Chlorinated Pesticides, PCBs, and Dioxins in Yakima River Fish in 2006: Data Summary and Comparison to Human Health Criteria

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Chlorinated Pesticides, PCBs, and Dioxins in Yakima River Fish in 2006: Data Summary and Comparison to Human Health Criteria

by
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Waterbody Numbers:
Yakima River (WA-37-1010, -1020, -1040 and
WA-39-1010, -1030, -1060, -1070)
Kachess Lake (WA-39-9040)
Keechelus Lake (WA-39-9050)

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Abstract

Chlorinated pesticides, polychlorinated biphenyls (PCBs), and polychlorinated dioxins and furans (PCDDs/PCDFs) were analyzed in resident Yakima River fish collected in 2006. Fillet and whole fish samples were obtained throughout the mainstem, from the storage reservoirs in the headwaters to within a few miles of the river mouth. The survey was conducted to assess progress in meeting Total Maximum Daily Load targets for DDT and dieldrin, verify 303(d) listings for other organochlorine compounds, and provide data to the Washington State Department of Health to update the 1993 fish consumption advisory for the river.

This report summarizes data on the primary contaminants of concern in fish fillets and compares the results to federal Clean Water Act 303(d) human health criteria for fish consumption. Appendices contain the complete chemical and biological data from the survey, and include historical data on chemical contaminants in Yakima River fish. Polybrominated diphenyl ethers (PBDEs) were analyzed on a subset of the 2006 samples as part of a separate study; these data are also included in the appendices.

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Introduction

Total Maximum Daily Loads (TMDLs) have been established for suspended sediment in the Yakima River to bring the river into compliance with Washington State water quality standards for chlorinated pesticides and turbidity. A TMDL establishes the maximum pollutant load a waterbody can assimilate without violating standards.

Waterbodies that exceed standards and thus require TMDLs are identified on the federal Clean Water Act Section 303(d) list. The U.S. Environmental Protection Agency (EPA) requires states to compile a new list every two-to-four years. The lower Yakima River was first listed for DDT, dieldrin, and other chlorinated pesticides in 1994, based on fish and water samples analyzed by the Washington State Department of Ecology (Ecology) and the U.S. Geological Survey. The upper Yakima River was similarly listed for DDT compounds and dieldrin in 1996.

The basic premise behind the Yakima TMDLs was that suspended sediment from erosion of farm soils is the primary vehicle by which DDT, dieldrin, and other chlorinated pesticides were being introduced to the river at levels that adversely affected aquatic life and caused an increased health risk to people consuming fish. These pesticides were banned in the 1970s and 1980s, but persist in soil and aquatic habitats. The Washington State Department of Health (WDOH) issued a fish consumption advisory for DDT in the lower Yakima River in 1993. (www.doh.wa.gov/ehp/oehas/EHA_fish_adv.htm).

The TMDL schedule for the upper Yakima River called for monitoring DDT and dieldrin in 2006 to assess progress toward meeting Washington State human health criteria for fish and water consumption (Joy, 2002). The schedule for the lower Yakima River called for developing a strategy to meet the human health criteria for DDT in 2007 (Joy and Patterson, 1997).

Washington State's 303(d) list for 2002/2004 has Yakima River fish tissue listings for a number of additional organochlorine compounds including chlordane, alpha-BHC, polychlorinated biphenyls (PCBs), and polychlorinated dioxins and furans (PCDDs/PCDFs), (www.ecy.wa.gov/programs/wq/303d/index.html). Chlordane and alpha-BHC are chlorinated pesticides. PCBs were used in closed industrial systems such as electrical transformers and capacitors, plasticizers, lubricants, and hydraulic fluids. PCDDs/PCDFs are unintended byproducts of combustion and certain industrial processes. All uses of chlordane, alpha-BHC, and PCBs were banned in the 1970s and 1980s. These chemicals have not yet been addressed through the TMDL process.

In light of the TMDL targets for 2006/2007 and the recent 303(d) listings for other chemicals, the Ecology Water Quality Program requested a survey to determine current levels of organochlorine compounds in resident fish throughout the Yakima River. Field work for this study was conducted by the Ecology Environmental Assessment Program during 2006.

The objectives of the Yakima River fish tissue survey were to:

1. Determine if chlorinated pesticide levels have decreased in resident fish species as a result of reduced suspended sediment loading.
2. Evaluate compliance with the human health criteria for DDT compounds, dieldrin, and other 303(d) listed compounds.
3. Provide data to WDOH to update the fish consumption advisory.

Objective 2 is addressed in the present report. The report has descriptions of the study design, field procedures, and laboratory methods; assesses the quality of the data; and summarizes results for the primary contaminants of concern. The appendices contain the complete chemical and biological data from the survey and include historical data on chemical contaminants in Yakima River fish.

Objective 1 will be addressed in the report on a TMDL evaluation of chlorinated pesticides, PCBs, suspended sediment, and turbidity in the Yakima River, which was initiated in April 2007 (Johnson et al., 2007). The fish tissue data have been provided to WDOH for their use in updating the fish consumption advisory (Objective 3). A completion date for the new advisory is not known at this time.

This survey was conducted following a quality assurance project plan (Johnson, 2006).

Sampling Design

Fish were collected from seven areas on the Yakima River system (Figure 1). Samples were obtained from Keechelus Lake and Kachess Lake, two of the three storage reservoirs on the upper Yakima. Keechelus is listed for PCBs and dioxin, based on the EPA National Study of Chemical Residues in Lake Fish Tissue (unpublished 2001 data). Kachess Lake, which lacks the highway and development around Keechelus, was sampled to give a more representative assessment of upstream conditions and to put the Keechelus results in perspective.

Fish were collected from five reaches further down on the mainstem: below Cle Elum, Yakima Canyon (Umtanum–Wymer), Wapato–Toppenish, Sunnyside–Prosser, and Kiona–Horn Rapids. These areas have been the focus of historical fish tissue studies and are positioned below major tributary, irrigation, and urban inputs.

The numbers and types of fish tissue samples analyzed are shown in Table 1. An effort was made to collect two-to-four species of interest at each site. Species diversity is generally greatest in the mid- and lower Yakima mainstem.

The species most frequently analyzed historically were targeted: largescale suckers (*Catostomus macrocheilus*), bridgelip suckers (*Catostomus columbianus*), mountain whitefish (*Prosopium williamsoni*), smallmouth bass (*Micropterus dolomieu*), pike minnow (*Ptychocheilus oregonensis*), and common carp (*Cyprinus carpio*).

Kokanee (*Oncorhynchus nerka*) and cutthroat trout (*Oncorhynchus clarkii)* were obtained from the storage reservoirs. Rainbow trout (*Oncorhynchus mykiss*) could not be taken at any location because the steelhead (a sea-going rainbow) is listed under the Endangered Species Act.

Fillets were analyzed for all fish samples. Limited numbers of whole fish samples were also analyzed for comparison with historical data. The whole fish samples were from those reaches with the most data: Yakima Canyon, Wapato–Toppenish, Granger–Prosser, and Kiona–Horn Rapids Dam. Each fillet and whole fish sample consisted of a composite of pooled tissues from multiple individual fish, typically five. Composite samples provide a more cost-efficient estimate of mean contaminant concentrations than single fish samples.

Only a limited number of samples establish chlorinated pesticide levels in Yakima River fish at or near the time the TMDLs were initiated in 1997. The historical data against which progress toward achieving TMDL targets can be judged are for sample sizes of three or less (most often one or two) for any given species and location. Sample size for the present study is equivalent to or better than the historical data. WDOH requested that at least three composite fillet samples be analyzed for each species and location for their human health evaluation (Dave McBride, Office of Environmental Health Assessments, personal communication).

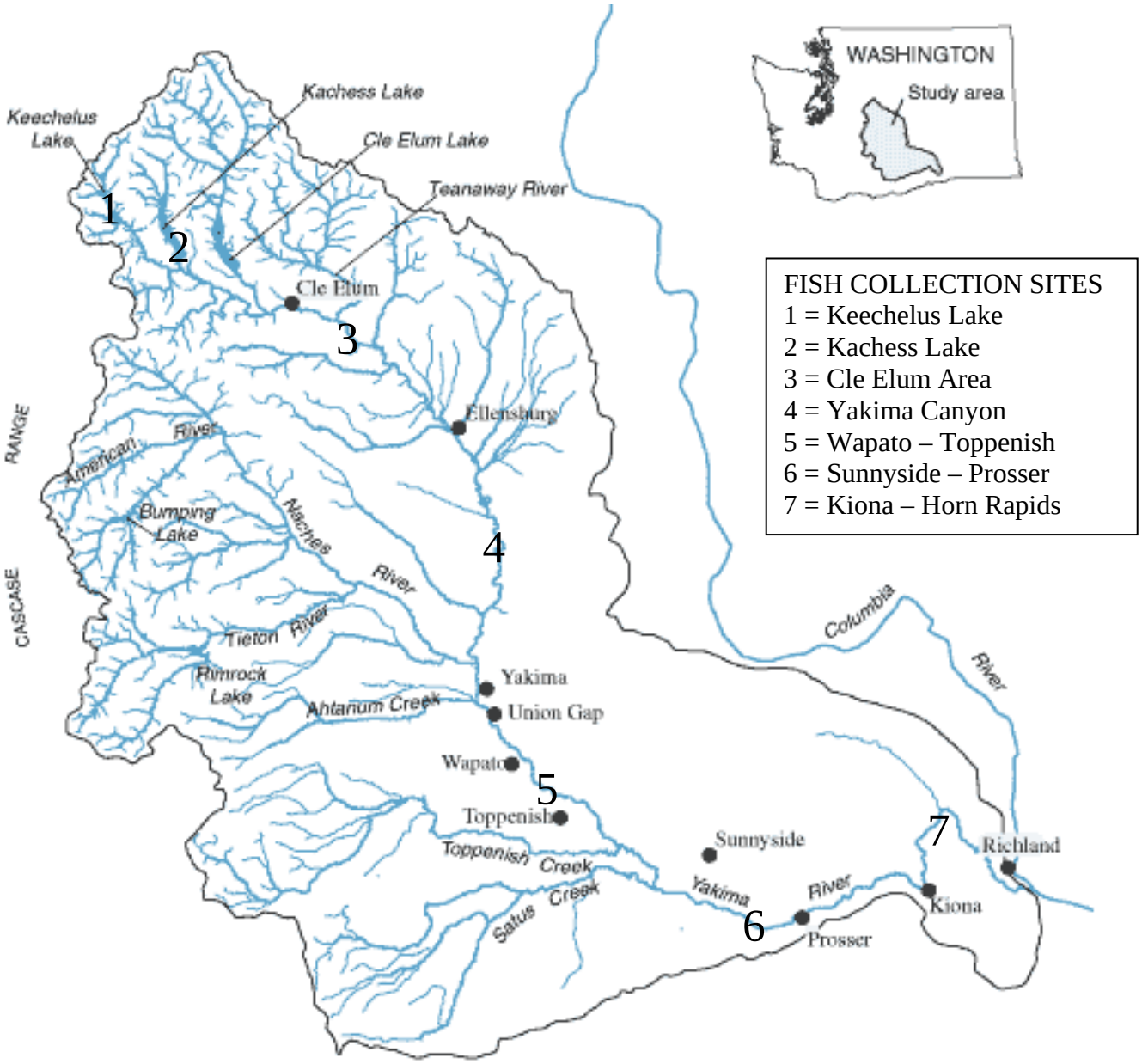

Figure 1. Sampling Sites for Ecology's 2006 Yakima River Fish Tissue Survey (http://wa.water.usgs.gov/projects/yakimawarsmp/maps.htm)

Table 1. Number and Type of Fish Tissue Samples Analyzed for 2006 Yakima River Fish Tissue Survey

Sampling Site	Fillet Samples*			Whole Fish Samples*			Totals
	Species	Per Species	Subtotals	Species	Per Species	Subtotals	
Keechelus Lake	5	2-3	13	0	0	0	13
Kachess Lake	2	3	6	0	0	0	6
Cle Elum	3	3	9	0	0	0	9
Umtanum-Wymer	3	3	9	2	3	6	15
Wapato-Toppenish	3	3	9	3	3	9	18
Sunnyside-Prosser	3	3	9	2	3	6	15
Above Horn Rapids Dam	4	3	12	3	3	9	21
			67			30	97

*composites of three-to-five fish each

All of the 2006 samples were analyzed for chlorinated pesticides, PCBs (as Aroclor-equivalents), and percent lipids. To reduce laboratory cost, the PCDD/PCDF analysis (~$800/sample) was limited to one composite sample per species per location. Aliquots from all fish used in the associated pesticide/PCB samples for that species and location were composited to give a representative PCDD/PCDF result. No analyses were conducted for PCB congeners or for PCDDs/PCDFs in whole fish, since this information is available in EPA (2002). A subset of the 2006 samples was also analyzed for polybrominated diphenyl ethers (PBDEs) as part of Ecology's Washington State Toxics Monitoring Program (WSTMP; www.ecy.wa.gov/programs/eap/toxics/wstmp.htm). The PBDE data are included in the appendix to this report, but not discussed further here beyond analytical methods and data quality.

Due to the time required to obtain collection permits, and a permit requirement that water temperatures be less than 18^{o}C when fish sampling was conducted, field work got underway in early September 2006 and was completed in mid-November 2006. The irrigation season extends from April into October. Fish collections for similar studies in the Yakima have occurred as early as March and as late as October. Most of the sampling has been during the summer and fall, which is also the period when sport and subsistence fishing is most active.

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Methods

Field Procedures

Fish were primarily collected by electroshocking. A few fish were also obtained with beach seines in the storage reservoirs and with hook and line in the lower river. Only legal size fish were taken. For species with no size limits, only those large enough to reasonably be retained for consumption were taken. The latitude and longitude of the sampling sites was recorded from a Global Positioning System (GPS).

Fish selected for analysis were killed by a blow to the head. Each fish was given a unique identifying number, and its length and weight recorded. The fish were individually wrapped in aluminum foil, put in plastic bags, and placed on ice for transport to Ecology headquarters, where the samples were frozen pending preparation of tissue samples.

Preparation of Tissue Samples

Tissue samples were prepared follow the guidance in EPA (2000). Techniques to minimize potential for sample contamination were used. People preparing the samples wore non-talc nitrile gloves and worked on heavy-duty aluminum foil or a polyethylene cutting board. The gloves and foil were changed between samples; the cutting board was cleaned between samples as described below.

The fish were thawed enough to remove the foil wrapper and rinsed with tap water, then deionized water, to remove any adhering debris. The entire fillet from one or both sides of each fish was removed with stainless steel knives and homogenized in a Kitchen-Aid or Hobart commercial blender. The fillets were scaled and analyzed skin-on. Whole fish were homogenized in a Hobart blender. The sex of each fish was recorded. Fish age was not determined.

Most of the composites consisted of pooled tissues from five individual fish, except 15 fish for the PCDD/PCDF analysis. In a few instances, only three or four fish were available for compositing. To the extent possible, the length of the smallest fish in a composite was no less than 75% of the length of the largest fish. The composites were prepared using equal weights from each fish. The pooled tissues were homogenized to uniform color and consistency, using three passes through the blender. The homogenates were placed in 4–8 oz. glass jars with Teflon lid liners, cleaned to EPA (1990) QA/QC specifications.

Resecting instruments, cutting boards, and blender parts were cleaned by washing in tap water with Liquinox detergent, followed by sequential rinses with tap water, de-ionized water, and pesticide-grade acetone. The items were then air dried on aluminum foil in a fume hood before use.

The tissue samples were refrozen for shipment with chain-of-custody record to the Ecology Manchester Environmental Laboratory (MEL). The samples were stored frozen at MEL until analyzed. Excess samples were stored frozen at Ecology Headquarters. The holding time for tissue samples being analyzed for organochlorines is up to one year (PSWQAT, 1997; Method 1668A).

Chemical Analysis

The methods used to extract and analyze the samples are shown in Table 2. Chlorinated pesticides, PCBs, PBDEs, and percent lipids were analyzed at MEL. PCDDs and PCDFs were analyzed at Pacific Rim Laboratories, Surrey, BC.

