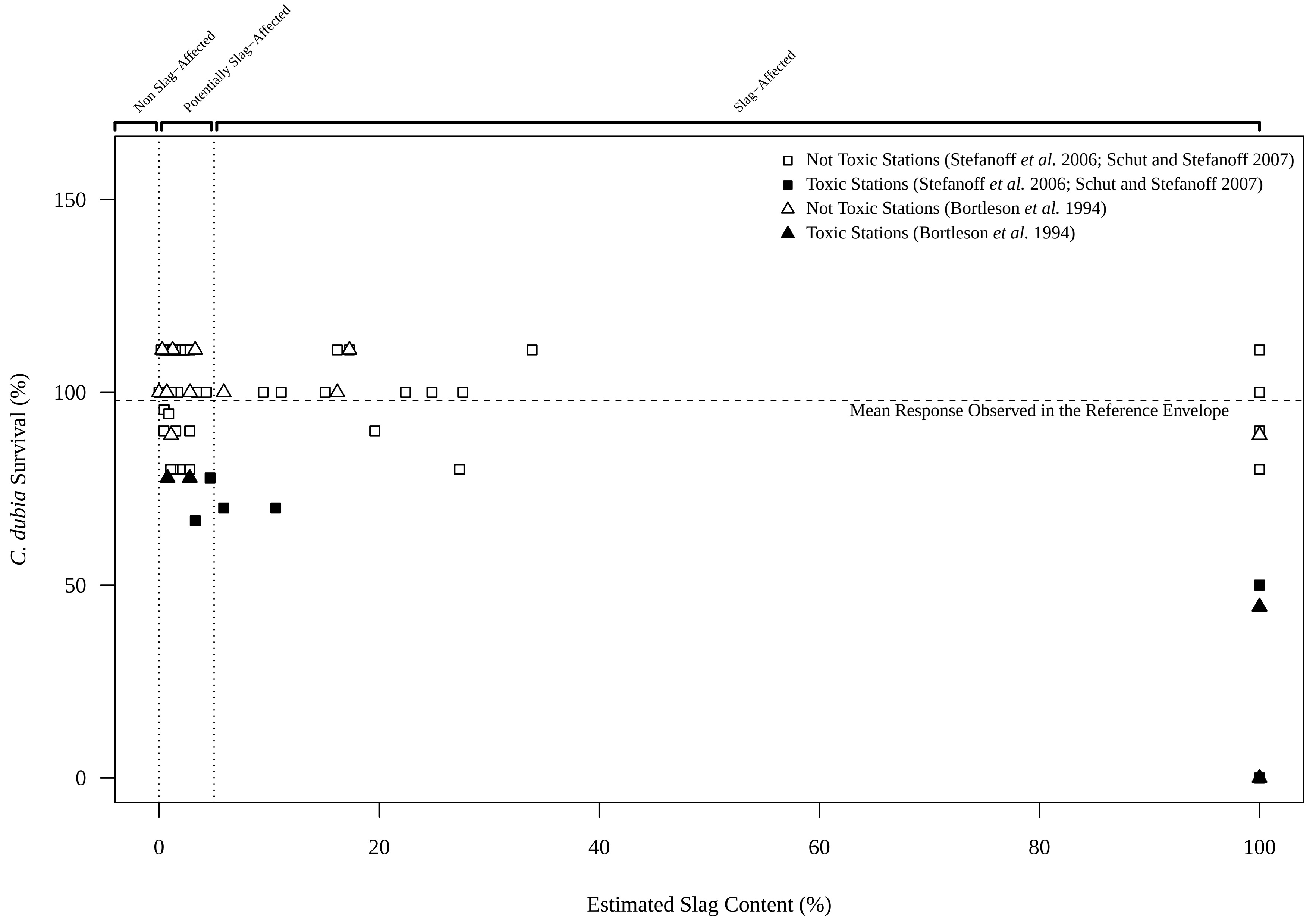


Figure A8.18. Relationship between control or reference−adjusted reproduction of the cladoceran (*Ceriodaphnia dubia*) and estimated slag content (based on the Fe:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

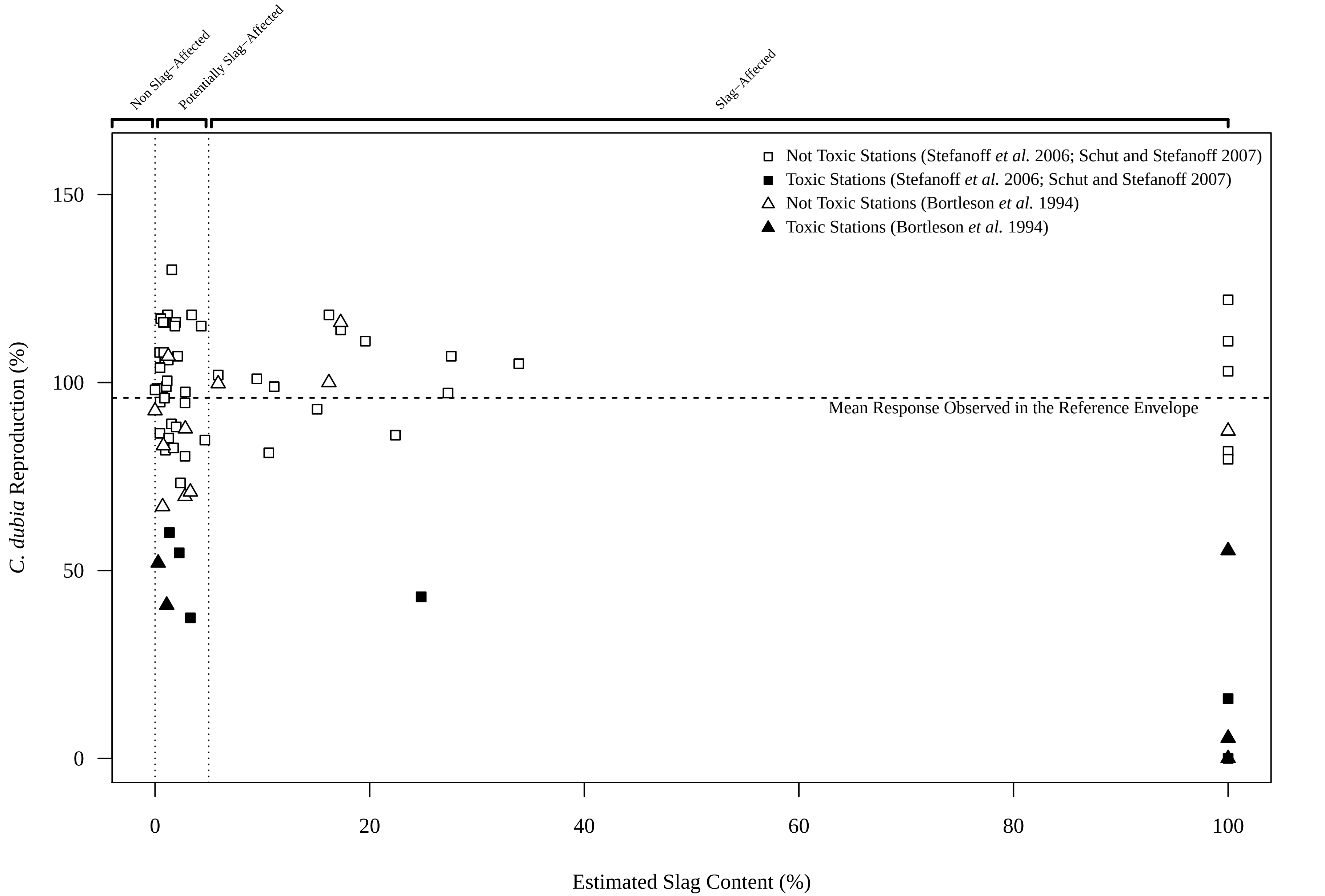


Figure A8.19. Relationship between control or reference−adjusted survival of the midge (*Chironomus dilutus*) and estimated slag content (based on the Fe:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

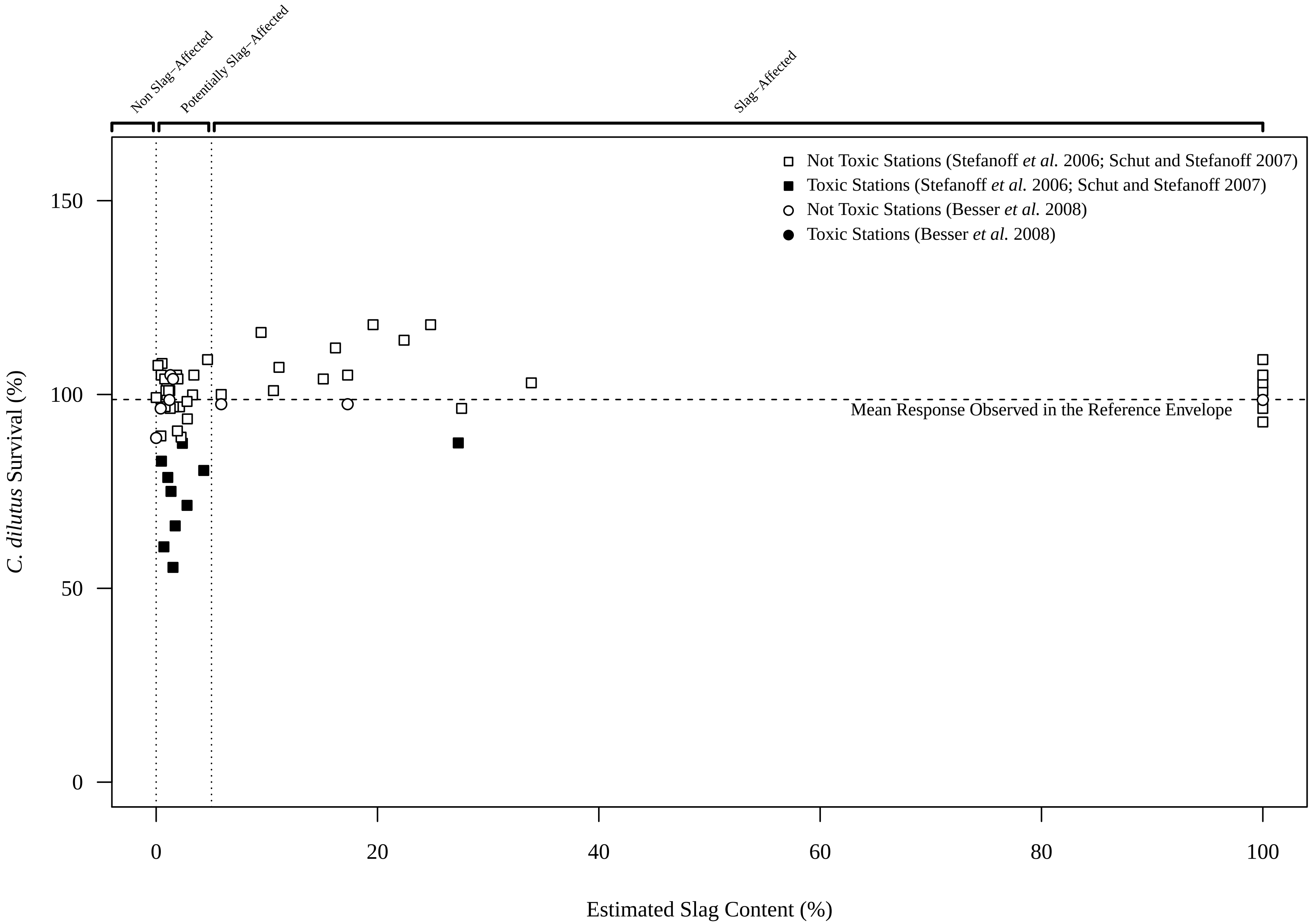


Figure A8.20. Relationship between control or reference−adjusted growth of the midge (*Chironomus dilutus*) and estimated slag content (based on the Fe:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

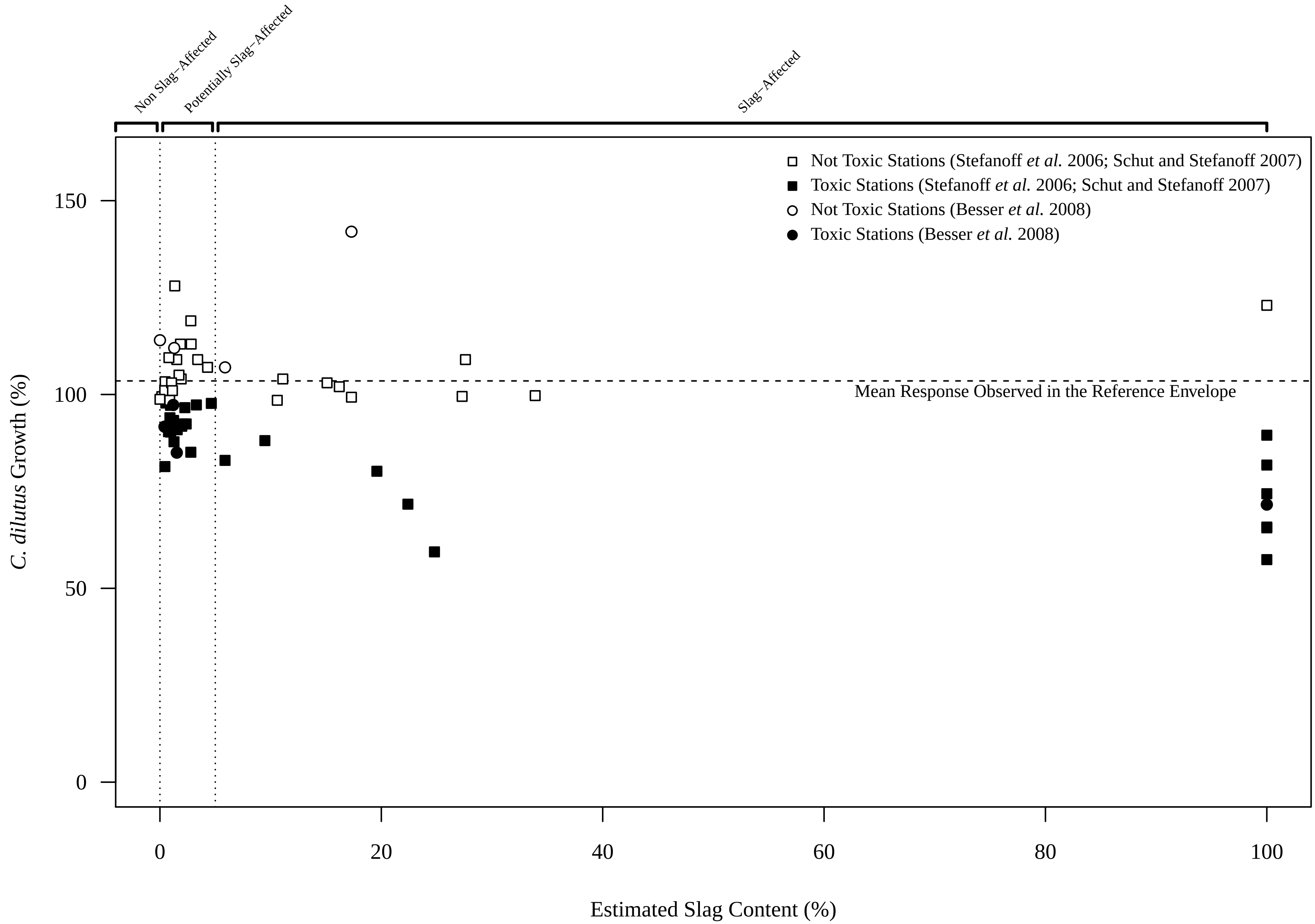


Figure A8.21. Relationship between control or reference−adjusted biomass of the midge (*Chironomus dilutus*) and estimated slag content (based on the Fe:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

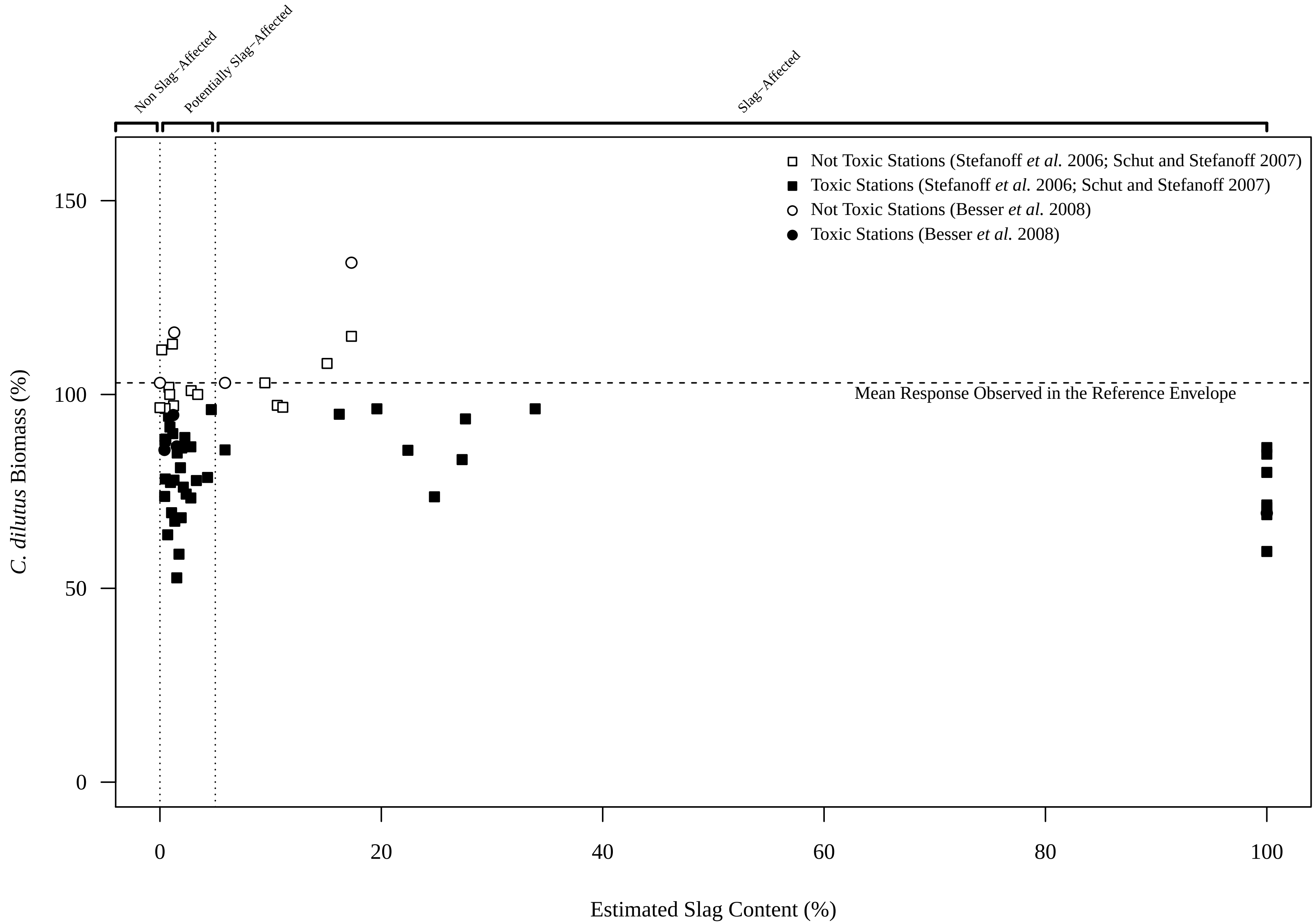


Figure A8.22. Relationship between control or reference−adjusted survival of the amphipod (*Hyalella azteca*) and estimated slag content (based on the Fe:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

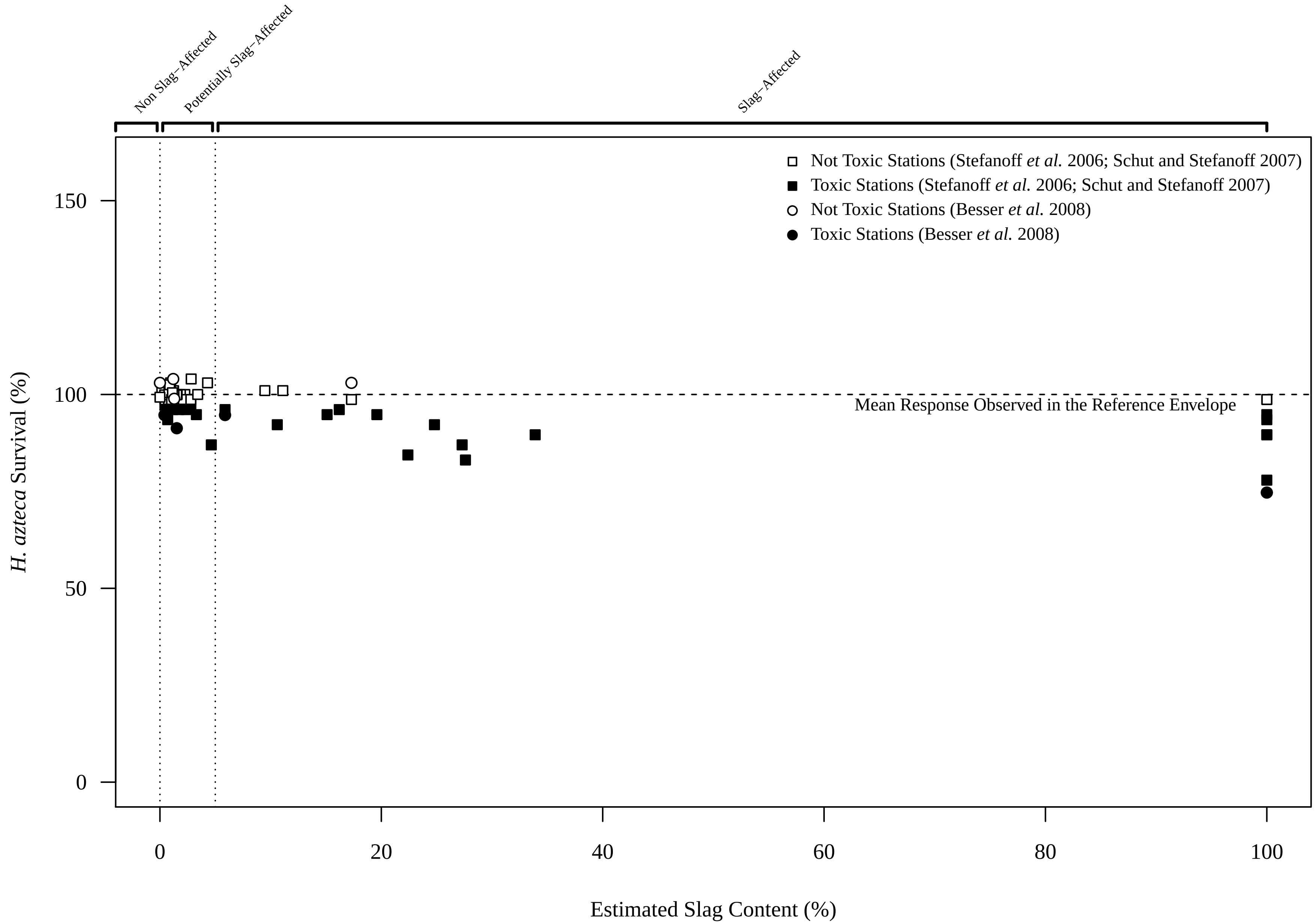


Figure A8.23. Relationship between control or reference−adjusted growth of the amphipod (*Hyalella azteca*) and estimated slag content (based on the Fe:Al and Zn:Cd slag identification method) of sediments in the Upper Columbia River.

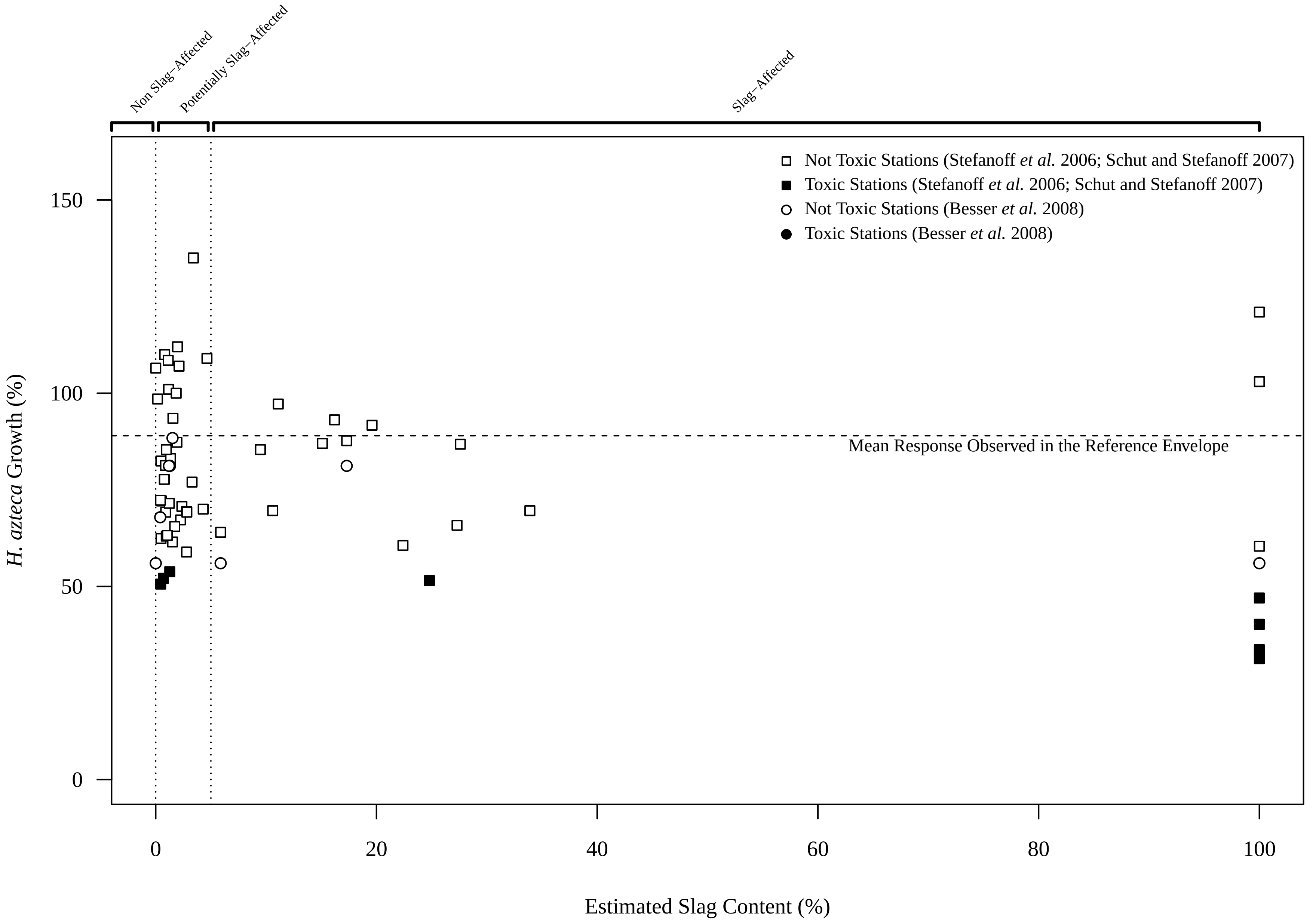


Figure A8.24. Relationship between control or reference−adjusted biomass of the amphipod (*Hyalella azteca*) and estimated slag content (based on the Fe:Al and Zn:Cd slag identification method) in the Upper Columbia River.

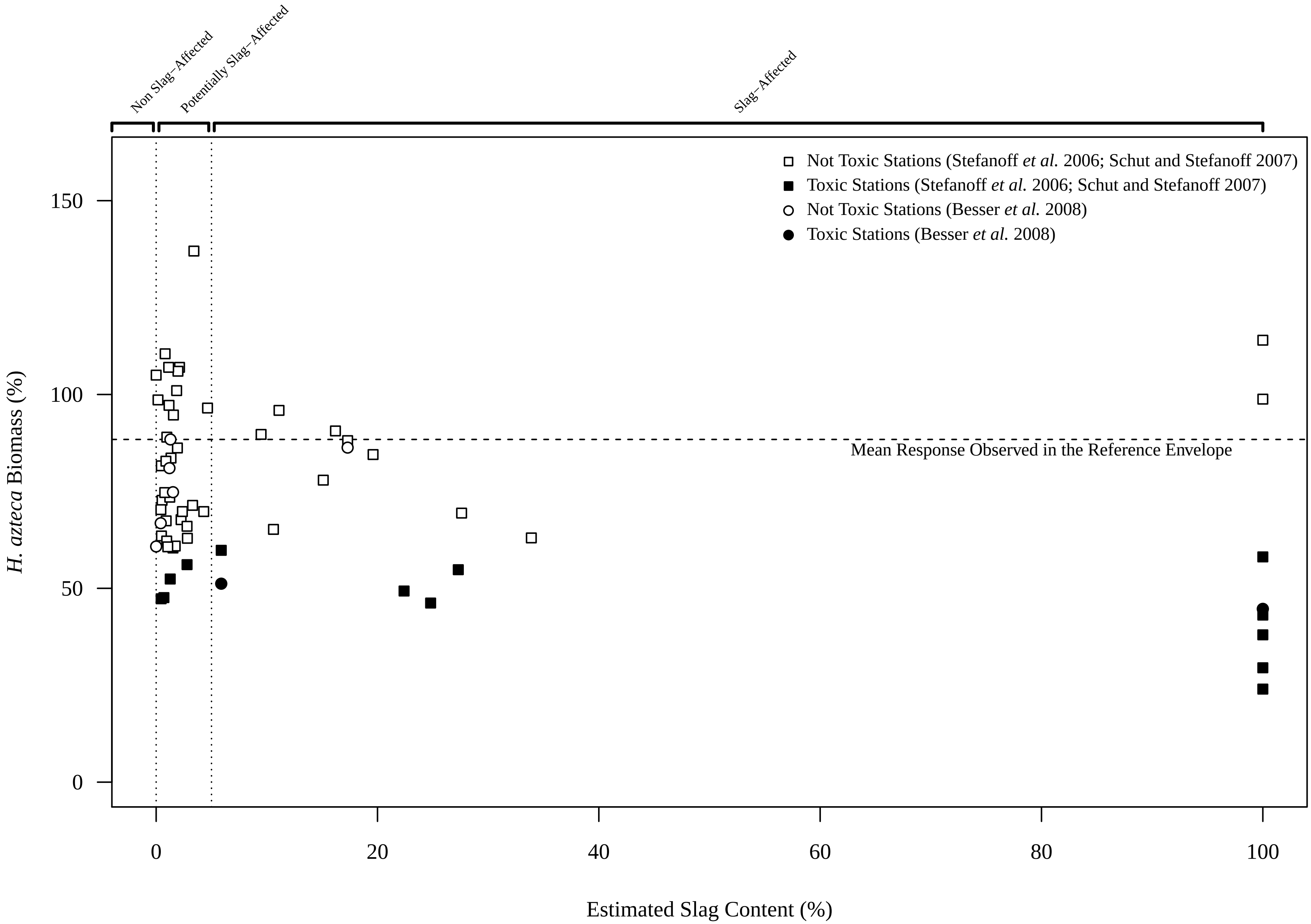
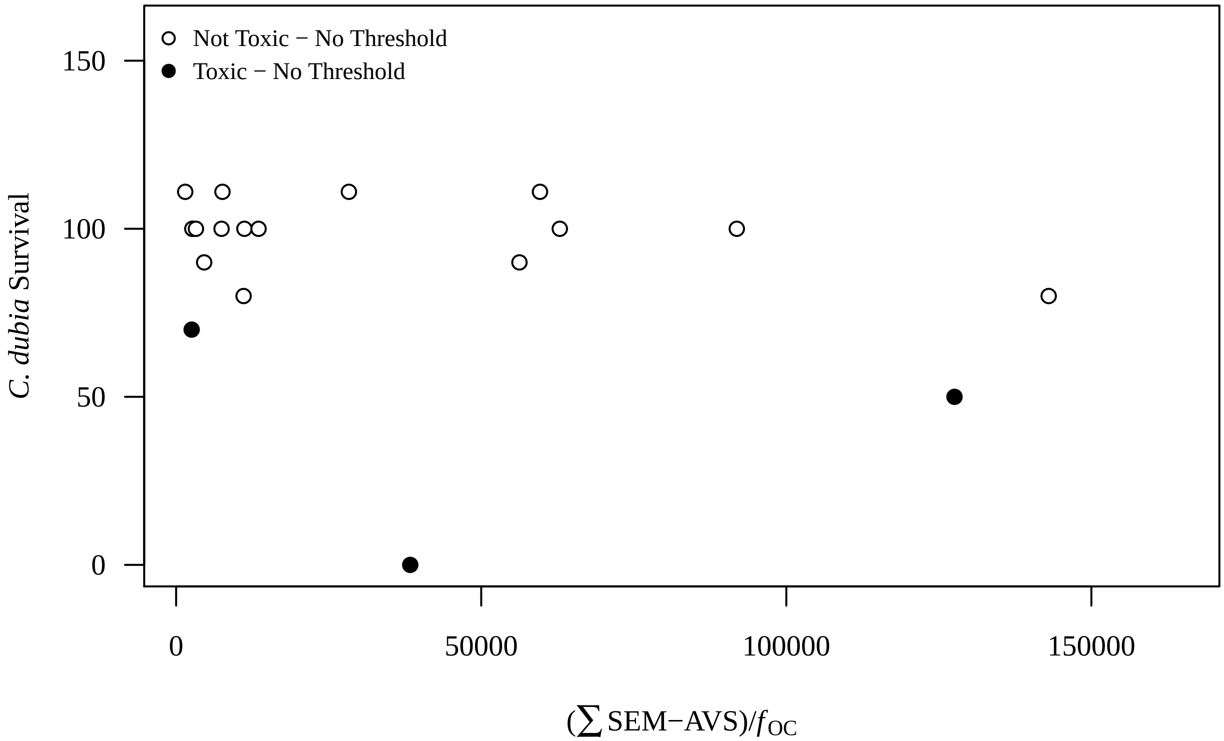


Figure A8.25. Comparison of the relationship between *Ceriodaphnia dubia* survival and (∑ SEM−AVS)/f_{OC} for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007) using an organic carbon threshold of 0.5%.