Table 2. Laboratory Procedures for 2006 Yakima River Fish Tissue Survey

Analysis	Sample Prep Method	Analytical Method
Chlorinated Pesticides	EPA 3540/3620/3665	EPA 8081
PCBs (Aroclors)	EPA 3540/3620/3666	EPA 8082
PCDDs/PCDFs	NA	EPA 1613B
PBDEs	EPA 3540	EPA 8270
Percent lipids	extraction	EPA 608.5

NA = not applicable

Data Quality

Manchester Environmental Laboratory (MEL) prepared written case narratives assessing the quality of these data. The reviews include a description of analytical methods and an assessment of holding times, tuning, initial and continuing calibration verification and degradation checks, method blanks, matrix spike/matrix spike duplicate recoveries, laboratory control samples, surrogate recoveries, internal standard recoveries, ion abundance ratios, laboratory duplicates, and standard reference materials. The case narratives are available on request.

Instances where the results failed to meet measurement quality objectives established for the study (Johnson, 2006) or other shortcomings in the data are described below.

Chlorinated Pesticides

Low recoveries of continuing calibration verification standards, surrogates, matrix spikes, or laboratory control samples were variously encountered for delta BHC, endosulfan I, endosulfan II, endosulfan sulfate, dieldrin, endrin, endrin ketone, endrin aldehyde, and methoxychlor in some samples. The associated results were qualified as not detected at an estimated detection limit (UJ flag) or as estimates when detected (J flag). The case narrative should be consulted for details. Dieldrin is the only chemical among this group that occurs at significant levels in Yakima River fish.

PCBs and Toxaphene

PCBs and toxaphene were present in every sample. (Only one storage reservoir sample was analyzed for toxaphene). These compounds have similar polarities and elute in the same area of the chromatogram. Chromatographic isolation of each compound is difficult due to co-eluting peaks. Therefore, all PCB and toxaphene results reported as detected were qualified as estimates. These results should be considered biased high.

PCDDs/PCDFs

Pentachlorodibenzofuran (PeCDF) congeners were present above the detection limit in the method blank for the lower Yakima River samples. This appeared to be the result of random contamination as several samples were clean for PeCDFs. Where these analytes were also detected in the samples at a concentration less than 10 times the blank, the results were reported as not detected (U flag). In addition, the totals for each homologue group were qualified as estimates.

Internal standard recoveries for each congener were within control limits of 25-150%, except for 13C12-OCDD in sample 454114. OCDD was a minor constituent in these samples and did not contribute significantly to the TEQs (2,3,7,8-TCDD toxic equivalents) of the overall PCDD/ PCDF mixture.

PBDEs

No significant problems were encountered in the PBDE analysis.

Percent Lipids

All lipids results were within established quality control (QC) acceptance limits.

Variability of the Data

The field variability inherent in the chemical residues accumulated by fish was minimized by using composite samples. Estimates of analytical precision were obtained by analyzing laboratory splits. Results for the chemicals of primary concern in edible fish tissue are summarized for fillet samples in Table 3.

For chlorinated pesticides, the relative percent difference (RPD) between duplicates was less than 12%, except for one DDT result (sample #444232–31% RPD) and several results near the detection limit where a compound was detected in only one of the duplicate pairs. RPDs for total PCBs were less than 10%, except for one result (sample #454108–17% RPD). RPDs for 2,3,7,8-TCDD and dioxin/furan TEQs were 0–7%.

A single sample was analyzed in duplicate for the WSTMP PBDE samples. RPDs for the seven PBDE congeners detected ranged from 1–12% (data not tabulated).

Table 3. Precision of Chemical Analyses on Duplicate (Split) Fish Fillet Samples - Selected Compounds (ug/Kg, parts per billion; except ng/Kg, parts per trillion for TCDD; wet weight)

Species	Northern Pike Minnow			Mountain Whitefish		
Location	Keechelus Lake			Yakima Canyon		
Sample No.	394092	duplicate	RPD (%)	414051	duplicate	RPD (%)
4,4'-DDT	0.40 U	0.39 U	0	2.0	1.9	3
4,4'-DDE	1.8	1.8	0	23	19	10
4,4'-DDD	0.40 U	0.39 U	0	0.70	0.63	5
Dieldrin	0.40 U	0.39 U	0	0.24 J	0.40 UJ	>25
cis-Chlordane	0.40 U	0.39 U	0	0.24 J	0.40 U	>25
trans-Chlordane	0.40 U	0.39 U	0	0.39 U	0.40 U	0
cis-Nonachlor	0.40 UJ	0.39 UJ	0	0.84	0.73	7
trans-Nonachlor	0.40 U	0.39 U	0	0.87	0.80	4
Oxychlordane	0.40 U	0.39 U	0	0.39 U	0.40 U	0
alpha-BHC	0.40 U	0.39 U	0	0.39 U	0.40 U	0
Toxaphene	NA	NA	- -	2.0 U	2.0 U	0
Total PCBs	15.9 J	15.8 J	0.3	21.0 J	19.6 J	3

Species	Common Carp			Smallmouth Bass		
Location	Kiona - Horn Rapids			Kiona - Horn Rapids		
Sample No.	444232	duplicate	RPD (%)	454108	duplicate	RPD (%)
4,4'-DDT	4.2 J	2.2 J	31	1.3	1.3	0
4,4'-DDE	380	340	6	78	52 E	*
4,4'-DDD	17	14	10	3.8	3.8	0
Dieldrin	0.80	0.77 J	2	0.62 J	0.61 J	1
cis-Chlordane	0.39 U	0.50	>12	0.39 U	0.39 U	0
trans-Chlordane	0.39 U	0.38 U	0	0.39 U	0.39 U	0
cis-Nonachlor	3.9 UJ	3.5 UJ	0	0.66	0.66	0
trans-Nonachlor	1.9	1.8	3	0.46	0.46	0
Oxychlordane	0.39 U	0.38 U	0	0.39 U	0.39 U	0
alpha-BHC	0.39 U	0.38 U	0	0.39 U	0.39 U	0
Toxaphene	43 J	34 J	12	1.9 U	0.39 U	0
Total PCBs	54 J	48 J	6	16.0 J	11.4 J	17

Table 3 (cont.).

Species	Largescale Sucker		
Location	Wapato - Toppenish		
Sample No.	484230	duplicate	RPD (%)
4,4'-DDT	4.9	4.9	0
4,4'-DDE	55	60	4
4,4'-DDD	3.8	4.2	5
Dieldrin	0.75 UJ	1.2 J	>23
cis-Chlordane	0.39 U	0.39 U	0
trans-Chlordane	0.39 U	0.39 U	0
cis-Nonachlor	0.43 UJ	0.43 UJ	0
trans-Nonachlor	0.53	0.59	5
Oxychlordane	0.39 U	0.39 U	0
alpha-BHC	0.39 U	0.39 U	0
Toxaphene	4.8 U	4.9 U	0
Total PCBs	14 J	14.1 J	0.4

Species	Common Carp		
Location	Sunnyside - Proser		
Sample No.	454114	duplicate	RPD (%)
2,3,7,8-TCDD	0.030 UJ	0.030 UJ	0
TEQ	0.21	0.21	0

Species	Northern Pike Minnow		
Location	Keechlus Lake		
Sample No.	394094	duplicate	RPD (%)
2,3,7,8-TCDD	0.030 UJ	0.030 UJ	0
TEQ (ND=0)	0.20	0.23	7

RPD = relative percent difference (range/mean x 100)
U = not detected at or above reported value
J = estimated value
UJ = not detected at or above estimated value
E = exceeds calibration range
*not calculated, duplicate exceeded calibration range but was not reanalyzed
NA = not analyzed
TEQ (ND=0) = 2,3,7,8-TCDD Toxic Equivalents (non-detects set at zero)

Data Summary and Criteria Comparison

Fillet Samples

Table 4 summarizes the results on the Yakima River fish fillet samples collected in 2006, showing average concentrations of 303(d) listed compounds for each species at each location. The values Ecology uses to place waterbodies on the 303(d) list for exceeding human health criteria for fish consumption are shown at the bottom of the table. Concentrations that exceed criteria are highlighted in bold font. Although not currently 303(d) listed, toxaphene is included here because it exceeded criteria. A more detailed comparison to the criteria is provided in the section that follows.

Table 4. Mean Concentrations of 303(d) Listed Compounds and Toxaphene in Composite Samples* of Yakima River Fish Fillets (ug/Kg, parts per billion; except ng/Kg, parts per trillion for TCDD; wet weight)

Reach	Species	N =	DDE	Dieldrin	Total Chlordane	Alpha-BHC	Total PCBs	Toxaphene	2,3,7,8-TCDD
				UPPER YAKIMA RIVER					
Kachess Lake	Sucker	3	0.83	0.40 U	0.40 U	0.40 U	2.0 U	NA	0.030 UJ
"	Pike Minnow	3	3.7	0.40 U	0.40 U	0.40 U	**16** J	NA	0.030 UJ
Keechelus Lake	Sucker	3	2.2	0.38 U	0.38 U	0.40 U	**13** J	NA	0.030
"	Pike Minnow	2	2.6	0.40 U	0.40 U	0.40 U	**17** J	NA	0.030 UJ
"	Kokanee	3	2.2	0.40 UJ	0.70 J	0.40 U	**15** J	NA	0.030 UJ
"	Cutthroat	3	0.61	0.39 U	0.23 J	0.40 U	**5.6** J	2 U	0.030 UJ
"	Whitefish	2	0.73	0.39 U	0.39 U	0.40 U	**9.6** J	NA	0.030 UJ
Cle Elum	Sucker	2	7.1	0.39 U	0.41 J	0.40 U	**9.5** J	5 U	0.030 UJ
"	Pike Minnow	3	11	0.39 U	0.57 J	0.40 U	4.9 J	5 U	0.030 UJ
"	Whitefish	3	10	0.40 UJ	2.0 J	0.40 U	**16**	2 U	**0.15**
Yakima Canyon	Sucker	3	12	**0.93**	1.1 J	0.40 U	**9.4** J	5 U	0.030 UJ
"	Pike Minnow	3	31	**0.77**	2.3 J	0.40 U	**24**	2 U	0.030 UJ
"	Whitefish	3	**34**	0.35 J	2.9 J	0.40 U	**24**	2 U	0.030 UJ
				LOWER YAKIMA RIVER					
Wapato	Sucker	3	**63**	**0.99** J	0.59 J	0.40 U	**13**	5.0 U	0.030 UJ
"	Pike Minnow	3	**113**	**0.81**	0.74 J	0.40 U	**16**	7.0	0.030 UJ
"	Whitefish	3	**100**	**1.3** J	2.0 J	0.40 U	**28**	**11**	**0.24**
Prosser	Sucker	3	**100**	**2.3** J	0.68 J	0.39 U	**16** J	**14** J	0.030 UJ
"	Smallmouth Bass	3	**38**	**0.74** J	0.39 U	0.39 U	4.0 J	8.4 J	0.030 UJ
"	Carp	3	**500**	0.59 J	**10**	0.39 U	**88**	**56** J	0.030 UJ
Horn Rapids	Sucker	3	**82**	**0.95**	1.8 J	0.40 U	**34**	**10** J	0.030 UJ
"	Pike Minnow	3	**78**	**2.7** J	0.56 U	0.40 U	**7.9** J	**17** J	**0.010** J
"	Smallmouth Bass	3	**54**	**0.79**	0.99 U	0.39 U	**18**	1.9 U	0.030 UJ
"	Carp	3	**520**	**1.3** J	5.3 J	0.40 U	**96**	**55** J	0.030 UJ
303(d) Human Health Criteria			32	0.65	8.3	1.7	5.3	9.8	0.07

Bold values exceed criteria
*4-5 individuals per composite, except 8-15 for TCDD

U = not detected
UJ = not detected; detection limit is an estimate

J = estimated value
NA = not analyzed

Of the four remaining 303(d) listed compounds, DDT, DDD, and endosulfan results are not shown because the concentrations were low and chlorpyrifos was not analyzed due to limited potential for bioaccumulation. All other chemicals analyzed met human health criteria.

Whole Fish Samples

Table 5 summarizes the whole fish results. Whole fish data are not used for 303(d) listing purposes because the human health criteria apply to edible tissues only and most segments of the population do not consume fish whole. TCDD was not analyzed in the whole fish samples.

Table 5. Mean Concentrations of 303(d) Listed Compounds and Toxaphene in Composite Whole Body Samples* of Yakima River Fish (ug/Kg, parts per billion; except ng/Kg, parts per trillion for TCDD; wet weight)

Reach	Species	N =	DDE	Dieldrin	Total Chlordane	Alpha-BHC	Total PCBs	Toxaphene
			UPPER YAKIMA RIVER					
Yakima Canyon	Sucker	3	29	0.5 J	3.2 J	0.40 U	13 J	4.5 J
"	Whitefish	3	66	0.3 J	6.7	0.40 U	27 J	2.0 U
			LOWER YAKIMA RIVER					
Wapato	Sucker	3	169	2.8 J	3.1 J	0.40 U	41 J	17 J
"	Pike Minnow	3	325	2.1 J	2.8 J	0.40 U	49 J	28 J
"	Whitefish	3	123	1.2 J	2.6 J	0.40 U	30 J	13 J
Prosser	Sucker	3	274	5.8 J	4.8 J	0.40 U	53 J	21 J
"	Smallmouth Bass	3	243	2.9 J	2.3	0.40 U	34 J	12 J
Horn Rapids	Sucker	3	198	4.6 J	4.1 J	0.40 U	40 J	18 J
"	Pike Minnow	3	195	6.2 J	3.6 J	0.40 U	45 J	24 J
"	Smallmouth Bass	3	206	5.0 J	4.8 J	0.40 U	50 J	23 J

*4-5 individuals per composite, except 8-15 for TCDD
U = not detected
J = estimated value

On average, the chlorinated pesticide and PCB residues in whole fish averaged 3-4 times higher than in the corresponding fillets.

Criteria Comparison

Washington State water quality criteria for the protection of human health are applied to the state through the EPA National Toxics Rule (NTR) (40 CFR 131.36(14). In freshwater, the criteria take into account the combined exposure of drinking the water and eating fish that live in the water. The criteria protect against non-carcinogenic illness and keep the risk of developing cancer to a pre-specified level.

EPA has classed all the Table 4 chemicals as probable human carcinogens. In Washington, the cancer risk is set such that no more than 1 in 1,000,000 people with full exposure would be likely to develop cancer in response to that exposure. Full exposure is defined by a set of assumptions on body size, fish and water consumption, and the number of years exposed. The risk is correlated to an average-size man consuming 6.5 grams of fish per day (approximately 5 pounds per year), drinking 2 liters of water per day (if freshwater), and continuing this pattern for 70 years. For the chemicals of concern in the present study, almost all of the cancer risk is from fish consumption. People with higher or lower exposure patterns would face higher or lower risks.

The edible fish tissue criteria that Ecology uses to place waterbodies on the 303(d) list are derived from the human health criteria and EPA bioconcentration factors (BCFs). The BCF predicts the chemical concentration in fish tissue that would be expected to result for a given concentration in the water column. In essence, the 303(d) fish tissue criteria are the NTR water quality criteria expressed in tissue form. Ecology uses these criteria as screening-level indicators for water quality impairments.

WDOH is the agency responsible for making statements about human health risk from fish consumption. While WDOH supports Ecology's use of the NTR criteria for identifying problems and controlling pollutant sources so that water quality will meet standards, WDOH does not use the NTR criteria to establish fish consumption advisories (McBride, 2006). WDOH uses an approach similar to that in EPA's Guidance for Assessing Chemical Contaminant Data for use in Fish Advisories, Vol. 1-4 (EPA, 2000). These guidance documents provide a framework from which states can evaluate fish tissue data to develop fish consumption advisories, based on sound science and established procedures in risk assessment, risk management, and risk communication. The NTR criteria do not incorporate the varied risk management decisions essential to developing fish consumption advisories.

The Table 4 data were plotted to illustrate how concentrations of 303(d) listed compounds change moving downstream in the Yakima River (Figure 2). These figures identify reaches where concentrations are above or below NTR human health criteria. Comparison with the average is appropriate in this case since the concern is for long-term fish consumption.