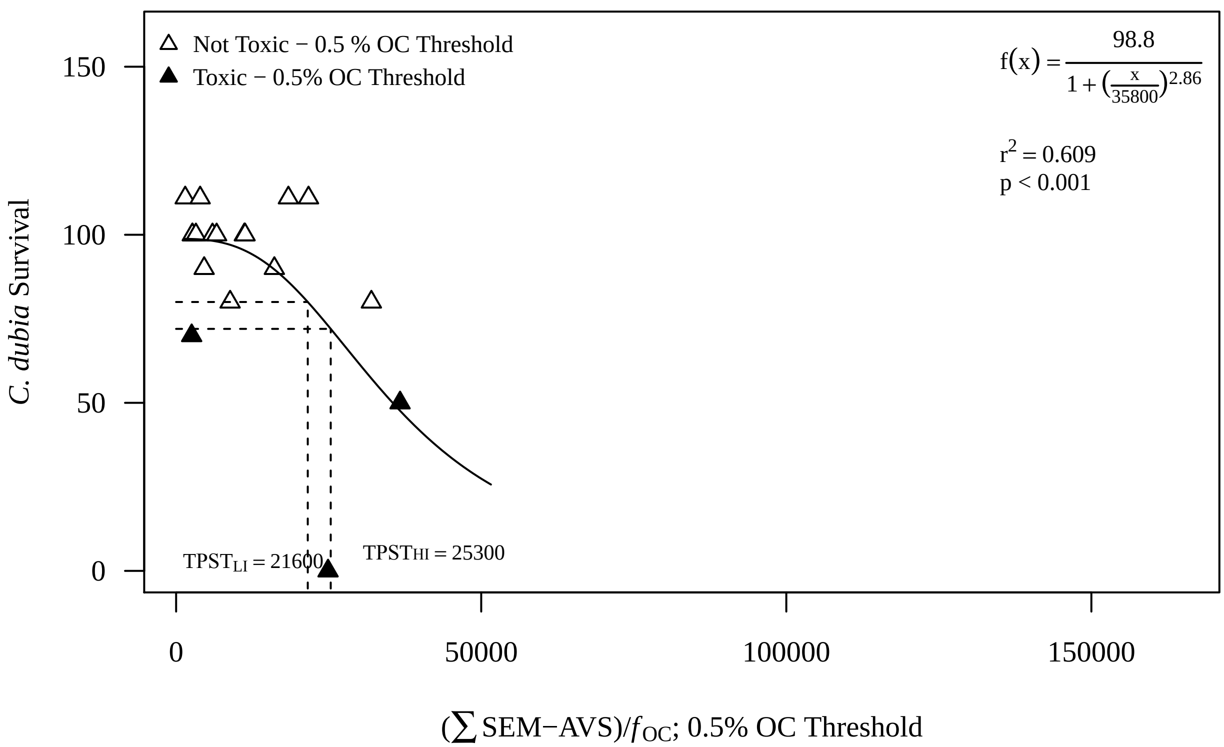
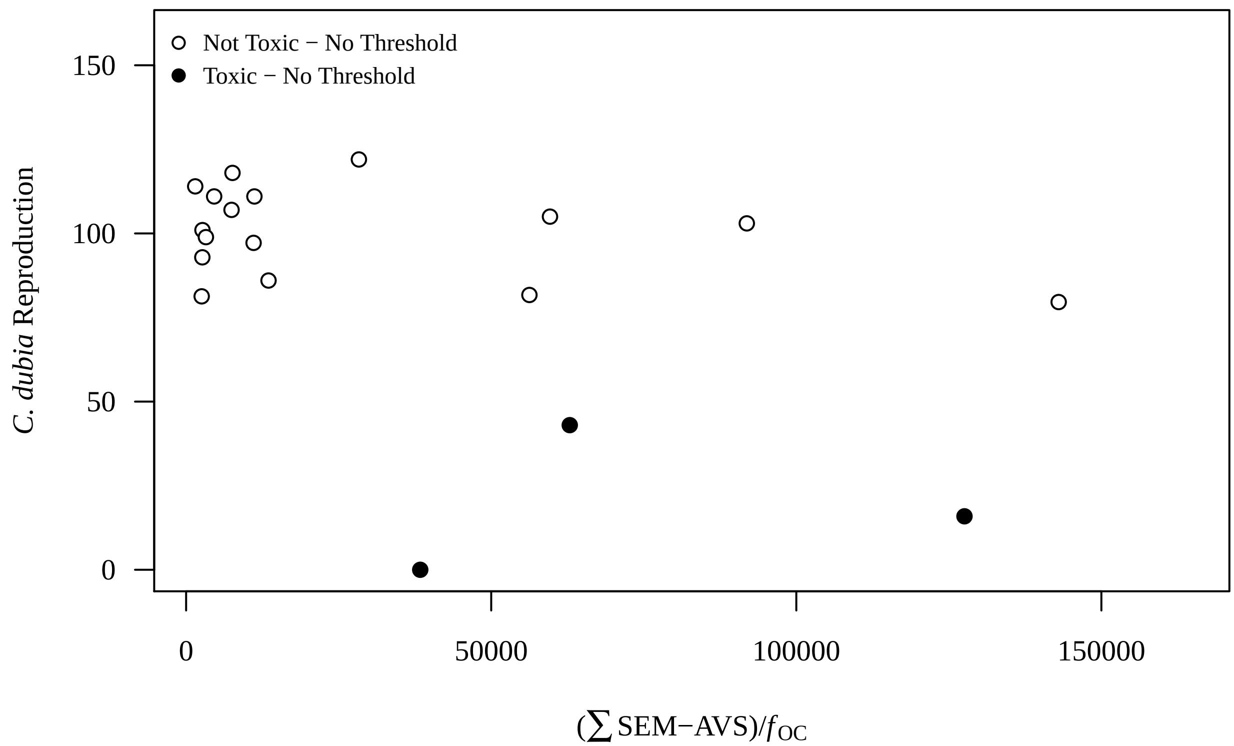


Figure A8.26. Comparison of the relationship between *Ceriodaphnia dubia* reproduction and ($\sum$ SEM−AVS)/f_{OC} for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007) using an organic carbon threshold of 0.5%.



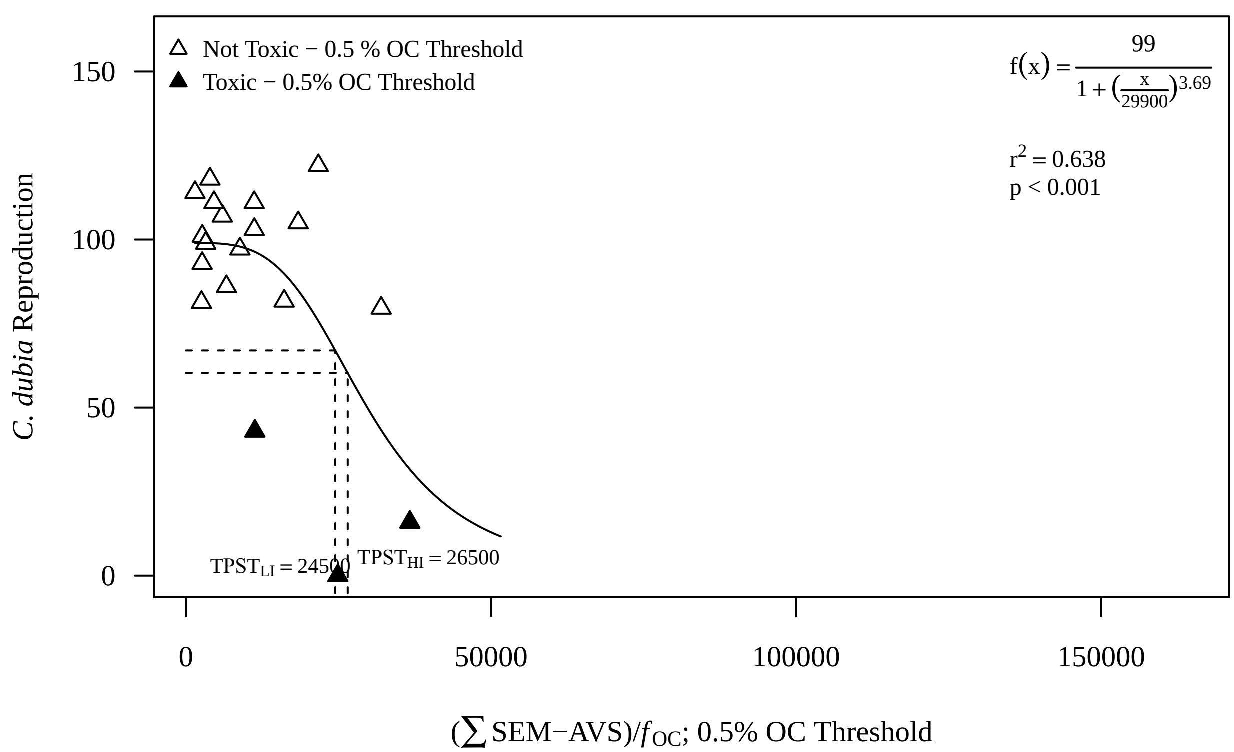
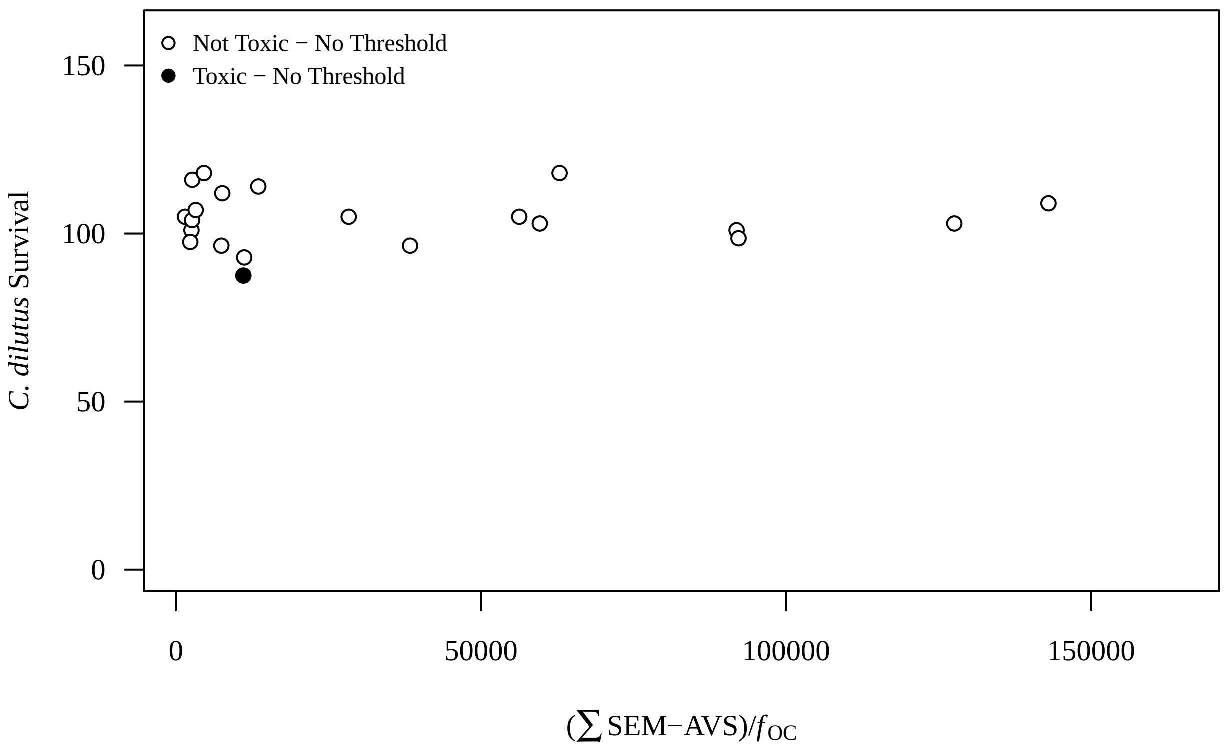


Figure A8.27. Comparison of the relationship between *Chironomus dilutus* survival and ($\sum$ SEM−AVS)/f_{OC} for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008) using an organic carbon threshold of 0.5%.



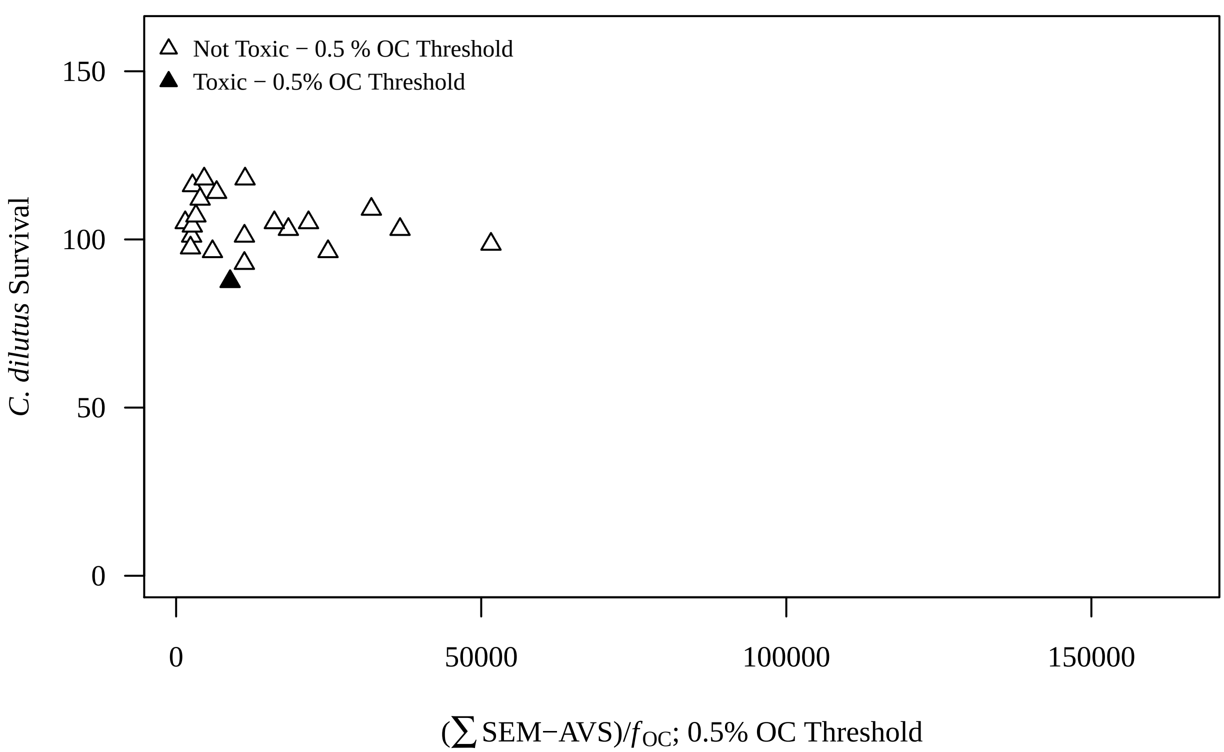
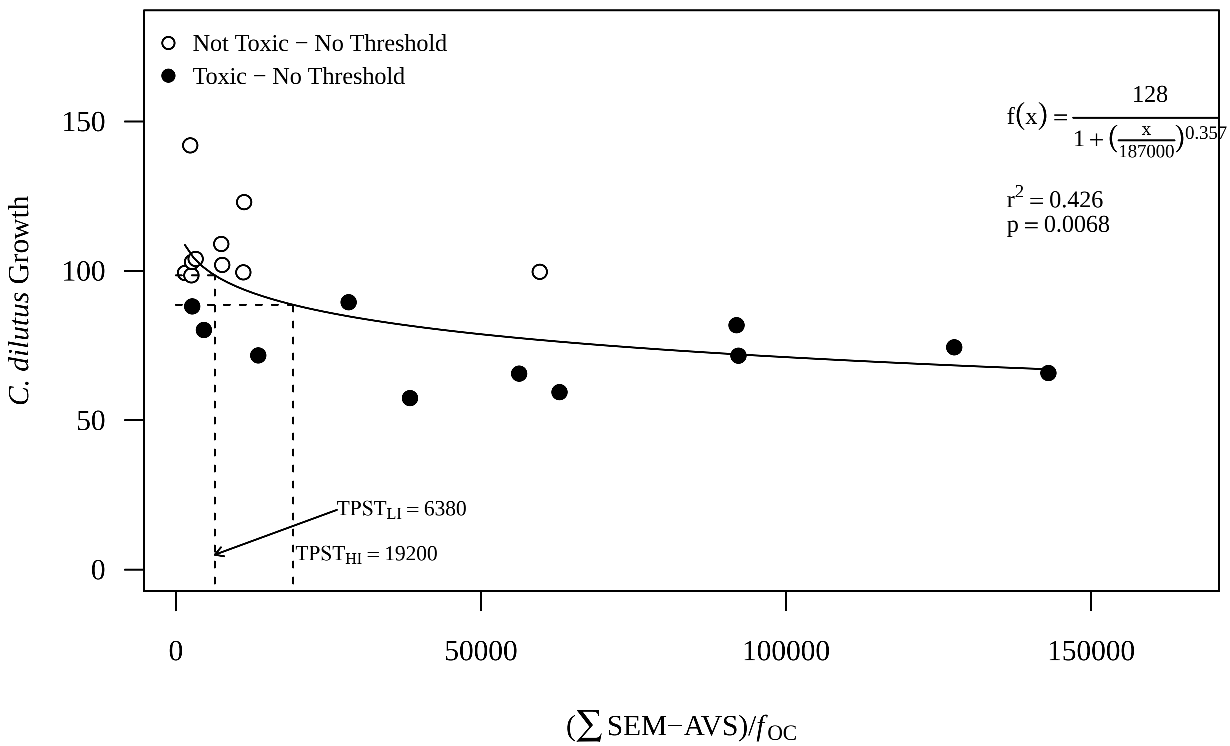


Figure A8.28. Comparison of the relationship between *Chironomus dilutus* growth and (∑ SEM−AVS)/f_{OC} for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008) using an organic carbon threshold of 0.5%.



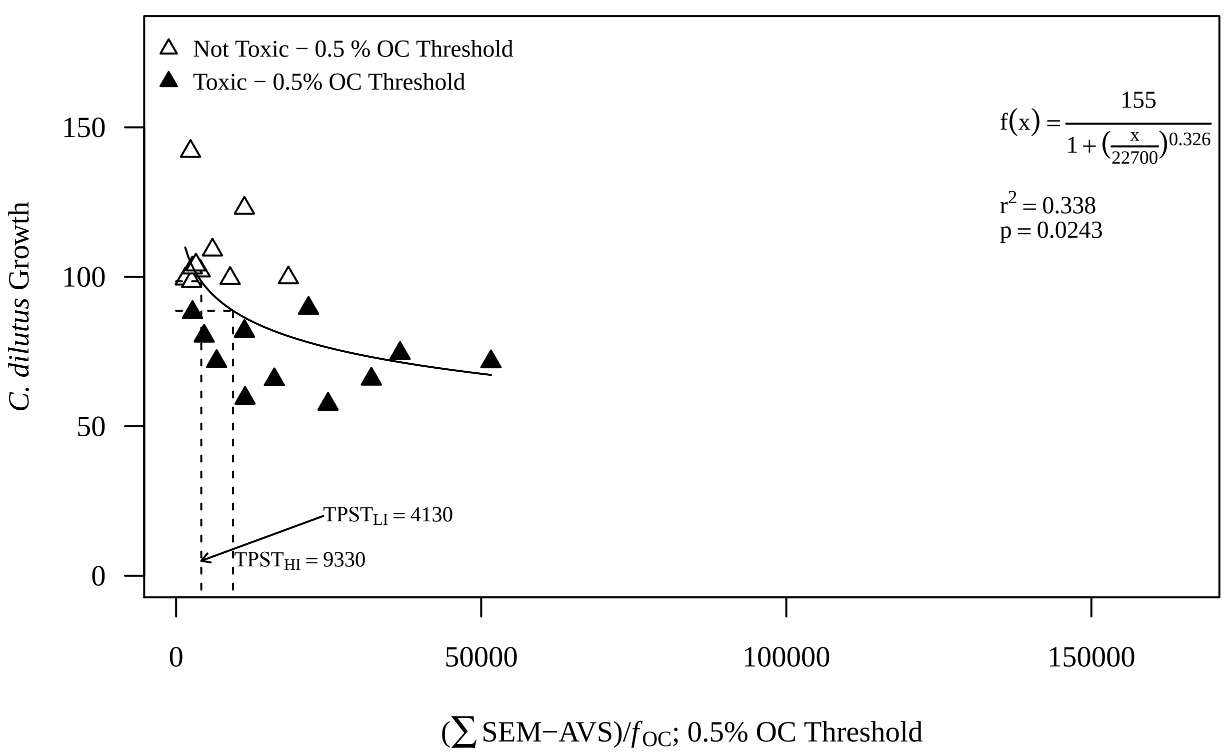
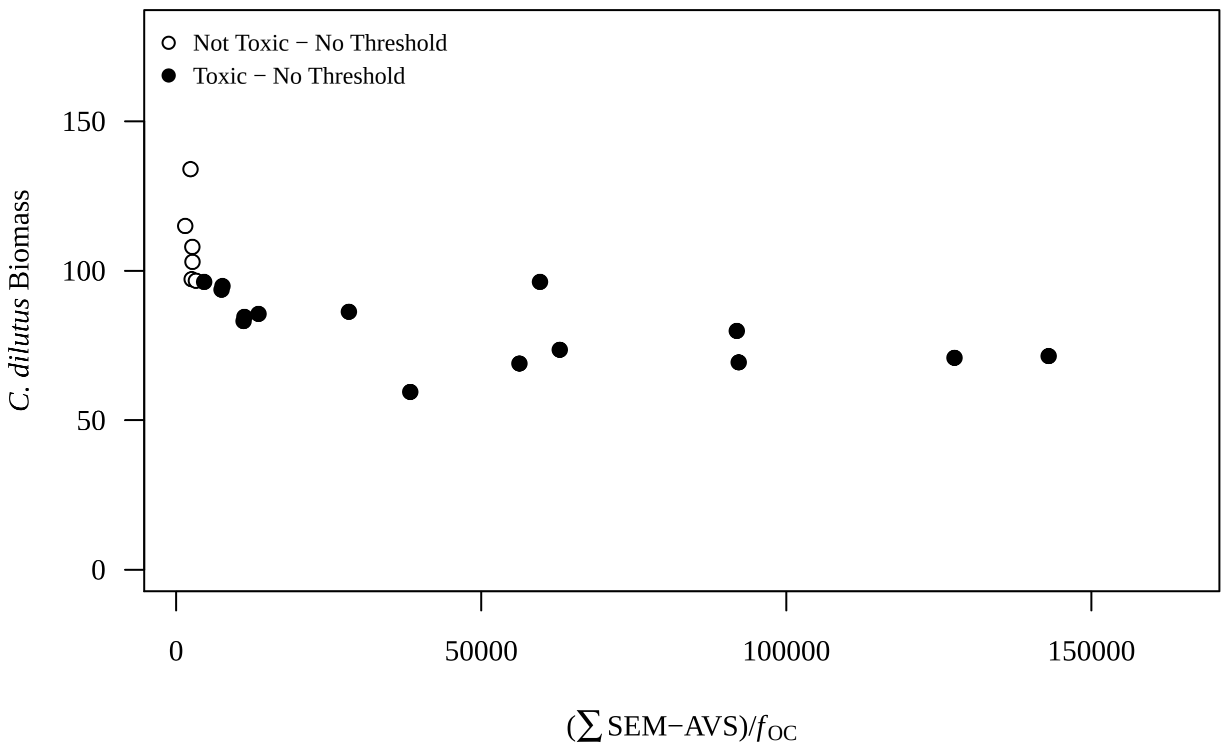


Figure A8.29. Comparison of the relationship between *Chironomus dilutus* biomass and ($\sum$ SEM−AVS)/f_{OC} for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008) using an organic carbon threshold of 0.5%.



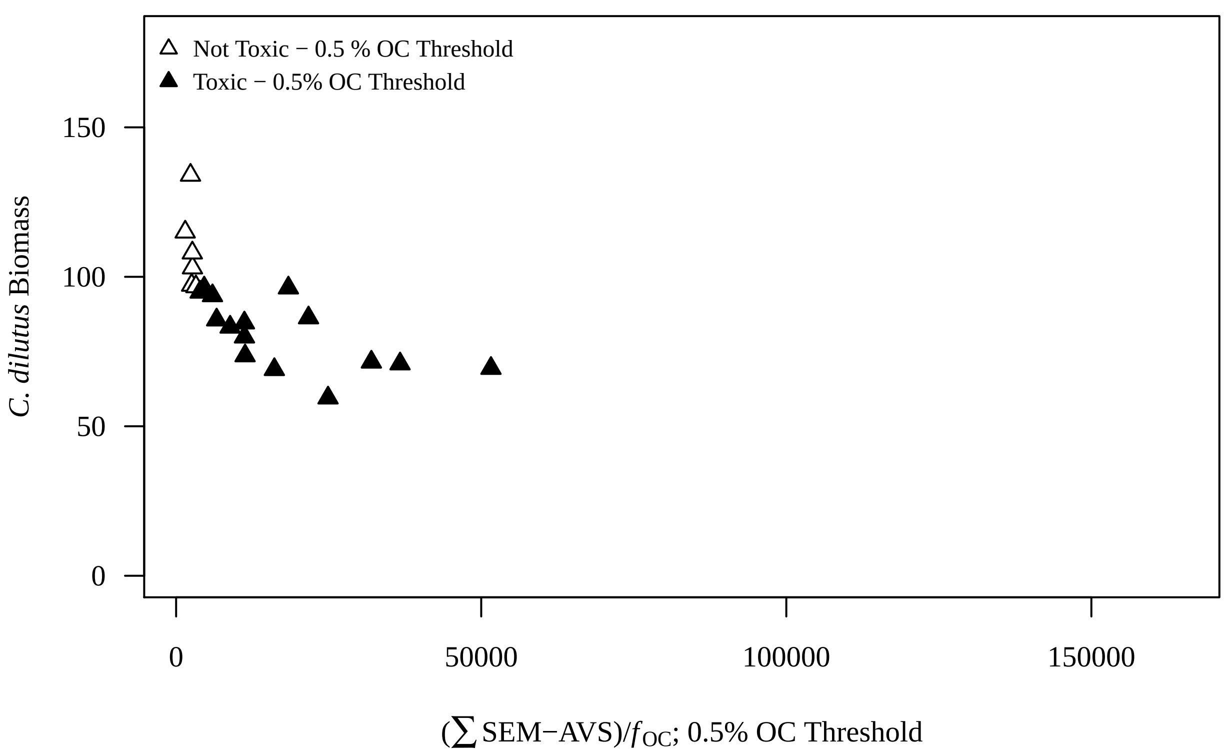
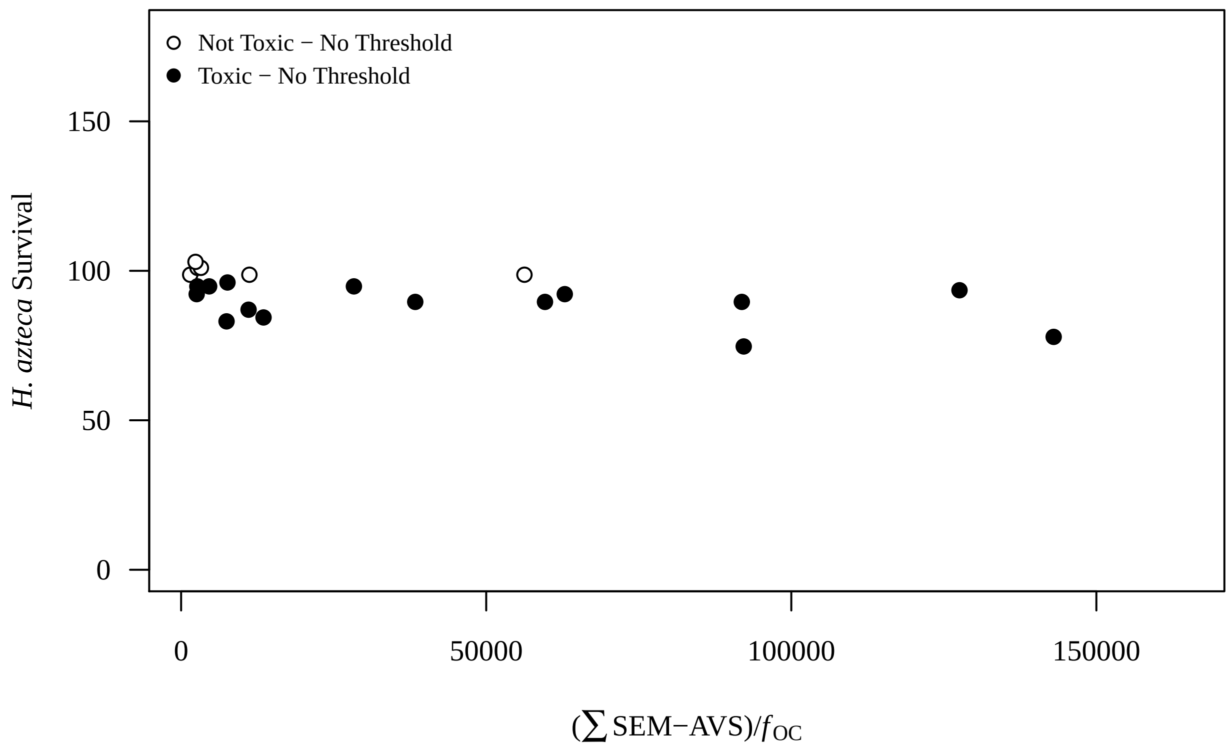


Figure A8.30. Comparison of the relationship between *Hyalella azteca* survival and ($\sum$ SEM−AVS)/f_{OC} for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008) using an organic carbon threshold of 0.5%.



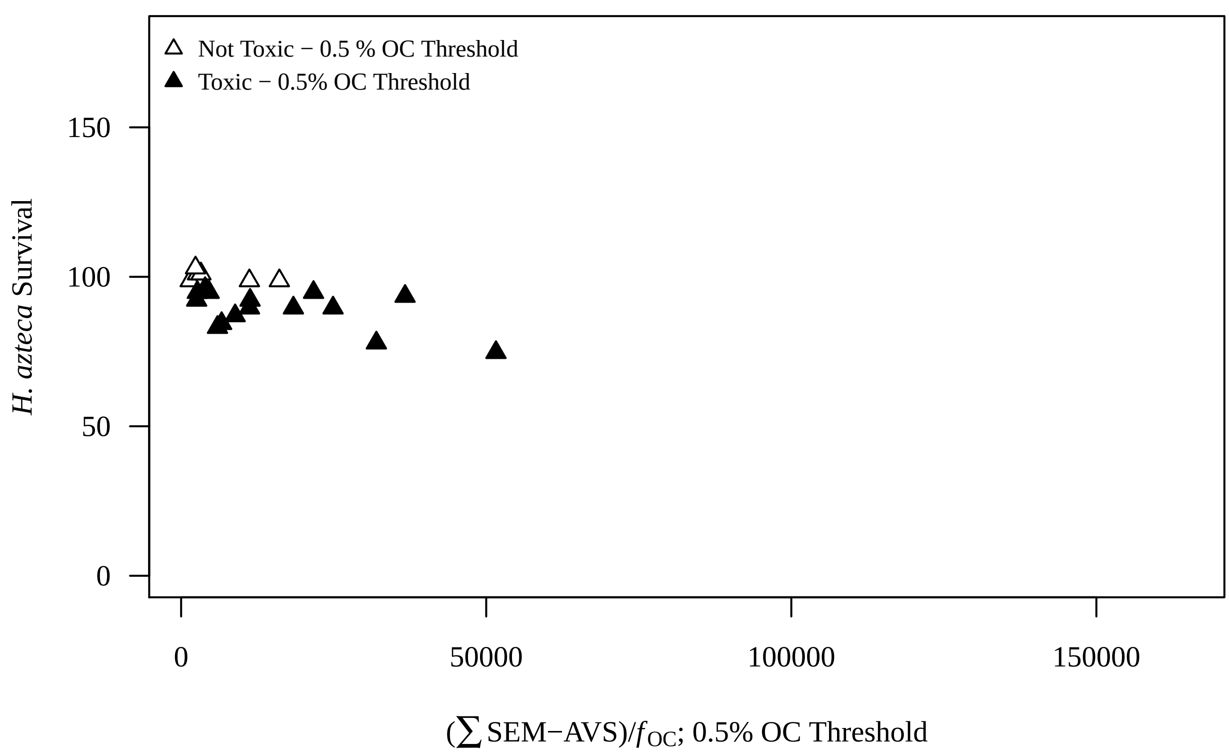
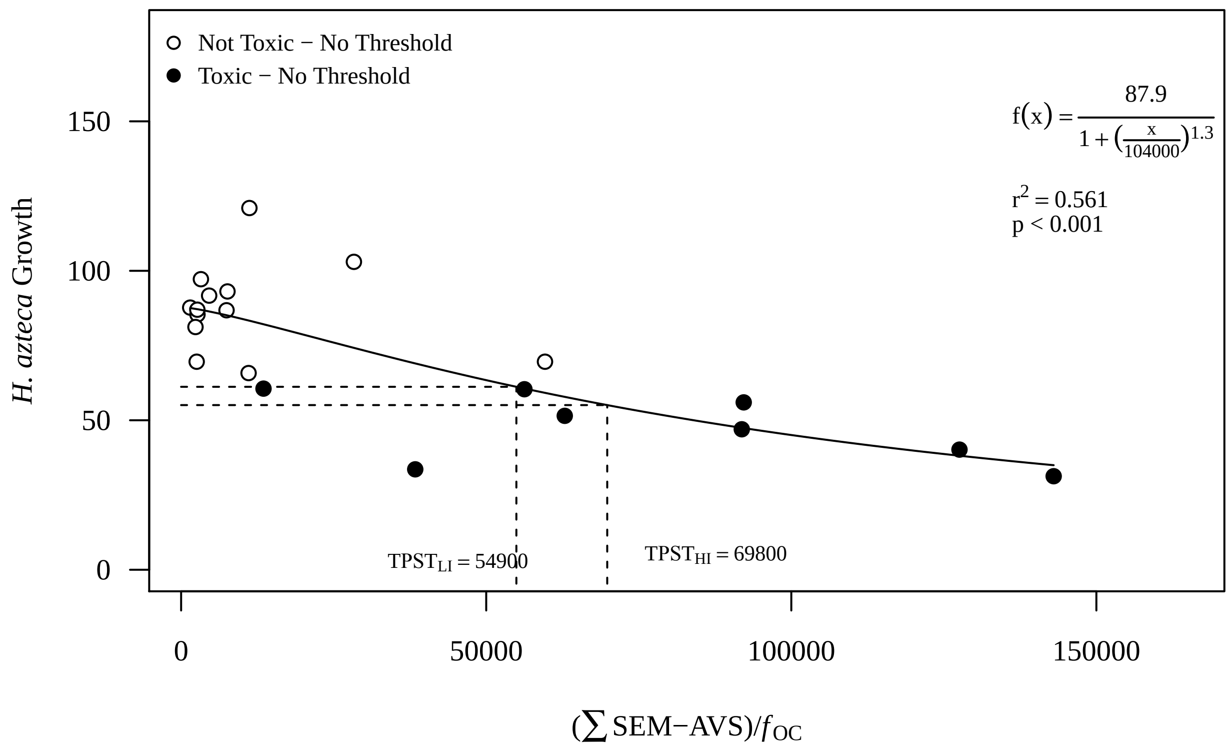


Figure A8.31. Comparison of the relationship between *Hyalella azteca* growth and $(\sum \text{SEM-AVS})/f_{OC}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008) using an organic carbon threshold of 0.5%.