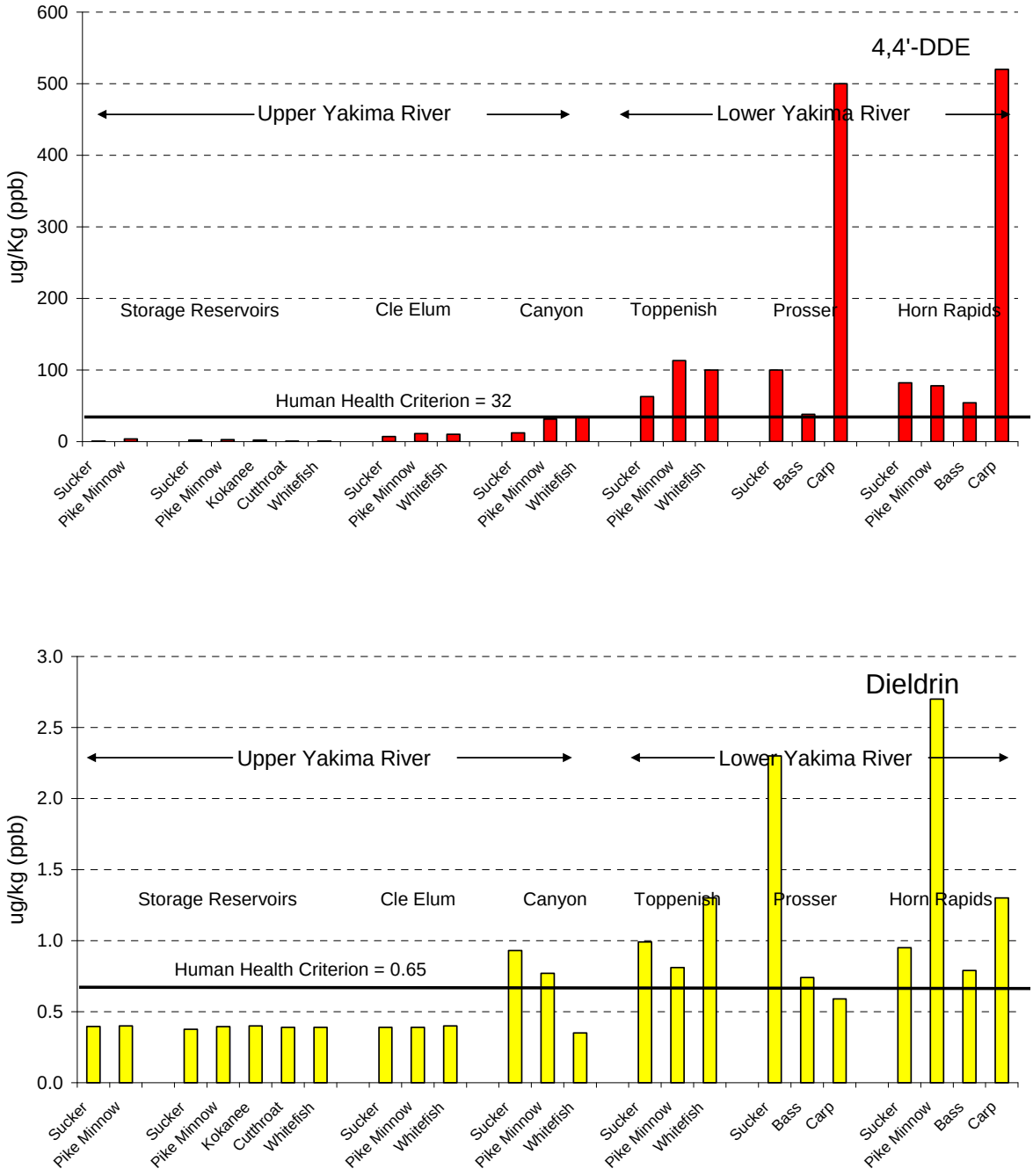
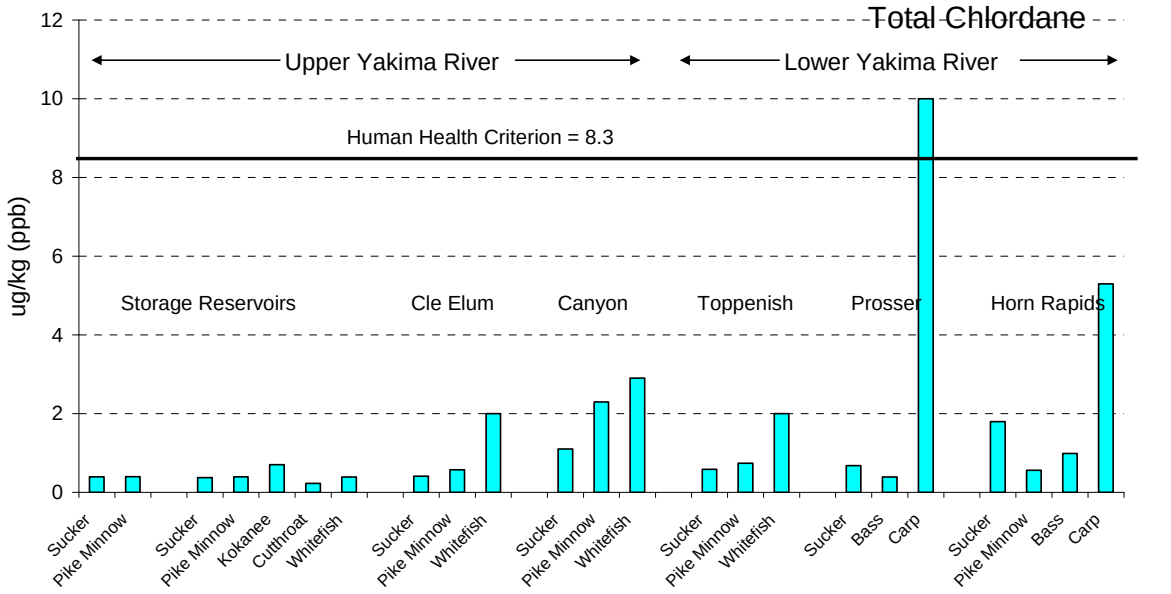


Figure 2. Downstream Trends in Concentrations of 303(d) Listed Compounds in Fillets from Resident Yakima River Fish Species (average concentrations for each species and location; non-detects set at reporting limit).



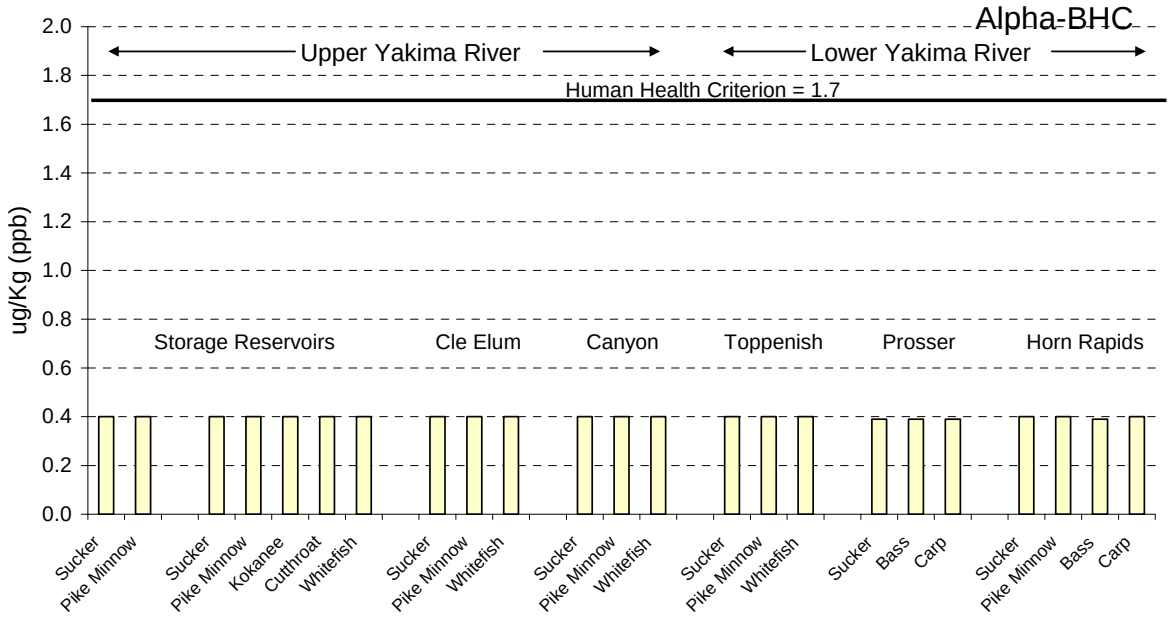


Figure 2. (continued)

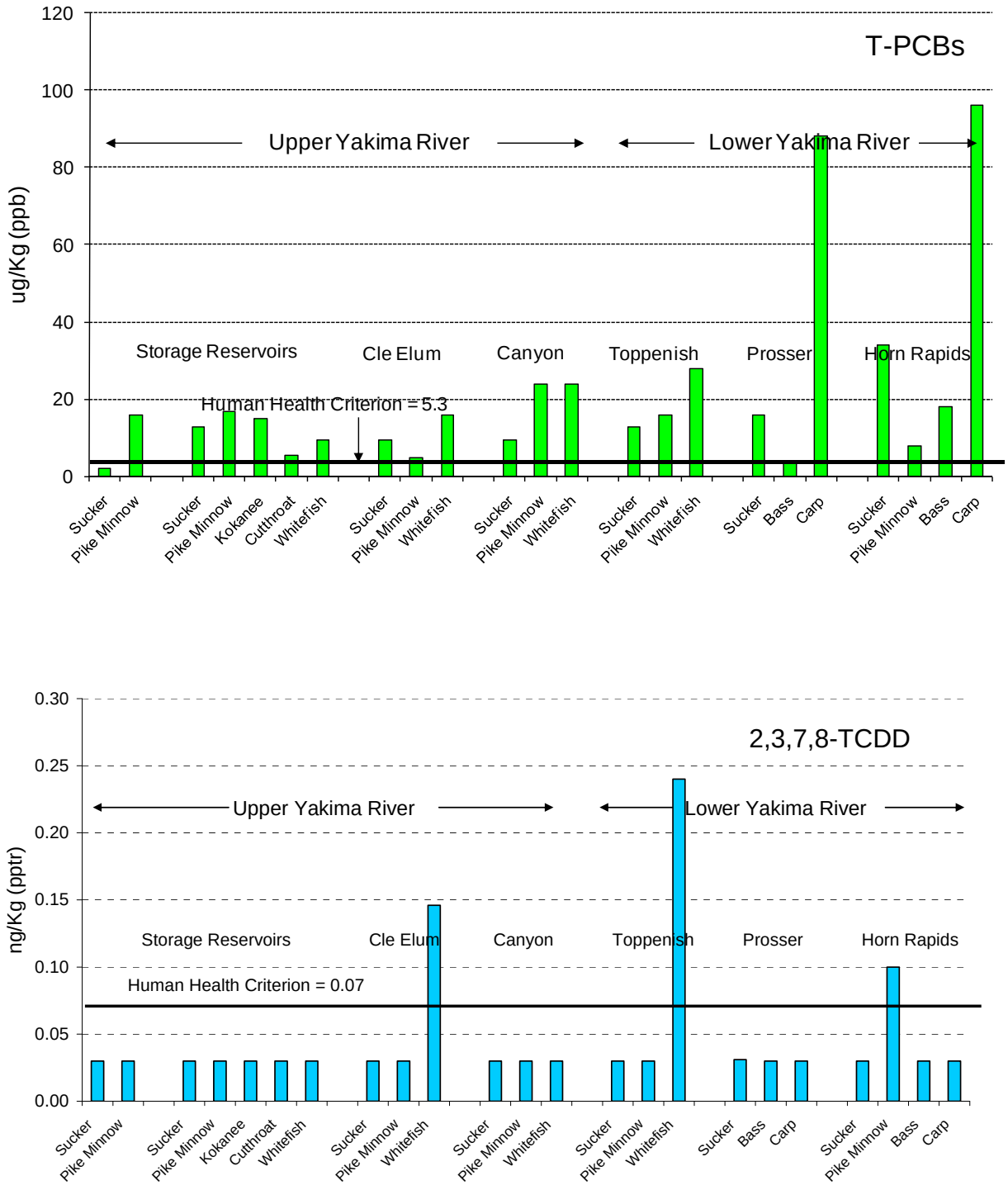


Figure 2. (continued)

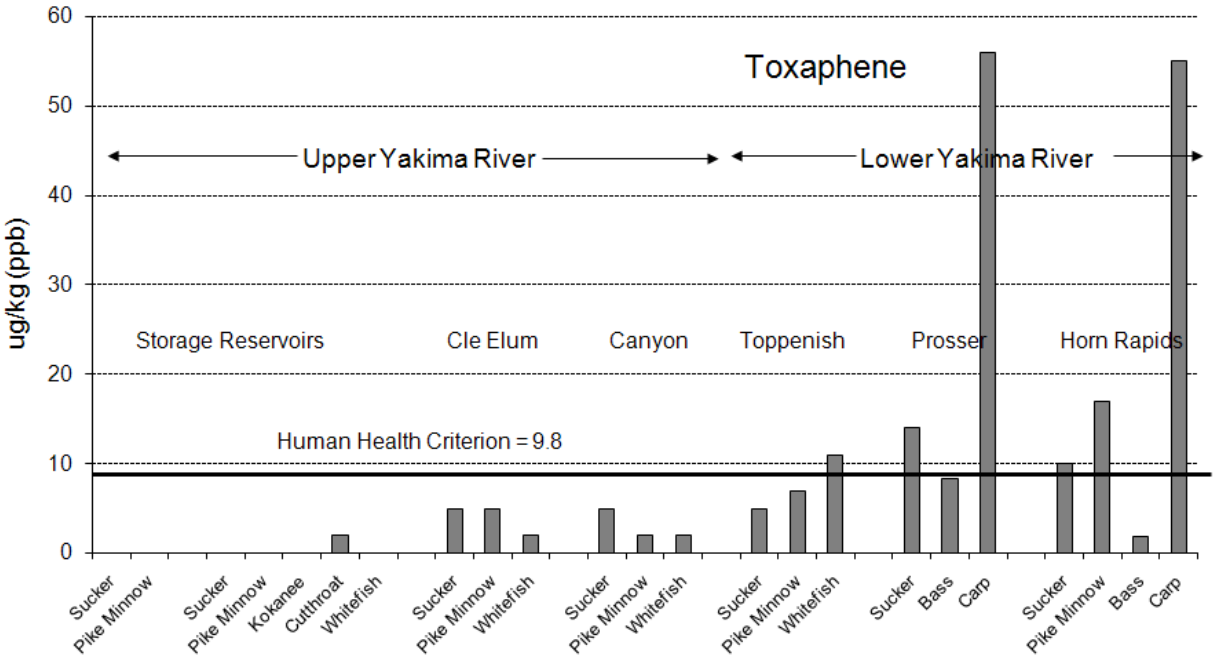


Figure 2. (continued)

Based on examination of these figures and other data collected through this study, the following conclusions appear warranted with regard to 303(d) listed compounds and toxaphene:

- Upper Yakima River fish are currently meeting or close to meeting NTR human health criteria for DDT, DDE, DDD, dieldrin, total chlordane, alpha-BHC, toxaphene, and dioxin.

- Lower Yakima River fish are currently meeting or close to meeting NTR human health criteria for DDT, DDD, total chlordane, alpha-BHC, and dioxin.

- PCBs exceed NTR human health criteria throughout the river, with slightly to substantially higher levels in the lower river.

- Most lower river fish species currently exceed NTR human health criteria by factors of 2–4 for DDE and dieldrin, and factors of 2–6 for PCBs. Carp are more contaminated than other lower river species, at least partly due to their greater fat content.

- Some lower river species exceed the NTR human health criteria for toxaphene. Toxaphene, a chlorinated insecticide, is difficult to analyze and has been under-reported in the past.

- The major contaminants of potential human health concern in resident Yakima River fish are DDE, dieldrin, PCBs, and toxaphene. Except for PCBs, these contaminants are found primarily in the lower river.