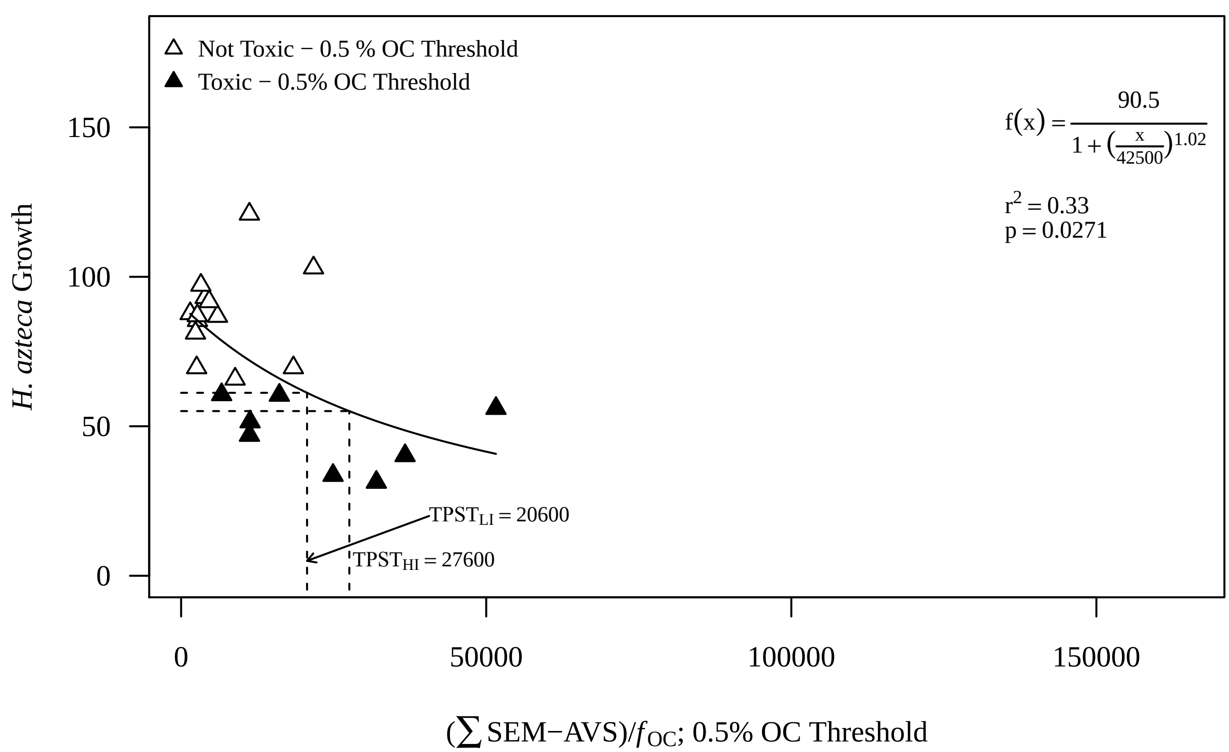
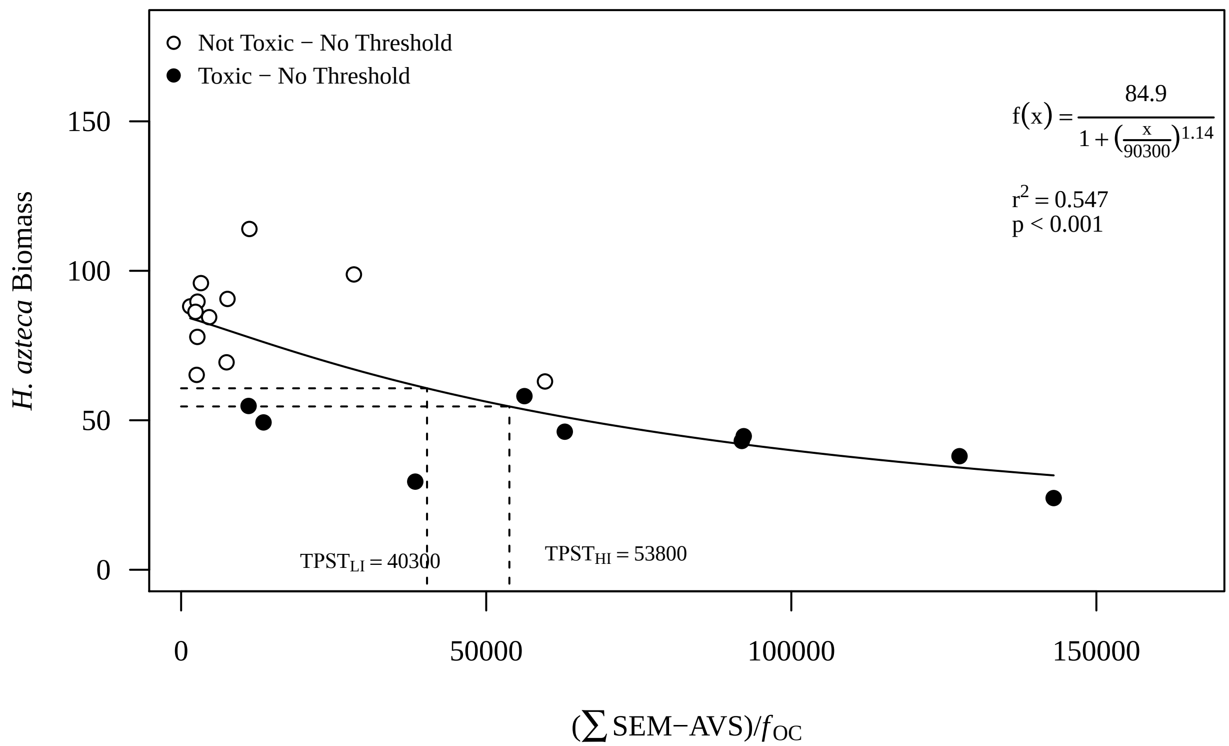


Figure A8.32. Comparison of the relationship between *Hyalella azteca* biomass and ($\sum$ SEM−AVS)/f_{OC} for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007; Besser *et al.* 2008) using an organic carbon threshold of 0.5%.



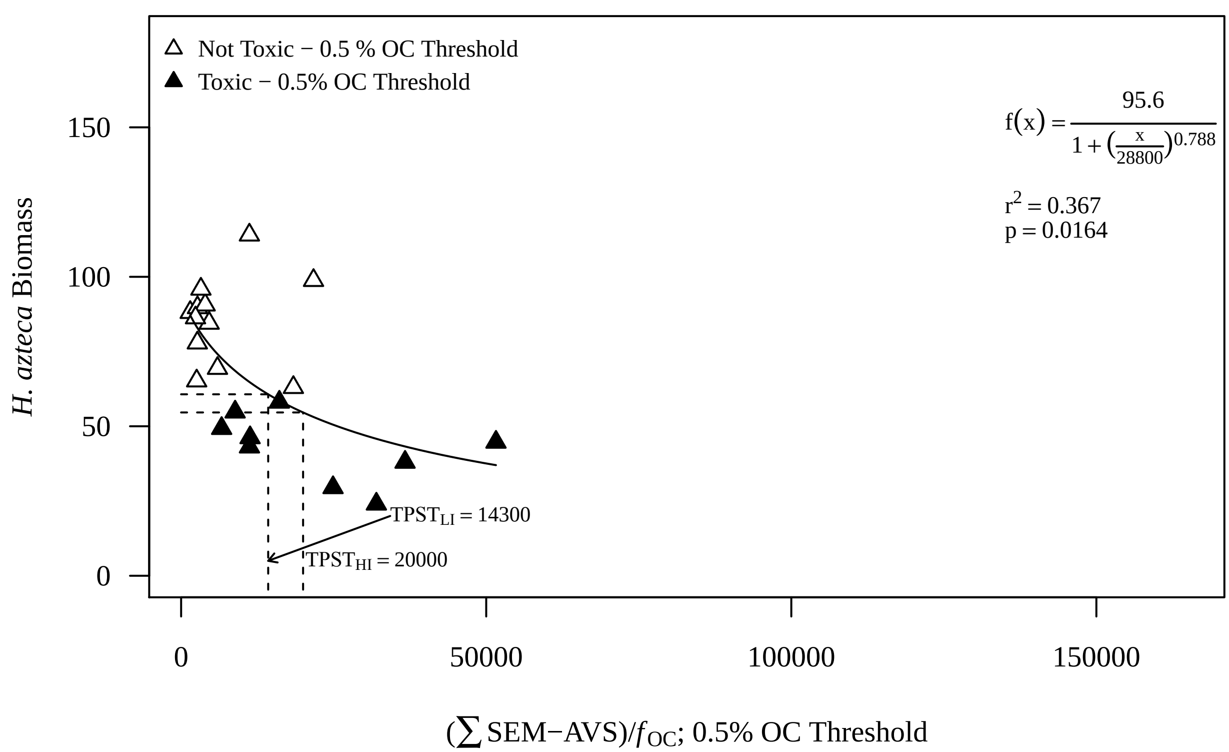
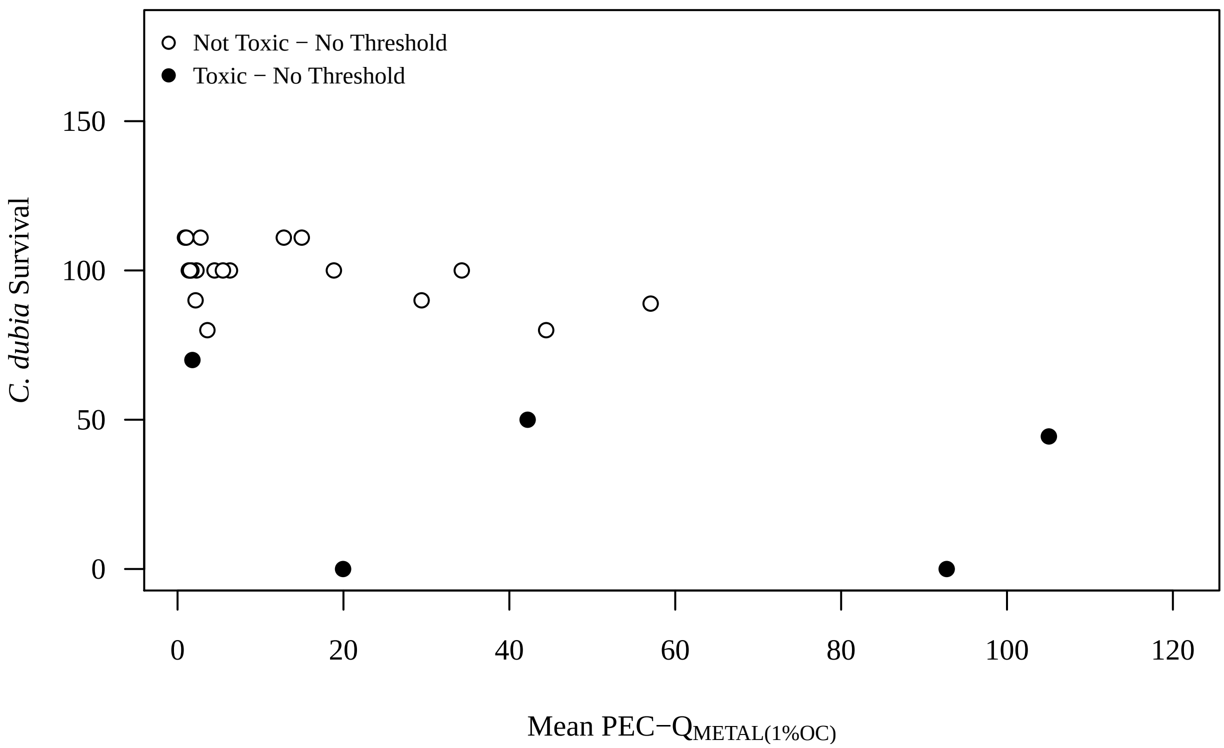


Figure A8.33. Comparison of the relationship between *Ceriodaphnia dubia* survival and Mean PEC−$Q_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007) using an organic carbon threshold of 0.5%.



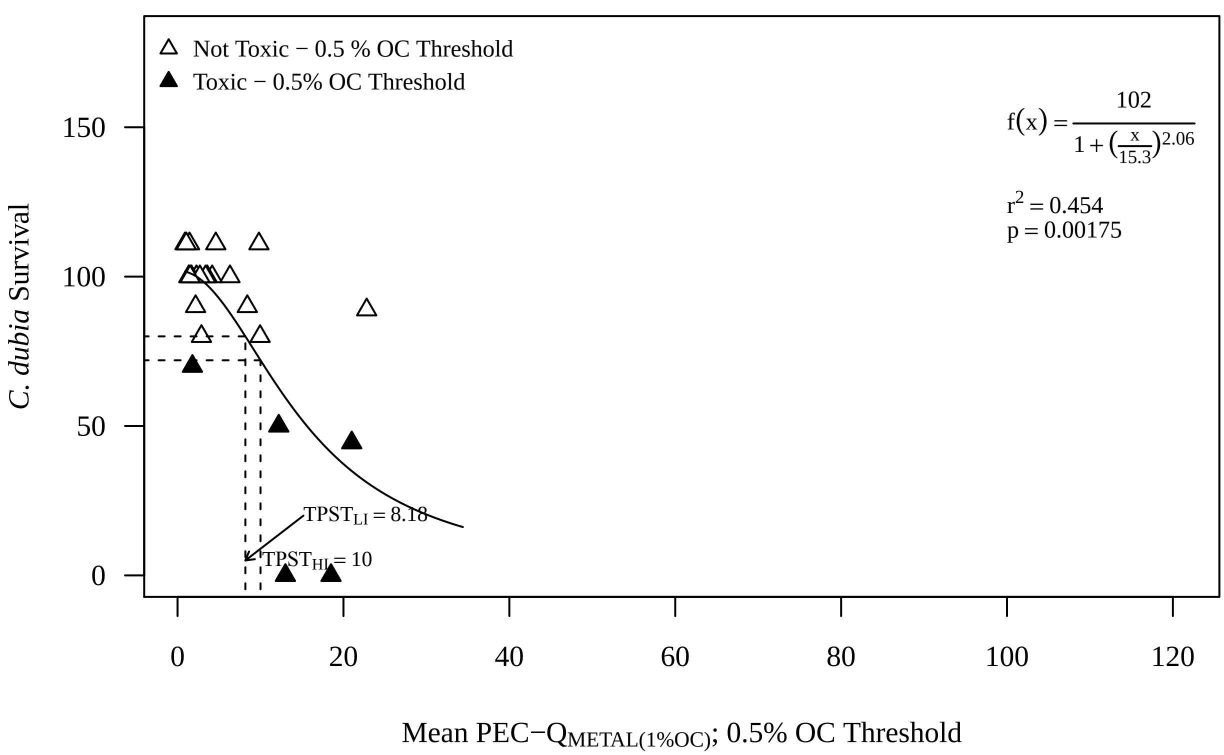
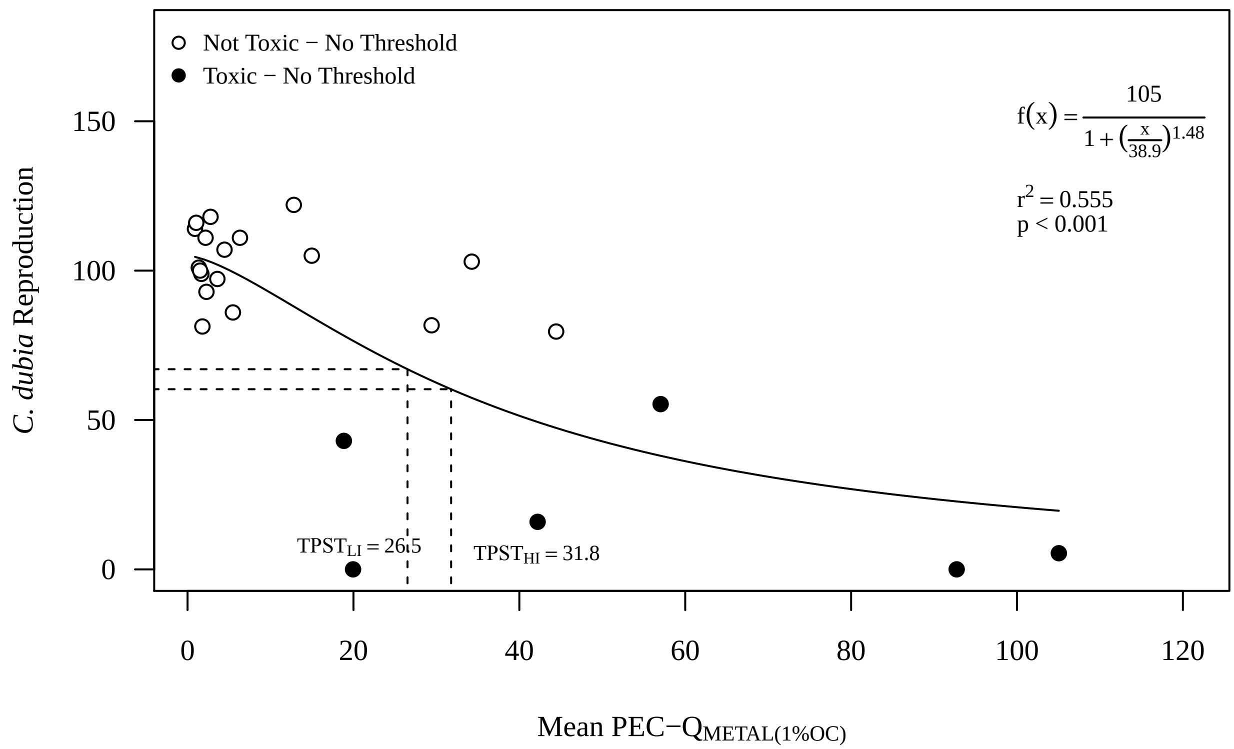


Figure A8.34. Comparison of the relationship between *Ceriodaphnia dubia* reproduction and Mean PEC−$Q_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Bortleson *et al.* 1994; Stefanoff *et al.* 2006; Schut and Stefanoff 2007) using an organic carbon threshold of 0.5%.



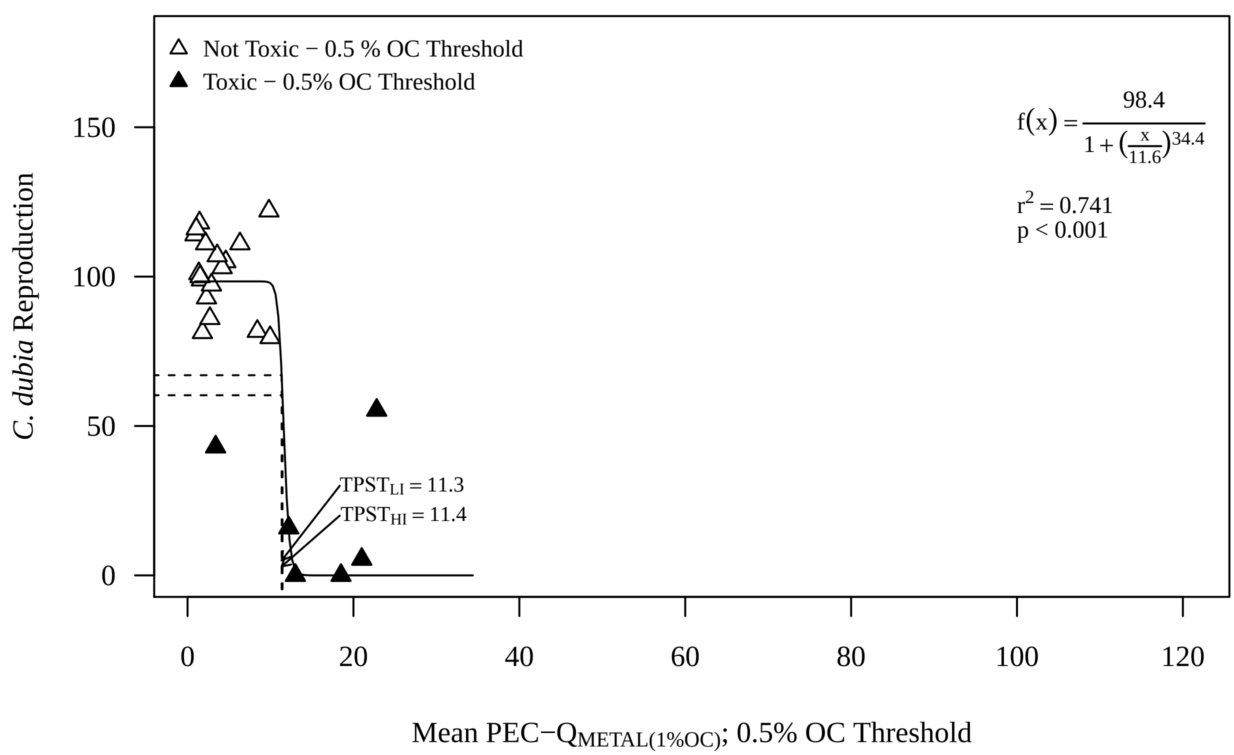
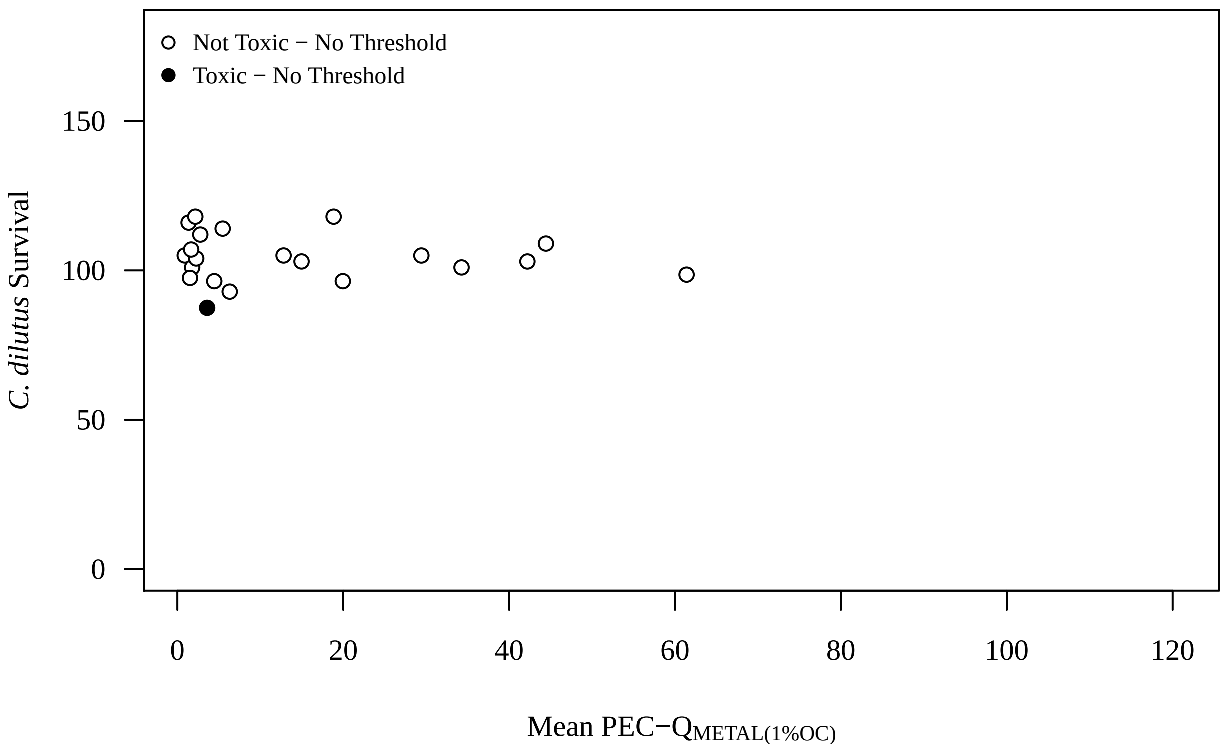


Figure A8.35. Comparison of the relationship between *Chironomus dilutus* survival and Mean PEC−Q$_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007, Besser *et al.* 2008) using an organic carbon threshold of 0.5%.



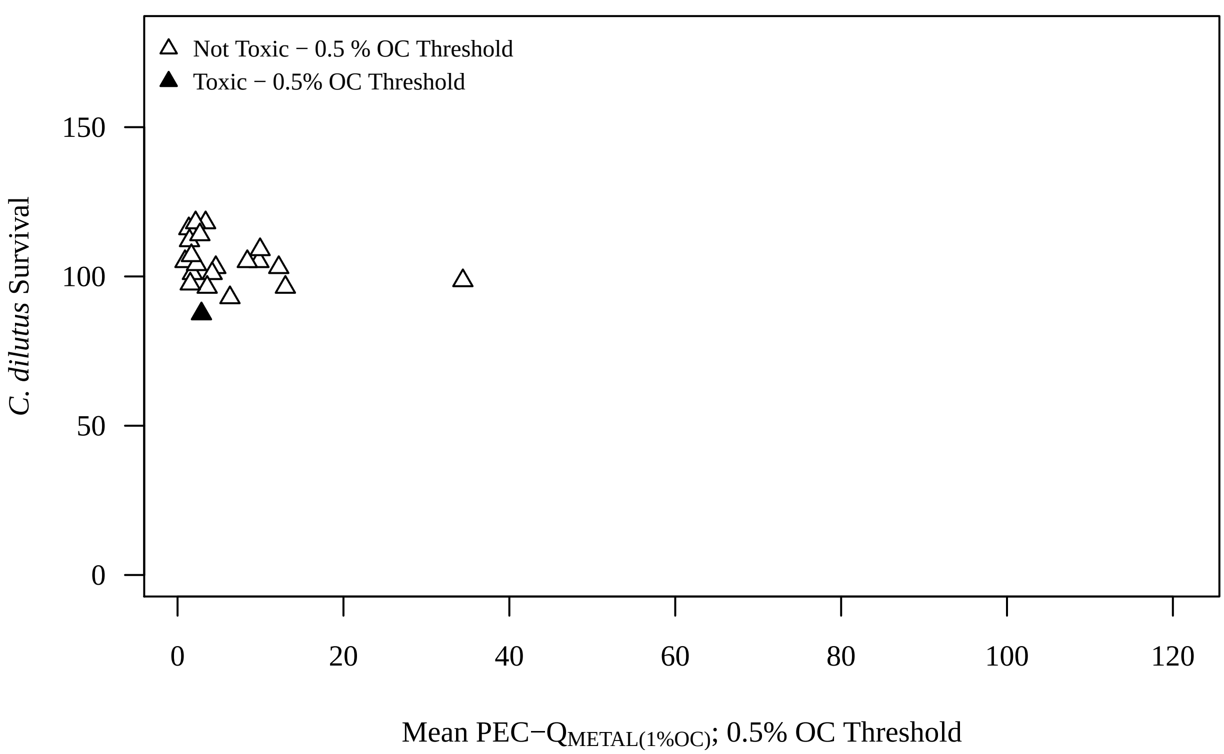
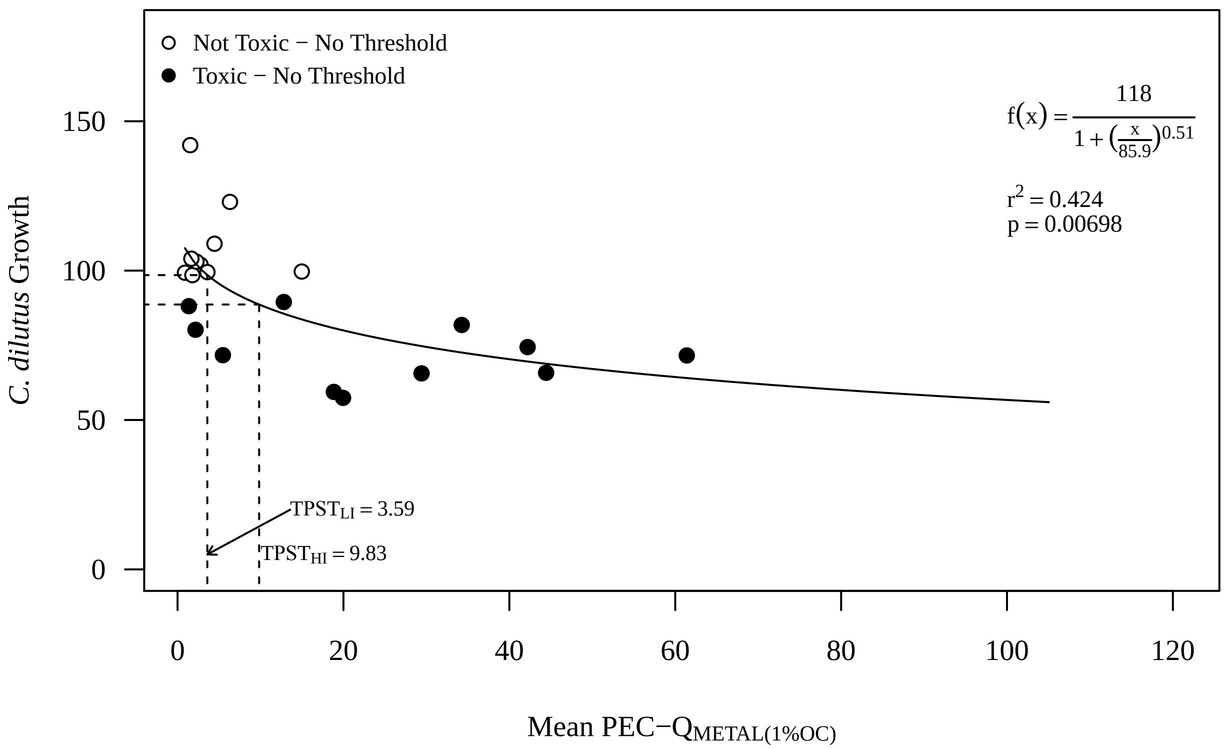


Figure A8.36. Comparison of the relationship between *Chironomus dilutus* growth and Mean PEC−$Q_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007, Besser *et al.* 2008) using an organic carbon threshold of 0.5%.