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Appendices

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Appendix A. 2006 Yakima River Fish Fillet Data

Table A1. Chlorinated Pesticide Concentrations in Yakima River Fish Fillet Samples, 2006 (ug/Kg, wet weight; parts per billion)

Reach	Sample No.	Species	Lipids (%)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDT	Cis-Chlordane	Cis-Nonachlor	Oxychlordane	Trans-Chlordane	Trans-Nonachlor	Total Chlordane	Methoxychlor	Alpha-BHC	Beta-BHC	Delta-BHC	Gamma-BHC (Lindane)	Aldrin	Dieldrin	Endrin
Keechelus Lake	6394088	LSS	2.08	0.37 U	**2.8**	**0.5**	**3.3**	0.37 U	0.83 UJ	0.37 U	0.37 U	0.37 U	0.37 U	0.37 UJ	0.37 U	0.37 U	0.37 UJ	0.37 U	0.37 U	0.37 U	0.37 U
Keechelus Lake	6394089	LSS	1.56	0.38 U	**2.4**	**0.4**	**2.8**	0.38 U	0.74 UJ	0.38 U	0.38 U	0.38 U	0.38 U	0.38 UJ	0.38 U	0.38 U	0.38 UJ	0.38 U	0.38 U	0.38 U	0.38 U
Keechelus Lake	6394090	LSS	1.6	0.38 U	**1.3**	0.38 U	**1.3**	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 UJ	0.38 U	0.38 U	0.38 UJ	0.38 U	0.38 U	0.38 U	0.38 U
Keechelus Lake	6394092	NPM	1.13	0.4 U	**1.8**	0.4 U	**1.8**	0.4 U	0.88 UJ	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	0.4 U	0.4 U
Keechelus Lake	6394093	NPM	1.09	0.37 U	**3.3**	0.37 U	**3.3**	0.37 U	1.1 UJ	0.37 U	0.37 U	0.37 U	0.37 U	0.37 UJ	0.37 U	0.37 U	0.37 UJ	0.37 U	0.37 U	0.37 U	0.37 U
Keechelus Lake	6394095	KOK	2.54	**0.41**	**2.4**	**0.83**	**3.6**	0.37 U	0.49 UJ	0.37 U	0.37 U	**0.72**	**0.72**	0.37 UJ	0.37 U	0.37 U	0.37 UJ	0.37 U	0.37 U	0.37 U	0.37 U
Keechelus Lake	6394096	KOK	2.78	0.4 U	**2**	**0.79**	**2.8**	0.4 U	0.42 UJ	0.4 U	0.4 U	**0.6**	**0.6**	0.4 UJ	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	0.4 UJ	0.4 UJ
Keechelus Lake	6394097	KOK	3.33	**0.47**	**2.1**	**0.87**	**3.4**	0.39 U	0.5 UJ	0.39 U	0.39 U	**0.78**	**0.78**	0.39 UJ	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U
Keechelus Lake	6394099	CTT	1.86	0.39 U	**0.77**	**0.28 J**	**1.1 J**	0.39 U	**0.23 J**	0.39 U	0.39 U	0.39 U	**0.23 J**	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U
Keechelus Lake	6394100	CTT	1.36	0.39 U	**0.61**	0.39 U	**0.6**	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U
Keechelus Lake	6394101	CTT	1.09	0.39 U	**0.44**	0.39 U	**0.4**	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U
Keechelus Lake	6394103	MWF	2.55	0.39 U	**0.59**	0.39 U	**0.6**	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U
Keechelus Lake	6394104	MWF	2.96	0.39 U	**0.87**	0.39 U	**0.9**	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U
Kachess Lake	6394080	LSS	0.69	0.4 U	**0.76**	0.4 U	**0.76**	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	0.4 U	0.4 U
Kachess Lake	6394081	LSS	0.48	0.4 U	**0.87**	0.4 U	**0.87**	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	0.4 U	0.4 U
Kachess Lake	6394082	LSS	0.55	0.39 U	**0.86**	0.39 U	**0.86**	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 UJ	0.39 UJ
Kachess Lake	6394084	NPM	0.58	0.4 U	**2.7**	0.4 U	**2.7**	0.4 U	0.57 UJ	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	0.4 U	0.4 U
Kachess Lake	6394085	NPM	0.86	0.37 U	**4.2**	0.37 U	**4.2**	0.37 U	0.92 UJ	0.37 U	0.37 U	**0.63**	**0.63**	0.37 U	0.37 U	0.37 U	0.37 UJ	0.37 U	0.37 U	0.37 U	0.37 U
Kachess Lake	6394086	NPM	0.6	0.39 U	**4.2**	0.39 U	**4.2**	0.39 U	0.98 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U
Cle Elum	6414068	MWF	4.24	**0.27 J**	**6.6**	**0.8**	**8 J**	0.39 U	**0.56**	0.39 U	0.39 U	**0.37 J**	**0.93 J**	0.39 UJ	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 UJ	0.39 UJ
Cle Elum	6414069	MWF	5.09	**0.54**	**5.7**	**3.1**	**9**	**0.32 J**	**0.96**	**0.21 J**	0.39 U	**1.6**	**3.09 J**	0.39 UJ	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 UJ	0.39 UJ
Cle Elum	6414070	MWF	4.42	**0.49**	**18**	**2**	**20**	**0.21 J**	**0.74**	0.4 U	0.4 U	**1.1**	**2.05 J**	0.4 UJ	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	**0.29 J**	0.4 UJ
Cle Elum	6414072	BLS	4.03	**0.45**	**9.1**	**1.4**	**11**	0.38 U	**0.38**	0.38 U	0.38 U	**0.28**	**0.66**	0.38 UJ	0.38 U	0.38 U	0.38 UJ	0.38 U	0.38 UJ	0.38 UJ	0.38 UJ
Cle Elum	6414073	BLS	2.8	**0.3 J**	**5.1**	**0.77**	**6 J**	0.39 U	**0.28 J**	0.39 U	0.39 U	**0.29 J**	**0.57 J**	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U
Cle Elum	6414074	BLS	2.51	**0.81**	**9.4**	**1.2**	**11**	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 UJ	0.4 UJ
Cle Elum	6414076	NPM	1.98	**0.71**	**12**	0.39 U	**13**	0.39 U	0.41 UJ	0.39 U	0.39 U	**0.57**	**0.57**	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	**0.24 J**	0.39 UJ
Cle Elum	6414077	NPM	1.73	**0.43**	**12**	0.38 U	**12**	0.38 U	0.38 U	0.38 U	0.38 U	**0.53**	**0.53**	0.38 UJ	0.38 U	0.38 U	0.38 U	0.38 U	0.38 UJ	**0.29 J**	0.38 UJ
Cle Elum	6414078	NPM	1.27	**0.62**	**8.8**	0.39 U	**9**	0.39 U	0.39 U	0.39 U	0.39 U	**0.61**	**0.61**	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	**0.12 J**	0.39 UJ
Yakima Canyon	6414050	MWF	4.51	**1.2**	**41**	**3.9**	**46**	**0.4**	**0.95**	0.4 U	0.4 U	**1.5**	**2.85**	0.4 UJ	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	**0.22 J**	0.4 UJ
Yakima Canyon	6414051	MWF	5.43	**0.7**	**23**	**2**	**26**	0.39 U	**0.84**	0.39 U	0.39 U	**0.87**	**1.71**	0.39 UJ	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	**0.24 J**	0.39 UJ
Yakima Canyon	6414052	MWF	4.67	**1.1**	**40**	**3.7**	**45**	**0.53**	**1.1**	**0.22 J**	**0.21 J**	**2.1**	**4.16**	**0.4 J**	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	**0.51**	0.4 U
Yakima Canyon	6414057	NPM	2.87	**1.4**	**45**	**1.4**	**48**	**0.27 J**	**1.5**	0.4 U	0.4 U	**1.7**	**3.47 J**	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	**0.49**	0.4 U
Yakima Canyon	6414058	NPM	2.04	**1.1**	**34**	**0.36 J**	**35 J**	**0.21 J**	**0.79**	0.38 U	0.38 U	**1.4**	**2.4 J**	0.38 U	0.38 U	0.38 U	0.38 UJ	0.38 U	0.38 U	**1.1**	0.38 U
Yakima Canyon	6414059	NPM	1.76	**0.56**	**15**	**0.2 J**	**16 J**	0.39 U	**0.53**	0.39 U	0.39 U	**0.9**	**1.43**	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	**0.72**	0.39 U
Yakima Canyon	6414061	BLS	4.72	**1.3**	**26**	**3.9**	**31**	**0.58**	**0.77**	**0.21 J**	**0.2 J**	**1.3**	**3.06**	0.38 U	0.38 U	0.38 U	0.38 UJ	0.38 U	0.38 U	**0.63**	0.38 U
Yakima Canyon	6414062	BLS	2.16	**0.52**	**5.1**	**0.97**	**7**	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 UJ	0.37 U	0.37 U	**0.86**	0.37 U
Yakima Canyon	6414063	BLS	2.93	**0.34 J**	**5.1**	**0.84**	**6 J**	0.4 U	0.4 U	0.4 U	0.4 U	**0.34 J**	**0.34 J**	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U	**1.3**	0.4 U
Wapato-Toppenish	6484230	LSS	3.33	**3.8**	**55**	**4.9**	**64**	0.39 U	0.43 UJ	0.39 U	0.39 U	**0.53**	**0.53**	1.6 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	**0.99 J**	1.6 U
Wapato-Toppenish	6484231	LSS	2.92	**5.1**	**61**	**4**	**70**	0.39 U	0.49 UJ	0.39 U	0.39 U	**0.66**	**0.66**	0.77 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	**0.72 J**	0.77 U
Wapato-Toppenish	6484232	LSS	3.25	**8.2**	**71**	**4.9**	**84**	0.4 U	0.51 UJ	0.4 U	0.4 U	**0.61**	**0.61**	1.6 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	**1.5 J**	1.6 U
Wapato-Toppenish	6484234	NPM	1.06	**3**	**53**	0.4 U	**56**	0.4 U	0.63 UJ	0.4 U	0.4 U	**0.61**	**0.61**	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	**1**	0.4 U
Wapato-Toppenish	6484235	NPM	1.1	**4.2**	**130**	**0.48**	**135**	0.4 U	0.4 U	0.4 U	0.4 U	**0.42**	**0.42**	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	**0.6**	0.4 U
Wapato-Toppenish	6484236	NPM	1.35	**8.2**	**160**	0.4 U	**168**	0.4 U	1.7 UJ	0.4 U	0.4 U	**1.2**	**1.2**	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	**0.83**	0.4 U
Wapato-Toppenish	6484238	MWF	3.15	**8.5**	**110**	**7.9**	**126**	**0.71**	1 UJ	0.39 U	0.39 U	**1.9**	**2.61**	1.6 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	**1.5 J**	1.6 U
Wapato-Toppenish	6484239	MWF	2.9	**7.4**	**110**	**7.1**	**125**	**0.59**	1.1 UJ	0.38 U	0.38 U	**1.7**	**2.29**	0.77 UJ	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	**1.4**	0.77 U
Wapato-Toppenish	6484240	MWF	3.02	**5.6**	**80**	**6**	**92**	0.4 U	0.79 UJ	0.4 U	0.4 U	**1**	**1**	1.6 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	**1 J**	1.6 U

Table A1 continued.

Reach	Sample No.	Species	Lipids (%)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDT	Cis-Chlordane	Cis-Nonachlor	Oxychlordane	Trans-Chlordane	Trans-Nonachlor	Total Chlordane	Methoxychlor	Alpha-BHC	Beta-BHC	Delta-BHC	Gamma-BHC (Lindane)	Aldrin	Dieldrin	Endrin
Prosser	6454105	CRP	4.31	**25**	**380**	**3.4**	**408**	**1**	**4.1**	**0.27 J**	**0.4**	**2.7**	**8.47 J**	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 UJ
Prosser	6454106	CRP	7.14	**38**	**750**	**7**	**795**	**1.7**	**7.8**	**0.55**	**0.75**	**5**	**15.8**	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	**0.74 J**	0.39 UJ
Prosser	6454107	CRP	3.71	**21**	**360**	**2.6**	**384**	**1.2**	**6**	**0.31 J**	**0.58**	**3.7**	**11.8 J**	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	**0.65 J**	0.39 UJ
Prosser	6444234	SMB	0.62	**2.5**	**32**	**0.93**	**35**	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	**1.4**	0.39 U
Prosser	6444235	SMB	0.66	**3.3**	**43**	**2.3**	**49**	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 UJ	**1.1**	0.38 U
Prosser	6444236	SMB	0.3	**3**	**17**	**0.46**	**20**	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	**0.46**	0.4 U
Prosser	6444238	LSS	1.77	**11**	**99**	**4.8**	**115**	0.39 U	0.77 UJ	0.39 U	0.39 U	**0.73**	**0.73**	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	**2.2 J**	0.39 UJ
Prosser	6444239	LSS	2.01	**10**	**100**	**3.7**	**114**	0.39 U	0.73 UJ	0.39 U	0.39 U	**0.71**	**0.71**	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	**2 J**	0.39 UJ
Prosser	6444240	LSS	2.41	**21**	**100**	**4.3**	**125**	0.39 U	1.4 UJ	0.39 U	0.39 U	**0.61**	**0.61**	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	**2.6 J**	0.39 UJ
Horn Rapids	6444230	CRP	7.94	**41**	**990**	**7**	**1038**	**1.6**	11 UJ	**0.64**	0.4 U	**5.8**	**8.04**	1.6 UJ	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	**1.6 J**	1.6 UJ
Horn Rapids	6444231	CRP	9.17	**25**	**500**	**4.3**	**529**	**1.1**	7.2 UJ	**0.57**	0.39 U	**3.9**	**5.57**	1.6 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	**1.3 J**	1.6 UJ
Horn Rapids	6444232	CRP	5.83	**17**	**380**	**4.2 J**	**401 J**	0.39 U	3.9 UJ	0.39 U	0.39 U	**1.9**	**1.9**	0.79 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	**0.8 J**	0.79 UJ
Horn Rapids	6444242	NPM	1.08	**5.2**	**65**	0.38 U	**70**	0.38 U	0.96 UJ	0.38 U	0.38 U	**0.73**	**0.73**	0.38 UJ	0.38 U	0.38 U	0.38 U	0.38 U	0.38 UJ	**1.4 J**	0.38 UJ
Horn Rapids	6444243	NPM	1.41	**4.8**	**60**	0.39 U	**65**	0.39 U	0.89 UJ	0.39 U	0.39 U	**0.51**	**0.51**	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	**1.9 J**	0.39 UJ
Horn Rapids	6444244	NPM	1.3	**6.7**	**110**	**0.41**	**117**	0.4 U	0.58 UJ	0.4 U	0.4 U	**0.45**	**0.45**	0.4 UJ	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	**4.7 J**	0.4 UJ
Horn Rapids	6454108	SMB	1.37	**3.8**	**78**	**1.3**	**83**	0.39 U	**0.66**	0.39 U	0.39 U	**0.46**	**1.12**	0.39 UJ	0.39 U	0.39 U	**0.54**	0.39 U	0.39 U	**0.62 J**	0.39 UJ
Horn Rapids	6454109	SMB	1.01	**3.3**	**59**	**0.89**	**63**	0.38 U	**0.57**	0.38 U	0.38 U	**0.62**	**1.19**	0.38 UJ	0.38 U	0.38 U	**0.38**	0.38 U	0.38 U	**1 J**	0.38 UJ
Horn Rapids	6454110	SMB	0.95	**1.9**	**37**	**1.1**	**40**	0.39 U	**0.36 J**	0.39 U	0.39 U	**0.31 J**	**0.67 J**	0.39 UJ	0.39 U	0.39 U	**0.48**	0.39 U	0.39 U	**0.76 J**	0.39 UJ
Horn Rapids	6454111	LSS	2.79	**5.3**	**57**	**2.4**	**65**	**0.22 J**	**0.62**	0.4 U	0.4 U	**0.54**	**1.38 J**	0.4 UJ	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	**0.74 J**	0.4 UJ
Horn Rapids	6454112	LSS	4.65	**6.2**	**79**	**3.1**	**88**	**0.3 J**	**0.87**	**0.2 J**	0.4 U	**0.76**	**2.13 J**	0.4 UJ	0.4 U	0.4 U	**0.4 J**	**0.4 J**	**0.4 J**	**0.92 J**	0.4 UJ
Horn Rapids	6454113	LSS	3.56	**7.7**	**110**	**5.8**	**124**	0.39 U	**1.2**	0.39 U	0.39 U	**0.8**	**2**	0.39 UJ	0.39 U	0.39 U	0.53	0.39 U	0.39 U	**1.2 J**	0.39 UJ

(--) Not analyzed for

U = The analyte was not detected at or above the reported result.