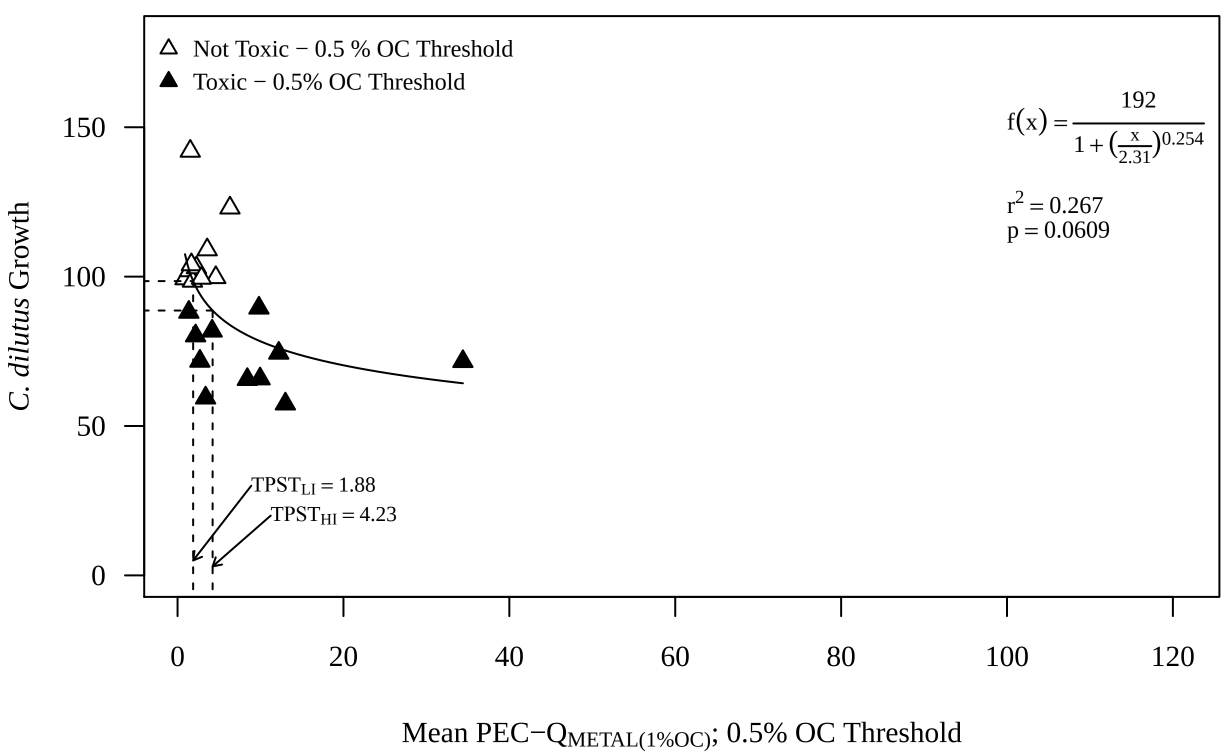
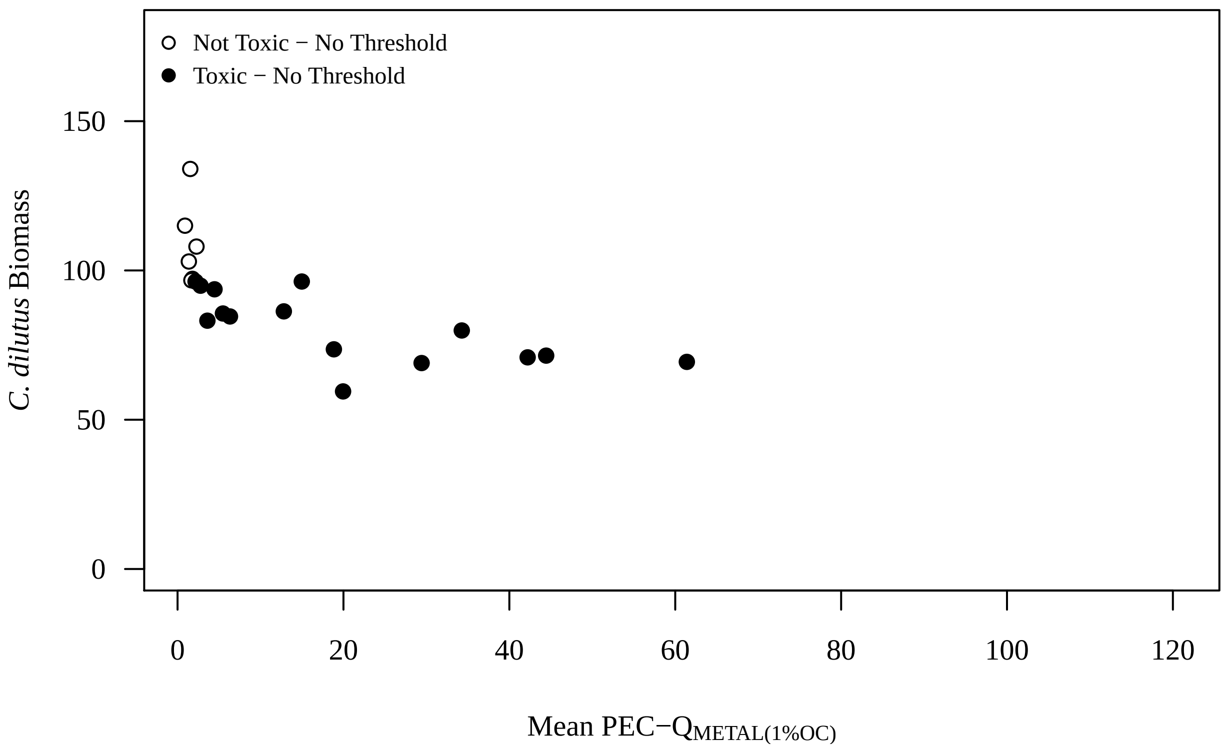


Figure A8.37. Comparison of the relationship between *Chironomus dilutus* biomass and Mean PEC−$Q_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007, Besser *et al.* 2008) using an organic carbon threshold of 0.5%.



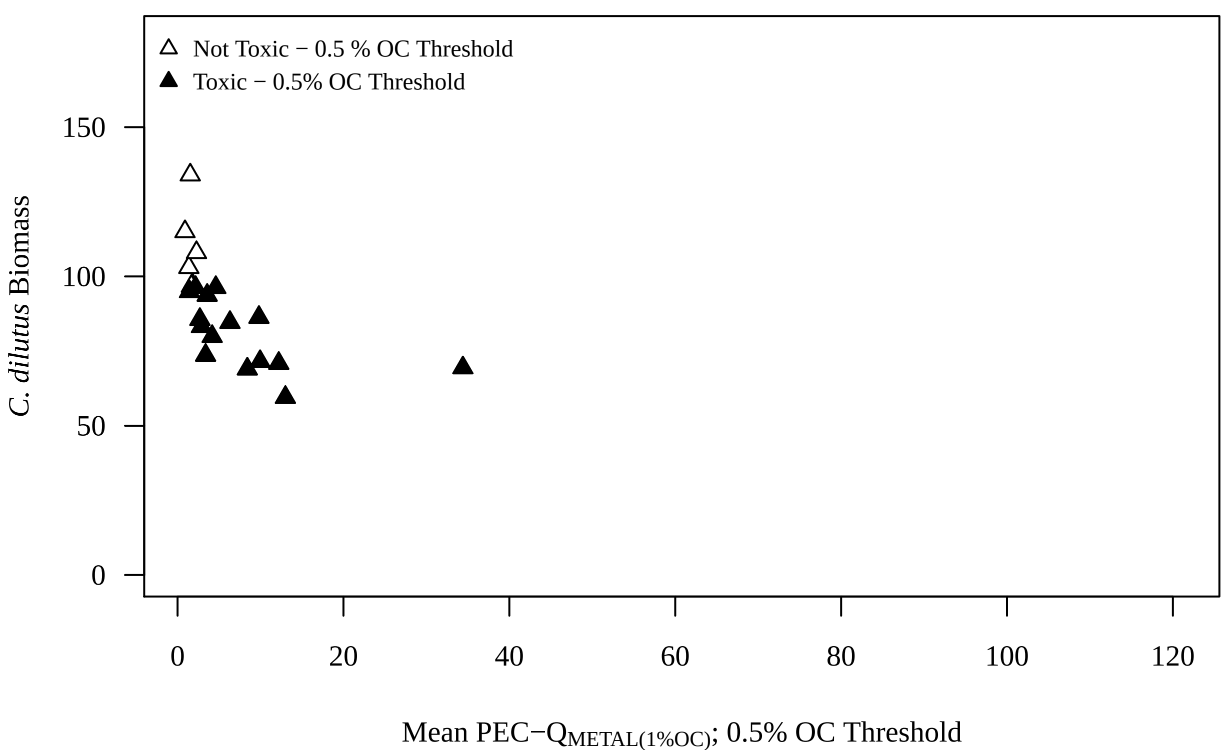
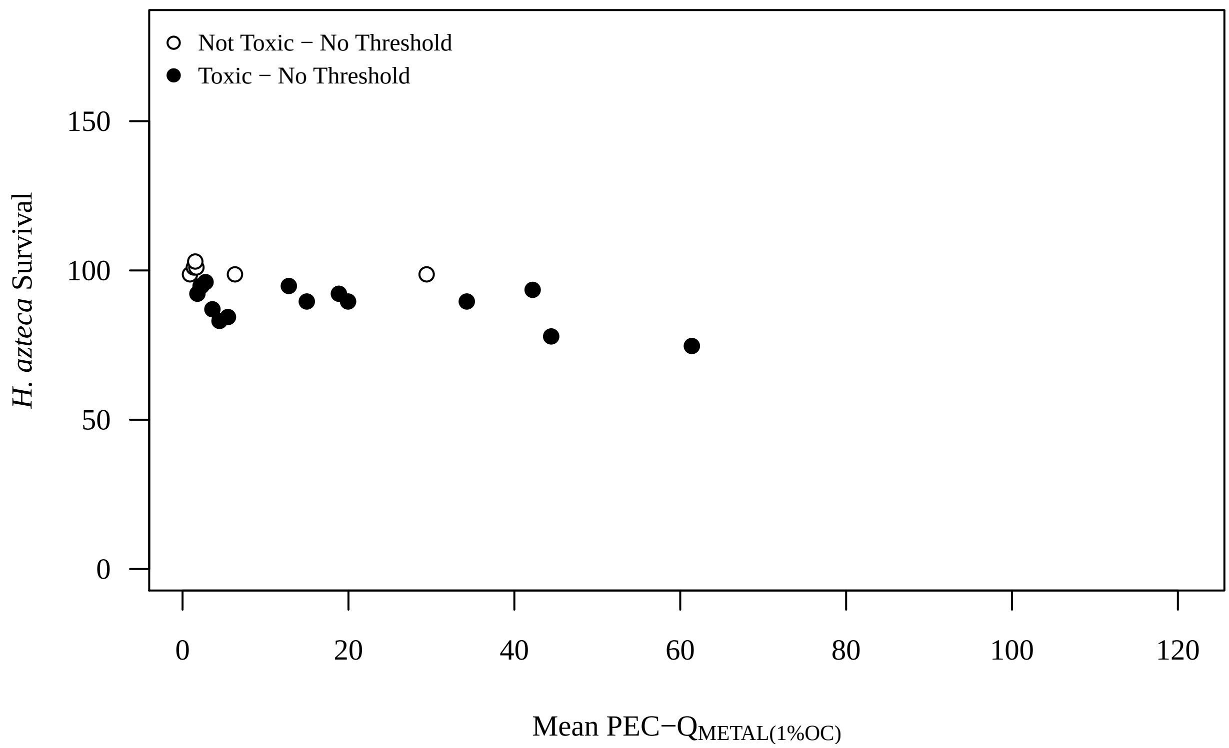


Figure A8.38. Comparison of the relationship between *Hyalella azteca* survival and Mean PEC−$Q_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007, Besser *et al.* 2008) using an organic carbon threshold of 0.5%.



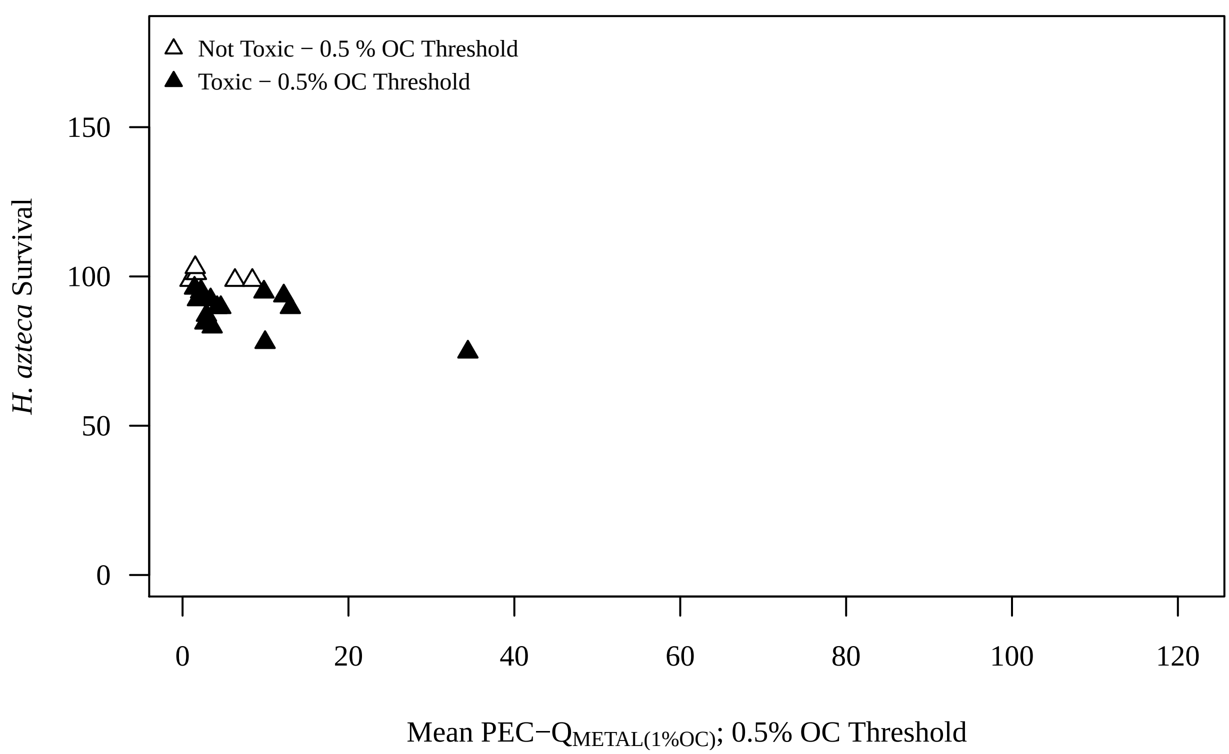
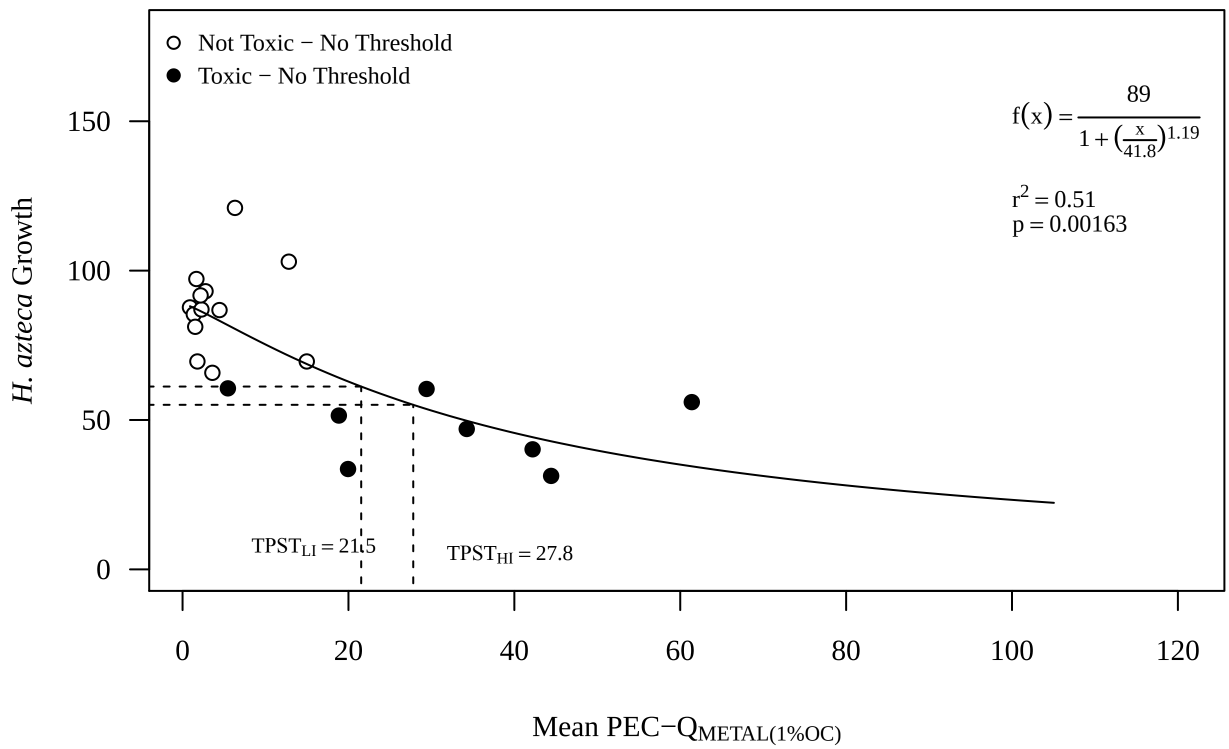


Figure A8.39. Comparison of the relationship between *Hyalella azteca* growth and Mean PEC−$Q_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007, Besser *et al.* 2008) using an organic carbon threshold of 0.5%.



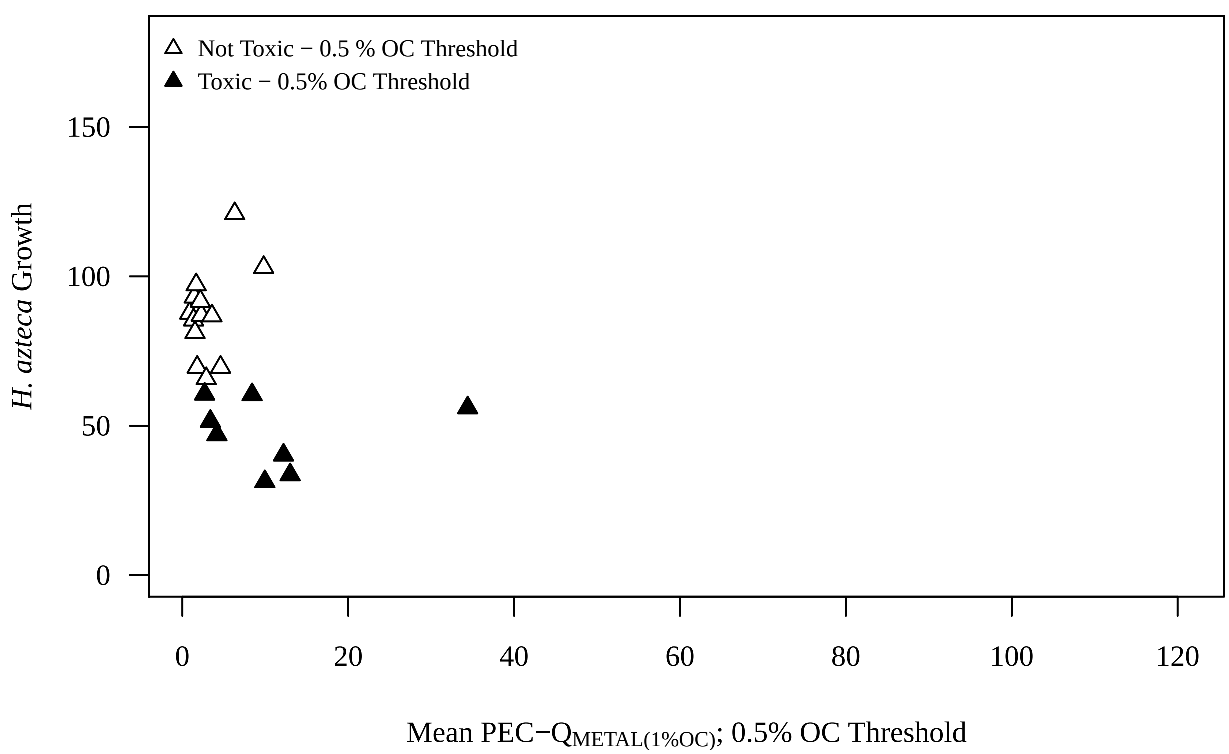
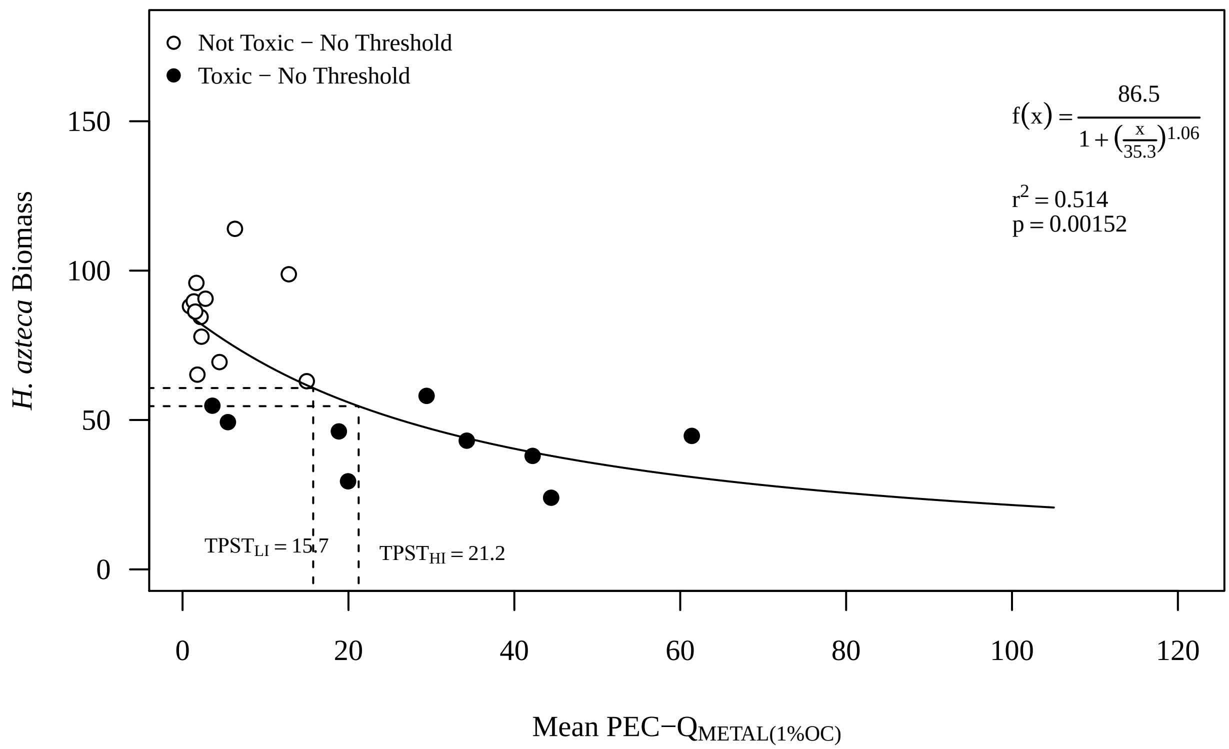
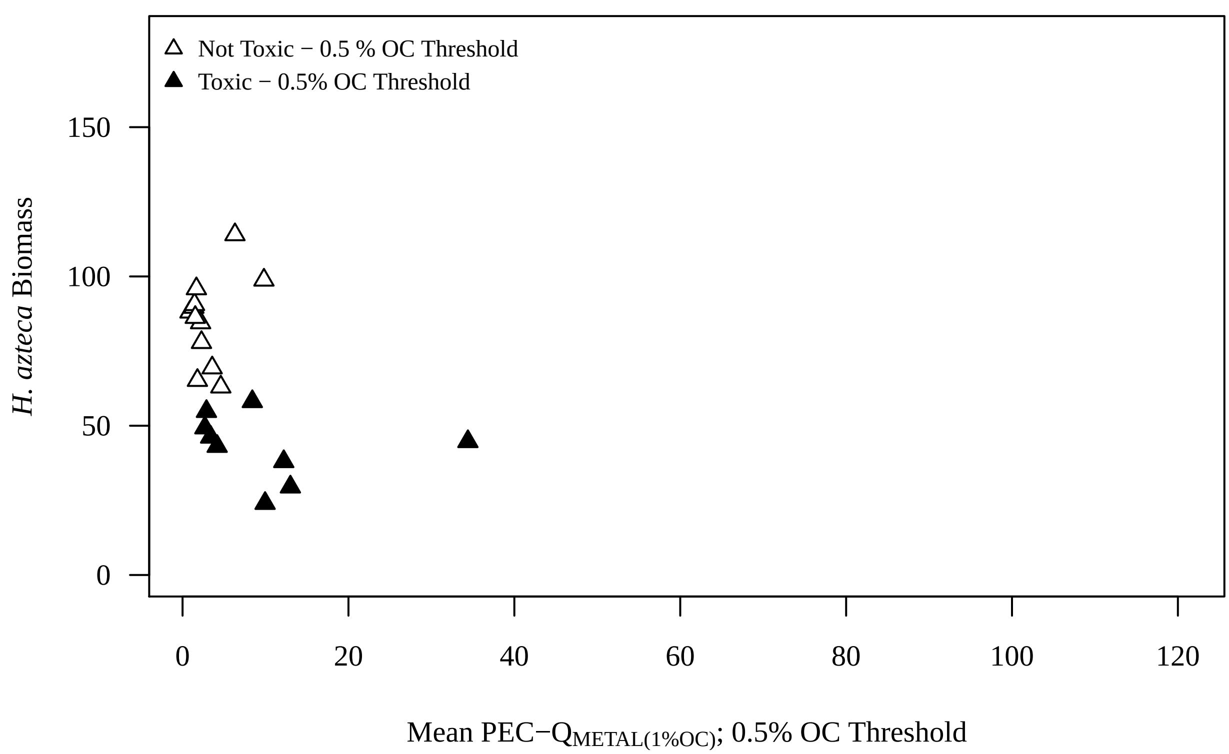


Figure A8.40. Comparison of the relationship between *Hyalella azteca* biomass and Mean PEC−$Q_{METAL(1\%OC)}$ for slag−affected samples in the Upper Columbia River (Stefanoff *et al.* 2006; Schut and Stefanoff 2007, Besser *et al.* 2008) using an organic carbon threshold of 0.5%.





Appendix 9 Whole Sediment Toxicity and Chemistry Data

Appendix A9.1. Summary of control-adjusted toxicity data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007																														
Toxicity Test/ Species/ Endpoint	**RM603A1(X1)**	**RM605A1(X1)**	**RM605A2(X8)**	**RM606A1(X3)**	**RM616A1(X3)**	**RM622A1(X3)**	**RM628A1(X1)**	**RM634A1(X1)**	**RM637A1(X1)**	**RM640A1(X3)**	**RM641A1(X1)**	**RM642A1(X1)**	**RM644A1(X3)**	**RM658A1(X3)**	**RM661A1(X1)**	**RM676A1(X3)**	**RM677A1(X3)**	**RM678A1(X1)**	**RM680A1(X1)**	**RM685R1**	**RM686A1(X3)**	**RM686R1**	**RM687A1**	**RM689A1(X3)**	**RM692A1(X1)**	**RM698A1(X1)**	**RM704A1(X1)**	**RM705R1**	**RM706A1(X1)**	**RM706A2(X7)**	**RM708A1(X3)**
28 day WS *Hyalella azteca*																															
Survival (%)	100	96.1	97.4	97.4	100	98.7	87.0	94.8	100	100	98.7	100	96.1	103	101	96.1	93.5	101	99.9	101	97.4	98.7	97.4	97.4	98.7	99.9	99.9	100	98.7	98.7	96.1
Growth (%)	67.2	101	69.2	87.3	100	107	109	77.0	93.5	83.1	72.1	62.4	70.7	85.4	71.5	65.5	52.1	63.0	61.5	98.5	112	82.5	50.6	69.4	77.7	53.8	72.3	110	58.9	63.2	64.0
Biomass (%)	67.7	97.2	67.4	86.2	101	107	96.5	71.4	94.7	83.6	72.7	63.5	69.8	89.0	73.5	60.9	47.6	62.2	60.4	98.6	106	81.6	47.3	66.0	74.7	52.4	70.3	111	56.1	60.7	59.8
10 day WS *Chironomus dilutus* [1]																															
Survival (%)	89.0	96.8	101	90.6	105	96.8	109	99.9	96.8	75.0	108	82.8	87.4	99.9	101	66.1	60.7	102	55.4	108	104	96.9	105	71.4	104	96.4	89.3	96.9	98.2	78.6	100
Growth (%)	96.6	91.9	94.0	104	113	92.4	97.7	97.3	90.9	128	97.8	100	92.4	90.3	93.3	105	99.8	97.2	109	99.5	91.8	103	81.4	119	90.4	87.8	101	110	85.1	103	83.0
Biomass (%)	88.9	89.9	91.6	68.2	81.1	76.1	96.1	77.8	84.9	67.3	88.5	78.2	74.3	96.3	97.1	58.8	63.8	77.3	52.7	112	86.2	96.4	88.1	73.3	94.4	77.9	73.7	102	86.5	69.5	85.7
7 day WS *Ceriodaphnia dubia*																															
Survival (%)	111	111	100	111	111	111	77.8	66.7	111	100	111	111	111	111	111	100	100	100	90.0	111	80.0	95.5	90.0	90.0	100	80.0	100	100	80.0	80.0	70.0
Reproduction (%)	54.7	118	106	116	115	107	84.7	37.4	130	60.1	117	94.8	73.3	82.0	106	82.6	98.5	116	89.0	98.4	88.2	104	86.5	94.6	116	85.2	108	108	80.4	98.9	102

NA = Not available.

[1] A 12 day WS C*hironomus dilutus* toxicity test was performed for the Besser *et al.* (2008) evaluation.

Appendix A9.1. Summary of control-adjusted toxicity data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff et al. 2006; Schut and Stefanoff 2007																									Besser *et al.* 2008				
Toxicity Test/ Species/ Endpoint	**RM713A1(X3)**	**RM721R1**	**RM723A1(X1)**	**RM723A2(X3)**	**RM724A1(X1)**	**RM724A2(X3)**	**RM726R1**	**RM727A1(X1)**	**RM729A1(X1)**	**RM730A1**	**RM732R1**	**RM733A1(X1)**	**RM734A1**	**RM736A1(X1)**	**RM737A1(X3)**	**RM738A1(X3)**	**RM739A1(X3)**	**RM740A1(X1)**	**RM741A1(X3)**	**RM742A1(X1)**	**RM742A2(X5)**	**RM743A1(X1)**	**RM743A2(X3)**	**RM744A1(X1)**	**RM744A2(X3)**	**LR1**	**LR2**	**LR3**	**LR4**	**LR5**
28 day WS *Hyalella azteca*																														
Survival (%)	104	103	100	98.7	103	98.7	100	101	96.1	89.6	99.3	94.8	89.6	92.2	93.5	89.6	94.8	101	83.1	92.2	98.7	94.8	84.4	87.0	77.9	98.9	104	94.7	91.3	94.7
Growth (%)	69.2	81.3	135	87.7	70.0	121	109	85.4	93.1	69.6	107	103	47.0	69.6	40.2	33.6	87.0	97.2	86.8	51.5	60.4	91.7	60.6	65.8	31.3	81.2	81.2	67.9	88.4	56.0
Biomass (%)	62.9	82.8	137	88.1	69.8	114	107	89.7	90.6	63.0	105	98.8	43.1	65.2	38.0	29.5	77.9	95.9	69.4	46.2	58.1	84.5	49.3	54.8	24.0	88.4	81.0	66.8	74.8	51.2
10 day WS *Chironomus dilutus* [1]																														
Survival (%)	93.7	101	105	105	80.4	92.9	101	116	112	103	99.2	105	101	101	103	96.4	104	107	96.4	118	105	118	114	87.5	109	105	98.6	96.4	104	97.5
Growth (%)	113	98.5	109	99.3	107	123	101	88.1	102	99.7	98.8	89.5	81.8	98.5	74.4	57.4	103	104	109	59.4	65.6	80.2	71.7	99.5	65.8	112	97.3	91.7	85.0	107
Biomass (%)	101	100	100	115	78.6	84.6	113	103	94.9	96.3	96.6	86.3	79.9	97.2	70.9	59.5	108	96.7	93.7	73.6	69.0	96.3	85.6	83.2	71.5	116	94.7	85.7	86.6	103
7 day WS *Ceriodaphnia dubia*																														
Survival (%)	111	94.5	100	111	100	100	100	100	111	111	100	111	100	70.0	50.0	0.00	100	100	100	100	90.0	90.0	100	80.0	80.0	NA	NA	NA	NA	NA
Reproduction (%)	97.5	95.9	118	114	115	111	100	101	118	105	98.1	122	103	81.3	15.9	0.00	92.9	98.9	107	43.0	81.7	111	86.0	97.2	79.6	NA	NA	NA	NA	NA

NA = Not available.

[1] A 12 day WS C*hironomus dilutus* toxicity test was performed for the Besser *et al.* (2008) evaluation.

Appendix A9.1. Summary of control-adjusted toxicity data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Besser *et al.* 2008			Bortleson *et al.* 1994															
Toxicity Test/ Species/ Endpoint	**LR6**	**LR7**	**SA8**	**2**	**8**	**10**	**11**	**14**	**15**	**17**	**19**	**20**	**22**	**38**	**46**	**57**	**61**	**62**	**71**
28 day WS *Hyalella azteca*																			
Survival (%)	103	74.7	103	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Growth (%)	81.2	56.0	56.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Biomass (%)	86.3	44.7	60.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10 day WS *Chironomus dilutus* [1]																			
Survival (%)	97.5	98.6	88.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Growth (%)	142	71.6	114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Biomass (%)	134	69.4	103	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7 day WS *Ceriodaphnia dubia*																			
Survival (%)	NA	NA	NA	100	0.00	44.4	88.9	88.9	100	111	100	100	77.8	77.8	111	111	111	100	88.9
Reproduction (%)	NA	NA	NA	92.5	0.00	5.40	55.3	87.1	100	116	87.7	99.7	69.7	83.2	107	70.9	52.0	67.0	40.8

NA = Not available.

[1] A 12 day WS C*hironomus dilutus* toxicity test was performed for the Besser *et al.* (2008) evaluation.

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM603A1(X1)**	**RM605A1(X1)**	**RM605A2(X8)**	**RM606A1(X3)**	**RM616A1(X3)**	**RM622A1(X3)**	**RM628A1(X1)**	**RM634A1(X1)**	**RM637A1(X1)**
Conventionals (%)									
Organic carbon, total	0.0996	0.0641	0.413	0.273	0.121	0.119	0.121	0.0658	0.0366
Moisture, percent	NA	NA	NA	NA	NA	NA	NA	NA	NA
Clay, percent	9.05	0.0220	1.78	0.780	0.411	0.711	0.0585	0.657	0.0405
Silt, percent	36.9	2.17	26.0	18.4	13.2	14.7	3.82	13.7	2.65
Fines, percent (silt+clay)	46.0	2.19	27.8	19.2	13.6	15.4	3.88	14.3	2.69
Sand - fine, percent	32.3	5.60	42.2	44.6	63.8	55.8	6.90	22.0	33.8
Sand - medium, percent	10.4	59.8	28.2	30.8	18.2	25.3	82.7	61.2	42.8
Sand - coarse, percent	4.40	12.9	0.00	2.00	2.60	1.70	6.30	2.2	6.00
Sand, percent	47.1	78.3	70.4	77.4	84.6	82.8	95.9	85.4	82.6
Gravel, percent	4.00	19.5	0.00	3.10	1.70	1.40	0.200	0.00	14.7
Metals (mg/kg DW)									
Aluminum, total	12000	4680	10500	8020	6140	9630	5870	10400	5620
Antimony, total	<5.6	<7.4	<6	<8	<7.3	<6.1	<6.9	<6.3	<7
Arsenic, total	6.00	3.00	4.20	3.10	4.90	13.7	7.10	13.5	3.90
Barium, total	125	35.5	74.2	56.8	47.8	68.7	38.7	97.2	41.1
Beryllium, total	1.300	0.350	0.86	0.73	0.510	0.770	0.460	0.990	0.570
Cadmium, total	0.230	<0.62	0.67	0.28	0.140	0.160	0.058	0.140	<0.58
Calcium, total	8370	5370	2690	2290	4510	15300	8050	19400	11300
Chromium, total	14.0	6.40	13.5	12.6	10.7	12.0	7.20	14.0	8.30
Cobalt, total	11.0	2.70	6.30	5.40	4.50	5.70	3.60	9.70	4.40
Copper, total	11.8	6.00	11.5	7.9	8.50	11.6	8.70	16.5	7.00
Iron, total	24900	9830	17800	15300	12100	17800	12400	24800	12400
Lead, total	11.1	3.90	16.8	10.4	6.10	10.9	7.40	12.7	5.70
Magnesium, total	8090	4000	5940	4110	4240	9140	4890	7330	4700
Manganese, total	457	138	243	217	225	413	257	458	214
Mercury, total	0.0170	0.00600	0.0750	0.0130	0.00900	0.0190	0.00700	0.00800	0.00600
Nickel, total	12.7	5.70	11.3	10.0	9.50	10.0	7.00	13.4	6.40

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM603A1(X1)**	**RM605A1(X1)**	**RM605A2(X8)**	**RM606A1(X3)**	**RM616A1(X3)**	**RM622A1(X3)**	**RM628A1(X1)**	**RM634A1(X1)**	**RM637A1(X1)**
Metals (mg/kg DW) cont'd									
Potassium, total	2430	747	1740	1400	1120	1810	1020	1860	1180
Selenium, total	2.30	3.00	1.70	3.10	2.80	2.70	3.60	3.90	2.60
Silver, total	<0.93	<1.2	<1	<1.3	<1.2	<1	<1.2	<1	<1.2
Sodium, total	320	99.0	184	159	112	137	92.0	136	111
Thallium, total	<2.3	<3.1	<2.5	<3.3	<3	<2.5	<2.9	<2.6	<2.9
Uranium, total	<18.6	<24.8	<20	<26.8	<24.4	<20.2	<23.1	<20.9	<23.3
Vanadium, total	33.4	8.90	21.1	20.1	14.3	17.8	9.00	28.1	14.5
Zinc, total	94.2	27.9	140	102	49.5	62.5	40.7	76.4	30.9
Simultaneously extracted metals (SEM; µmol/g)									
Simultaneously extracted antimony	<0.00148	<0.00107	<0.00140	0.000411	0.0021	0.000731	<0.00115	<0.00115	<0.00107
Simultaneously extracted arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted cadmium	0.00214	0.000979	0.0056	0.00276	0.00178	0.00249	0.00160	0.000676	0.000391
Simultaneously extracted chromium	0.0106	0.00615	0.00885	0.0123	0.0106	0.0167	0.00789	0.0115	0.00769
Simultaneously extracted copper	0.0677	0.0378	0.0456	0.0362	0.0441	0.0708	0.0283	0.0346	0.0220
Simultaneously extracted lead	0.0212	0.00965	0.055	0.0405	0.0251	0.0473	0.0179	0.0188	0.0101
Simultaneously extracted mercury	0.00000897	<0.00000264	<0.00000339	0.00000150	0.00000379	<0.00000299	<0.00000274	0.00000140	0.00000230
Simultaneously extracted nickel	0.0341	0.102	0.0204	0.0204	0.0204	0.0324	0.0124	0.0307	0.0100
Simultaneously extracted zinc	0.150	0.136	1.11	0.841	0.350	0.401	0.194	0.0964	0.0811
Acid volatile sulfides	<0.0251	0.0069	<0.0233	<0.0224	<0.0206	<0.0194	0.027	<0.0191	0.0190
SEM minus AVS	0.263	0.280	1.22	0.930	0.431	0.544	0.228	0.172	0.105
SEM minus AVS, OC normalized	264	437	296	341	357	457	188	261	286
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)									
2-Methylnaphthalene	0.400	0.400	0.400	0.700	0.700	0.500	0.400	0.500	0.400
Acenaphthene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Acenaphthylene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Anthracene	<5	<5	<5	<6	<6	<6	<5	<6	<5

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM603A1(X1)**	**RM605A1(X1)**	**RM605A2(X8)**	**RM606A1(X3)**	**RM616A1(X3)**	**RM622A1(X3)**	**RM628A1(X1)**	**RM634A1(X1)**	**RM637A1(X1)**
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW) cont'd									
Fluorene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Naphthalene	1.00	1.00	4.30	1.00	2.00	4.70	1.00	1.00	1.00
Phenanthrene	<5	<5	0.200	0.200	<6	<6	<5	<6	<5
Total Low-Molecular Weight PAHs	13.9	13.9	14.9	13.9	17.7	20.2	13.9	16.5	13.9
Benz(a)anthracene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Benzo(a)pyrene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Chrysene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Dibenz(a,h)anthracene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Fluoranthene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Pyrene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Total High-Molecular Weight PAHs	<30	<30	<30	<36	<36	<36	<30	<36	<30
PAHs, total	28.9	28.9	29.9	31.9	35.7	38.2	28.9	34.5	28.9
ΣESB_{TU} (based on 13 PAHs)	0.130	0.202	0.0329	0.0516	0.133	0.151	0.107	0.234	0.353
Dibenzofuran	<5	<5	<5	<6	<6	<6	<5	<6	<5
Benzo(b)fluoranthene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Benzo(g,h,i)perylene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Benzo(k)fluoranthene	<5	<5	0.200	<6	<6	<6	<5	<6	<5
Indeno(1,2,3-c,d)pyrene	<5	<5	<5	<6	<6	<6	<5	<6	<5
Polychlorinated Biphenyls (PCBs; µg/kg DW)									
Aroclor 1016	<1.1	<1	<1	<1.1	<1.1	<1.2	<1.1	<1.1	<0.96
Aroclor 1221	<4.2	<4.2	<4.2	<4.4	<4.6	<4.7	<4.3	<4.6	<3.9
Aroclor 1232	<4.2	<4.2	<4.2	<4.4	<4.6	<4.7	<4.3	<4.6	<3.9
Aroclor 1242	<1.1	<1	<1	<1.1	<1.1	<1.2	<1.1	<1.1	<0.96
Aroclor 1248	<1.1	<1	<1	<1.1	<1.1	<1.2	<1.1	<1.1	<0.96
Aroclor 1254	<1.1	<1	<1	<1.1	<1.1	<1.2	<1.1	<1.1	<0.96
Aroclor 1260	<1.1	<1	<1	<1.1	<1.1	<1.2	<1.1	<1.1	<0.96
PCBs, total	<13.9	<13.4	<13.4	<14.3	<14.7	<15.4	<14.1	<14.7	<12.6

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM603A1(X1)**	**RM605A1(X1)**	**RM605A2(X8)**	**RM606A1(X3)**	**RM616A1(X3)**	**RM622A1(X3)**	**RM628A1(X1)**	**RM634A1(X1)**	**RM637A1(X1)**
Organochlorine Pesticides (µg/kg DW)									
Hexachlorocyclopentadiene	<100	<100	<110	<110	<110	<120	<110	<110	<96
Isophorone	<100	<100	<110	<110	<110	<120	<110	<110	<96
Aldrin	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Chlordane, cis-	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Chlordane, trans-	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Chlordane (cis & trans)	<0.84	<0.82	<0.84	<0.86	<0.9	<0.92	<0.86	<0.9	<0.76
Dieldrin	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
gamma-BHC (Lindane)	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Hexachlorocyclohexane-delta	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
o,p'-DDD	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
p,p'-DDD	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
DDDs, sum of p,p'-DDD and o,p'-DDD	<1.7	<1.66	<1.7	<1.76	<1.82	<1.86	<1.74	<1.84	<1.54
o,p'-DDE	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
p,p'-DDE	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
DDEs, sum of p,p'-DDE and o,p'-DDE	<1.7	<1.66	<1.7	<1.76	<1.82	<1.86	<1.74	<1.84	<1.54
o,p'-DDT	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
p,p'-DDT	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
DDTs, sum of p,p'-DDT and o,p'-DDT	<1.7	<1.66	<1.7	<1.76	<1.82	<1.86	<1.74	<1.84	<1.54
DDTs, total of 6 isomers	<5.1	<4.98	<5.1	<5.28	<5.46	<5.58	<5.22	<5.52	<4.62
Endosulfan sulfate	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
Endosulfan-alpha	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Endosulfan-beta	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
Endrin	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
Endrin aldehyde	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
Endrin ketone	<0.85	<0.83	<0.85	<0.88	<0.91	<0.93	<0.87	<0.92	<0.77
Heptachlor	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Heptachlor epoxide	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Hexachlorobenzene	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

COPC	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
	RM603A1(X1)	RM605A1(X1)	RM605A2(X8)	RM606A1(X3)	RM616A1(X3)	RM622A1(X3)	RM628A1(X1)	RM634A1(X1)	RM637A1(X1)
Organochlorine Pesticides (µg/kg DW) cont'd									
Hexachlorocyclohexane-alpha	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Hexachlorocyclohexane-beta	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Methoxychlor	<4.2	<4.1	<4.2	<4.3	<4.5	<4.6	<4.3	<4.6	<3.8
Nonachlor, cis-	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Nonachlor, trans-	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Oxychlordane	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38
Toxaphene	<42	<41	<42	<43	<45	<46	<43	<45	<38
Semi-Volatile and Volatile Compounds (µg/kg DW)									
1,2,4-Trichlorobenzene	<100	<100	<110	<110	<110	<120	<110	<110	<96
1,2-Dichlorobenzene	<100	<100	<110	<110	<110	<120	<110	<110	<96
1,3-Dichlorobenzene	<100	<100	<110	<110	<110	<120	<110	<110	<96
1,4-Dichlorobenzene	<100	<100	<110	<110	<110	<120	<110	<110	<96
2,2'-Oxybis(1-chloropropane)	<100	<100	<110	<110	<110	<120	<110	<110	<96
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,5,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	<270	<260	<270	<280	<280	<290	<270	<290	<240
2,4,6-Trichlorophenol	<100	<100	<110	<110	<110	<120	<110	<110	<96
2,4-Dichlorophenol	<100	<100	<110	<110	<110	<120	<110	<110	<96
2,4-Dimethylphenol	<100	<100	<110	<110	<110	<120	<110	<110	<96
2,4-Dinitrophenol	<270	<260	<270	<280	<280	<290	<270	<290	<240
2,4-Dinitrotoluene	<100	<100	<110	<110	<110	<120	<110	<110	<96
2,6-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	<100	<100	<110	<110	<110	<120	<110	<110	<96
2-Chloronaphthalene	<100	<100	<110	<110	<110	<120	<110	<110	<96
2-Chlorophenol	<100	<100	<110	<110	<110	<120	<110	<110	<96
2-Fluorobiphenyl	<100	<100	<110	<110	<110	<120	<110	<110	<96

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

COPC	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
	RM603A1(X1)	RM605A1(X1)	RM605A2(X8)	RM606A1(X3)	RM616A1(X3)	RM622A1(X3)	RM628A1(X1)	RM634A1(X1)	RM637A1(X1)
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
2-Methylphenol	<100	<100	<110	<110	<110	<120	<110	<110	<96
2-Nitroaniline	<270	<260	<270	<280	<280	<290	<270	<290	<240
2-Nitrophenol	<100	<100	<110	<110	<110	<120	<110	<110	<96
3,3'-Dichlorobenzidine	<100	<100	<110	<110	<110	<120	<110	<110	<96
3-Nitroaniline	<270	<260	<270	<280	<280	<290	<270	<290	<240
4-Bromophenyl phenyl ether	<100	<100	<110	<110	<110	<120	<110	<110	<96
4-Chloro-3-methylphenol	<100	<100	<110	<110	<110	<120	<110	<110	<96
4-Chloroaniline	<100	<100	<110	<110	<110	<120	<110	<110	<96
4-Chlorophenyl phenyl ether	<100	<100	<110	<110	<110	<120	<110	<110	<96
4-Methylphenol	<100	<100	<110	<110	<110	<120	<110	<110	<96
4-Nitroaniline	<270	<260	<270	<280	<280	<290	<270	<290	<240
4-Nitrophenol	<270	<260	<270	<280	<280	<290	<270	<290	<240
Acetophenone	<100	<100	<110	<110	<110	<120	<110	<110	<96
Atrazine	<100	<100	<110	<110	<110	<120	<110	<110	<96
Benzaldehyde	<100	<100	<110	<110	<110	<120	<110	<110	<96
Benzoic acid	<100	<100	<110	<110	<110	<120	<110	<110	<96
Benzyl alcohol	<100	<100	<110	<110	<110	<120	<110	<110	<96
Bis(2-Chloroethoxy)methane	<100	<100	<110	<110	<110	<120	<110	<110	<96
Bis(2-chloroethyl)ether	<100	<100	<110	<110	<110	<120	<110	<110	<96
Bis(2-ethylhexyl) phthalate	37.0	<100	<110	<110	<110	<120	<110	<110	<96
Butyl benzyl phthalate	<100	<100	<110	<110	<110	<120	<110	<110	<96
Caprolactam	<100	<100	<110	<110	<110	<120	<110	<110	<96
Diethyl phthalate	<100	<100	<110	<110	<110	<120	<110	<110	<96
Dimethyl phthalate	<100	<100	<110	<110	<110	<120	<110	<110	<96
Di-n-butyl phthalate	<100	<100	<110	<110	<110	<120	<110	<110	<96
Dinitro-o-cresol	<270	<260	<270	<280	<280	<290	<270	<290	<240
Di-N-octyl phthalate	<100	<100	<110	<110	<110	<120	<110	<110	<96
Hexachlorobutadiene	<0.42	<0.41	<0.42	<0.43	<0.45	<0.46	<0.43	<0.45	<0.38

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM603A1(X1)**	**RM605A1(X1)**	**RM605A2(X8)**	**RM606A1(X3)**	**RM616A1(X3)**	**RM622A1(X3)**	**RM628A1(X1)**	**RM634A1(X1)**	**RM637A1(X1)**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
Hexachloroethane	<100	<100	<110	<110	<110	<120	<110	<110	<96
N-Nitrosodi-n-propylamine	<100	<100	<110	<110	<110	<120	<110	<110	<96
N-Nitrosodiphenylamine	<100	<100	<110	<110	<110	<120	<110	<110	<96
Pentachlorophenol	<270	<260	<270	<280	<280	<290	<270	<290	<240
Phenol	<100	<100	<110	<110	<110	<120	<110	<110	<96
Pentachloroanisole	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mean Quotients and other models (no units)									
Ratio of Copper to Aluminum	0.000983	0.00128	0.00110	0.000985	0.00138	0.00120	0.00148	0.00159	0.00125
Ratio of Zinc to Cadmium	0.208	90.0	209	364	354	391	702	546	107
Mean metals PECQ (Ingersoll et al. 2001)	0.141	0.0657	0.161	0.118	0.0973	0.151	0.0915	0.174	0.0774
Mean metals PECQ (Ingersoll et al. 2001) - OC normalized	1.42	1.02	0.391	0.432	0.804	1.27	0.756	2.64	2.11
Mean PECQ (Ingersoll et al. 2001)	0.0508	0.0256	0.0575	0.0433	0.0366	0.0548	0.0344	0.0620	0.0293

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	RM640A1(X3)	RM641A1(X1)	RM642A1(X1)	RM644A1(X3)	RM658A1(X3)	RM661A1(X1)	RM676A1(X3)	RM677A1(X3)	RM678A1(X1)
Conventionals (%)									
Organic carbon, total	0.220	1.41	0.716	0.138	0.250	0.135	0.107	0.533	0.141
Moisture, percent	NA	NA	NA	NA	NA	NA	NA	NA	NA
Clay, percent	2.83	15.5	7.03	6.27	9.69	0.930	4.25	12.1	0.884
Silt, percent	32.2	61.9	39.2	33.2	37.2	29.5	50.7	67.9	20.6
Fines, percent (silt+clay)	35.1	77.4	46.2	39.4	46.9	30.4	54.9	80.0	21.4
Sand - fine, percent	56.0	12.8	48.4	45.2	40.7	56.6	37.2	6.60	60.9
Sand - medium, percent	2.40	1.00	1.40	6.80	6.80	2.20	2.20	0.400	13.1
Sand - coarse, percent	0.800	0.00	0.00	2.60	1.20	1.60	0.300	0.00	3.00
Sand, percent	59.2	13.8	49.8	54.6	48.7	60.4	39.7	7.00	77.0
Gravel, percent	1.20	0.200	0.00	0.600	0.300	8.60	0.00	0.00	0.900
Metals (mg/kg DW)									
Aluminum, total	11400	13500	10100	14000	13500	7830	9890	11800	6660
Antimony, total	<7.35	<11.3	<7.3	<7.2	<7.4	1.00	<5.1	<8.6	0.350
Arsenic, total	8.95	3.40	4.10	14.1	5.10	3.00	3.40	2.70	1.60
Barium, total	120	128	94.9	162	148	76.6	115	139	60.1
Beryllium, total	1.00	1.30	0.910	1.20	1.20	0.770	0.980	1.20	0.670
Cadmium, total	0.325	2.40	2.10	0.150	0.405	0.320	0.180	0.400	0.270
Calcium, total	4120	3770	2620	10200	5085	2430	11400	14800	4280
Chromium, total	21.7	24.1	17.9	25.9	30.55	16.6	24.4	29.7	16.9
Cobalt, total	14.0	10.3	7.70	15.0	12.3	7.30	9.70	10.9	5.60
Copper, total	17.6	28.0	19.9	22.6	23.1	11.3	21.1	23.7	11.8
Iron, total	21000	20500	16900	25900	23500	13700	21200	21200	13500
Lead, total	18.4	67.7	82.4	17.7	19.1	21.1	9.85	12.0	9.70
Magnesium, total	5320	5230	4010	7260	7090	3280	6490	8570	4030
Manganese, total	499	379	314	641	568	162	478	466	268
Mercury, total	0.0200	0.340	0.230	0.0100	0.0180	0.016	0.0435	0.0120	0.0120
Nickel, total	22.7	20.5	14.8	26.4	27.4	14.4	21.8	25.4	13.9

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM640A1(X3)**	**RM641A1(X1)**	**RM642A1(X1)**	**RM644A1(X3)**	**RM658A1(X3)**	**RM661A1(X1)**	**RM676A1(X3)**	**RM677A1(X3)**	**RM678A1(X1)**
Metals (mg/kg DW) cont'd									
Potassium, total	2240	2430	1800	2310	2570	1490	1920	2370	1040
Selenium, total	3.60	4.80	3.10	3.50	3.70	2.30	4.00	5.00	2.40
Silver, total	<1.25	<1.9	<1.2	<1.2	<1.25	<1.2	<1.3	<1.4	<1.3
Sodium, total	168	254	171	197	297	153	271	270	150
Thallium, total	<3.05	<4.7	<3	<3	<3.1	<3	<3.25	<3.6	<3.1
Uranium, total	<24.5	<37.7	<24.3	<24	<24.7	<24.2	<26	<28.5	<25.2
Vanadium, total	30.0	29.6	22.8	34.4	38.5	22.0	34.1	38.8	22.9
Zinc, total	90.2	355	292	64.0	88.8	83.5	60.1	70.4	58.7
Simultaneously extracted metals (SEM; µmol/g)									
Simultaneously extracted antimony	<0.00136	<0.00197	0.00279	<0.00140	<0.00251	<0.00107	<0.00136	<0.001725	<0.00131
Simultaneously extracted arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted cadmium	0.00169	0.0214	0.0302	0.00178	0.00638	0.00107	0.00129	0.00472	0.00231
Simultaneously extracted chromium	0.0279	0.0269	0.0346	0.0481	0.0615	0.0250	0.0288	0.0404	0.0404
Simultaneously extracted copper	0.0747	0.220	0.274	0.0710	0.389	0.0928	0.0960	0.176	0.192
Simultaneously extracted lead	0.0630	0.341	0.476	0.0410	0.0827	0.0767	0.0311	0.0560	0.0454
Simultaneously extracted mercury	0.00000199	0.00000274	0.00000548	0.00000390	0.00000361	0.00000264	<0.00000329	0.00000224	<0.00000324
Simultaneously extracted nickel	0.116	0.121	0.0715	0.0954	1.38	0.451	0.0707	0.128	0.809
Simultaneously extracted zinc	0.346	4.50	4.07	0.188	0.659	0.431	0.201	0.292	0.468
Acid volatile sulfides	<0.0252	0.0690	0.0870	0.00780	<0.0243	<0.0184	<0.0486	<0.0284	0.0720
SEM minus AVS	0.588	5.13	4.83	0.390	2.50	1.04	0.376	0.643	1.44
SEM minus AVS, OC normalized	265	364	675	282	1000	776	350	121	1020
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)									
2-Methylnaphthalene	0.400	1.00	0.700	0.400	0.700	0.600	<5.5	0.200	0.200
Acenaphthene	<5	<9	<6	<5	<6	<5	<2.9	<6	<5
Acenaphthylene	<5	<9	<6	<5	<6	<5	<5.5	<6	<5
Anthracene	<5	<9	<6	<5	<6	<5	<5.5	<6	<5

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM640A1(X3)**	**RM641A1(X1)**	**RM642A1(X1)**	**RM644A1(X3)**	**RM658A1(X3)**	**RM661A1(X1)**	**RM676A1(X3)**	**RM677A1(X3)**	**RM678A1(X1)**
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW) cont'd									
Fluorene	<5	<9	<6	<5	<6	<5	<5.5	<6	<5
Naphthalene	1.00	3.00	1.00	1.00	1.00	2.00	2.65	1.00	4.20
Phenanthrene	0.400	1.00	0.500	<5	0.200	<5	<5.5	0.200	<5
Total Low-Molecular Weight PAHs	11.8	23.0	14.2	13.9	13.9	15.1	17.9	13.4	16.9
Benz(a)anthracene	1.35	0.700	0.200	<5	<6	<5	<5.5	<6	<5
Benzo(a)pyrene	<5	<9	<6	<5	<6	<5	<5.5	<6	<5
Chrysene	1.55	2.00	0.500	<5	0.200	<5	<5.5	<6	<5
Dibenz(a,h)anthracene	<5	<9	<6	<5	<6	<5	<5.5	<6	<5
Fluoranthene	1.65	1.00	0.700	<5	1.60	<5	<5.5	<6	<5
Pyrene	1.45	1.00	0.500	<5	1.60	<5	<5.5	<6	<5
Total High-Molecular Weight PAHs	11.0	13.7	7.90	<30	12.4	<30	<33	<36	<30
PAHs, total	22.8	36.7	22.1	28.9	26.3	30.1	34.4	31.4	31.9
ΣESB_{TU} (based on 13 PAHs)	0.0475	0.0126	0.0148	0.0937	0.0424	0.101	0.136	0.0264	0.108
Dibenzofuran	<5	<9	<6	<5	<6	<5	<5.5	<6	<5
Benzo(b)fluoranthene	<5	<9	<6	<5	0.200	<5	<5.5	<6	<5
Benzo(g,h,i)perylene	<5	<9	<6	<5	<6	<5	<5.5	<6	<5
Benzo(k)fluoranthene	<5	<9	<6	<5	0.450	<5	<5.5	<6	<5
Indeno(1,2,3-c,d)pyrene	<5	0.700	<6	<5	1.60	0.200	<5.5	<6	<5
Polychlorinated Biphenyls (PCBs; µg/kg DW)									
Aroclor 1016	<1.1	<1.8	<1.2	<1	<1.1	<1.1	<1.1	<1.2	<1
Aroclor 1221	<4.35	<7.4	<5	<4.1	<4.5	<4.3	<4.35	<5	<4.1
Aroclor 1232	<4.35	<7.4	<5	<4.1	<4.5	<4.3	<4.35	<5	<4.1
Aroclor 1242	<1.1	<1.8	<1.2	<1	<1.1	<1.1	<1.1	<1.2	<1
Aroclor 1248	<1.1	<1.8	<1.2	<1	<1.1	<1.1	<1.1	<1.2	<1
Aroclor 1254	<1.1	<1.8	<1.2	<1	<1.1	<1.1	<1.1	<1.2	<1
Aroclor 1260	<1.1	<1.8	<1.2	<1	<1.1	<1.1	<1.1	<1.2	<1
PCBs, total	<14.2	<23.8	<16	<13.2	<14.5	<14.1	<14.2	<16	<13.2

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM640A1(X3)**	**RM641A1(X1)**	**RM642A1(X1)**	**RM644A1(X3)**	**RM658A1(X3)**	**RM661A1(X1)**	**RM676A1(X3)**	**RM677A1(X3)**	**RM678A1(X1)**
Organochlorine Pesticides (µg/kg DW)									
Hexachlorocyclopentadiene	<110	<180	<120	<100	<110	<110	<110	<120	<100
Isophorone	<110	<180	<120	<100	<110	<110	<110	<120	<100
Aldrin	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Chlordane, cis-	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Chlordane, trans-	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Chlordane (cis & trans)	<0.85	<1.46	<1	<0.82	<0.88	<0.86	<0.87	<1	<0.82
Dieldrin	<0.865	<1.5	<1	<0.82	<0.9	<0.87	<0.875	<1	<0.83
gamma-BHC (Lindane)	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Hexachlorocyclohexane-delta	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
o,p'-DDD	<0.865	<1.5	<1	<0.82	<0.9	<0.87	<0.875	<1	<0.83
p,p'-DDD	<0.865	<1.5	<1	<0.82	<0.9	<0.87	<0.875	<1	<0.83
DDDs, sum of p,p'-DDD and o,p'-DDD	<1.73	<3	<2	<1.64	<1.8	<1.74	<1.75	<2	<1.66
o,p'-DDE	<0.865	<1.5	<1	<0.82	<0.9	<0.87	0.685	<1	<0.83
p,p'-DDE	<0.865	<1.5	<1	<0.82	<0.9	<0.87	0.715	0.190	0.880
DDEs, sum of p,p'-DDE and o,p'-DDE	<1.73	<3	<2	<1.64	<1.8	<1.74	1.40	0.690	1.30
o,p'-DDT	<0.865	<1.5	<1	<0.82	<0.9	<0.87	0.653	<1	<0.83
p,p'-DDT	<0.865	<1.5	<1	<0.82	<0.9	<0.87	0.923	<1	<0.83
DDTs, sum of p,p'-DDT and o,p'-DDT	<1.73	<3	<2	<1.64	<1.8	<1.74	1.58	<2	<1.66
DDTs, total of 6 isomers	<5.19	<9	<6	<4.92	<5.4	<5.22	3.85	2.69	2.96
Endosulfan sulfate	<0.865	<1.5	<1	<0.82	<0.9	<0.87	<0.875	<1	<0.83
Endosulfan-alpha	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Endosulfan-beta	<0.865	<1.5	<1	<0.82	<0.9	<0.87	<0.875	<1	<0.83
Endrin	<0.865	<1.5	<1	<0.82	<0.9	<0.87	<0.875	<1	<0.83
Endrin aldehyde	<0.865	<1.5	<1	<0.82	<0.9	<0.87	<0.875	<1	<0.83
Endrin ketone	<0.865	<1.5	<1	<0.82	<0.9	<0.87	<0.875	<1	<0.83
Heptachlor	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Heptachlor epoxide	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Hexachlorobenzene	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM640A1(X3)**	**RM641A1(X1)**	**RM642A1(X1)**	**RM644A1(X3)**	**RM658A1(X3)**	**RM661A1(X1)**	**RM676A1(X3)**	**RM677A1(X3)**	**RM678A1(X1)**
Organochlorine Pesticides (µg/kg DW) cont'd									
Hexachlorocyclohexane-alpha	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Hexachlorocyclohexane-beta	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Methoxychlor	<4.25	<7.3	<5	2.4	<4.4	<4.3	<4.35	<5	<4.1
Nonachlor, cis-	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Nonachlor, trans-	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Oxychlordane	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41
Toxaphene	<42.5	<73	<50	<41	<44	<43	<43.5	<50	<41
Semi-Volatile and Volatile Compounds (µg/kg DW)									
1,2,4-Trichlorobenzene	<110	<180	<120	<100	<110	<110	<110	<120	<100
1,2-Dichlorobenzene	<110	<180	<120	<100	<110	<110	<110	<120	<100
1,3-Dichlorobenzene	<110	<180	<120	<100	<110	<110	<110	<120	<100
1,4-Dichlorobenzene	<110	<180	<120	<100	<110	<110	<110	<120	<100
2,2'-Oxybis(1-chloropropane)	<110	<180	<120	<100	<110	<110	<110	<120	<100
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,5,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	<270	<460	<310	<260	<280	<270	<275	<310	<260
2,4,6-Trichlorophenol	<110	<180	<120	<100	<110	<110	<110	<120	<100
2,4-Dichlorophenol	<110	<180	<120	<100	<110	<110	<110	<120	<100
2,4-Dimethylphenol	<110	<180	<120	<100	<110	<110	<110	<120	<100
2,4-Dinitrophenol	<270	<460	<310	<260	<280	<270	<275	<310	<260
2,4-Dinitrotoluene	<110	<180	<120	<100	<110	<110	<110	<120	<100
2,6-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	<110	<180	<120	<100	<110	<110	<110	<120	<100
2-Chloronaphthalene	<110	<180	<120	<100	<110	<110	<110	<120	<100
2-Chlorophenol	<110	<180	<120	<100	<110	<110	<110	<120	<100
2-Fluorobiphenyl	<110	<180	<120	<100	<110	<110	<110	<120	<100

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM640A1(X3)**	**RM641A1(X1)**	**RM642A1(X1)**	**RM644A1(X3)**	**RM658A1(X3)**	**RM661A1(X1)**	**RM676A1(X3)**	**RM677A1(X3)**	**RM678A1(X1)**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
2-Methylphenol	<110	<180	<120	<100	<110	<110	<110	<120	<100
2-Nitroaniline	<270	<460	<310	<260	<280	<270	<275	<310	<260
2-Nitrophenol	<110	<180	<120	<100	<110	<110	<110	<120	<100
3,3'-Dichlorobenzidine	<110	<180	<120	<100	<110	<110	<110	<120	<100
3-Nitroaniline	<270	<460	<310	<260	<280	<270	<275	<310	<260
4-Bromophenyl phenyl ether	<110	<180	<120	<100	<110	<110	<110	<120	<100
4-Chloro-3-methylphenol	<110	<180	<120	<100	<110	<110	<110	<120	<100
4-Chloroaniline	<110	<180	<120	<100	<110	<110	<110	<120	<100
4-Chlorophenyl phenyl ether	<110	<180	<120	<100	<110	<110	<110	<120	<100
4-Methylphenol	<110	<180	<120	<100	<110	<110	<110	<120	<100
4-Nitroaniline	<270	<460	<310	<260	<280	<270	<275	<310	<260
4-Nitrophenol	<270	<460	<310	<260	<280	<270	<275	<310	<260
Acetophenone	<110	<180	<120	<100	<110	<110	<110	<120	<100
Atrazine	<110	<180	<120	<100	<110	<110	<110	<120	<100
Benzaldehyde	<110	<180	<120	<100	<110	<110	<110	<120	<100
Benzoic acid	<110	<180	<120	<100	<110	<110	<110	<120	<100
Benzyl alcohol	<110	<180	<120	<100	<110	<110	<110	<120	<100
Bis(2-Chloroethoxy)methane	<110	<180	<120	<100	<110	<110	<110	<120	<100
Bis(2-chloroethyl)ether	<110	<180	<120	<100	<110	<110	<110	<120	<100
Bis(2-ethylhexyl) phthalate	<110	<180	<120	<100	<110	<110	<110	<120	<100
Butyl benzyl phthalate	<110	<180	<120	<100	<110	<110	<110	<120	<100
Caprolactam	<110	<180	43	<100	<110	<110	<110	<120	<100
Diethyl phthalate	<110	<180	<120	<100	<110	<110	<110	<120	<100
Dimethyl phthalate	<110	<180	<120	<100	<110	<110	<110	<120	<100
Di-n-butyl phthalate	<110	<180	<120	<100	<110	<110	<110	<120	<100
Dinitro-o-cresol	<270	<460	<310	<260	<280	<270	<275	<310	<260
Di-N-octyl phthalate	<110	<180	<120	<100	<110	<110	<110	<120	<100
Hexachlorobutadiene	<0.425	<0.73	<0.5	<0.41	<0.44	<0.43	<0.435	<0.5	<0.41