J = The analyte was positively identified. The associated numerical result is an estimate.

UJ = The analyte was not detected at or above the reported estimated result.

NJ = There is evidence that the analyte is present. The associated numerical result is an estimate.

BLS = bridgelip sucker
CRP = common carp
CTT = cutthroat trout
KOK = kokanee
LSS = largescale sucker
MWF = mountain whitefish
NPM = northern pikeminnow
SMB = smallmouth bass

Table A1 continued.

Reach	Sample No.	Species	Endrin Aldehyde	Endrin Ketone	Heptachlor	Heptachlor Epoxide	Hexachloro-benzene	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Toxaphene
Keechelus Lake	6394088	LSS	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 UJ	--
Keechelus Lake	6394089	LSS	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 UJ	--
Keechelus Lake	6394090	LSS	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 UJ	--
Keechelus Lake	6394092	NPM	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	--
Keechelus Lake	6394093	NPM	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 UJ	--
Keechelus Lake	6394095	KOK	0.37 U	0.37 U	0.37 U	0.37 U	**0.55**	0.37 U	0.37 U	0.37 UJ	--
Keechelus Lake	6394096	KOK	0.4 UJ	0.4 UJ	0.4 U	0.4 UJ	**0.5**	0.4 UJ	0.4 UJ	0.4 UJ	--
Keechelus Lake	6394097	KOK	0.39 U	0.39 U	0.39 U	0.39 U	**0.59**	0.39 U	0.39 U	0.39 UJ	--
Keechelus Lake	6394099	CTT	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	2 U
Keechelus Lake	6394100	CTT	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	2 U
Keechelus Lake	6394101	CTT	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	2 U
Keechelus Lake	6394103	MWF	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	--
Keechelus Lake	6394104	MWF	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	--
Kachess Lake	6394080	LSS	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	--
Kachess Lake	6394081	LSS	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	--
Kachess Lake	6394082	LSS	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 UJ	0.39 UJ	--
Kachess Lake	6394084	NPM	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	--
Kachess Lake	6394085	NPM	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 UJ	--
Kachess Lake	6394086	NPM	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	--
Cle Elum	6414068	MWF	0.39 UJ	0.39 UJ	0.39 U	0.39 UJ	**0.25 J**	0.39 UJ	0.39 UJ	0.39 UJ	1.9 U
Cle Elum	6414069	MWF	0.39 UJ	0.39 UJ	0.39 U	0.39 UJ	**0.51**	0.39 UJ	0.39 UJ	0.39 UJ	1.9 U
Cle Elum	6414070	MWF	0.4 UJ	0.4 UJ	0.4 U	0.4 UJ	**0.45**	0.4 UJ	0.4 UJ	0.4 UJ	2 U
Cle Elum	6414072	BLS	0.38 UJ	0.38 UJ	0.38 U	0.38 UJ	**0.24 J**	0.38 UJ	0.38 UJ	0.38 UJ	1.9 UJ
Cle Elum	6414073	BLS	0.39 U	0.39 U	0.39 U	0.39 U	**0.24 J**	0.39 U	0.39 U	0.39 U	2 U
Cle Elum	6414074	BLS	0.4 UJ	0.4 UJ	0.4 U	0.4 UJ	0.4 U	0.4 UJ	0.4 UJ	0.4 UJ	4.9 U
Cle Elum	6414076	NPM	0.39 UJ	0.39 UJ	0.39 U	0.39 UJ	0.39 U	0.39 UJ	0.39 UJ	0.39 UJ	4.9 U
Cle Elum	6414077	NPM	0.38 UJ	0.38 UJ	0.38 U	0.38 UJ	0.38 U	0.38 UJ	0.38 UJ	0.38 UJ	0.38 U
Cle Elum	6414078	NPM	0.39 UJ	0.39 UJ	0.39 U	0.39 UJ	0.39 U	0.39 UJ	0.39 UJ	0.39 UJ	4.9 U
Yakima Canyon	6414050	MWF	0.4 UJ	0.4 UJ	0.4 U	0.4 UJ	**0.26 J**	0.4 UJ	0.4 UJ	0.4 UJ	2 U
Yakima Canyon	6414051	MWF	0.39 UJ	0.39 UJ	0.39 U	0.39 UJ	**0.46**	0.39 UJ	0.39 UJ	0.39 UJ	2 U
Yakima Canyon	6414052	MWF	0.4 UJ	0.4 UJ	0.4 U	0.4 U	**0.53**	0.4 U	0.4 U	0.4 U	2 U
Yakima Canyon	6414057	NPM	0.4 UJ	0.4 U	0.4 U	0.4 U	**0.28 J**	0.4 U	0.4 U	0.4 U	2 U
Yakima Canyon	6414058	NPM	0.38 UJ	0.38 U	0.38 U	0.38 U	**0.23 J**	0.38 U	0.38 U	0.38 U	1.9 U
Yakima Canyon	6414059	NPM	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	**6.5 NJ**
Yakima Canyon	6414061	BLS	0.38 U	0.38 U	0.38 U	0.38 U	**0.47**	0.38 U	0.38 U	0.38 U	**50 NJ**
Yakima Canyon	6414062	BLS	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	1.9 U
Yakima Canyon	6414063	BLS	0.4 U	0.4 U	0.4 U	0.4 U	**0.21 J**	0.4 U	0.4 U	0.4 U	2 U
Wapato-Toppenish	6484230	LSS	1.6 U	1.6 U	0.39 U	1.6 U	0.39 U	1.6 U	1.6 U	1.6 U	4.8 U
Wapato-Toppenish	6484231	LSS	0.77 UJ	0.77 UJ	0.39 U	0.77 U	0.39 U	0.77 U	0.77 U	0.77 UJ	0.39 U
Wapato-Toppenish	6484232	LSS	1.6 U	1.6 U	0.4 U	1.6 U	0.4 U	1.6 U	1.6 U	1.6 U	5 U
Wapato-Toppenish	6484234	NPM	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	5 U
Wapato-Toppenish	6484235	NPM	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	4.9 U
Wapato-Toppenish	6484236	NPM	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	**10 J**
Wapato-Toppenish	6484238	MWF	1.6 U	1.6 U	0.39 U	1.6 U	0.57 UJ	1.6 U	1.6 U	1.6 U	**11 J**
Wapato-Toppenish	6484239	MWF	0.77 UJ	0.77 UJ	0.38 U	0.77 U	0.57 UJ	**1.6**	0.77 U	0.77 UJ	**10 J**
Wapato-Toppenish	6484240	MWF	1.6 UJ	1.6 U	0.4 U	1.6 U	0.4 U	1.6 U	1.6 UJ	1.6 UJ	**11 J**

Table A1 continued.

Reach	Sample No.	Species	Endrin Aldehyde	Endrin Ketone	Heptachlor	Heptachlor Epoxide	Hexachloro-benzene	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Toxaphene
Prosser	6454105	CRP	**0.46 J**	0.39 UJ	0.39 U	0.39 UJ	**0.52**	0.39 UJ	**0.21 J**	0.39 UJ	**55 J**
Prosser	6454106	CRP	**0.35 J**	0.39 UJ	0.39 U	0.39 UJ	**1.3**	0.39 UJ	**0.22 J**	**0.53 J**	**63 J**
Prosser	6454107	CRP	**0.35 J**	0.39 UJ	0.39 U	0.39 UJ	0.39 U	0.39 UJ	**0.3 J**	**0.82 J**	**49 J**
Prosser	6444234	SMB	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	4.9 U
Prosser	6444235	SMB	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	4.7 U
Prosser	6444236	SMB	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	4.9 U
Prosser	6444238	LSS	0.39 UJ	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 UJ	**10 J**
Prosser	6444239	LSS	0.39 UJ	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 UJ	4.9 U
Prosser	6444240	LSS	0.39 UJ	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 UJ	**11 J**
Horn Rapids	6444230	CRP	1.6 UJ	1.6 UJ	0.4 U	1.6 UJ	**0.79**	1.6 UJ	1.6 UJ	**1.7 J**	**59 J**
Horn Rapids	6444231	CRP	1.6 UJ	1.6 UJ	0.39 U	1.6 UJ	**0.91**	1.6 UJ	1.6 UJ	**2.1 J**	**25 J**
Horn Rapids	6444232	CRP	0.79 UJ	0.79 UJ	0.39 U	0.79 UJ	**0.56**	0.79 UJ	0.79 UJ	**0.93 J**	**43 J**
Horn Rapids	6444242	NPM	0.38 UJ	0.38 UJ	0.38 U	0.38 U	0.38 U	0.38 U	0.38 UJ	0.38 UJ	**10 J**
Horn Rapids	6444243	NPM	0.39 UJ	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 UJ	0.39 UJ	4.8 U
Horn Rapids	6444244	NPM	0.4 UJ	0.4 UJ	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 UJ	**14 J**
Horn Rapids	6454108	SMB	**0.21 J**	0.39 UJ	0.39 U	0.39 UJ	0.39 U	**0.28 J**	0.39 UJ	**0.2 J**	1.9 U
Horn Rapids	6454109	SMB	**0.37 J**	0.38 UJ	0.38 U	0.38 UJ	0.38 U	0.38 UJ	0.38 UJ	0.38 UJ	1.9 U
Horn Rapids	6454110	SMB	**0.25 J**	0.39 UJ	0.39 U	0.39 UJ	0.39 U	0.39 UJ	0.39 UJ	0.39 UJ	1.9 U
Horn Rapids	6454111	LSS	**0.33 J**	0.4 UJ	0.4 U	0.4 UJ	**0.23 J**	0.4 UJ	0.4 UJ	0.4 UJ	**9.1 J**
Horn Rapids	6454112	LSS	**0.28 J**	0.4 UJ	0.4 U	0.4 UJ	**0.31 J**	0.4 UJ	0.4 UJ	0.4 UJ	**10 J**
Horn Rapids	6454113	LSS	**0.3 J**	0.39 UJ	0.39 U	0.39 UJ	**0.24 J**	**0.33 J**	0.39 UJ	0.39 UJ	**12 J**

(--) Not analyzed for

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J = The analyte was positively identified. The associated numerical result is an estimate.

UJ = The analyte was not detected at or above the reported estimated result.

NJ = There is evidence that the analyte is present. The associated numerical result is an estimate.

BLS = bridgelip sucker
CRP = common carp
CTT = cutthroat trout
KOK = kokanee
LSS = largescale sucker
MWF = mountain whitefish
NPM = northern pikeminnow
SMB = smallmouth bass

Table A2. PCBs Concentrations in Yakima River Fish Fillet Samples, 2006
(ug/Kg, wet weight, parts per billion)

Reach	Sample No.	Species	Lipids (%)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Aroclors
Keechelus Lake	6394088	LSS	2.08	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**7.4 J**	**9 J**	7.5 UJ	1.9 U	**16 J**
Keechelus Lake	6394089	LSS	1.56	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**8.1 J**	**7.8 J**	6.6 UJ	1.9 U	**16 J**
Keechelus Lake	6394090	LSS	1.6	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**3.6 J**	**4.4 J**	3.8 UJ	1.9 U	**8 J**
Keechelus Lake	6394092	NPM	1.13	2 U	2 U	2 U	2 U	2 U	**6 J**	**8.9 J**	7.9 UJ	2 U	**15 J**
Keechelus Lake	6394093	NPM	1.09	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**8 J**	**11 J**	9.3 UJ	1.9 U	**19 J**
Keechelus Lake	6394095	KOK	2.54	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**11 J**	**4.6 J**	5.6 UJ	1.9 U	**16 J**
Keechelus Lake	6394096	KOK	2.78	2 U	2 U	2 U	2 U	2 U	**9.2 J**	**3.7 J**	4 UJ	2 U	**13 J**
Keechelus Lake	6394097	KOK	3.33	2 U	2 U	2 U	2 U	4.9 UJ	**12 J**	**5.8 J**	3.9 UJ	2 U	**18 J**
Keechelus Lake	6394099	CTT	1.86	2 U	2 U	2 U	2 U	2 U	**5.8**	**2.3**	--	2 U	**8**
Keechelus Lake	6394100	CTT	1.36	2 U	2 U	2 U	2 U	2 U	**3.8**	**1.4 J**	--	2 U	**5 J**
Keechelus Lake	6394101	CTT	1.09	2 U	2 U	2 U	2 U	2 U	**2.5**	**0.48 J**	--	2 U	**3 J**
Keechelus Lake	6394103	MWF	2.55	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2.6 UJ	2 U	2 U
Keechelus Lake	6394104	MWF	2.96	2 U	2 U	2 U	2 U	2 U	**6.3 J**	**3.3 J**	3.9 UJ	2 U	**10 J**
Kachess Lake	6394080	LSS	0.69	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Kachess Lake	6394081	LSS	0.48	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Kachess Lake	6394082	LSS	0.55	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Kachess Lake	6394084	NPM	0.58	2 U	2 U	2 U	2 U	5 UJ	**13 J**	**4.5 J**	5 UJ	2 U	**18 J**
Kachess Lake	6394085	NPM	0.86	1.8 U	1.8 U	1.8 U	1.8 U	4.6 UJ	**19 J**	**6.6 J**	5.5 UJ	1.8 U	**26 J**
Kachess Lake	6394086	NPM	0.6	2 U	2 U	2 U	2 U	4.9 UJ	**15 J**	**7.2 J**	5.9 UJ	2 U	**22 J**
Cle Elum	6414068	MWF	4.24	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**12**	1.9 U	--	1.9 U	**12**
Cle Elum	6414069	MWF	5.09	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**19**	**7.8**	--	1.9 U	**27**
Cle Elum	6414070	MWF	4.42	2 U	2 U	2 U	2 U	2 U	**14**	**5.7**	--	2 U	**20**
Cle Elum	6414072	BLS	4.03	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**7.6**	**3.6**	--	1.9 U	**11**
Cle Elum	6414073	BLS	2.8	2 U	2 U	2 U	2 U	2 U	**6.3**	**1.5 J**	--	2 U	**8 J**
Cle Elum	6414074	BLS	2.51	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Cle Elum	6414076	NPM	1.98	2 U	2 U	2 U	2 U	2 U	**4.8 J**	2 U	2 U	2 U	**5 J**
Cle Elum	6414077	NPM	1.73	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**4.6 J**	1.9 U	1.9 U	1.9 U	**5 J**
Cle Elum	6414078	NPM	1.27	2 U	2 U	2 U	2 U	2 U	**3.2 J**	**2.3**	2 U	2 U	**6 J**
Yakima Canyon	6414050	MWF	4.51	2 U	2 U	2 U	2 U	2 U	**17**	**7.1**	--	2 U	**24**
Yakima Canyon	6414051	MWF	5.43	2 U	2 U	2 U	2 U	2 U	**15**	**6**	--	2 U	**21**
Yakima Canyon	6414052	MWF	4.67	2 U	2 U	2 U	2 U	2 U	**20**	**8.7**	--	2 U	**29**
Yakima Canyon	6414057	NPM	2.87	2 U	2 U	2 U	2 U	2 U	**21**	**13**	--	2 U	**34**
Yakima Canyon	6414058	NPM	2.04	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**16**	**7.1**	--	1.9 U	**23**
Yakima Canyon	6414059	NPM	1.76	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**10**	**4.3**	--	**1.2 J**	**16 J**
Yakima Canyon	6414061	BLS	4.72	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**15.0**	**7.0**	--	1.9 U	**22**
Yakima Canyon	6414062	BLS	2.16	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**2.4**	1.9 U	--	1.9 U	**2**
Yakima Canyon	6414063	BLS	2.93	2 U	2 U	2 U	2 U	2 U	**3.8**	2 U	--	2 U	**4**
Wapato-Toppenish	6484230	LSS	3.33	1.9 U	1.9 U	1.9 U	1.9 U	**3.9 J**	**7**	**3.1**	4.8 UJ	1.9 U	**14 J**
Wapato-Toppenish	6484231	LSS	2.92	1.9 U	1.9 U	1.9 U	1.9 U	**3.9 J**	**7.9**	**4.1**	4.8 UJ	1.9 U	**16 J**
Wapato-Toppenish	6484232	LSS	3.25	2 U	2 U	2 U	2 U	**4.6 J**	**8**	**3.4**	5 UJ	2 U	**16 J**
Wapato-Toppenish	6484234	NPM	1.06	2 U	2 U	2 U	2 U	2 U	**6.9**	**5**	5 UJ	2 U	**12 J**
Wapato-Toppenish	6484235	NPM	1.1	2 U	2 U	2 U	2 U	4.9 UJ	**5.6**	**4.1 J**	4.9 UJ	2 U	**10 J**
Wapato-Toppenish	6484236	NPM	1.35	2 U	2 U	2 U	2 U	**3.6 J**	**12 J**	**12 J**	5 UJ	2 U	**28 J**
Wapato-Toppenish	6484238	MWF	3.15	2 U	2 U	2 U	2 U	**6.2 J**	**17 J**	**7.3**	9.9 UJ	2 U	**31 J**

Table A2 continued.