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM640A1(X3)**	**RM641A1(X1)**	**RM642A1(X1)**	**RM644A1(X3)**	**RM658A1(X3)**	**RM661A1(X1)**	**RM676A1(X3)**	**RM677A1(X3)**	**RM678A1(X1)**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
Hexachloroethane	<110	<180	<120	<100	<110	<110	<110	<120	<100
N-Nitrosodi-n-propylamine	<110	<180	<120	<100	<110	<110	<110	<120	<100
N-Nitrosodiphenylamine	<110	<180	<120	<100	<110	<110	<110	<120	<100
Pentachlorophenol	<270	<460	<310	<260	<280	<270	<275	<310	<260
Phenol	<110	<180	<120	<100	<110	<110	<110	<120	<100
Pentachloroanisole	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mean Quotients and other models (no units)									
Ratio of Copper to Aluminum	0.00155	0.00207	0.00197	0.00161	0.00171	0.00144	0.00213	0.00201	0.00177
Ratio of Zinc to Cadmium	277	148	139	427	219	261	334	176	217
Mean metals PECQ (Ingersoll et al. 2001)	0.208	0.388	0.346	0.238	0.224	0.146	0.165	0.194	0.118
Mean metals PECQ (Ingersoll et al. 2001) - OC normalized	0.939	0.275	0.484	1.72	0.900	1.09	1.54	0.364	0.835
Mean PECQ (Ingersoll et al. 2001)	0.0732	0.136	0.120	0.0829	0.0788	0.0527	0.0591	0.0691	0.0430

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM680A1(X1)**	**RM685R1**	**RM686A1(X3)**	**RM686R1**	**RM687A1**	**RM689A1(X3)**	**RM692A1(X1)**	**RM698A1(X1)**	**RM704A1(X1)**
Conventionals (%)									
Organic carbon, total	0.259	3.18	0.0684	1.52	1.67	0.387	0.0372	2.17	0.800
Moisture, percent	NA	NA	NA	NA	NA	NA	NA	NA	NA
Clay, percent	1.79	2.34	0.132	0.960	3.00	6.56	0.0335	15.3	7.14
Silt, percent	22.0	35.1	6.34	30.2	57.0	48.9	3.27	64.9	40.3
Fines, percent (silt+clay)	23.8	37.4	6.47	31.2	60.0	55.4	3.31	80.3	47.4
Sand - fine, percent	47.0	34.2	45.4	65.9	18.6	40.0	67.2	9.200	48.2
Sand - medium, percent	16.4	16.4	36.3	1.80	9.00	0.400	26.2	0.400	0.800
Sand - coarse, percent	7.20	6.00	6.80	0.300	3.20	0.00	1.30	0.200	0.00
Sand, percent	70.6	56.6	88.5	68	30.8	40.4	94.7	9.80	49.0
Gravel, percent	3.80	4.40	4.90	0.00	9.20	0.00	1.95	0.00	0.00
Metals (mg/kg DW)									
Aluminum, total	9870	8840	5470	6310	11000	7540	3780	14000	10000
Antimony, total	<7.6	<11.6	<6.9	<8.2	1.40	<7.4	0.765	3.50	1.40
Arsenic, total	2.4	<1.9	1.30	<1.4	5.70	2.10	0.810	7.90	4.90
Barium, total	83.5	221	49.6	61.5	160	78.3	33.6	546	141
Beryllium, total	0.780	0.700	0.460	0.700	0.910	0.800	0.375	1.50	1.10
Cadmium, total	0.260	0.85	0.110	0.19	2.10	0.130	<0.58	5.30	2.00
Calcium, total	8360	45500	2390	3450	4170	4870	1940	16000	5470
Chromium, total	23.8	23.8	9.10	8.90	21.2	16.9	8.05	34.9	22.8
Cobalt, total	9.30	7.50	3.60	3.80	8.40	6.70	2.85	11.6	8.20
Copper, total	17.9	16.3	10.8	5.50	27.0	14.7	6.05	164	25.9
Iron, total	21700	15600	10400	7560	19600	15000	7510	29800	18900
Lead, total	11.7	10.1	6.60	3.80	136	12.3	4.15	309	72.4
Magnesium, total	5730	4710	3300	2070	4480	4020	2180	11600	5800
Manganese, total	343	447	161	138	291	319	113	417	433
Mercury, total	0.0220	0.0260	0.0100	0.00800	0.410	0.0340	<0.13	0.870	0.230
Nickel, total	25.2	24.3	10.6	5.80	21.0	15.1	6.55	25.3	19.8

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM680A1(X1)**	**RM685R1**	**RM686A1(X3)**	**RM686R1**	**RM687A1**	**RM689A1(X3)**	**RM692A1(X1)**	**RM698A1(X1)**	**RM704A1(X1)**
Metals (mg/kg DW) cont'd									
Potassium, total	1300	1590	714	1030	1870	1370	516	2110	1950
Selenium, total	3.60	3.40	1.40	2.60	<4.4	<4.3	<4.1	<7.1	<4.6
Silver, total	<1.3	<1.9	<1.2	<1.4	<1.2	<1.2	<1.15	<2	<1.3
Sodium, total	167	173	172	91.6	120	165	80.2	249	215
Thallium, total	<3.2	<4.8	<2.9	<3.4	<3.1	<3.1	<2.95	<5.1	<3.3
Uranium, total	<25.3	<38.7	<23.1	<27.3	5.10	<24.8	<23.3	11.5	5.60
Vanadium, total	27.0	33.9	18.2	12.9	27.6	25.9	14.0	40.0	31.2
Zinc, total	76.6	72.8	40.7	26.1	281	62.6	32.0	954	204
Simultaneously extracted metals (SEM; µmol/g)a									
Simultaneously extracted antimony	<0.00140	<0.00140	<0.00115	0.000526	0.00076	<0.00156	<0.00115	<0.00205	<0.00148
Simultaneously extracted arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted cadmium	0.0024	0.00294	0.00107	0.00107	0.0391	0.00383	0.000823	0.0356	0.00979
Simultaneously extracted chromium	0.0192	0.0133	0.00846	0.0106	0.0385	0.0269	0.00558	0.106	0.0308
Simultaneously extracted copper	0.0834	0.0504	0.0378	0.0315	0.505	0.156	0.0205	2.01	0.217
Simultaneously extracted lead	0.0449	0.0208	0.0208	0.00917	2.17	0.0714	0.0138	1.17	0.204
Simultaneously extracted mercury	<0.00000339	0.00000229	0.00000175	0.00000349	0.0000135	0.00000230	0.00000563	0.00000897	0.00000429
Simultaneously extracted nickel	0.0511	0.0273	0.0123	0.0138	0.0937	0.0647	0.00869	0.119	0.0766
Simultaneously extracted zinc	0.430	0.162	0.165	0.101	8.95	0.618	0.139	10.3	1.43
Acid volatile sulfides	<0.0233	<0.0230	<0.0194	<0.0236	<0.0254	0.0218	<0.0192	<0.0333	<0.0248
SEM minus AVS	0.600	0.252	0.227	0.145	11.7	0.892	0.173	13.6	1.92
SEM minus AVS, OC normalized	232	7.92	333	9.52	703	230	466	627	240
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)									
2-Methylnaphthalene	<6	0.700	<5	0.700	1.00	<6	<5	4.00	1.00
Acenaphthene	<6	<9	<5	<9	<6	<6	<5	<8	<6
Acenaphthylene	<6	<9	<5	<9	<6	<6	<5	<8	<6
Anthracene	<6	<9	<5	<9	<6	<6	<5	<8	<6

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

COPC	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
	RM680A1(X1)	RM685R1	RM686A1(X3)	RM686R1	RM687A1	RM689A1(X3)	RM692A1(X1)	RM698A1(X1)	RM704A1(X1)
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW) cont'd									
Fluorene	<6	<9	<5	<9	<6	<6	<5	<8	<6
Naphthalene	4.60	2.00	4.10	3.00	5.10	4.80	4.15	4.00	4.70
Phenanthrene	<6	1.00	<5	1.00	2.00	<6	<5	6.00	2.00
Total Low-Molecular Weight PAHs	22.6	21.7	19.1	22.7	20.1	22.8	19.2	30.0	19.7
Benz(a)anthracene	2.00	0.700	<5	1.00	<6	<6	<5	2.00	0.500
Benzo(a)pyrene	2.00	<9	<5	<9	<6	<6	<5	2.00	<6
Chrysene	4.00	1.00	<5	2.00	1.00	<6	1.35	5.00	0.900
Dibenz(a,h)anthracene	1.00	<9	<5	<9	<6	<6	<5	0.700	<6
Fluoranthene	0.900	1.00	<5	3.00	1.00	0.200	<5	5.00	0.700
Pyrene	1.00	1.00	<5	3.00	0.800	<6	<5	4.00	0.700
Total High-Molecular Weight PAHs	10.9	12.7	<30	18.0	11.8	15.2	13.9	18.7	8.80
PAHs, total	33.5	34.4	34.1	40.7	31.9	38.0	33.0	48.7	28.5
ΣESB_{TU} (based on 13 PAHs)	0.0631	0.00524	0.222	0.0128	0.00931	0.0439	0.398	0.0101	0.0162
Dibenzofuran	<6	<9	<5	<9	0.500	<6	<5	2.00	0.500
Benzo(b)fluoranthene	5.00	<9	<5	<9	<6	<6	<5	3.00	0.900
Benzo(g,h,i)perylene	2.00	<9	<5	<9	<6	<6	<5	2.00	0.500
Benzo(k)fluoranthene	2.00	<9	<5	<9	<6	<6	<5	2.00	0.500
Indeno(1,2,3-c,d)pyrene	3.00	<9	<5	<9	<6	<6	<5	2.00	0.500
Polychlorinated Biphenyls (PCBs; µg/kg DW)									
Aroclor 1016	<1.1	<1.7	<1	<1.8	25	<1.2	<1	<1.7	<1.1
Aroclor 1221	<4.4	<6.8	<4	<7.2	<5	<4.7	<4	<6.7	<4.6
Aroclor 1232	<4.4	<6.8	<4	<7.2	<5	<4.7	<4	<6.7	<4.6
Aroclor 1242	<1.1	<1.7	<1	<1.8	<1.2	<1.2	<1	<1.7	<1.1
Aroclor 1248	<1.1	<1.7	<1	<1.8	<1.2	<1.2	<1	<1.7	<1.1
Aroclor 1254	<1.1	<1.7	<1	<1.8	<1.2	<1.2	<1	<1.7	<1.1
Aroclor 1260	<1.1	<1.7	<1	<1.8	9.4	<1.2	<1	<1.7	<1.1
PCBs, total	<14.3	<22.1	<13	<23.4	41.2	<15.4	<13	<21.9	<14.7

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM680A1(X1)**	**RM685R1**	**RM686A1(X3)**	**RM686R1**	**RM687A1**	**RM689A1(X3)**	**RM692A1(X1)**	**RM698A1(X1)**	**RM704A1(X1)**
Organochlorine Pesticides (µg/kg DW)									
Hexachlorocyclopentadiene	<110	<170	<100	<180	<120	<120	<100	<170	<110
Isophorone	<110	<170	<100	<180	<120	<120	<100	<170	<110
Aldrin	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Chlordane, cis-	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Chlordane, trans-	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Chlordane (cis & trans)	<0.88	<1.36	<0.8	<1.42	<0.98	<0.94	<0.8	<1.32	<0.9
Dieldrin	<0.89	<1.4	<0.81	<1.4	<1	<0.95	<0.81	<1.3	<0.92
gamma-BHC (Lindane)	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Hexachlorocyclohexane-delta	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
o,p'-DDD	<0.89	<1.4	<0.81	<1.4	<1	<0.95	<0.81	<1.3	<0.92
p,p'-DDD	0.890	<1.4	<0.81	<1.4	<1	<0.95	<0.81	<1.3	<0.92
DDDs, sum of p,p'-DDD and o,p'-DDD	1.34	<2.8	<1.62	<2.8	<2	<1.9	<1.62	<2.6	<1.84
o,p'-DDE	<0.89	<1.4	<0.81	<1.4	<1	<0.95	<0.81	<1.3	<0.92
p,p'-DDE	0.890	<1.4	<0.81	<1.4	5.20	<0.95	<0.81	<1.3	<0.92
DDEs, sum of p,p'-DDE and o,p'-DDE	1.34	<2.8	<1.62	<2.8	5.70	<1.9	<1.62	<2.6	<1.84
o,p'-DDT	0.890	<1.4	<0.81	<1.4	<1	<0.95	<0.81	<1.3	<0.92
p,p'-DDT	10.0	<1.4	<0.81	<1.4	9.60	<0.95	<0.81	<1.3	<0.92
DDTs, sum of p,p'-DDT and o,p'-DDT	10.9	<2.8	<1.62	<2.8	10.1	<1.9	<1.62	<2.6	<1.84
DDTs, total of 6 isomers	13.6	<8.4	<4.86	<8.4	16.8	<5.7	<4.86	<7.8	<5.52
Endosulfan sulfate	<0.89	<1.4	<0.81	<1.4	<1	<0.95	<0.81	<1.3	<0.92
Endosulfan-alpha	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Endosulfan-beta	<0.89	<1.4	<0.81	<1.4	<1	<0.95	<0.81	<1.3	<0.92
Endrin	<0.89	<1.4	<0.81	<1.4	<1	<0.95	<0.81	<1.3	<0.92
Endrin aldehyde	<0.89	<1.4	<0.81	<1.4	<1	<0.95	<0.81	<1.3	<0.92
Endrin ketone	<0.89	<1.4	<0.81	<1.4	<1	<0.95	<0.81	<1.3	<0.92
Heptachlor	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Heptachlor epoxide	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Hexachlorobenzene	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM680A1(X1)**	**RM685R1**	**RM686A1(X3)**	**RM686R1**	**RM687A1**	**RM689A1(X3)**	**RM692A1(X1)**	**RM698A1(X1)**	**RM704A1(X1)**
Organochlorine Pesticides (µg/kg DW) cont'd									
Hexachlorocyclohexane-alpha	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Hexachlorocyclohexane-beta	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Methoxychlor	<4.4	<6.8	<4	<7.1	<4.9	<4.7	<4	<6.6	<4.6
Nonachlor, cis-	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Nonachlor, trans-	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Oxychlordane	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45
Toxaphene	<44	<68	<40	<71	<49	<47	<40	<66	<45
Semi-Volatile and Volatile Compounds (µg/kg DW)									
1,2,4-Trichlorobenzene	<110	<170	<100	<180	<120	<120	<100	<170	<110
1,2-Dichlorobenzene	<110	<170	<100	<180	<120	<120	<100	<170	<110
1,3-Dichlorobenzene	<110	<170	<100	<180	<120	<120	<100	<170	<110
1,4-Dichlorobenzene	<110	<170	<100	<180	<120	<120	<100	<170	<110
2,2'-Oxybis(1-chloropropane)	<110	<170	<100	<180	<120	<120	<100	<170	<110
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,5,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	<280	<430	<250	<450	<310	<290	<255	<420	<290
2,4,6-Trichlorophenol	<110	<170	<100	<180	<120	<120	<100	<170	<110
2,4-Dichlorophenol	<110	<170	<100	<180	<120	<120	<100	<170	<110
2,4-Dimethylphenol	<110	<170	<100	<180	<120	<120	<100	<170	<110
2,4-Dinitrophenol	<280	<430	<250	<450	<310	<290	<255	<420	<290
2,4-Dinitrotoluene	<110	<170	<100	<180	<120	<120	<100	<170	<110
2,6-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	<110	<170	<100	<180	<120	<120	<100	<170	<110
2-Chloronaphthalene	<110	<170	<100	<180	<120	<120	<100	<170	<110
2-Chlorophenol	<110	<170	<100	<180	<120	<120	<100	<170	<110
2-Fluorobiphenyl	<110	<170	<100	<180	<120	<120	<100	<170	<110

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM680A1(X1)**	**RM685R1**	**RM686A1(X3)**	**RM686R1**	**RM687A1**	**RM689A1(X3)**	**RM692A1(X1)**	**RM698A1(X1)**	**RM704A1(X1)**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
2-Methylphenol	<110	<170	<100	<180	<120	<120	<100	<170	<110
2-Nitroaniline	<280	<430	<250	<450	<310	<290	<255	<420	<290
2-Nitrophenol	<110	<170	<100	<180	<120	<120	<100	<170	<110
3,3'-Dichlorobenzidine	<110	<170	<100	<180	<120	<120	<100	<170	<110
3-Nitroaniline	<280	<430	<250	<450	<310	<290	<255	<420	<290
4-Bromophenyl phenyl ether	<110	<170	<100	<180	<120	<120	<100	<170	<110
4-Chloro-3-methylphenol	<110	<170	<100	<180	<120	<120	<100	<170	<110
4-Chloroaniline	<110	<170	<100	<180	<120	<120	<100	<170	<110
4-Chlorophenyl phenyl ether	<110	<170	<100	<180	<120	<120	<100	<170	<110
4-Methylphenol	<110	200	<100	<180	<120	<120	<100	<170	<110
4-Nitroaniline	<280	<430	<250	<450	<310	<290	<255	<420	<290
4-Nitrophenol	<280	<430	<250	<450	<310	<290	<255	<420	<290
Acetophenone	<110	<170	<100	<180	<120	<120	<100	<170	<110
Atrazine	<110	<170	<100	<180	<120	<120	<100	<170	<110
Benzaldehyde	<110	<170	<100	<180	<120	<120	<100	<170	<110
Benzoic acid	<110	<170	<100	<180	<120	<120	<100	<170	<110
Benzyl alcohol	<110	<170	<100	<180	<120	<120	<100	<170	<110
Bis(2-Chloroethoxy)methane	<110	<170	<100	<180	<120	<120	<100	<170	<110
Bis(2-chloroethyl)ether	<110	<170	<100	<180	<120	<120	<100	<170	<110
Bis(2-ethylhexyl) phthalate	<110	<170	<100	<180	<120	<120	<100	<170	<110
Butyl benzyl phthalate	<110	<170	<100	<180	<120	<120	<100	<170	<110
Caprolactam	<110	<170	<100	<180	<120	<120	<100	<170	<110
Diethyl phthalate	<110	<170	<100	<180	<120	<120	<100	<170	<110
Dimethyl phthalate	<110	<170	<100	<180	<120	<120	<100	<170	<110
Di-n-butyl phthalate	<110	<170	<100	<180	<120	<120	<100	<170	<110
Dinitro-o-cresol	<280	<430	<250	<450	<310	<290	<255	<420	<290
Di-N-octyl phthalate	<110	<170	<100	<180	<120	<120	<100	<170	<110
Hexachlorobutadiene	<0.44	<0.68	<0.4	<0.71	<0.49	<0.47	<0.4	<0.66	<0.45

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM680A1(X1)**	**RM685R1**	**RM686A1(X3)**	**RM686R1**	**RM687A1**	**RM689A1(X3)**	**RM692A1(X1)**	**RM698A1(X1)**	**RM704A1(X1)**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
Hexachloroethane	<110	<170	<100	<180	<120	<120	<100	<170	<110
N-Nitrosodi-n-propylamine	<110	<170	<100	<180	<120	<120	<100	<170	<110
N-Nitrosodiphenylamine	<110	<170	<100	<180	<120	<120	<100	<170	<110
Pentachlorophenol	<280	<430	<250	<450	<310	<290	<255	<420	<290
Phenol	<110	<170	<100	<180	<120	<120	<100	<170	<110
Pentachloroanisole	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mean Quotients and other models (no units)									
Ratio of Copper to Aluminum	0.00181	0.00184	0.00197	0.000872	0.00245	0.00195	0.00160	0.0117	0.00259
Ratio of Zinc to Cadmium	295	85.6	370	137	134	482	110	180	102
Mean metals PECQ (Ingersoll et al. 2001)	0.177	0.180	0.0820	0.0546	0.439	0.126	0.0618	1.10	0.335
Mean metals PECQ (Ingersoll et al. 2001) - OC normalized	0.682	0.0566	1.20	0.0359	0.263	0.326	1.66	0.509	0.419
Mean PECQ (Ingersoll et al. 2001)	0.0629	0.066	0.0311	0.0246	0.167	0.0464	0.0243	0.374	0.116

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	RM705R1	RM706A1(X1)	RM706A2(X7)	RM708A1(X3)	RM713A1(X3)	RM721R1	RM723A1(X1)	RM723A2(X3)	RM724A1(X1)
Conventionals (%)									
Organic carbon, total	2.14	1.96	2.91	1.47	0.902	2.44	0.375	1.44	1.07
Moisture, percent	NA	NA	NA	NA	NA	NA	NA	NA	NA
Clay, percent	0.312	9.29	7.08	3.47	1.53	2.87	0.835	2.79	0.48
Silt, percent	15.1	62.7	52.2	36.5	31.8	32.1	15.8	27.6	17.8
Fines, percent (silt+clay)	15.4	72.0	59.2	39.9	33.3	35.0	16.6	30.4	18.2
Sand - fine, percent	51.3	21.8	32.4	56.2	60.5	45.5	39.2	58.6	79.7
Sand - medium, percent	21.0	0.600	2.20	0.400	2.20	7.60	43.6	10.2	1.10
Sand - coarse, percent	4.70	0.200	0.600	0.00	1.60	3.60	0.500	0.200	0.00
Sand, percent	77.0	22.6	35.2	56.6	64.3	56.7	83.3	69.0	80.8
Gravel, percent	7.40	0.00	0.400	0.00	1.70	7.40	0.00	0.00	0.00
Metals (mg/kg DW)									
Aluminum, total	4030	7390	10700	7960	6890	7480	5030	6410	9990
Antimony, total	<10.5	3.80	<14	1.40	<10.15	<11.55	1.50	7.00	1.30
Arsenic, total	<1.8	4.50	1.40	5.80	4.60	2.25	2.30	4.40	3.10
Barium, total	45.4	445	102	526	267	96.8	109	368	99.4
Beryllium, total	0.510	0.970	1.30	0.800	0.825	0.555	0.440	0.690	1.00
Cadmium, total	0.160	3.80	0.420	4.80	2.85	0.415	0.530	2.70	0.140
Calcium, total	3480	15000	5300	37600	8675	31400	6940	18200	4730
Chromium, total	6.90	21.3	24.9	20.7	20.4	22.2	12.6	20.3	22.1
Cobalt, total	3.40	6.70	7.70	7.30	7.25	6.75	4.80	9.10	9.40
Copper, total	7.90	78.8	26.2	106	65.0	15.1	22.2	195	21.0
Iron, total	7010	18800	19500	26300	17600	15100	13600	34900	19300
Lead, total	6.20	197	14.7	192	148	12.5	24.5	203	16.0
Magnesium, total	2220	10400	5130	21800	7010	5150	4530	10600	5770
Manganese, total	210	317	276	380	274	483	195	558	358
Mercury, total	<0.19	0.660	0.0440	0.430	0.550	0.0350	0.0380	0.390	0.0170
Nickel, total	4.90	15.5	15.9	16.4	16.0	14.5	12.0	12.2	21.7

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM705R1**	**RM706A1(X1)**	**RM706A2(X7)**	**RM708A1(X3)**	**RM713A1(X3)**	**RM721R1**	**RM723A1(X1)**	**RM723A2(X3)**	**RM724A1(X1)**
Metals (mg/kg DW) cont'd									
Potassium, total	831	1600	1180	1330	1275	880	890	1250	1690
Selenium, total	2.20	<7.7	4.10	9.60	5.80	4.20	3.6	7.7	<5.1
Silver, total	<1.8	<2.2	<2.3	<1.6	<1.7	<1.95	<1.1	<1.6	<1.4
Sodium, total	60.8	137	229	172	124	183	112	243	154
Thallium, total	<4.4	<5.5	<5.8	<4	<4.25	<4.8	<2.7	<4	<3.6
Uranium, total	<35.1	9.60	<46.7	<32.4	<33.9	<52.5	<21.4	<32.2	<29
Vanadium, total	12.8	26.3	36.9	28.8	28.1	29.1	19.1	22.5	28.2
Zinc, total	31.1	764	97.5	1340	539	54.8	179	2290	93.1
Simultaneously extracted metals (SEM; µmol/g)									
Simultaneously extracted antimony	<0.00189	<0.00230	<0.00304	0.00181	0.00292	<0.00197	0.00903	0.00230	0.00310
Simultaneously extracted arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted cadmium	0.00110	0.0302	0.00205	0.0160	0.0147	0.00414	0.0178	0.0214	0.00810
Simultaneously extracted chromium	0.0156	0.0904	0.0539	0.0827	0.0798	0.0433	0.0789	0.127	0.0942
Simultaneously extracted copper	0.0818	1.02	0.197	0.870	0.729	0.169	0.966	1.78	0.848
Simultaneously extracted lead	0.0169	1.17	0.0569	0.695	0.707	0.0521	0.478	0.936	0.354
Simultaneously extracted mercury	0.00000798	0.00000748	0.00000897	0.00000444	0.000011	<0.00000526	0.00000598	0.00000548	0.00000234
Simultaneously extracted nickel	0.0221	0.104	0.0511	0.0681	0.927	0.381	0.0647	0.777	0.213
Simultaneously extracted zinc	0.265	11.8	0.558	10.4	5.83	0.399	7.57	17.9	8.29
Acid volatile sulfides	0.0120	0.127	0.790	0.375	0.122	5.30	0.287	0.0340	1.7
SEM minus AVS	0.375	14.0	0.0752	11.7	8.08	-4.29	8.81	21.4	8.01
SEM minus AVS, OC normalized	17.5	715	2.58	793	897	-176	2350	1490	749
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)									
2-Methylnaphthalene	0.600	2.00	<9	0.900	1.00	0.300	0.400	2.00	1.00
Acenaphthene	<7	<9	<9	<8	<6.5	<7	<5	<7	<6
Acenaphthylene	<7	<9	<9	<8	<6.5	<7	<5	<7	<6
Anthracene	<7	<9	<9	0.6	<6.5	<7	<5	<7	<6

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM705R1**	**RM706A1(X1)**	**RM706A2(X7)**	**RM708A1(X3)**	**RM713A1(X3)**	**RM721R1**	**RM723A1(X1)**	**RM723A2(X3)**	**RM724A1(X1)**
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW) cont'd									
Fluorene	<7	<9	<9	0.600	<6.5	<7	<5	<7	0.700
Naphthalene	2.00	3.00	7.70	1.00	1.50	1.00	1.00	3.00	2.00
Phenanthrene	0.600	4.00	0.800	4.00	2.00	<7	1.00	4.00	5.00
Total Low-Molecular Weight PAHs	17.2	27.0	31.0	15.1	17.5	18.8	12.4	23.0	17.7
Benz(a)anthracene	<7	2.00	<9	2.00	0.750	<7	0.900	1.00	2.00
Benzo(a)pyrene	<7	2.00	<9	<8	0.850	<7	<5	<7	4.00
Chrysene	<7	3.00	1.00	3.00	1.50	<7	1.00	3.00	6.00
Dibenz(a,h)anthracene	<7	<9	<9	0.600	<6.5	<7	<5	<7	<6
Fluoranthene	0.600	5.00	2.00	4.00	2.00	<7	2.00	3.00	11.0
Pyrene	<7	4.00	2.00	4.00	1.50	<7	2.00	2.00	8.00
Total High-Molecular Weight PAHs	18.1	20.5	18.5	17.6	9.85	<42	10.9	16.0	34.0
PAHs, total	35.3	47.5	49.5	32.7	27.35	39.8	23.3	39.0	51.7
ΣESB_{TU} (based on 13 PAHs)	0.00751	0.0106	0.00779	0.0109	0.0146	0.00730	0.0289	0.0123	0.0212
Dibenzofuran	<7	1.00	<9	<8	<4	<7	<5	0.900	0.700
Benzo(b)fluoranthene	<7	3.00	<9	<8	<6.5	<7	<5	<7	6.00
Benzo(g,h,i)perylene	<7	2.00	<9	1.00	0.750	<7	0.900	<7	4.00
Benzo(k)fluoranthene	<7	2.00	<9	<8	<6.5	<7	<5	<7	3.00
Indeno(1,2,3-c,d)pyrene	<7	2.00	<9	1.00	0.850	<7	0.900	<7	4.00
Polychlorinated Biphenyls (PCBs; µg/kg DW)									
Aroclor 1016	<1.4	<1.7	<1.9	<1.5	<1.25	<1.4	<1.1	<1.4	<1.2
Aroclor 1221	<5.8	<6.8	<7.6	<5.9	<5.2	<5.6	<4.4	<5.6	<4.9
Aroclor 1232	<5.8	<6.8	<7.6	<5.9	<5.2	<5.6	<4.4	<5.6	<4.9
Aroclor 1242	<1.4	<1.7	<1.9	<1.5	<1.25	<1.4	<1.1	<1.4	<1.2
Aroclor 1248	<1.4	<1.7	<1.9	<1.5	<1.25	<1.4	<1.1	<1.4	<1.2
Aroclor 1254	<1.4	<1.7	<1.9	<1.5	<1.25	<1.4	<1.1	<1.4	<1.2
Aroclor 1260	<1.4	<1.7	<1.9	<1.5	<1.25	<1.4	<1.1	<1.4	<1.2
PCBs, total	<18.6	<22.1	<24.7	<19.3	<16.65	<18.2	<14.3	<18.2	<15.8

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM705R1**	**RM706A1(X1)**	**RM706A2(X7)**	**RM708A1(X3)**	**RM713A1(X3)**	**RM721R1**	**RM723A1(X1)**	**RM723A2(X3)**	**RM724A1(X1)**
Organochlorine Pesticides (µg/kg DW)									
Hexachlorocyclopentadiene	<140	<170	<190	<150	<125	<140	<110	<140	<120
Isophorone	<140	<170	<190	<150	<125	<140	<110	<140	<120
Aldrin	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
Chlordane, cis-	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
Chlordane, trans-	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
Chlordane (cis & trans)	<1.14	<1.34	<1.5	<1.18	<1.02	<1.09	<0.88	<1.12	<0.96
Dieldrin	<1.2	<1.4	<1.6	<1.2	<1.05	<1.1	<0.89	<1.1	<0.97
gamma-BHC (Lindane)	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
Hexachlorocyclohexane-delta	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
o,p'-DDD	<1.2	<1.4	<1.6	<1.2	<1.05	<1.1	<0.89	<1.1	<0.97
p,p'-DDD	<1.2	<1.4	<1.6	<1.2	<1.05	<1.1	<0.89	<1.1	<0.97
DDDs, sum of p,p'-DDD and o,p'-DDD	<2.4	<2.8	<3.2	<2.4	<2.1	<2.2	<1.78	<2.2	<1.94
o,p'-DDE	<1.2	<1.4	<1.6	<1.2	<1.05	<1.1	<0.89	<1.1	<0.97
p,p'-DDE	<1.2	<1.4	<1.6	0.360	0.115	<1.1	<0.89	<1.1	0.57
DDEs, sum of p,p'-DDE and o,p'-DDE	<2.4	<2.8	<3.2	0.960	0.640	<2.2	<1.78	<2.2	1.055
o,p'-DDT	<1.2	<1.4	<1.6	<1.2	<1.05	<1.1	<0.89	<1.1	<0.97
p,p'-DDT	<1.2	<1.4	<1.6	<1.2	<1.05	<1.1	<0.89	<1.1	<0.97
DDTs, sum of p,p'-DDT and o,p'-DDT	<2.4	<2.8	<3.2	<2.4	<2.1	<2.2	<1.78	<2.2	<1.94
DDTs, total of 6 isomers	<7.2	<8.4	<9.6	3.36	2.74	<6.6	<5.34	<6.6	2.995
Endosulfan sulfate	<1.2	<1.4	<1.6	<1.2	<1.05	<1.1	<0.89	<1.1	<0.97
Endosulfan-alpha	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
Endosulfan-beta	<1.2	<1.4	<1.6	<1.2	<1.05	<1.1	<0.89	<1.1	<0.97
Endrin	<1.2	<1.4	<1.6	<1.2	<1.05	<1.1	<0.89	<1.1	<0.97
Endrin aldehyde	<1.2	<1.4	<1.6	<1.2	<1.05	<1.1	<0.89	<1.1	<0.97
Endrin ketone	<1.2	<1.4	<1.6	<1.2	<1.05	<1.1	<0.89	<1.1	<0.97
Heptachlor	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
Heptachlor epoxide	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
Hexachlorobenzene	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	0.300