Reach	Sample No.	Species	Lipids (%)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Aroclors
Wapato-Toppenish	6484239	MWF	2.9	1.9 U	1.9 U	1.9 U	1.9 U	**6.2 J**	**16 J**	**7.9 J**	9.6 UJ	1.9 U	**30 J**
Wapato-Toppenish	6484240	MWF	3.02	2 U	2 U	2 U	2 U	**5.3 J**	**11 J**	**5.2 J**	5 UJ	2 U	**22 J**
Prosser	6454105	CRP	4.31	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**24**	**39**	--	1.9 U	**63**
Prosser	6454106	CRP	7.14	2 U	2 U	2 U	2 U	2 U	**48**	**61**	--	2 U	**109**
Prosser	6454107	CRP	3.71	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**45**	**48 J**	--	1.9 U	**93 J**
Prosser	6444234	SMB	0.62	2 U	2 U	2 U	2 U	2 U	**3.6 J**	**2.6**	2 U	2 U	**6 J**
Prosser	6444235	SMB	0.66	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser	6444236	SMB	0.3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Prosser	6444238	LSS	1.77	2 U	2 U	2 U	2 U	2 U	**4.9 J**	**7.1**	2 U	2 U	**12 J**
Prosser	6444239	LSS	2.01	2 U	2 U	2 U	2 U	2 U	**11 J**	**7.2**	9.8 UJ	2 U	**18 J**
Prosser	6444240	LSS	2.41	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**12 J**	**7.2**	9.7 UJ	1.9 U	**19 J**
Horn Rapids	6444230	CRP	7.94	2 U	2 U	2 U	2 U	8.5 UJ	**35 J**	**110**	99 UJ	20 UJ	**145 J**
Horn Rapids	6444231	CRP	9.17	1.9 U	1.9 U	1.9 U	1.9 U	7.2 UJ	**25 J**	**68 J**	58 UJ	1.9 UJ	**93**
Horn Rapids	6444232	CRP	5.83	4.9 UJ	2 U	2 U	2 U	2 U	**12 J**	**42**	59 UJ	2 U	**54 J**
Horn Rapids	6444242	NPM	1.08	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**5.7 J**	**6.9**	9.6 UJ	1.9 U	**13 J**
Horn Rapids	6444243	NPM	1.41	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**4.9 J**	**6**	9.7 UJ	1.9 U	**11 J**
Horn Rapids	6444244	NPM	1.3	2 U	2 U	2 U	2 U	2 U	**3.5 J**	**3.9**	2 U	2 U	**7 J**
Horn Rapids	6454108	SMB	1.37	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**9.8**	**6.2 J**	--	1.9 U	**16 J**
Horn Rapids	6454109	SMB	1.01	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**6.9**	**3.5 J**	--	1.9 U	**10 J**
Horn Rapids	6454110	SMB	0.95	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**7.7**	1.9 U	--	1.9 U	**8**
Horn Rapids	6454111	LSS	2.79	2 U	2 U	2 U	2 U	2 U	**7.4**	**4 J**	--	2 U	**11 J**
Horn Rapids	6454112	LSS	4.65	2 U	2 U	2 U	2 U	2 U	**9.8**	**4.8 J**	--	2 U	**15 J**
Horn Rapids	6454113	LSS	3.56	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**11**	**9.5 J**	--	1.9 U	**21 J**

(--) Not analyzed for
U = The analyte was not detected at or above the reported result.
J = The analyte was positively identified. The associated numerical result is an estimate.
UJ = The analyte was not detected at or above the reported estimated result.

BLS = bridgelip sucker
CRP = common carp
CTT = cutthroat trout
KOK = kokanee
LSS = largescale sucker
MWF = mountain whitefish
NPM = northern pikeminnow
SMB = smallmouth bass

Table A3. Dioxin and Furan Concentrations in Yakima River Fish Fillet Samples, 2006 (ng/Kg, wet weight; parts per trillion)

Reach	Sample No.	Species	Lipids (%)	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF
Keechelus Lake	394091	LSS	1.9	0.030 UJ	0.050 UJ	0.100 UJ	0.080 UJ	0.060 UJ	**0.206 J**	**1.08**	**0.132**	**1.850**	0.040 UJ	0.075 UJ	0.075 UJ	0.060 UJ
Keechelus Lake	394094	NPM	1.7	0.030 UJ	0.050 UJ	0.100 UJ	0.080 UJ	0.060 UJ	**0.125 J**	0.230 UJ	**0.120**	**1.80**	0.040 UJ	0.075 UJ	0.075 UJ	0.060 UJ
Keechelus Lake	394098	KOK	3.6	0.030 UJ	0.050 UJ	0.100 UJ	**0.104 J**	0.060 UJ	0.085 UJ	0.230 UJ	**0.159**	**1.46**	0.040 UJ	**0.136 J**	**0.076 J**	0.060 UJ
Keechelus Lake	394102	CTT	2.2	0.030 UJ	0.080 UJ	0.100 UJ	**0.080 J**	0.060 UJ	0.085 UJ	0.230 UJ	**0.105**	**0.507**	0.040 UJ	**0.075 J**	**0.075 J**	0.060 UJ
Keechelus Lake	394105	MWF	3.4	0.030 UJ	0.050 UJ	0.100 UJ	0.080 UJ	0.060 UJ	0.085 UJ	**0.256 J**	**0.156**	**0.434 J**	0.040 UJ	0.075 UJ	0.075 UJ	0.060 UJ
Kachess Lake	394083	LSS	1.8	0.030 UJ	0.050 UJ	0.100 UJ	0.080 UJ	0.060 UJ	0.085 UJ	0.230 UJ	**0.039 J**	**0.234 J**	0.040 UJ	0.075 UJ	0.075 UJ	0.060 UJ
Kachess Lake	394087	NPM	1.4	0.030 UJ	0.050 UJ	0.100 UJ	0.080 UJ	0.060 UJ	**0.249 J**	0.230 UJ	**0.088 J**	**1.00**	0.040 UJ	**0.239 J**	0.075 UJ	0.060 UJ
Cle Elum	414071	MWF	5	0.030 UJ	0.050 UJ	0.100 UJ	**0.124 J**	0.060 UJ	**0.197 J**	0.230 UJ	**0.329**	**0.682**	0.040 UJ	0.075 UJ	0.075 UJ	0.060 UJ
Cle Elum	414075	BLS	3.4	0.030 UJ	0.050 UJ	0.100 UJ	0.080 UJ	0.060 UJ	0.085 UJ	0.230 UJ	**0.120**	**0.457 J**	0.040 UJ	0.075 UJ	0.075 UJ	0.060 UJ
Cle Elum	414079	NPM	2.9	0.030 UJ	0.050 UJ	0.100 UJ	0.080 UJ	0.060 UJ	**0.189 J**	**0.290 J**	**0.144**	**0.509**	0.040 UJ	0.075 UJ	0.075 UJ	0.060 UJ
Canyon	414056	MWF	6.4	**0.146**	0.050 UJ	0.100 UJ	0.080 UJ	0.060 UJ	**0.190 J**	0.230 UJ	**0.364**	**0.700**	0.040 UJ	0.075 UJ	0.075 UJ	0.060 UJ
Canyon	414060	NPM	2.8	0.030 UJ	0.050 UJ	0.100 UJ	0.080 UJ	0.060 UJ	0.085 UJ	0.230 UJ	**0.156**	**0.787**	0.040 UJ	0.075 UJ	0.075 UJ	0.060 UJ
Canyon	414067	BLS	4.2	0.03 UJ	0.05 UJ	0.100 UJ	0.08 UJ	0.060 UJ	0.085 UJ	0.23 UJ	**0.036 J**	**0.226 J**	0.040 UJ	0.075 UJ	0.075 UJ	0.060 UJ
Wapato-Toppenish	484233	LSS	4.7	0.03 UJ	0.05 UJ	0.10 UJ	0.08 UJ	0.06 UJ	0.085 UJ	0.23 UJ	**0.27**	0.05 UJ	0.042 UJ	**0.304**	0.075 UJ	**0.295**
Wapato-Toppenish	484241	MWF	4.5	0.03 UJ	0.05 UJ	0.10 UJ	0.08 UJ	0.06 UJ	0.085 UJ	0.23 UJ	**0.227**	0.054 UJ	0.04 UJ	**0.145 J**	0.075 UJ	**0.063 J**
Wapato-Toppenish	484237	NPM	1.7	**0.242 J**	**0.267 J**	0.10 UJ	0.08 UJ	0.06 UJ	0.085 UJ	**0.969**	**0.998**	0.066 UJ	0.075 UJ	**0.121 J**	**0.195 J**	0.06 UJ
Prosser	454114	CRP	5.1	0.03 UJ	0.05 UJ	0.1 UJ	0.08 UJ	0.06 UJ	0.784 UJ	1.44 UJ	**1.11**	0.075 UJ	0.136 UJ	**0.214 J**	0.075 UJ	**0.495**
Prosser	444241	LSS	3.1	**0.031 J**	0.05 UJ	0.1 UJ	0.08 UJ	0.06 UJ	**0.142 J**	**0.728**	**0.625**	0.05 UJ	0.04 UJ	0.075 UJ	0.075 UJ	**0.144 J**
Prosser	444237	SMB	1.5	0.03 UJ	0.05 UJ	0.10 UJ	0.08 UJ	0.06 UJ	0.085 UJ	**1.24**	**0.251**	0.05 UJ	0.171 UJ	**0.366**	0.075 UJ	**0.153 J**
Horn Rapids	444233	CRP	8.5	0.03 UJ	0.05 UJ	0.1 UJ	**0.567**	**0.087 J**	**1.29**	**2.23**	**1.68**	0.094 UJ	0.157 UJ	**0.102 J**	0.075 UJ	**0.574**
Horn Rapids	454116	LSS	6.1	0.03 UJ	0.05 UJ	0.10 UJ	0.08 UJ	0.06 UJ	0.085 UJ	0.906 UJ	**0.266**	0.05 UJ	0.096 UJ	**0.112 J**	0.075 UJ	**0.159 J**
Horn Rapids	444245	NPM	2.2	**0.101**	0.05 UJ	0.10 UJ	0.08 UJ	0.06 UJ	0.085 UJ	**0.942**	**0.06**	0.05 UJ	0.067 UJ	**0.461**	0.075 UJ	**0.211 J**
Horn Rapids	454115	SMB	2.2	0.03 UJ	0.05 UJ	0.1 UJ	0.08 UJ	0.06 UJ	0.085 UJ	0.23 UJ	**0.136**	0.085 UJ	0.044 UJ	**0.174 J**	0.075 UJ	**0.121 J**

U = The analyte was not detected at or above the reported result.
J = The analyte was positively identified. The associated numerical result is an estimate.
UJ = The analyte was not detected at or above the reported estimated result.
TEQ = 2,3,7,8-TCDD toxicity equivalent based on toxicity equivalency factors from Van den Berg et. al., 1998; Only detected chemicals were used in calculation.

BLS = bridgelip sucker
CRP = common carp
CTT = cutthroat trout
KOK = kokanee
LSS = largescale sucker
MWF = mountain whitefish
NPM = northern pikeminnow
SMB = smallmouth bass

Table A3 continued.

Reach	Sample No.	Species	1,2,3,7,8,9-HxCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	OCDF	TEQ
Keechelus Lake	394091	LSS	0.060 UJ	0.070 UJ	0.085 UJ	**0.309 J**	**0.358**
Keechelus Lake	394094	NPM	0.060 UJ	0.070 UJ	0.085 UJ	0.200 UJ	**0.205**
Keechelus Lake	394098	KOK	0.060 UJ	0.070 UJ	0.085 UJ	0.200 UJ	**0.194**
Keechelus Lake	394102	CTT	0.060 UJ	0.070 UJ	0.085 UJ	0.200 UJ	**0.069**
Keechelus Lake	394105	MWF	0.060 UJ	0.070 UJ	0.085 UJ	0.200 UJ	**0.083**
Kachess Lake	394083	LSS	0.060 UJ	**0.134 J**	0.085 UJ	0.200 UJ	**0.041**
Kachess Lake	394087	NPM	0.060 UJ	0.070 UJ	0.085 UJ	0.200 UJ	**0.158**
Cle Elum	414071	MWF	0.060 UJ	0.070 UJ	0.085 UJ	0.200 UJ	**0.133**
Cle Elum	414075	BLS	0.060 UJ	0.070 UJ	0.085 UJ	0.200 UJ	**0.058**
Cle Elum	414079	NPM	0.060 UJ	0.070 UJ	0.085 UJ	0.200 UJ	**0.113**
Canyon	414056	MWF	0.060 UJ	0.070 UJ	0.085 UJ	0.200 UJ	**0.140**
Canyon	414060	NPM	0.060 UJ	0.070 UJ	0.085 UJ	0.200 UJ	**0.095**
Canyon	414067	BLS	0.060 UJ	0.070 UJ	0.085 UJ	0.200 UJ	**0.026**
Wapato-Toppenish	484233	LSS	0.06 UJ	0.07 UJ	0.085 UJ	0.20 UJ	**0.091**
Wapato-Toppenish	484241	MWF	0.06 UJ	0.07 UJ	0.085 UJ	0.20 UJ	**0.049**
Wapato-Toppenish	484237	NPM	0.06 UJ	**0.158 J**	0.085 UJ	0.20 UJ	**0.309**
Prosser	454114	CRP	0.06 UJ	**0.19 J**	0.085 UJ	**0.971**	**0.319**
Prosser	444241	LSS	0.06 UJ	0.07 UJ	0.085 UJ	0.2 UJ	**0.167**
Prosser	444237	SMB	0.06 UJ	**0.279**	0.085 UJ	0.20 UJ	**0.246**
Horn Rapids	444233	CRP	0.06 UJ	**0.252 J**	0.085 UJ	**0.476 J**	**0.751**
Horn Rapids	454116	LSS	0.06 UJ	0.07 UJ	0.085 UJ	**0.581**	**0.121**
Horn Rapids	444245	NPM	0.06 UJ	**0.085 J**	0.085 UJ	0.20 UJ	**0.19**
Horn Rapids	454115	SMB	0.06 UJ	0.07 UJ	0.085 UJ	0.2 UJ	**0.056**

U = The analyte was not detected at or above the reported result.
J = The analyte was positively identified. The associated numerical result is an estimate.
UJ = The analyte was not detected at or above the reported estimated result.

TEQ = 2,3,7,8-TCDD toxicity equivalent based on toxicity equivalency factors from Van den Berg et al., 1998;
Only detected chemicals were used in calculation.