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM705R1**	**RM706A1(X1)**	**RM706A2(X7)**	**RM708A1(X3)**	**RM713A1(X3)**	**RM721R1**	**RM723A1(X1)**	**RM723A2(X3)**	**RM724A1(X1)**
Organochlorine Pesticides (µg/kg DW) cont'd									
Hexachlorocyclohexane-alpha	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	0.48
Hexachlorocyclohexane-beta	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
Methoxychlor	<5.7	<6.7	<7.5	<5.9	<5.1	<5.45	<4.4	<5.6	<4.8
Nonachlor, cis-	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
Nonachlor, trans-	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
Oxychlordane	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48
Toxaphene	<57	<67	<75	<59	<51	<54.5	<44	<56	<48
Semi-Volatile and Volatile Compounds (µg/kg DW)									
1,2,4-Trichlorobenzene	<140	<170	<190	<150	<125	<140	<110	<140	<120
1,2-Dichlorobenzene	<140	<170	<190	<150	<125	<140	<110	<140	<120
1,3-Dichlorobenzene	<140	<170	<190	<150	<125	<140	<110	<140	<120
1,4-Dichlorobenzene	<140	<170	<190	<150	<125	<140	<110	<140	<120
2,2'-Oxybis(1-chloropropane)	<140	<170	<190	<150	<125	<140	<110	<140	<120
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,5,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	<360	<430	<480	<370	<330	<345	<270	<350	<300
2,4,6-Trichlorophenol	<140	<170	<190	<150	<125	<140	<110	<140	<120
2,4-Dichlorophenol	<140	<170	<190	<150	<125	<140	<110	<140	<120
2,4-Dimethylphenol	<140	<170	<190	<150	<125	<140	<110	<140	<120
2,4-Dinitrophenol	<360	<430	<480	<370	<330	<345	<270	<350	<300
2,4-Dinitrotoluene	<140	<170	<190	<150	<125	<140	<110	<140	<120
2,6-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	<140	<170	<190	<150	<125	<140	<110	<140	<120
2-Chloronaphthalene	<140	<170	<190	<150	<125	<140	<110	<140	<120
2-Chlorophenol	<140	<170	<190	<150	<125	<140	<110	<140	<120
2-Fluorobiphenyl	<140	<170	<190	<150	<125	<140	<110	<140	<120

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

COPC	RM705R1	RM706A1(X1)	RM706A2(X7)	RM708A1(X3)	RM713A1(X3)	RM721R1	RM723A1(X1)	RM723A2(X3)	RM724A1(X1)
	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
2-Methylphenol	<140	<170	<190	<150	<125	<140	<110	<140	<120
2-Nitroaniline	<360	<430	<480	<370	<330	<345	<270	<350	<300
2-Nitrophenol	<140	<170	<190	<150	<125	<140	<110	<140	<120
3,3'-Dichlorobenzidine	<140	<170	<190	<150	<125	<140	<110	<140	<120
3-Nitroaniline	<360	<430	<480	<370	<330	<345	<270	<350	<300
4-Bromophenyl phenyl ether	<140	<170	<190	<150	<125	<140	<110	<140	<120
4-Chloro-3-methylphenol	<140	<170	<190	<150	<125	<140	<110	<140	<120
4-Chloroaniline	<140	<170	<190	<150	<125	<140	<110	<140	<120
4-Chlorophenyl phenyl ether	<140	<170	<190	<150	<125	<140	<110	<140	<120
4-Methylphenol	<140	<170	<190	<150	<125	<140	<110	<140	<120
4-Nitroaniline	<360	<430	<480	<370	<330	<345	<270	<350	<300
4-Nitrophenol	<360	<430	<480	<370	<330	<345	<270	<350	<300
Acetophenone	<140	<170	<190	<150	<125	<140	<110	<140	<120
Atrazine	<140	<170	<190	<150	<125	<140	<110	<140	<120
Benzaldehyde	<140	<170	<190	<150	<125	<140	<110	<140	<120
Benzoic acid	<140	<170	<190	<150	<125	<140	<110	<140	<120
Benzyl alcohol	<140	<170	<190	<150	<125	<140	<110	<140	<120
Bis(2-Chloroethoxy)methane	<140	<170	<190	<150	<125	<140	<110	<140	<120
Bis(2-chloroethyl)ether	<140	<170	63	<150	<125	<140	<110	<140	<120
Bis(2-ethylhexyl) phthalate	<140	<170	<190	<150	<185	<140	<110	<140	<120
Butyl benzyl phthalate	<140	<170	<190	<150	<125	<140	<110	<140	<120
Caprolactam	<140	<170	<190	<150	<125	<140	<110	<140	<120
Diethyl phthalate	<140	<170	<190	<150	<125	<140	<110	<140	<120
Dimethyl phthalate	<140	<170	<190	<150	<125	<140	<110	<140	<120
Di-n-butyl phthalate	<140	<170	<190	<150	<125	<140	<110	<140	<120
Dinitro-o-cresol	<360	<430	<480	<370	<330	<345	<270	<350	<300
Di-N-octyl phthalate	<140	<170	<190	<150	<125	<140	<110	<140	<120
Hexachlorobutadiene	<0.57	<0.67	<0.75	<0.59	<0.51	<0.545	<0.44	<0.56	<0.48

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM705R1**	**RM706A1(X1)**	**RM706A2(X7)**	**RM708A1(X3)**	**RM713A1(X3)**	**RM721R1**	**RM723A1(X1)**	**RM723A2(X3)**	**RM724A1(X1)**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
Hexachloroethane	<140	<170	<190	<150	<125	<140	<110	<140	<120
N-Nitrosodi-n-propylamine	<140	<170	<190	<150	<125	<140	<110	<140	<120
N-Nitrosodiphenylamine	<140	<170	<190	<150	<125	<140	<110	<140	<120
Pentachlorophenol	<360	<430	<480	<370	<330	<345	<270	<350	<300
Phenol	<140	<170	<190	<150	<125	<140	<110	<140	<120
Pentachloroanisole	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mean Quotients and other models (no units)									
Ratio of Copper to Aluminum	0.00196	0.0107	0.00245	0.0133	0.00943	0.00201	0.00441	0.0304	0.0021
Ratio of Zinc to Cadmium	194	201	232	279	189	132	338	848	665
Mean metals PECQ (Ingersoll et al. 2001)	0.0559	0.735	0.169	0.971	0.570	0.138	0.181	1.28	0.177
Mean metals PECQ (Ingersoll et al. 2001) - OC normalized	0.0261	0.375	0.0580	0.660	0.632	0.0566	0.483	0.895	0.165
Mean PECQ (Ingersoll et al. 2001)	0.0237	0.251	0.0631	0.3288	0.195	0.0511	0.0642	0.433	0.0635

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	RM724A2(X3)	RM726R1	RM727A1(X1)	RM729A1(X1)	RM730A1	RM732R1	RM733A1(X1)	RM734A1	RM736A1(X1)
Conventionals (%)									
Organic carbon, total	0.635	3.91	0.658	0.260	0.154	2.52	0.383	0.0609	0.628
Moisture, percent	NA	NA	NA	NA	NA	NA	NA	NA	NA
Clay, percent	0.639	2.27	0.916	0.057	0.0700	4.99	0.0860	0.172	0.780
Silt, percent	13.4	21.9	18.1	5.61	6.83	34.1	8.43	4.73	18.5
Fines, percent (silt+clay)	14.1	24.2	19.1	5.67	6.90	39.1	8.51	4.90	19.3
Sand - fine, percent	37.9	39.2	78.1	51.6	88.0	38.0	61.1	92.6	56.4
Sand - medium, percent	47.9	26.0	1.45	28.0	4.80	9.20	26.0	1.80	2.20
Sand - coarse, percent	0.00	4.40	0.750	8.20	0.200	2.80	1.20	0.300	1.30
Sand, percent	85.8	69.6	80.3	87.8	93.0	50.0	88.3	94.7	59.9
Gravel, percent	0.00	5.20	0.450	6.50	0.00	8.40	3.10	0.400	20.6
Metals (mg/kg DW)									
Aluminum, total	12300	6900	5900	3080	6250	3170	9510	7280	6390
Antimony, total	24.6	<10.3	5.70	9.90	14.9	<11.3	17.4	11.6	5.10
Arsenic, total	2.10	3.10	7.85	2.00	2.40	3.40	6.60	<1.3	4.80
Barium, total	769	101	338	172	424	234	489	318	540
Beryllium, total	1.10	0.420	0.590	0.320	0.610	0.075	0.880	0.67	0.710
Cadmium, total	2.20	0.580	3.00	1.10	3.50	1.30	2.90	1.80	4.30
Calcium, total	34300	62800	25200	11100	23600	229000	29700	21200	35300
Chromium, total	49.0	23.9	18.9	14.5	25.4	7.40	38.6	25.9	20.7
Cobalt, total	20.7	5.80	7.30	6.10	10.3	2.10	20.0	10.1	7.50
Copper, total	969	16.7	130	183	400	6.60	641	396	129
Iron, total	114000	14400	24000	16200	46400	5090	88400	57600	27400
Lead, total	267	14.5	170	68.4	266	25.5	1390	148	214
Magnesium, total	7940	4530	13250	5090	7880	3840	5860	5470	20700
Manganese, total	1980	196	366	371	1030	316	2490	1140	378
Mercury, total	0.110	0.0200	0.325	0.0600	0.160	0.0150	0.0830	0.0900	0.330
Nickel, total	10.6	15.2	12.4	6.30	7.70	5.30	9.50	6.60	15.1

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM724A2(X3)**	**RM726R1**	**RM727A1(X1)**	**RM729A1(X1)**	**RM730A1**	**RM732R1**	**RM733A1(X1)**	**RM734A1**	**RM736A1(X1)**
Metals (mg/kg DW) cont'd									
Potassium, total	2520	789	1010	611	1220	675	2480	1500	1330
Selenium, total	10.6	4.90	6.35	3.90	4.40	10.3	3.70	6.40	9.80
Silver, total	<1.2	<1.7	<1.35	<1.2	<1.1	<1.9	<0.98	<1.3	<1.4
Sodium, total	933	163	234.5	157	394	199	957	460	197
Thallium, total	<3	<4.3	<3.4	<3	<2.7	<4.7	<2.4	<3.3	<3.5
Uranium, total	<24.4	<34.3	<26.95	<24.1	<21.3	<37.6	<19.6	<26.7	<28.3
Vanadium, total	30.0	25.0	23.6	11.0	20.0	8.50	28.0	20.0	27.0
Zinc, total	8410	60.5	1280	1250	4690	49.0	8200	4610	1760
Simultaneously extracted metals (SEM; µmol/g)									
Simultaneously extracted antimony	0.000772	<0.00230	0.00591	0.00903	0.00747	<0.00189	0.00115	0.0238	0.00739
Simultaneously extracted arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted cadmium	0.016	0.00685	0.0173	0.00783	0.024	0.0133	0.0205	0.0196	0.0151
Simultaneously extracted chromium	0.385	0.0539	0.113	0.165	0.369	0.025	0.564	0.344	0.110
Simultaneously extracted copper	5.00	0.354	1.46	1.76	4.14	0.0551	5.30	3.90	1.33
Simultaneously extracted lead	0.787	0.107	0.888	0.349	1.25	0.106	2.51	0.681	0.787
Simultaneously extracted mercury	0.00000194	0.00000698	0.00000469	0.00000135	0.0000016	0.00000364	0.00000224	0.00000354	0.00000499
Simultaneously extracted nickel	0.0477	0.799	0.0707	0.0409	0.0307	0.138	0.0426	0.0221	0.600
Simultaneously extracted zinc	77.5	0.407	15.2	17.9	88.5	0.488	101	76.3	13.9
Acid volatile sulfides	12.3	<0.0393	0.0755	0.340	2.10	<0.0333	0.690	25.0	0.610
SEM minus AVS	71.1	1.65	17.6	19.7	91.8	0.784	108	56.0	16.0
SEM minus AVS, OC normalized	11200	42.3	2680	7600	59600	31.1	28300	91900	2550
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)									
2-Methylnaphthalene	1.00	0.300	0.600	0.600	0.900	0.700	0.500	2.00	1.00
Acenaphthene	<6	<8	<6	<5	<6	<9	<6	<6	<7
Acenaphthylene	<6	<8	<6	<5	<6	<9	<6	<6	<7
Anthracene	<6	<8	<6	<5	<6	<9	<6	<6	1.00

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM724A2(X3)**	**RM726R1**	**RM727A1(X1)**	**RM729A1(X1)**	**RM730A1**	**RM732R1**	**RM733A1(X1)**	**RM734A1**	**RM736A1(X1)**
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW) cont'd									
Fluorene	<6	<8	<6	<5	<6	<9	<6	<6	1.00
Naphthalene	1.00	0.900	1.00	1.00	1.00	2.00	4.70	3.00	2.00
Phenanthrene	1.00	21.5	1.00	0.800	0.900	0.300	0.500	1.00	10.0
Total Low-Molecular Weight PAHs	15.0	38.7	14.6	12.4	14.8	21.0	17.7	18.0	22.0
Benz(a)anthracene	1.00	0.300	1.25	1.00	0.400	<9	0.500	0.900	6.00
Benzo(a)pyrene	2.00	<8	0.85	1.00	<6	<9	<6	1.00	7.00
Chrysene	2.00	<8	1.85	1.00	0.700	<9	0.500	1.00	7.00
Dibenz(a,h)anthracene	<6	<8	<3.2	<5	<6	<9	<6	<6	<7
Fluoranthene	<6	16.5	1.00	3.00	1.00	<9	0.900	0.900	14.0
Pyrene	2.00	34.0	0.850	2.00	0.900	<9	0.700	1.00	13.0
Total High-Molecular Weight PAHs	13.0	62.8	7.40	10.5	9.00	<54	8.60	7.80	50.5
PAHs, total	28.0	101	22.0	22.9	23.8	48.0	26.3	25.8	72.5
ΣESB_{TU} (based on 13 PAHs)	0.0188	0.0112	0.0165	0.0414	0.0727	0.00852	0.0353	0.203	0.0494
Dibenzofuran	<6	<8	<6	<5	<6	<9	<6	0.900	0.800
Benzo(b)fluoranthene	2.00	<8	2.50	<5	<6	<9	<6	<6	6.00
Benzo(g,h,i)perylene	1.00	<8	0.500	0.800	0.400	<9	<6	0.900	6.00
Benzo(k)fluoranthene	1.00	<8	1.85	<5	<6	<9	<6	<6	5.00
Indeno(1,2,3-c,d)pyrene	<6	<8	1.85	1.00	0.400	<9	0.500	1.00	6.00
Polychlorinated Biphenyls (PCBs; µg/kg DW)									
Aroclor 1016	<1.2	<1.6	<1.2	<0.99	<1.1	<1.7	<1.1	<1.1	<1.3
Aroclor 1221	<5	<6.1	<5	<4	<4.4	<7	<4.6	<4.4	<5.3
Aroclor 1232	<5	<6.1	<5	<4	<4.4	<7	<4.6	<4.4	<5.3
Aroclor 1242	<1.2	<1.6	<1.2	<0.99	<1.1	<1.7	<1.1	<1.1	<1.3
Aroclor 1248	<1.2	<1.6	<1.2	<0.99	<1.1	<1.7	<1.1	<1.1	<1.3
Aroclor 1254	<1.2	<1.6	<1.2	<0.99	<1.1	<1.7	<1.1	<1.1	<1.3
Aroclor 1260	<1.2	<1.6	<1.2	<0.99	<1.1	<1.7	<1.1	<1.1	<1.3
PCBs, total	<16	<20.2	<16	<12.95	<14.3	<22.5	<14.7	<14.3	<17.1

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM724A2(X3)**	**RM726R1**	**RM727A1(X1)**	**RM729A1(X1)**	**RM730A1**	**RM732R1**	**RM733A1(X1)**	**RM734A1**	**RM736A1(X1)**
Organochlorine Pesticides (µg/kg DW)									
Hexachlorocyclopentadiene	<120	<150	<120	<100	<110	<170	<110	<110	<130
Isophorone	<120	<150	<120	<100	<110	<170	<110	<110	<130
Aldrin	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
Chlordane, cis-	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
Chlordane, trans-	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
Chlordane (cis & trans)	<1	<1.2	<0.98	<0.78	<0.86	<1.38	<0.9	<0.86	<1.04
Dieldrin	<1	<1.2	<1	<0.8	<0.88	<1.4	<0.91	<0.88	<1.1
gamma-BHC (Lindane)	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
Hexachlorocyclohexane-delta	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
o,p'-DDD	<1	<1.2	<1	<0.8	<0.88	<1.4	<0.91	<0.88	<1.1
p,p'-DDD	<1	<1.2	<1	<0.8	<0.88	<1.4	<0.91	<0.88	<1.1
DDDs, sum of p,p'-DDD and o,p'-DDD	<2	<2.4	<2	<1.6	<1.76	<2.8	<1.82	<1.76	<2.2
o,p'-DDE	<1	<1.2	<1	<0.8	<0.88	<1.4	<0.91	<0.88	<1.1
p,p'-DDE	<1	<1.2	<1	<0.8	0.880	<1.4	<0.91	<0.88	<1.1
DDEs, sum of p,p'-DDE and o,p'-DDE	<2	<2.4	<2	<1.6	1.32	<2.8	<1.82	<1.76	<2.2
o,p'-DDT	<1	<1.2	<1	<0.8	<0.88	<1.4	<0.91	<0.88	<1.1
p,p'-DDT	0.280	<1.2	0.750	0.230	0.400	<1.4	<0.91	<0.88	<1.1
DDTs, sum of p,p'-DDT and o,p'-DDT	0.780	<2.4	1.25	0.630	0.840	<2.8	<1.82	<1.76	<2.2
DDTs, total of 6 isomers	2.78	<7.2	3.25	2.23	3.04	<8.4	<5.46	<5.28	<6.6
Endosulfan sulfate	<1	<1.2	<1	<0.8	<0.88	<1.4	<0.91	<0.88	<1.1
Endosulfan-alpha	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
Endosulfan-beta	<1	<1.2	<1	<0.8	<0.88	<1.4	<0.91	<0.88	<1.1
Endrin	<1	<1.2	<1	<0.8	<0.88	<1.4	<0.91	<0.88	<1.1
Endrin aldehyde	<1	<1.2	<1	<0.8	<0.88	<1.4	<0.91	<0.88	<1.1
Endrin ketone	<1	<1.2	<1	<0.8	<0.88	<1.4	<0.91	<0.88	<1.1
Heptachlor	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
Heptachlor epoxide	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
Hexachlorobenzene	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	0.450	<0.43	<0.52

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM724A2(X3)**	**RM726R1**	**RM727A1(X1)**	**RM729A1(X1)**	**RM730A1**	**RM732R1**	**RM733A1(X1)**	**RM734A1**	**RM736A1(X1)**
Organochlorine Pesticides (µg/kg DW) cont'd									
Hexachlorocyclohexane-alpha	0.500	<0.6	<0.49	<0.39	<0.43	0.69	<0.45	<0.43	0.180
Hexachlorocyclohexane-beta	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
Methoxychlor	<5	<6	<4.9	<3.9	<4.3	<6.9	<4.6	<4.3	<5.2
Nonachlor, cis-	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
Nonachlor, trans-	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
Oxychlordane	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52
Toxaphene	<50	<60	<49	<39	<43	<69	<45	<43	<52
Semi-Volatile and Volatile Compounds (µg/kg DW)									
1,2,4-Trichlorobenzene	<120	<150	<120	<100	<110	<170	<110	<110	<130
1,2-Dichlorobenzene	<120	<150	<120	<100	<110	<170	<110	<110	<130
1,3-Dichlorobenzene	<120	<150	<120	<100	<110	<170	<110	<110	<130
1,4-Dichlorobenzene	<120	<150	<120	<100	<110	<170	<110	<110	<130
2,2'-Oxybis(1-chloropropane)	<120	<150	<120	<100	<110	<170	<110	<110	<130
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,5,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	<310	<380	<310	<250	<280	<440	<290	<280	<330
2,4,6-Trichlorophenol	<120	<150	<120	<100	<110	<170	<110	<110	<130
2,4-Dichlorophenol	<120	<150	<120	<100	<110	<170	<110	<110	<130
2,4-Dimethylphenol	<120	<150	<120	<100	<110	<170	<110	<110	<130
2,4-Dinitrophenol	<310	<380	<310	<250	<280	<440	<290	<280	<330
2,4-Dinitrotoluene	<120	<150	<120	<100	<110	<170	<110	<110	<130
2,6-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	<120	<150	<120	<100	<110	<170	<110	<110	<130
2-Chloronaphthalene	<120	<150	<120	<100	<110	<170	<110	<110	<130
2-Chlorophenol	<120	<150	<120	<100	<110	<170	<110	<110	<130
2-Fluorobiphenyl	<120	<150	<120	<100	<110	<170	<110	<110	<130

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	RM724A2(X3)	RM726R1	RM727A1(X1)	RM729A1(X1)	RM730A1	RM732R1	RM733A1(X1)	RM734A1	RM736A1(X1)
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
2-Methylphenol	<120	<150	<120	<100	<110	<170	<110	<110	<130
2-Nitroaniline	<310	<380	<310	<250	<280	<440	<290	<280	<330
2-Nitrophenol	<120	<150	<120	<100	<110	<170	<110	<110	<130
3,3'-Dichlorobenzidine	<120	<150	<120	<100	<110	<170	<110	<110	<130
3-Nitroaniline	<310	<380	<310	<250	<280	<440	<290	<280	<330
4-Bromophenyl phenyl ether	<120	<150	<120	<100	<110	<170	<110	<110	<130
4-Chloro-3-methylphenol	<120	<150	<120	<100	<110	<170	<110	<110	<130
4-Chloroaniline	<120	<150	<120	<100	<110	<170	<110	<110	<130
4-Chlorophenyl phenyl ether	<120	<150	<120	<100	<110	<170	<110	<110	<130
4-Methylphenol	<120	<150	<120	<100	<110	<170	<110	<110	<130
4-Nitroaniline	<310	<380	<310	<250	<280	<440	<290	<280	<330
4-Nitrophenol	<310	<380	<310	<250	<280	<440	<290	<280	<330
Acetophenone	<120	<150	<120	<100	<110	<170	<110	<110	<130
Atrazine	<120	<150	<120	<100	<110	<170	<110	<110	<130
Benzaldehyde	<120	<150	<120	<100	<110	<170	<110	<110	<130
Benzoic acid	<120	<150	<120	<100	<110	<170	<110	<110	<130
Benzyl alcohol	<120	<150	<120	<100	<110	<170	<110	<110	<130
Bis(2-Chloroethoxy)methane	<120	<150	<120	<100	<110	<170	<110	<110	<130
Bis(2-chloroethyl)ether	<120	<150	<120	<100	<110	<170	<110	<110	<130
Bis(2-ethylhexyl) phthalate	<120	<150	<120	40.0	25.0	82.0	110	<110	<130
Butyl benzyl phthalate	<120	<150	<120	<100	<110	<170	<110	<110	<130
Caprolactam	<120	<150	<120	<100	<110	<170	<110	<110	<130
Diethyl phthalate	<120	<150	<120	<100	<110	<170	<110	<110	<130
Dimethyl phthalate	<120	<150	<120	<100	<110	<170	<110	<110	<130
Di-n-butyl phthalate	<120	<150	<120	<100	<110	<170	<110	<110	<130
Dinitro-o-cresol	<310	<380	<310	<250	<280	<440	<290	<280	<330
Di-N-octyl phthalate	<120	<150	<120	<100	<110	<170	<110	<110	<130
Hexachlorobutadiene	<0.5	<0.6	<0.49	<0.39	<0.43	<0.69	<0.45	<0.43	<0.52

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM724A2(X3)**	**RM726R1**	**RM727A1(X1)**	**RM729A1(X1)**	**RM730A1**	**RM732R1**	**RM733A1(X1)**	**RM734A1**	**RM736A1(X1)**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
Hexachloroethane	<120	<150	<120	<100	<110	<170	<110	<110	<130
N-Nitrosodi-n-propylamine	<120	<150	<120	<100	<110	<170	<110	<110	<130
N-Nitrosodiphenylamine	<120	<150	<120	<100	<110	<170	<110	<110	<130
Pentachlorophenol	<310	<380	<310	<250	<280	<440	<290	<280	<330
Phenol	<120	<150	<120	<100	<110	<170	<110	<110	<130
Pentachloroanisole	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mean Quotients and other models (no units)									
Ratio of Copper to Aluminum	0.0788	0.00242	0.022	0.0594	0.064	0.00208	0.0674	0.0544	0.0202
Ratio of Zinc to Cadmium	3820	104	427	1140	1340	37.7	2830	2560	409
Mean metals PECQ (Ingersoll et al. 2001)	4.01	0.157	0.893	0.718	2.31	0.127	4.91	2.09	1.13
Mean metals PECQ (Ingersoll et al. 2001) - OC normalized	6.32	0.04	1.36	2.77	15.0	0.0505	12.8	34.3	1.79
Mean PECQ (Ingersoll et al. 2001)	1.34	0.0586	0.302	0.243	0.773	0.0486	1.64	0.700	0.380

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	RM737A1(X3)	RM738A1(X3)	RM739A1(X3)	RM740A1(X1)	RM741A1(X3)	RM742A1(X1)	RM742A2(X5)	RM743A1(X1)	RM743A2(X3)
Conventionals (%)									
Organic carbon, total	0.144	0.325	0.569	0.543	0.401	0.0896	0.143	0.702	0.246
Moisture, percent	NA	NA	NA	NA	NA	NA	NA	NA	NA
Clay, percent	0.0805	0.109	0.740	0.226	0.242	0.0460	0.0590	0.168	0.137
Silt, percent	2.21	2.98	13.9	10.8	11.6	4.46	5.69	8.02	8.65
Fines, percent (silt+clay)	2.29	3.08	14.7	11.1	11.9	4.51	5.75	8.19	8.78
Sand - fine, percent	39.9	45.1	75.5	68.0	85.7	92.8	82.1	84.7	90.0
Sand - medium, percent	57.8	51.8	3.30	6.70	1.90	2.60	11.9	5.60	0.800
Sand - coarse, percent	0.00	0.00	1.60	4.70	0.300	0.00	0.00	0.700	0.00
Sand, percent	97.7	96.9	80.4	79.4	87.9	95.4	94.0	91.0	90.8
Gravel, percent	0.00	0.00	4.80	9.30	0.00	0.00	0.100	0.600	0.100
Metals (mg/kg DW)									
Aluminum, total	14600	21100	7030	5740	6590	6080	12100	7370	5560
Antimony, total	62.5	25.2	25.4	6.20	24.1	19.0	41.7	20.7	14.1
Arsenic, total	3.60	8.50	7.90	5.20	8.20	6.30	8.20	8.70	4.70
Barium, total	1490	1140	327	268	437	516	966	406	398
Beryllium, total	1.30	1.50	0.700	0.730	0.610	0.600	0.990	0.72	0.71
Cadmium, total	1.20	0.27	1.80	2.00	2.10	3.40	0.650	2.00	1.70
Calcium, total	47100	58300	18000	17800	21900	41700	34500	18800	18100
Chromium, total	111	100	29.1	21.5	33.1	29.6	72.3	28.5	28.6
Cobalt, total	59.4	38.1	12.2	8.30	14.3	14.3	34.9	10.1	11.8
Copper, total	1920	1630	367	181	458	399	1240	356	325
Iron, total	172000	207000	35700	25200	44600	39200	99700	42500	34200
Lead, total	163	215	114	118	166	182	221	201	142
Magnesium, total	5270	6810	8130	8440	8340	17700	4630	7950	8140
Manganese, total	3050	3410	570	429	819	745	2080	616	613
Mercury, total	0.220	<0.12	0.300	0.140	0.170	0.160	0.0520	0.170	0.120
Nickel, total	11.6	9.30	12.0	11.0	9.90	10.6	10.9	11.1	9.90

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM737A1(X3)**	**RM738A1(X3)**	**RM739A1(X3)**	**RM740A1(X1)**	**RM741A1(X3)**	**RM742A1(X1)**	**RM742A2(X5)**	**RM743A1(X1)**	**RM743A2(X3)**
Metals (mg/kg DW) cont'd									
Potassium, total	3200	4020	1180	1190	1120	1050	2130	1060	1210
Selenium, total	13.0	19.5	4.80	<5	7.40	9.20	11.4	7.00	<4.7
Silver, total	<1.2	<1.2	<1.5	<1.4	<1.2	<1.3	<1.2	<1.3	<1.3
Sodium, total	1630	1770	390	226	438	534	1220	386	251
Thallium, total	<3	<3	<3.7	1.50	<3.1	<3.2	<3.1	<3.2	<3.3
Uranium, total	<23.8	<23.8	<29.9	9.40	<24.8	<25.3	<24.4	<25.9	16.4
Vanadium, total	35.1	41.3	22.6	21.4	21.5	23.1	28.1	24.2	20.6
Zinc, total	12300	14400	2120	1480	3190	2920	8330	2560	2380
Simultaneously extracted metals (SEM; µmol/g)									
Simultaneously extracted antimony	0.0945	0.00378	0.0164	0.0189	0.0329	0.0501	0.0386	0.0361	0.0246
Simultaneously extracted arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted cadmium	0.0222	0.0133	0.01600	0.00810	0.00658	0.00836	<0.000142	0.0125	0.00810
Simultaneously extracted chromium	1.54	0.783	0.169	0.169	0.248	0.438	0.658	0.223	0.252
Simultaneously extracted copper	13.8	<0.000441	1.59	1.86	3.05	5.27	6.85	2.97	3.64
Simultaneously extracted lead	0.642	0.0555	0.454	0.408	0.579	0.792	0.618	0.806	0.618
Simultaneously extracted mercury	<0.00000304	<0.00000274	0.0000033	0.00000269	0.00000279	0.00000299	<0.00000314	0.00000548	0.00000489
Simultaneously extracted nickel	0.366	0.448	0.227	1.22	0.0443	0.0477	0.0409	0.063	0.0443
Simultaneously extracted zinc	171	126	14.9	15.2	29.8	54.9	84.6	29.4	31.5
Acid volatile sulfides	2.50	1.39	2.1	1.06	3.70	4.70	11.6	0.965	2.60
SEM minus AVS	184	125	15.1	17.6	29.8	56.3	80.5	32.3	33.2
SEM minus AVS, OC normalized	128000	38400	2660	3240	7440	62900	56300	4600	13500
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)									
2-Methylnaphthalene	0.400	0.400	0.500	0.600	0.700	0.200	0.200	0.500	0.500
Acenaphthene	<5	<5	<6	0.2	0.2	<5	<5	<6	<6
Acenaphthylene	<5	<5	<6	<5	<6	<5	<5	<6	<6
Anthracene	<5	<5	<6	0.4	0.2	<5	<5	<6	<6

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM737A1(X3)**	**RM738A1(X3)**	**RM739A1(X3)**	**RM740A1(X1)**	**RM741A1(X3)**	**RM742A1(X1)**	**RM742A2(X5)**	**RM743A1(X1)**	**RM743A2(X3)**
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW) cont'd									
Fluorene	<5	<5	<6	<5	<6	<5	<5	<6	<6
Naphthalene	1.00	1.00	2.00	1.00	2.00	4.30	0.900	4.80	4.70
Phenanthrene	0.200	<5	2.00	21.5	2.00	0.400	0.400	0.900	0.900
Total Low-Molecular Weight PAHs	11.6	13.9	16.5	28.7	11.1	14.9	11.5	18.2	18.1
Benz(a)anthracene	<5	<5	1.00	1.00	3.00	0.200	0.400	0.500	0.900
Benzo(a)pyrene	<5	<5	<6	<5	4.00	<5	0.600	<6	0.900
Chrysene	<5	<5	2.00	11.5	4.00	0.400	2.00	0.900	1.00
Dibenz(a,h)anthracene	<5	<5	<6	<5	1.00	<5	<5	<6	<6
Fluoranthene	<5	<5	3.00	22.5	5.00	0.600	0.600	1.00	2.00
Pyrene	<5	<5	2.00	17.5	4.00	0.400	0.600	0.900	2.00
Total High-Molecular Weight PAHs	<30	<30	14.0	57.5	21.0	6.600	6.70	9.30	9.80
PAHs, total	26.6	28.9	30.5	86.2	32.1	21.5	18.2	27.5	27.9
ΣESB_{TU} (based on 13 PAHs)	0.0824	0.0398	0.0251	0.0655	0.0363	0.126	0.0561	0.020	0.0548
Dibenzofuran	<5	<5	<6	0.200	<6	<5	<5	0.2	<6
Benzo(b)fluoranthene	<5	<5	<6	<5	4.00	<5	0.900	<6	2.00
Benzo(g,h,i)perylene	<5	<5	<6	1.00	3.00	<5	0.600	<6	0.900
Benzo(k)fluoranthene	<5	<5	<6	<5	2.00	<5	0.600	<6	1.00
Indeno(1,2,3-c,d)pyrene	<5	<5	<6	1.00	3.00	<5	0.600	<6	0.900
Polychlorinated Biphenyls (PCBs; µg/kg DW)									
Aroclor 1016	<1.1	<1	<1.2	<1	<1.2	<1	<1.1	<1.2	<1.2
Aroclor 1221	<4.3	<4.1	<5	<4.2	<4.8	<4.2	<4.3	<4.7	<4.7
Aroclor 1232	<4.3	<4.1	<5	<4.2	<4.8	<4.2	<4.3	<4.7	<4.7
Aroclor 1242	<1.1	<1	<1.2	<1	<1.2	<1	<1.1	<1.2	<1.2
Aroclor 1248	<1.1	<1	<1.2	<1	<1.2	<1	<1.1	<1.2	<1.2
Aroclor 1254	<1.1	<1	<1.2	<1	<1.2	<1	<1.1	<1.2	<1.2
Aroclor 1260	<1.1	<1	<1.2	<1	<1.2	<1	<1.1	<1.2	<1.2
PCBs, total	<14.1	<13.2	<16	<13.4	<15.6	<13.4	<14.1	<15.4	<15.4