Table A4. PBDE Concentrations in Yakima River Fish Fillets, 2006 (ug/Kg, wet weight, parts per billion)

Reach	Sample No.	Species	Lipids (%)	PBDE - 47	PBDE - 49	PBDE - 66	PBDE - 71	PBDE - 99	PBDE - 100	PBDE - 138	PBDE - 153	PBDE - 154	PBDE - 183	PBDE - 184	PBDE - 191	PBDE - 209
Keechelus Lake	6394088	LSS	2.08	**5**	0.2 U	0.2 U	0.2 U	0.2 U	**0.8**	0.4 U	**0.13 J**	**0.36 J**	0.4 U	0.4 U	0.4 U	0.99 U
Keechelus Lake	6394093	NPM	1.09	**1**	**0.13 J**	0.2 U	0.2 U	0.2 U	**0.57**	0.39 U	0.39 U	**0.28 J**	0.39 U	0.39 U	0.39 U	0.98 U
Keechelus Lake	6394099	CTT	1.86	**1**	0.2 U	0.2 U	0.2 U	**0.4**	**0.18 J**	0.4 U	**0.13 J**	**0.14 J**	0.4 U	0.4 U	0.4 U	0.99 U
Keechelus Lake	6394103	MWF	2.55	**1**	0.2 U	0.2 U	0.2 U	**0.9**	**0.31**	0.4 U	**0.16 J**	**0.16 J**	0.4 U	0.4 U	0.4 U	0.99 U
Kachess Lake	6394080	LSS	0.69	**5**	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.39 U	0.39 U	0.19 U	0.39 U	0.39 U	0.39 U	0.97 U
Kachess Lake	6394084	NPM	0.58	**1**	**0.16 J**	0.19 U	0.19 U	0.19 U	**0.33**	0.39 U	**0.12 J**	**0.2 J**	0.39 U	0.39 U	0.39 U	0.96 U
Yakima Canyon	6414050	MWF	4.51	**26**	**1.3**	**1**	0.2 U	**18**	**5.5**	0.39 U	**1.6**	**1.3**	0.39 U	0.39 U	0.39 U	0.98 U
Yakima Canyon	6414057	NPM	2.87	**17**	**0.71**	0.2 U	0.2 U	0.2 U	**3.6**	0.39 U	**0.22 J**	**1.2**	0.39 U	0.39 U	0.39 U	0.99 U
Yakima Canyon	6414061	BLS	4.72	**18**	**0.51**	0.2 U	0.2 U	0.2 U	**2.4**	0.39 U	**0.31 J**	**0.67**	0.39 U	0.39 U	0.39 U	0.98 U
Wapato-Toppenish	6484230	LSS	3.33	**33**	**0.58**	0.2 U	0.2 U	**0.2 J**	**4.2**	0.4 U	**0.85**	**1**	0.4 U	0.4 U	0.4 U	1 U
Wapato-Toppenish	6484234	NPM	1.06	**15**	**0.52**	0.2 U	0.2 U	0.2 U	**2.9**	0.39 U	**0.32 J**	**0.69**	0.39 U	0.39 U	0.39 U	0.98 U
Wapato-Toppenish	6484238	MWF	3.15	**94**	**2.7**	**2.6**	0.19 U	**61.6**	**19.1**	0.38 U	**5.5**	**3.3**	0.38 U	0.38 U	0.38 U	**3.3**
Wapato-Toppenish	6484239	MWF	2.9	**95**	**2.5**	**3**	0.2 U	**68.3**	**20.6**	0.4 U	**6.8**	**4.2**	0.4 U	0.4 U	0.4 U	1.3 U

U = The analyte was not detected at or above the reported result.
J = The analyte was positively identified. The associated numerical result is an estimate.

BLS = bridgelip sucker
CTT = cutthroat trout
LSS = largescale sucker
MWF = mountain whitefish
NPM = northern pikeminnow

Appendix B. 2006 Yakima River Whole Fish Data

Table B1. Chlorinated Pesticide Concentrations in Yakima River Whole* Fish Samples, 2006 (ug/Kg, wet weight; parts per billion)

Reach	Sample No.	Species	Lipids (%)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDT	Cis-Chlordane	Cis-Nonachlor	Oxychlordane	Trans-Chlordane	Trans-Nonachlor	Total Chlordane	Methoxychlor	Alpha-BHC	Beta-BHC	Delta-BHC	Gamma-BHC (Lindane)	Aldrin
Yakima Canyon	06414050-06414053	MWF	6.4	**3.0**	**73**	**10**	**86**	**1.2**	**1.5**	**0.7**	**0.5**	**3.9**	**7.6**	0.4 UJ	**0.4**	0.4 U	0.4 UJ	0.4 U	0.4 U
Yakima Canyon	06414051-06414054	MWF	8.4	**1.5**	**44**	**5**	**51**	**0.7**	**1.0**	**0.5**	**0.3**	**2.1**	**4.4**	0.4 UJ	**0.4**	0.4 U	0.4 UJ	0.4 U	0.4 U
Yakima Canyon	06414052-06414055	MWF	7.8	**2.4**	**81**	**9**	**92**	**1.1**	**1.7**	**0.6 J**	**0.4 J**	**4.4**	**8.3**	**0.4 J**	**0.4**	0.4 U	0.4 UJ	0.4 U	0.4 U
Yakima Canyon	06414061-06414064	BLS	8.7	**3.3**	**52**	**9**	**64**	**1.2**	**1.0**	**0.5 J**	**0.4 J**	**2.7**	**6.0**	0.4 UJ	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U
Yakima Canyon	06414062-06414065	BLS	6.8	**2.5**	**23**	**4**	**30**	**0.6**	**0.4**	0.4 U	0.4 U	**1.0**	**1.9**	0.4 UJ	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 U
Yakima Canyon	06414063-06414066	BLS	6.2	**1.0 J**	**12**	**2**	**15 J**	**0.5**	**0.4 J**	0.4 U	0.4 U	**1.2 J**	**1.9 J**	0.4 UJ	0.4 U	0.4 U	**1.0**	0.4 U	0.4 U
Wapato-Toppenish	06484230-06484242	LSS	5.7	**15.7**	**243**	**2**	**261**	**0.6**	3.3 UJ	0.4 UJ	**0.5 J**	**3.3**	**4.4 J**	1.5 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U
Wapato-Toppenish	06484231-06484243	LSS	6.6	**10.1**	**103**	**8**	**121**	**1.1**	1.2 UJ	0.4 UJ	**0.6 J**	**2.0**	**3.5 J**	1.5 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U
Wapato-Toppenish	06484232-06484244	LSS	3.4	**22.9 J**	**161**	**6**	**190 J**	0.4 U	1.9 UJ	0.4 UJ	**0.4 J**	**1.1**	**1.4 J**	0.9 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U
Wapato-Toppenish	06484234-06484245	NPM	3.0	**10.1**	**194**	**1**	**205**	**0.6**	2.0 UJ	0.4 UJ	**0.6 J**	**2.1**	**3.1 J**	0.7 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U
Wapato-Toppenish	06484235-06484246	NPM	2.8	**13.1**	**372**	**1**	**387**	0.4 U	1.3 UJ	0.4 UJ	0.4 UJ	**1.5**	**1.5**	0.7 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U
Wapato-Toppenish	06484236-06484247	NPM	3.8	**17.1**	**409**	**2**	**428**	**0.6**	4.3 UJ	0.4 UJ	0.4 UJ	**3.2**	**3.7**	1.2 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U
Wapato-Toppenish	06484238-06484248	MWF	4.1	**10.5**	**141**	**10**	**162**	**0.8**	1.2 UJ	**0.5**	**0.4**	**2.2**	**3.8**	1.6 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U
Wapato-Toppenish	06484239-06484249	MWF	3.8	**8.9**	**133**	**8**	**150**	**0.7**	1.2 UJ	**0.5**	0.4 UJ	**1.9**	**3.0**	1.3 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U
Wapato-Toppenish	06484240-06484250	MWF	3.8	**6.1**	**95**	**6**	**108**	0.4 U	0.8 UJ	0.4 UJ	0.4 UJ	**1.1**	**1.1**	1.6 UJ	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Prosser	06444234-06474230	SMB	3.6	**17.6**	**283**	**9**	**309**	**0.5**	2.2 UJ	**0.8**	0.4 U	**2.4**	**3.4**	1.2 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ
Prosser	06444235-06474231	SMB	3.9	**17.1**	**286**	**16**	**319**	**0.4**	1.6 UJ	**0.6**	0.4 U	**1.6**	**2.4**	0.7 UJ	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ
Prosser	06444236-06474232	SMB	2.3	**10.7**	**159**	**16**	**185**	0.4 U	0.4 U	0.4 U	0.4 U	**1.2**	**1.2**	1.2 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ
Prosser	06444238-06474233	LSS	5.0	**21.3**	**243**	**13**	**277**	**0.8**	2.0 UJ	0.4 UJ	**0.7 J**	**2.3**	**3.0 J**	1.3 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 UJ
Prosser	06444239-06474234	LSS	7.6	**29.7**	**313**	**13**	**355**	**1.0**	2.8 UJ	**0.7 J**	**1.3 J**	**3.6**	**6.3 J**	1.3 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 UJ
Prosser	06444240-06474235	LSS	8.2	**28.0**	**268**	**11**	**307**	**1.0**	2.5 UJ	**0.5 J**	**1.0 J**	**2.8**	**5.0 J**	1.2 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 UJ
Horn Rapids	06444242-06474242	NPM	3.8	**7.0**	**98**	**6**	**112**	**0.5**	1.2 UJ	0.4 UJ	**0.6 J**	**1.4**	**2.2 J**	1.3 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 UJ
Horn Rapids	06444243-06474243	NPM	5.3	**18.3**	**152**	**2**	**171**	**0.8**	4.5 UJ	**0.5 J**	**0.7 J**	**3.3**	**4.9 J**	1.2 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 UJ
Horn Rapids	06444244-06474244	NPM	5.8	**20.3**	**336**	**1**	**357**	**0.6**	2.8 UJ	**0.4 J**	**0.6 J**	**2.5**	**3.7 J**	1.2 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 UJ
Horn Rapids	06454108-06474236	SMB	3.8	**14.8**	**247**	**5**	**266**	**0.5**	**3.2**	**0.4 J**	0.4 UJ	**2.4**	**3.4 J**	1.4 UJ	0.4 U	0.4 U	**0.4**	0.4 UJ	0.4 UJ
Horn Rapids	06454109-06474237	SMB	4.2	**9.9**	**165**	**3**	**178**	**0.6**	**1.9**	**0.5 J**	**0.8 J**	**2.0**	**3.7 J**	1.3 UJ	0.4 U	0.4 U	**0.4**	0.4 UJ	0.4 U
Horn Rapids	06454110-06474238	SMB	4.2	**14.0**	**207**	**5**	**226**	**0.6**	**2.8 J**	**0.6 J**	**1.0 J**	**2.8 J**	**4.8 J**	1.4 UJ	0.4 U	0.4 U	**0.4**	0.4 UJ	0.4 U
Horn Rapids	06454111-06474239	LSS	9.1	**17.7 J**	**264**	**8 J**	**290 J**	**1.2 J**	**2.4**	**0.6 J**	**1.1 J**	**1.8**	**4.6 J**	1.3 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 UJ
Horn Rapids	06454112-06474240	LSS	7.2	**12.9**	**148**	**5**	**167**	**0.8 J**	**1.7**	**0.5 J**	**0.6 J**	**2.0**	**4.0 J**	1.4 UJ	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U
Horn Rapids	06454113-06474241	LSS	7.0	**13.5**	**182**	**6**	**202**	**0.9**	**1.7**	**0.4 J**	**0.6 J**	**1.8**	**3.7 J**	1.4 UJ	0.4 U	0.4 U	**0.4**	0.4 UJ	0.4 U

U = The analyte was not detected at or above the reported result.
J = The analyte was positively identified. The associated numerical result is an estimate.
UJ = The analyte was not detected at or above the reported estimated result.
NJ = There is evidence that the analyte is present. The associated numerical result is an estimate.

BLS = bridgelip sucker
LSS = largescale sucker
MWF = mountain whitefish
NPM = northern pikeminnow
SMB = smallmouth bass

* Whole body concentrations were estimated from separate analysis of carcass and fillets using formula: Cw = [(Cf x Mf)+(Cr x Mr)] / (Mf + Mr)
C = concentration, M = weight, f = fillet, r = carcass, and w = whole fish

Table B1 continued.

Reach	Sample No.	Species	Dieldrin	Endrin	Endrin Aldehyde	Endrin Ketone	Heptachlor	Heptachlor Epoxide	Hexachloro-benzene	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Toxaphene
Yakima Canyon	06414050-06414053	MWF	**0.3 J**	0.4 UJ	**0.3 J**	0.4 UJ	0.4 U	0.4 UJ	**1.2 J**	0.4 UJ	0.4 UJ	0.4 UJ	2.0 U
Yakima Canyon	06414051-06414054	MWF	**0.4 J**	0.4 UJ	**0.8 J**	0.4 UJ	0.4 U	0.4 UJ	**1.3**	0.4 UJ	**0.5 J**	**0.8 J**	2.0 U
Yakima Canyon	06414052-06414055	MWF	**0.3 J**	0.4 UJ	**0.7 J**	0.4 UJ	0.4 U	0.4 UJ	**1.5**	0.4 UJ	**0.5 J**	0.9 **J**	2.0 U
Yakima Canyon	06414061-06414064	BLS	**0.4**	0.4 UJ	**0.6 J**	0.4 UJ	0.4 U	0.4 UJ	**1.0**	0.4 UJ	**0.4 J**	**0.8 J**	**9.5 NJ**
Yakima Canyon	06414062-06414065	BLS	**0.5**	0.4 UJ	0.4 UJ	0.4 UJ	0.4 U	0.4 UJ	**0.5**	0.4 UJ	**0.2 J**	0.4 UJ	2.0 U
Yakima Canyon	06414063-06414066	BLS	**0.6**	0.4 UJ	**0.6 J**	0.4 UJ	0.4 U	0.4 UJ	**0.4 J**	0.4 UJ	**0.3 J**	0.4 UJ	2.0 U
Wapato-Toppenish	06484230-06484242	LSS	**4.1 J**	0.9 UJ	1.9 UJ	1.5 UJ	0.4 U	0.9 U	**0.8**	**1.3 J**	1.5 UJ	1.5 UJ	**25.9 J**
Wapato-Toppenish	06484231-06484243	LSS	**1.6 J**	0.8 UJ	1.6 UJ	1.5 UJ	0.4 U	0.8 U	**0.8**	0.8 UJ	1.5 UJ	1.5 UJ	**11.1 J**
Wapato-Toppenish	06484232-06484244	LSS	**2.7 J**	0.9 UJ	1.2 UJ	0.9 UJ	0.4 U	0.9 U	**0.5**	0.9 UJ	0.9 UJ	0.9 UJ	**14.1 J**
Wapato-Toppenish	06484234-06484245	NPM	**2.7 J**	0.7 UJ	1.0 UJ	0.7 UJ	0.4 U	0.7 UJ	**0.7**	0.7 UJ	0.7 UJ	0.7 UJ	**17.7 J**
Wapato-Toppenish	06484235-06484246	NPM	**1.8 J**	0.7 UJ	1.1 UJ	0.7 UJ	0.4 U	0.7 UJ	**0.8**	0.7 UJ	0.7 UJ	0.7 UJ	**30.7 J**
Wapato-Toppenish	06484236-06484247	NPM	**1.8 J**	0.7 UJ	1.2 UJ	1.2 UJ	0.4 U	0.7 U	**0.5**	**0.7 J**	1.2 UJ	1.2 UJ	**34.1 J**
Wapato-Toppenish	06484238-06484248	MWF	**1.3 J**	1.6 UJ	1.6 UJ	1.6 UJ	0.4 U	1.6 U	0.7 UJ	1.6 U	1.6 UJ	1.6 UJ	**14.1 J**
Wapato-Toppenish	06484239-06484249	MWF	**1.4 J**	1.3 UJ	**1.5**	1.3 UJ	0.4 U	1.3 U	0.6 UJ	**1.5**	1.3 UJ	1.3 UJ	**13.8 J**
Wapato-Toppenish	06484240-06484250	MWF	**0.8 J**	1.6 U	1.6 UJ	1.6 UJ	0.4 U	1.6 U	0.4 U	1.6 U	1.6 UJ	1.6 UJ	**11.0 J**
Prosser	06444234-06474230	SMB	**2.9 J**	1.2 U	1.2 UJ	1.2 U	0.4 U	1.2 U	0.7 UJ	1.2 U	1.2 UJ	1.2 UJ	**14.8 J**
Prosser	06444235-06474231	SMB	**1.9 J**	0.7 UJ	0.8 UJ	0.7 UJ	0.4 U	**0.9**	0.7 UJ	0.7 U	0.7 UJ	**1.1 J**	**10.5 J**
Prosser	06444236-06474232	SMB	**3.8**	1.2 U	1.2 U	1.2 U	0.4 U	1.2 U	0.4 UJ	1.2 U	1.2 U	1.2 U	**11.3 J**
Prosser	06444238-06474233	LSS	**4.8 J**	1.3 UJ	1.3 UJ	1.3 UJ	0.4 U	0.7 U	**0.8**	**1.0 J**	1.3 UJ	1.3 UJ	**17.9 J**
Prosser	06444239-06474234	LSS	**7.0 J**	0.7 UJ	1.9 UJ	1.3 UJ	0.4 U	0.7 U	**1.3**	**2.0 J**	1.3 UJ	1.3 UJ	**25.4 J**
Prosser	06444240-06474235	LSS	**5.5 J**	0.7 UJ	1.5 UJ	1.2 UJ	0.4 U	0.7 U	**1.0**	**1.4 J**	1.2 UJ	1.2 UJ	**20.8 J**
Horn Rapids	06444242-06474242	NPM	**2.6 J**	0.7 UJ	1.3 UJ	1.3 UJ	0.4 U	0.7 U	**0.5**	0.7 UJ	1.3 UJ	1.3 UJ	**16.6 J**
Horn Rapids	06444243-06474243	NPM	**6.8 J**	0.6 UJ	1.2 UJ	1.2 UJ	0.4 U	0.6 U	**1.0**	**1.7 J**	1.2 UJ	1.5 UJ	**30.3 J**
Horn Rapids	06444244-06474244	NPM	**9.1 J**	0.7 UJ	1.2 UJ	1.2 UJ	0.4 U	0.7 UJ	**0.8**	**1.3 J**	1.2 UJ	1.2 UJ	**26.0 J**
Horn Rapids	06454108-06474236	SMB	**4.0 J**	0.7 UJ	**1.4 J**	1.4 UJ	0.4 U	0.7 UJ	**0.6**	**0.7 J**	1.4 UJ	**1.4 J**	**25.4 J**
Horn Rapids	06454109-06474237	SMB	**4.7 J**	0.7 UJ	**1.4 J**	1.3 UJ	0.4 U	0.7 UJ	**0.5**	0.7 UJ	1.3 UJ	1.3 UJ	**17.0 J**
Horn Rapids	06454110-06474238	SMB	**6.4 J**	0.7 UJ	**1.3 J**	1.4 UJ	0.4 U	0.7 UJ	**0.6**	0.7 UJ	1.4 UJ	1.4 UJ	**26.0 J**
Horn Rapids	06454111-06474239	LSS	**5.6 J**	0.7 UJ	**2.5 J**	1.3 UJ	0.4 U	0.7 UJ	**1.0 J**	**1.5 J**	1.3 UJ	1.3 UJ	**23.3 J**
Horn Rapids	06454112-06474240	LSS	**4.1 J**	0.7 UJ	**2.4 J**	1.4 UJ	0.4 U	0.7 UJ	**0.8 J**	**1.0 J**	1.4 UJ	1.4 UJ	**17.4 J**
Horn Rapids	06454113-06474241	LSS	**4.1 J**	0.7 UJ	**2.1 J**	1.4 UJ	0.4 U	0.7 UJ	**0.7 J**	**0.9 J**	1.4 UJ	1.4 UJ	**14.8 J**