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	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM737A1(X3)**	**RM738A1(X3)**	**RM739A1(X3)**	**RM740A1(X1)**	**RM741A1(X3)**	**RM742A1(X1)**	**RM742A2(X5)**	**RM743A1(X1)**	**RM743A2(X3)**
Organochlorine Pesticides (µg/kg DW)									
Hexachlorocyclopentadiene	<110	<100	<130	<100	<120	<100	<110	<230	<110
Isophorone	<110	<100	<130	<100	<120	<100	<110	<230	<110
Aldrin	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Chlordane, cis-	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Chlordane, trans-	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Chlordane (cis & trans)	<0.84	<0.82	<1	<0.84	<0.94	<0.84	<0.86	<0.94	<0.92
Dieldrin	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94
gamma-BHC (Lindane)	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Hexachlorocyclohexane-delta	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
o,p'-DDD	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94
p,p'-DDD	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94
DDDs, sum of p,p'-DDD and o,p'-DDD	<1.72	<1.64	<2	<1.7	<1.92	<1.7	<1.74	<1.9	<1.88
o,p'-DDE	<0.86	<0.82	<1	<0.85	<0.96	0.48	<0.87	<0.95	<0.94
p,p'-DDE	<0.86	<0.82	<1	0.120	<0.96	0.36	<0.87	0.650	<0.94
DDEs, sum of p,p'-DDE and o,p'-DDE	<1.72	<1.64	<2	0.545	<1.92	0.84	<1.74	1.13	<1.88
o,p'-DDT	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94
p,p'-DDT	<0.86	<0.82	<1	<0.85	<0.96	0.85	<0.87	<0.95	<0.94
DDTs, sum of p,p'-DDT and o,p'-DDT	<1.72	<1.64	<2	<1.7	<1.92	1.28	<1.74	<1.9	<1.88
DDTs, total of 6 isomers	<5.16	<4.92	<6	2.25	<5.76	2.97	<5.22	3.03	<5.64
Endosulfan sulfate	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94
Endosulfan-alpha	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Endosulfan-beta	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94
Endrin	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94
Endrin aldehyde	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94
Endrin ketone	<0.86	<0.82	<1	<0.85	<0.96	<0.85	<0.87	<0.95	<0.94
Heptachlor	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Heptachlor epoxide	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Hexachlorobenzene	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM737A1(X3)**	**RM738A1(X3)**	**RM739A1(X3)**	**RM740A1(X1)**	**RM741A1(X3)**	**RM742A1(X1)**	**RM742A2(X5)**	**RM743A1(X1)**	**RM743A2(X3)**
Organochlorine Pesticides (µg/kg DW) cont'd									
Hexachlorocyclohexane-alpha	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Hexachlorocyclohexane-beta	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Methoxychlor	<4.2	<4.1	<5	<4.2	<4.7	<4.2	<4.3	<4.7	<4.6
Nonachlor, cis-	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Nonachlor, trans-	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Oxychlordane	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46
Toxaphene	<42	<41	<50	<42	<47	<42	<43	<47	<46
Semi-Volatile and Volatile Compounds (µg/kg DW)									
1,2,4-Trichlorobenzene	<110	<100	<130	<100	<120	<100	<110	<230	<110
1,2-Dichlorobenzene	<110	<100	<130	<100	<120	<100	<110	<230	<110
1,3-Dichlorobenzene	<110	<100	<130	<100	<120	<100	<110	<230	<110
1,4-Dichlorobenzene	<110	<100	<130	<100	<120	<100	<110	<230	<110
2,2'-Oxybis(1-chloropropane)	<110	<100	<130	<100	<120	<100	<110	<230	<110
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,5,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	<270	<260	<320	<260	<300	<260	<270	<590	<290
2,4,6-Trichlorophenol	<110	<100	<130	<100	<120	<100	<110	<230	<110
2,4-Dichlorophenol	<110	<100	<130	<100	<120	<100	<110	<230	<110
2,4-Dimethylphenol	<110	<100	<130	<100	<120	<100	<110	<230	<110
2,4-Dinitrophenol	<270	<260	<320	<260	<300	<260	<270	<590	<290
2,4-Dinitrotoluene	<110	<100	<130	<100	<120	<100	<110	<230	<110
2,6-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	<110	<100	<130	<100	<120	<100	<110	<230	<110
2-Chloronaphthalene	<110	<100	<130	<100	<120	<100	<110	<230	<110
2-Chlorophenol	<110	<100	<130	<100	<120	<100	<110	<230	<110
2-Fluorobiphenyl	<110	<100	<130	<100	<120	<100	<110	<230	<110

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM737A1(X3)**	**RM738A1(X3)**	**RM739A1(X3)**	**RM740A1(X1)**	**RM741A1(X3)**	**RM742A1(X1)**	**RM742A2(X5)**	**RM743A1(X1)**	**RM743A2(X3)**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
2-Methylphenol	<110	<100	<130	<100	<120	<100	<110	<230	<110
2-Nitroaniline	<270	<260	<320	<260	<300	<260	<270	<590	<290
2-Nitrophenol	<110	<100	<130	<100	<120	<100	<110	<230	<110
3,3'-Dichlorobenzidine	<110	<100	<130	<100	<120	<100	<110	<230	<110
3-Nitroaniline	<270	<260	<320	<260	<300	<260	<270	<590	<290
4-Bromophenyl phenyl ether	<110	<100	<130	<100	<120	<100	<110	<230	<110
4-Chloro-3-methylphenol	<110	<100	<130	<100	<120	<100	<110	<230	<110
4-Chloroaniline	<110	<100	<130	<100	<120	<100	<110	<230	<110
4-Chlorophenyl phenyl ether	<110	<100	<130	<100	<120	<100	<110	<230	<110
4-Methylphenol	<110	<100	<130	<100	<120	<100	<110	<230	<110
4-Nitroaniline	<270	<260	<320	<260	<300	<260	<270	<590	<290
4-Nitrophenol	<270	<260	<320	<260	<300	<260	<270	<590	<290
Acetophenone	<110	<100	<130	<100	<120	<100	<110	<230	<110
Atrazine	<110	<100	<130	<100	<120	<100	<110	<230	<110
Benzaldehyde	<110	<100	<130	<100	<120	<100	<110	<230	<110
Benzoic acid	<110	<100	<130	<100	<120	<100	<110	<230	<110
Benzyl alcohol	<110	<100	<130	<100	<120	<100	<110	<230	<110
Bis(2-Chloroethoxy)methane	<110	<100	<130	<100	<120	<100	<110	<230	<110
Bis(2-chloroethyl)ether	<110	<100	<130	<100	<120	<100	<110	<230	<110
Bis(2-ethylhexyl) phthalate	<110	<100	<130	<100	<120	<100	<110	<230	<110
Butyl benzyl phthalate	<110	<100	<130	<100	<120	<100	<110	<230	<110
Caprolactam	<110	<100	<130	<100	<120	<100	<110	<230	<110
Diethyl phthalate	<110	<100	<130	<100	<120	<100	<110	<230	<110
Dimethyl phthalate	<110	<100	<130	<100	<120	<100	<110	<230	<110
Di-n-butyl phthalate	<110	<100	<130	<100	<120	<100	<110	<230	<110
Dinitro-o-cresol	<270	<260	<320	<260	<300	<260	<270	<590	<290
Di-N-octyl phthalate	<110	<100	<130	<100	<120	<100	<110	<230	<110
Hexachlorobutadiene	<0.42	<0.41	<0.5	<0.42	<0.47	<0.42	<0.43	<0.47	<0.46

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Stefanoff *et al.* 2006; Schut and Stefanoff 2007								
COPC	**RM737A1(X3)**	**RM738A1(X3)**	**RM739A1(X3)**	**RM740A1(X1)**	**RM741A1(X3)**	**RM742A1(X1)**	**RM742A2(X5)**	**RM743A1(X1)**	**RM743A2(X3)**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
Hexachloroethane	<110	<100	<130	<100	<120	<100	<110	<230	<110
N-Nitrosodi-n-propylamine	<110	<100	<130	<100	<120	<100	<110	<230	<110
N-Nitrosodiphenylamine	<110	<100	<130	<100	<120	<100	<110	<230	<110
Pentachlorophenol	<270	<260	<320	<260	<300	<260	<270	<590	<290
Phenol	<110	<100	<130	<100	<120	<100	<110	<230	<110
Pentachloroanisole	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mean Quotients and other models (no units)									
Ratio of Copper to Aluminum	0.132	0.0773	0.0522	0.0315	0.0695	0.0656	0.102	0.0483	0.0585
Ratio of Zinc to Cadmium	10300	53300	1180	740	1520	859	12800	1280	1400
Mean metals PECQ (Ingersoll et al. 2001)	6.08	6.49	1.30	0.906	1.78	1.69	4.21	1.53	1.35
Mean metals PECQ (Ingersoll et al. 2001) - OC normalized	42.2	20.0	2.28	1.67	4.46	18.8	29.4	2.17	5.47
Mean PECQ (Ingersoll et al. 2001)	2.03	2.17	0.437	0.307	0.599	0.567	1.41	0.513	0.453

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Besser *et al.* 2008								
COPC	**RM744A1(X1)**	**RM744A2(X3)**	**LR1**	**LR2**	**LR3**	**LR4**	**LR5**	**LR6**	**LR7**
Conventionals (%)									
Organic carbon, total	0.400	0.112	0.330	2.70	1.80	0.230	1.60	1.50	0.280
Moisture, percent	NA	NA	27.0	73.0	56.0	27.0	52.0	55.0	26.0
Clay, percent	0.125	0.0540	3.00	27.0	54.0	7.00	44.0	5.00	<1
Silt, percent	7.97	3.53	15.0	39.0	39.0	13.0	14.0	13.0	9.00
Fines, percent (silt+clay)	8.09	3.58	18.0	66.0	93.0	20.0	58.0	18.0	9.50
Sand - fine, percent	84.0	61.8	NA	NA	NA	NA	NA	NA	NA
Sand - medium, percent	7.50	34.5	NA	NA	NA	NA	NA	NA	NA
Sand - coarse, percent	0.200	0.100	NA	NA	NA	NA	NA	NA	NA
Sand, percent	91.7	96.4	82.0	34.0	7.0	80.0	43.0	82.0	92.0
Gravel, percent	0.00	0.00	NA	NA	NA	NA	NA	NA	NA
Metals (mg/kg DW)									
Aluminum, total	5310	12300	NA	NA	NA	NA	NA	NA	NA
Antimony, total	21.2	29.6	NA	NA	NA	NA	NA	NA	NA
Arsenic, total	6.90	10.7	8.60	22.0	13.0	2.80	8.60	9.90	32.0
Barium, total	415	1200	NA	NA	NA	NA	NA	NA	NA
Beryllium, total	0.540	1.20	NA	NA	NA	NA	NA	NA	NA
Cadmium, total	1.50	<0.62	0.300	7.70	7.10	0.200	4.30	4.30	4.30
Calcium, total	20000	38400	NA	NA	NA	NA	NA	NA	NA
Chromium, total	26.4	89.3	NA	NA	NA	NA	NA	NA	NA
Cobalt, total	13.6	50.1	NA	NA	NA	NA	NA	NA	NA
Copper, total	390	1540	10.0	84.0	68.0	12.0	78.0	290	2800
Iron, total	35800	124000	NA	NA	NA	NA	NA	NA	NA
Lead, total	141	183	10.0	270	400	9.00	220	200	1110
Magnesium, total	7440	3960	NA	NA	NA	NA	NA	NA	NA
Manganese, total	718	2410	NA	NA	NA	NA	NA	NA	NA
Mercury, total	0.150	0.0480	0.00300	0.840	1.10	0.0100	0.650	0.320	0.0200
Nickel, total	9.70	11.2	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Besser *et al.* 2008								
COPC	**RM744A1(X1)**	**RM744A2(X3)**	**LR1**	**LR2**	**LR3**	**LR4**	**LR5**	**LR6**	**LR7**
Metals (mg/kg DW) cont'd									
Potassium, total	1010	2400	NA	NA	NA	NA	NA	NA	NA
Selenium, total	<4.1	<4.3	NA	NA	NA	NA	NA	NA	NA
Silver, total	<1.2	0.710	NA	NA	NA	NA	NA	NA	NA
Sodium, total	368	1390	NA	NA	NA	NA	NA	NA	NA
Thallium, total	1.10	<3.1	NA	NA	NA	NA	NA	NA	NA
Uranium, total	11.4	54.7	NA	NA	NA	NA	NA	NA	NA
Vanadium, total	20.1	28.3	NA	NA	NA	NA	NA	NA	NA
Zinc, total	2480	9940	81.0	970	910	54.0	940	3100	26000
Simultaneously extracted metals (SEM; µmol/g)									
Simultaneously extracted antimony	0.0411	0.137	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted arsenic	NA	NA	0.0200	0.0814	0.0721	0.0107	0.0414	0.0574	0.174
Simultaneously extracted cadmium	0.00480	<0.000133	0.00205	0.0578	0.0578	0.00160	0.0276	0.016	0.0107
Simultaneously extracted chromium	0.288	1.46	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted copper	3.98	15.4	0.0268	0.724	0.598	0.0393	0.787	2.83	15.7
Simultaneously extracted lead	0.632	0.709	0.0241	1.16	1.83	0.0241	1.01	0.965	2.85
Simultaneously extracted mercury	0.00000598	0.00000150	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted nickel	0.0477	0.0784	0.0170	0.341	0.153	0.0341	0.119	0.102	0.119
Simultaneously extracted zinc	39.6	153	0.321	10.9	9.38	0.245	10.9	38.2	245
Acid volatile sulfides	0.0470	8.70	0.0400	3.10	0.600	0.010	1.40	7.40	11.0
SEM minus AVS	44.2	160	0.350	10.1	11.5	0.342	11.4	35.4	258
SEM minus AVS, OC normalized	11100	143000	106	375	637	149	714	2360	92200
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)									
2-Methylnaphthalene	0.200	<6	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	<5	<6	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	<5	<6	NA	NA	NA	NA	NA	NA	NA
Anthracene	<5	<6	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Besser *et al.* 2008								
COPC	**RM744A1(X1)**	**RM744A2(X3)**	**LR1**	**LR2**	**LR3**	**LR4**	**LR5**	**LR6**	**LR7**
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW) cont'd									
Fluorene	<5	<6	NA	NA	NA	NA	NA	NA	NA
Naphthalene	4.40	4.50	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	0.400	0.400	NA	NA	NA	NA	NA	NA	NA
Total Low-Molecular Weight PAHs	15.0	19.9	NA	NA	NA	NA	NA	NA	NA
Benz(a)anthracene	0.400	0.200	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	<5	<6	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.900	0.400	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	<5	<6	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	0.900	0.900	NA	NA	NA	NA	NA	NA	NA
Pyrene	0.600	0.700	NA	NA	NA	NA	NA	NA	NA
Total High-Molecular Weight PAHs	7.80	8.20	NA	NA	NA	NA	NA	NA	NA
PAHs, total	22.8	28.1	NA	NA	NA	NA	NA	NA	NA
ΣESB_{TU} (based on 13 PAHs)	0.0271	0.104	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	<5	<6	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.900	0.400	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	0.400	0.400	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.600	0.200	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-c,d)pyrene	0.600	<6	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (PCBs; µg/kg DW)									
Aroclor 1016	<1.1	<1.1	NA	NA	NA	NA	NA	NA	NA
Aroclor 1221	<4.3	<4.4	NA	NA	NA	NA	NA	NA	NA
Aroclor 1232	<4.3	<4.4	NA	NA	NA	NA	NA	NA	NA
Aroclor 1242	<1.1	<1.1	NA	NA	NA	NA	NA	NA	NA
Aroclor 1248	<1.1	<1.1	NA	NA	NA	NA	NA	NA	NA
Aroclor 1254	<1.1	<1.1	NA	NA	NA	NA	NA	NA	NA
Aroclor 1260	<1.1	<1.1	NA	NA	NA	NA	NA	NA	NA
PCBs, total	<14.1	<14.3	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Besser *et al.* 2008								
COPC	**RM744A1(X1)**	**RM744A2(X3)**	**LR1**	**LR2**	**LR3**	**LR4**	**LR5**	**LR6**	**LR7**
Organochlorine Pesticides (µg/kg DW)									
Hexachlorocyclopentadiene	<110	<110	NA	NA	NA	NA	NA	NA	NA
Isophorone	<110	<110	NA	NA	NA	NA	NA	NA	NA
Aldrin	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Chlordane, cis-	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Chlordane, trans-	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Chlordane (cis & trans)	<0.86	<0.86	NA	NA	NA	NA	NA	NA	NA
Dieldrin	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclohexane-delta	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
p,p'-DDD	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
DDDs, sum of p,p'-DDD and o,p'-DDD	<1.72	<1.76	NA	NA	NA	NA	NA	NA	NA
o,p'-DDE	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
p,p'-DDE	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
DDEs, sum of p,p'-DDE and o,p'-DDE	<1.72	<1.76	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
p,p'-DDT	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
DDTs, sum of p,p'-DDT and o,p'-DDT	<1.72	<1.76	NA	NA	NA	NA	NA	NA	NA
DDTs, total of 6 isomers	<5.16	<5.28	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
Endosulfan-alpha	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Endosulfan-beta	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
Endrin	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	<0.86	<0.88	NA	NA	NA	NA	NA	NA	NA
Heptachlor	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Besser *et al.* 2008								
COPC	**RM744A1(X1)**	**RM744A2(X3)**	**LR1**	**LR2**	**LR3**	**LR4**	**LR5**	**LR6**	**LR7**
Organochlorine Pesticides (µg/kg DW) cont'd									
Hexachlorocyclohexane-alpha	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclohexane-beta	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	<4.3	<4.3	NA	NA	NA	NA	NA	NA	NA
Nonachlor, cis-	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Nonachlor, trans-	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Oxychlordane	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA
Toxaphene	<43	<43							
Semi-Volatile and Volatile Compounds (µg/kg DW)									
1,2,4-Trichlorobenzene	<110	<110	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	<110	<110	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	<110	<110	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	<110	<110	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	<110	<110	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,5,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	<270	<280	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	<110	<110	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	<110	<110	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	<110	<110	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	<270	<280	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	<110	<110	NA	NA	NA	NA	NA	NA	NA
2,6-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	<110	<110	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	<110	<110	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	<110	<110	NA	NA	NA	NA	NA	NA	NA
2-Fluorobiphenyl	<110	<110	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Besser *et al.* 2008								
COPC	**RM744A1(X1)**	**RM744A2(X3)**	**LR1**	**LR2**	**LR3**	**LR4**	**LR5**	**LR6**	**LR7**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
2-Methylphenol	<110	<110	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	<270	<280	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	<110	<110	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	<110	<110	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	<270	<280	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl phenyl ether	<110	<110	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	<110	<110	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	<110	<110	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl phenyl ether	<110	<110	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	<110	<110	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	<270	<280	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	<270	<280	NA	NA	NA	NA	NA	NA	NA
Acetophenone	<110	<110	NA	NA	NA	NA	NA	NA	NA
Atrazine	<110	<110	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	<110	<110	NA	NA	NA	NA	NA	NA	NA
Benzoic acid	<110	<110	NA	NA	NA	NA	NA	NA	NA
Benzyl alcohol	<110	<110	NA	NA	NA	NA	NA	NA	NA
Bis(2-Chloroethoxy)methane	<110	<110	NA	NA	NA	NA	NA	NA	NA
Bis(2-chloroethyl)ether	<110	<110	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl) phthalate	<110	<110	NA	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	<110	<110	NA	NA	NA	NA	NA	NA	NA
Caprolactam	<110	<110	NA	NA	NA	NA	NA	NA	NA
Diethyl phthalate	<110	<110	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	<110	<110	NA	NA	NA	NA	NA	NA	NA
Di-n-butyl phthalate	<110	<110	NA	NA	NA	NA	NA	NA	NA
Dinitro-o-cresol	<270	<280	NA	NA	NA	NA	NA	NA	NA
Di-N-octyl phthalate	<110	<110	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	<0.43	<0.43	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Besser *et al.* 2008								
COPC	**RM744A1(X1)**	**RM744A2(X3)**	**LR1**	**LR2**	**LR3**	**LR4**	**LR5**	**LR6**	**LR7**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
Hexachloroethane	<110	<110	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodi-n-propylamine	<110	<110	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	<110	<110	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	<270	<280	NA	NA	NA	NA	NA	NA	NA
Phenol	<110	<110	NA	NA	NA	NA	NA	NA	NA
Pentachloroanisole	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mean Quotients and other models (no units)									
Ratio of Copper to Aluminum	0.0734	0.125	NA	NA	NA	NA	NA	NA	NA
Ratio of Zinc to Cadmium	1650	32100	270	126	128	270	219	721	6050
Mean metals PECQ (Ingersoll et al. 2001)	1.44	4.98	0.129	1.40	1.48	0.0787	1.08	2.29	17.2
Mean metals PECQ (Ingersoll et al. 2001) - OC normalized	3.60	44.4	0.391	0.519	0.822	0.342	0.675	1.53	61.4
Mean PECQ (Ingersoll et al. 2001)	0.483	1.66	0.129	1.40	1.48	0.0787	1.08	2.29	17.2

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Bortleson *et al.* 1994								
COPC	**SA8**	**2**	**8**	**10**	**11**	**14**	**15**	**17**	**19**
Conventionals (%)									
Organic carbon, total	1.90	0.800	0.100	0.100	0.200	0.400	1.90	2.90	2.20
Moisture, percent	48.0	NA	NA	NA	NA	NA	NA	NA	NA
Clay, percent	44.0	NA	NA	NA	NA	NA	NA	NA	NA
Silt, percent	32.0	NA	NA	NA	NA	NA	NA	NA	NA
Fines, percent (silt+clay)	76.0	9.00	1.00	0.00	5.00	25.0	22.0	41.0	33.0
Sand - fine, percent	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sand - medium, percent	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sand - coarse, percent	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sand, percent	24.0	NA	NA	NA	NA	NA	NA	NA	NA
Gravel, percent	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals (mg/kg DW)									
Aluminum, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic, total	8.40	1.10	27.0	27.0	29.0	NA	12.0	14.0	9.40
Barium, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, total	0.480	<0.4	<2.8	<3.8	<2.4	NA	5.20	6.50	4.60
Calcium, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, total	22.0	7.60	2500	2800	2800	NA	510	530	220
Iron, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, total	16.0	18.0	300	260	290	NA	330	460	270
Magnesium, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, total	0.0300	0.008	0.100	0.0600	0.0500	NA	0.400	0.600	0.400
Nickel, total	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Bortleson *et al.* 1994								
COPC	**SA8**	**2**	**8**	**10**	**11**	**14**	**15**	**17**	**19**
Metals (mg/kg DW) cont'd									
Potassium, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, total	120	46.0	12000	14000	16000	NA	3200	2900	1300
Simultaneously extracted metals (SEM; µmol/g)									
Simultaneously extracted antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted arsenic	0.0400	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted cadmium	0.00338	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted copper	0.121	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted lead	0.0820	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted nickel	0.102	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted zinc	0.581	NA	NA	NA	NA	NA	NA	NA	NA
Acid volatile sulfides	0.400	NA	NA	NA	NA	NA	NA	NA	NA
SEM minus AVS	0.484	NA	NA	NA	NA	NA	NA	NA	NA
SEM minus AVS, OC normalized	25.5	NA	NA	NA	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)									
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Bortleson *et al.* 1994								
COPC	**SA8**	**2**	**8**	**10**	**11**	**14**	**15**	**17**	**19**
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW) cont'd									
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Low-Molecular Weight PAHs	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benz(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total High-Molecular Weight PAHs	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAHs, total	NA	NA	NA	NA	NA	NA	NA	NA	NA
ΣESB_{TU} (based on 13 PAHs)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-c,d)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (PCBs; µg/kg DW)									
Aroclor 1016	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1221	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1232	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1242	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1248	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1254	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs, total	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Bortleson *et al.* 1994								
COPC	**SA8**	**2**	**8**	**10**	**11**	**14**	**15**	**17**	**19**
Organochlorine Pesticides (µg/kg DW)									
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane, cis-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane, trans-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane (cis & trans)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclohexane-delta	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
p,p'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDDs, sum of p,p'-DDD and o,p'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA
p,p'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDEs, sum of p,p'-DDE and o,p'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA
p,p'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDTs, sum of p,p'-DDT and o,p'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDTs, total of 6 isomers	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan-alpha	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan-beta	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Bortleson *et al.* 1994								
COPC	**SA8**	**2**	**8**	**10**	**11**	**14**	**15**	**17**	**19**
Organochlorine Pesticides (µg/kg DW) cont'd									
Hexachlorocyclohexane-alpha	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclohexane-beta	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nonachlor, cis-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nonachlor, trans-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oxychlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene									
Semi-Volatile and Volatile Compounds (µg/kg DW)									
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,5,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Fluorobiphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Bortleson *et al.* 1994								
COPC	**SA8**	**2**	**8**	**10**	**11**	**14**	**15**	**17**	**19**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl phenyl ether	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl phenyl ether	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzoic acid	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl alcohol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dinitro-o-cresol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-N-octyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Bortleson *et al.* 1994								
COPC	**SA8**	**2**	**8**	**10**	**11**	**14**	**15**	**17**	**19**
Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd									
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodi-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachloroanisole	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mean Quotients and other models (no units)									
Ratio of Copper to Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ratio of Zinc to Cadmium	250	230	8570	7370	13300	NA	615	446	283
Mean metals PECQ (Ingersoll et al. 2001)	0.177	0.0731	9.27	10.5	11.4	NA	2.88	3.04	1.53
Mean metals PECQ (Ingersoll et al. 2001) - OC normalized	0.0932	0.0913	92.7	105	57.0	NA	1.51	1.05	0.693
Mean PECQ (Ingersoll et al. 2001)	0.177	0.0731	9.27	10.5	11.4	NA	2.88	3.04	1.53

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Bortleson *et al.* 1994							
COPC	**20**	**22**	**38**	**46**	**57**	**61**	**62**	**71**
Conventionals (%)								
Organic carbon, total	3.30	2.50	2.60	1.40	0.60	1.60	2.30	1.30
Moisture, percent	NA	NA	NA	NA	NA	NA	NA	NA
Clay, percent	NA	NA	NA	NA	NA	NA	NA	NA
Silt, percent	NA	NA	NA	NA	NA	NA	NA	NA
Fines, percent (silt+clay)	82.0	82.0	97.0	94.0	48.0	99.0	85.0	95.0
Sand - fine, percent	NA	NA	NA	NA	NA	NA	NA	NA
Sand - medium, percent	NA	NA	NA	NA	NA	NA	NA	NA
Sand - coarse, percent	NA	NA	NA	NA	NA	NA	NA	NA
Sand, percent	NA	NA	NA	NA	NA	NA	NA	NA
Gravel, percent	NA	NA	NA	NA	NA	NA	NA	NA
Metals (mg/kg DW)								
Aluminum, total	NA	NA	NA	NA	NA	NA	NA	NA
Antimony, total	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic, total	NA	NA	11.0	NA	NA	11.0	3.70	8.10
Barium, total	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium, total	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, total	NA	NA	11.0	NA	NA	9.40	<1.4	5.60
Calcium, total	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, total	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, total	NA	NA	NA	NA	NA	NA	NA	NA
Copper, total	NA	NA	200	NA	NA	66.0	25.0	51.0
Iron, total	NA	NA	NA	NA	NA	NA	NA	NA
Lead, total	NA	NA	580	NA	NA	280	15.0	170
Magnesium, total	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, total	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, total	NA	NA	0.700	NA	NA	0.400	0.030	0.200
Nickel, total	NA	NA	NA	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Bortleson *et al.* 1994							
COPC	**20**	**22**	**38**	**46**	**57**	**61**	**62**	**71**
Metals (mg/kg DW) cont'd								
Potassium, total	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, total	NA	NA	NA	NA	NA	NA	NA	NA
Silver, total	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, total	NA	NA	NA	NA	NA	NA	NA	NA
Thallium, total	NA	NA	NA	NA	NA	NA	NA	NA
Uranium, total	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, total	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, total	NA	NA	1200	NA	NA	950	120	610
Simultaneously extracted metals (SEM; µmol/g)								
Simultaneously extracted antimony	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted arsenic	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted cadmium	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted chromium	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted copper	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted lead	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted mercury	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted nickel	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously extracted zinc	NA	NA	NA	NA	NA	NA	NA	NA
Acid volatile sulfides	NA	NA	NA	NA	NA	NA	NA	NA
SEM minus AVS	NA	NA	NA	NA	NA	NA	NA	NA
SEM minus AVS, OC normalized	NA	NA	NA	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW)								
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	<2.5	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	<36	<51	NA	NA	NA	NA	NA
Anthracene	NA	<26	<41	NA	NA	NA	NA	NA

Appendix A9.2. Summary of whole-sediment chemistry data compiled to support the development of thresholds for predicting the toxicity of sediments from the Upper Columbia River.

	Bortleson *et al.* 1994							
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Polycyclic Aromatic Hydrocarbons (PAHs; µg/kg DW) cont'd								
Fluorene	NA	<19	<31	NA	NA	NA	NA	NA
Naphthalene	NA	<120	<140	NA	NA	NA	NA	NA
Phenanthrene	NA	<120	<150	NA	NA	NA	<13	NA
Total Low-Molecular Weight PAHs	NA	<323.5	<413	NA	NA	NA	<13	NA
Benz(a)anthracene	NA	<56	<88	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	<84	<140	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	<53	<71	NA	NA	NA	<6.9	NA
Pyrene	NA	<29	<38	NA	NA	NA	NA	NA
Total High-Molecular Weight PAHs	NA	<222	<337	NA	NA	NA	<6.9	NA
PAHs, total	NA	<545.5	<750	NA	NA	NA	<19.9	NA
ΣESB_{TU} (based on 13 PAHs)	NA	0.0528	0.0677	NA	NA	NA	0.00189	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-c,d)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (PCBs; µg/kg DW)								
Aroclor 1016	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1221	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1232	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1242	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1248	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1254	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1260	NA	NA	NA	NA	NA	NA	NA	NA
PCBs, total	NA	NA	NA	NA	NA	NA	NA	NA

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	Bortleson *et al.* 1994							
COPC	**20**	**22**	**38**	**46**	**57**	**61**	**62**	**71**
Organochlorine Pesticides (µg/kg DW)								
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane, cis-	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane, trans-	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane (cis & trans)	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclohexane-delta	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	NA	NA	NA	NA	NA	NA	NA	NA
p,p'-DDD	NA	NA	NA	NA	NA	NA	NA	NA
DDDs, sum of p,p'-DDD and o,p'-DDD	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDE	NA	NA	NA	NA	NA	NA	NA	NA
p,p'-DDE	NA	NA	NA	NA	NA	NA	NA	NA
DDEs, sum of p,p'-DDE and o,p'-DDE	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	NA	NA	NA	NA	NA	NA	NA	NA
p,p'-DDT	NA	NA	NA	NA	NA	NA	NA	NA
DDTs, sum of p,p'-DDT and o,p'-DDT	NA	NA	NA	NA	NA	NA	NA	NA
DDTs, total of 6 isomers	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan-alpha	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan-beta	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA

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	Bortleson *et al.* 1994							
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Organochlorine Pesticides (µg/kg DW) cont'd								
Hexachlorocyclohexane-alpha	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclohexane-beta	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA
Nonachlor, cis-	NA	NA	NA	NA	NA	NA	NA	NA
Nonachlor, trans-	NA	NA	NA	NA	NA	NA	NA	NA
Oxychlordane	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene								
Semi-Volatile and Volatile Compounds (µg/kg DW)								
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	NA	<0.2	<0.2	NA	NA	NA	NA	NA
2,3,5,6-Tetrachlorophenol	NA	<0.2	<0.2	NA	NA	NA	NA	NA
2,3,6-Trichlorophenol	NA	<0.2	<0.2	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	<0.2	<0.2	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	<0.2	<0.2	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	<0.2	<0.2	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	<18	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dichlorophenol	NA	<0.2	<0.2	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA
2-Fluorobiphenyl	NA	NA	NA	NA	NA	NA	NA	NA

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Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd								
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl phenyl ether	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl phenyl ether	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA
Benzoic acid	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl alcohol	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl) phthalate	NA	<84	NA	NA	NA	NA	980	NA
Butyl benzyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA
Diethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butyl phthalate	NA	NA	NA	NA	NA	NA	590	NA
Dinitro-o-cresol	NA	NA	NA	NA	NA	NA	NA	NA
Di-N-octyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA

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Semi-Volatile and Volatile Compounds (µg/kg DW) cont'd								
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodi-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	<0.2	<0.2	NA	NA	NA	NA	NA
Phenol	NA	<74	<95	NA	NA	NA	<49	NA
Pentachloroanisole	NA	<0.2	<0.2	NA	NA	NA	NA	NA
Mean Quotients and other models (no units)								
Ratio of Copper to Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Ratio of Zinc to Cadmium	NA	NA	109	NA	NA	101	171	109
Mean metals PECQ (Ingersoll et al. 2001)	NA	NA	2.21	NA	NA	1.38	0.160	0.874
Mean metals PECQ (Ingersoll et al. 2001) - OC normalized	NA	NA	0.848	NA	NA	0.865	0.0695	0.672
Mean PECQ (Ingersoll et al. 2001)	NA	0.0239	1.11	NA	NA	1.38	0.0801	0.874