U = The analyte was not detected at or above the reported result.
J = The analyte was positively identified. The associated numerical result is an estimate.
UJ = The analyte was not detected at or above the reported estimated result.
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BLS = bridgelip sucker
LSS = largescale sucker
MWF = mountain whitefish
NPM = northern pikeminnow
SMB = smallmouth bass

* Whole body concentrations were estimated from separate analysis of carcass and fillets using formula: Cw = [(Cf x Mf)+(Cr x Mr)] / (Mf + Mr)
C = concentration, M = weight, f = fillet, r = carcass, and w = whole fish

Table B2. PCBs Concentrations in Yakima River Whole* Fish Samples, 2006 (ug/Kg, wet weight, parts per billion)

Reach	Sample No.	Species	Lipids (%)	Arodor 1016	Arodor 1221	Arodor 1232	Arodor 1242	Arodor 1248	Arodor 1254	Arodor 1260	Arodor 1262	Arodor 1268	Total PCB Arodors
Yakima Canyon	06414050-06414053	MWF	6.4	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**20.2**	**6.5 J**	--	2.0 U	**27 J**
Yakima Canyon	06414051-06414054	MWF	8.4	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**16.6**	**5.0 J**	--	1.9 U	**22 J**
Yakima Canyon	06414052-06414055	MWF	7.8	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	**25.5**	**8.4 J**	--	1.8 U	**34 J**
Yakima Canyon	06414061-06414064	BLS	8.7	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**18.4**	**5.0 J**	--	1.9 U	**23 J**
Yakima Canyon	06414062-06414065	BLS	6.8	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**7.5**	2.0 U	--	2.0 U	**7**
Yakima Canyon	06414063-06414066	BLS	6.2	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**7.0**	2.0 U	--	2.0 U	**7**
Wapato-Toppenish	06484230-06484242	LSS	5.7	4.3 UJ	1.9 U	1.9 U	4.3 UJ	**6.9 J**	**18.7 J**	**28.9 J**	2.4 UJ	1.9 U	**55 J**
Wapato-Toppenish	06484231-06484243	LSS	6.6	4.5 UJ	2.0 U	2.0 U	4.5 UJ	**7.5 J**	**11.4 J**	**12.5 J**	2.4 UJ	2.0 U	**31 J**
Wapato-Toppenish	06484232-06484244	LSS	3.4	4.2 UJ	1.9 U	1.9 U	4.2 UJ	**5.9 J**	**16.3 J**	**16.3 J**	2.4 UJ	1.9 U	**39 J**
Wapato-Toppenish	06484234-06484245	NPM	3.0	4.3 UJ	2.0 U	2.0 U	4.3 UJ	**5.9 J**	**14.9 J**	**16.9 J**	2.6 UJ	2.0 U	**37 J**
Wapato-Toppenish	06484235-06484246	NPM	2.8	4.2 UJ	2.0 U	2.0 U	4.2 UJ	16.3 UJ	**20.3 J**	**16.9 J**	2.7 UJ	2.0 U	**37 J**
Wapato-Toppenish	06484236-06484247	NPM	3.8	4.1 UJ	1.9 U	1.9 U	4.1 UJ	**8.1 J**	**28.6 J**	**36.9 J**	2.7 UJ	1.9 U	**74 J**
Wapato-Toppenish	06484238-06484248	MWF	4.1	2.0 U	2.0 U	8.2 UJ	2.0 U	**8.3 J**	**18.6 J**	**9.0 J**	9.9 UJ	2.0 U	**36 J**
Wapato-Toppenish	06484239-06484249	MWF	3.8	1.9 U	1.9 U	1.9 U	1.9 U	**7.7 J**	**17.5 J**	**8.5 J**	9.7 UJ	1.9 U	**34 J**
Wapato-Toppenish	06484240-06484250	MWF	3.8	1.9 U	1.9 U	4.2 UJ	1.9 U	**6.0 J**	**11.0 J**	**4.3 J**	4.9 UJ	1.9 U	**21 J**
Prosser	06444234-06474230	SMB	3.6	2.0 U	2.0 U	2.0 U	2.0 U	**5.4 J**	**17.2 J**	**22.5 J**	27.9 UJ	7.5 UJ	**44 J**
Prosser	06444235-06474231	SMB	3.9	2.0 U	2.0 U	2.0 U	2.0 U	**4.6 J**	**12.5 J**	**14.6 J**	14.6 UJ	2.0 U	**30 J**
Prosser	06444236-06474232	SMB	2.3	2.0 U	2.0 U	2.0 U	2.0 U	**4.2 J**	**9.7 J**	**13.9 J**	14.6 UJ	2.0 U	**27 J**
Prosser	06444238-06474233	LSS	5.0	4.3 UJ	2.0 U	2.0 U	4.3 UJ	**5.0 J**	**11.3 J**	**22.9 J**	2.0 U	2.0 U	**39 J**
Prosser	06444239-06474234	LSS	7.6	4.1 UJ	1.9 U	1.9 U	4.1 UJ	**9.1 J**	**26.0 J**	**28.3 J**	3.6 UJ	1.9 U	**63 J**
Prosser	06444240-06474235	LSS	8.2	4.0 UJ	2.0 U	2.0 U	4.0 UJ	**7.4 J**	**21.8 J**	**28.8 J**	4.3 UJ	2.0 U	**57 J**
Horn Rapids	06444242-06474242	NPM	3.8	4.1 UJ	2.0 U	2.0 U	4.1 UJ	**5.6 J**	**9.6 J**	**9.9 J**	4.0 UJ	2.0 U	**25 J**
Horn Rapids	06444243-06474243	NPM	5.3	3.8 UJ	1.9 U	1.9 U	3.8 UJ	**7.4 J**	**19.8 J**	**34.2 J**	4.2 UJ	1.9 U	**61 J**
Horn Rapids	06444244-06474244	NPM	5.8	4.0 UJ	1.9 U	1.9 U	4.0 UJ	**6.4 J**	**19.4 J**	**24.4 J**	1.9 U	1.9 U	**50 J**
Horn Rapids	06454108-06474236	SMB	3.8	4.5 UJ	2.0 U	2.0 U	4.5 UJ	**6.5 J**	**17.5 J**	**34.4 J**	--	2.0 U	**58 J**
Horn Rapids	06454109-06474237	SMB	4.2	2.0 U	2.0 U	2.0 U	4.2 UJ	**4.9 J**	**13.0 J**	**19.7 J**	--	2.0 U	**37 J**
Horn Rapids	06454110-06474238	SMB	4.2	2.0 U	2.0 U	2.0 U	4.4 UJ	**6.3 J**	**19.1 J**	**29.2 J**	--	2.0 U	**54 J**
Horn Rapids	06454111-06474239	LSS	9.1	4.9 UJ	1.9 U	1.9 U	7.9 UJ	**7.2 J**	**16.5 J**	**24.5 J**	--	1.9 U	**48 J**
Horn Rapids	06454112-06474240	LSS	7.2	4.6 UJ	2.0 U	2.0 U	4.6 UJ	**5.8 J**	**11.7 J**	**18.7 J**	--	2.0 U	**36 J**
Horn Rapids	06454113-06474241	LSS	7.0	4.3 UJ	2.0 U	2.0 U	4.3 UJ	**5.4 J**	**12.6 J**	**19.5 J**	--	2.0 U	**37 J**

(--) Not analyzed for

U = The analyte was not detected at or above the reported result.

J = The analyte was positively identified. The associated numerical result is an estimate.

UJ = The analyte was not detected at or above the reported estimated result.

BLS = bridgelip sucker
LSS = largescale sucker
MWF = mountain whitefish
NPM = northern pikeminnow
SMB = smallmouth bass

* Whole body concentrations were estimated from separate analysis of carcass and fillets using formula: Cw = [(Cf x Mf)+(Cr x Mr)] / (Mf + Mr)
C = concentration, M = weight, f = fillet, r = carcass, and w = whole fish

Appendix C. 2006 Yakima River Fish Biological Data

Table C1. Biological Data on 2006 Yakima River Fish Samples

Sample Reach Name	Sample Reach Number	Composite ID	Species	Weight (g)	Total Length (mm)	Collection Date	Pest/PCB sample No. (fillet)	Pest/PCB sample No. (Whole body)	Dioxin Sample No. (fillets)
Keechelus	Reach 1	KE LSS-1	LSS	1196	482	9/7/06	06394088		06394091
Keechelus	Reach 1	KE LSS-1	LSS	962	455	9/7/06	06394088		06394091
Keechelus	Reach 1	KE LSS-1	LSS	1070	451	9/7/06	06394088		06394091
Keechelus	Reach 1	KE LSS-1	LSS	794	430	9/7/06	06394088		06394091
Keechelus	Reach 1	KE LSS-1	LSS	780	425	9/7/06	06394088		06394091
			Mean	**960**	**449**				
Keechelus	Reach 1	KE LSS-2	LSS	1026	473	9/7/06	06394089		06394091
Keechelus	Reach 1	KE LSS-2	LSS	942	466	9/7/06	06394089		06394091
Keechelus	Reach 1	KE LSS-2	LSS	912	443	9/7/06	06394089		06394091
Keechelus	Reach 1	KE LSS-2	LSS	772	431	9/7/06	06394089		06394091
Keechelus	Reach 1	KE LSS-2	LSS	821	421	9/7/06	06394089		06394091
			Mean	**895**	**447**				
Keechelus	Reach 1	KE LSS-3	LSS	1098	472	9/7/06	06394090		06394091
Keechelus	Reach 1	KE LSS-3	LSS	1169	467	9/7/06	06394090		06394091
Keechelus	Reach 1	KE LSS-3	LSS	777	440	9/7/06	06394090		06394091
Keechelus	Reach 1	KE LSS-3	LSS	906	431	9/7/06	06394090		06394091
Keechelus	Reach 1	KE LSS-3	LSS	640	417	9/7/06	06394090		06394091
			Mean	**918**	**445**				
Keechelus	Reach 1	KE NPM-1	NPM	570	428	9/7/06	06394092		06394094
Keechelus	Reach 1	KE NPM-1	NPM	505	405	9/7/06	06394092		06394094
Keechelus	Reach 1	KE NPM-1	NPM	516	398	9/7/06	06394092		06394094
			Mean	**530**	**410**				
Keechelus	Reach 1	KE NPM-2	NPM	623	420	9/7/06	06394093		06394094
Keechelus	Reach 1	KE NPM-2	NPM	539	415	9/7/06	06394093		06394094
Keechelus	Reach 1	KE NPM-2	NPM	488	397	9/7/06	06394093		06394094
Keechelus	Reach 1	KE NPM-2	NPM	478	395	9/7/06	06394093		06394094
			Mean	**532**	**407**				
Keechelus	Reach 1	KE KOK-1	KOK	272	327	9/7/06	06394095		06394098
Keechelus	Reach 1	KE KOK-1	KOK	280	310	9/7/06	06394095		06394098
Keechelus	Reach 1	KE KOK-1	KOK	231	299	9/7/06	06394095		06394098
Keechelus	Reach 1	KE KOK-1	KOK	214	289	9/7/06	06394095		06394098
Keechelus	Reach 1	KE KOK-1	KOK	246	286	9/7/06	06394095		06394098
			Mean	**249**	**302**				
Keechelus	Reach 1	KE KOK-2	KOK	279	321	9/7/06	06394096		06394098
Keechelus	Reach 1	KE KOK-2	KOK	267	315	9/7/06	06394096		06394098
Keechelus	Reach 1	KE KOK-2	KOK	256	296	9/7/06	06394096		06394098
Keechelus	Reach 1	KE KOK-2	KOK	231	289	9/7/06	06394096		06394098
Keechelus	Reach 1	KE KOK-2	KOK	208	285	9/7/06	06394096		06394098
			Mean	**248**	**301**				
Keechelus	Reach 1	KE KOK-3	KOK	283	320	9/7/06	06394097		06394098
Keechelus	Reach 1	KE KOK-3	KOK	299	318	9/7/06	06394097		06394098
Keechelus	Reach 1	KE KOK-3	KOK	237	296	9/7/06	06394097		06394098
Keechelus	Reach 1	KE KOK-3	KOK	216	290	9/7/06	06394097		06394098
Keechelus	Reach 1	KE KOK-3	KOK	186	277	9/7/06	06394097		06394098
			Mean	**244**	**300**				
Keechelus	Reach 1	KE CTT-1	CTT	463	366	9/7/06	06394099		06394102
Keechelus	Reach 1	KE CTT-1	CTT	159	252	9/7/06	06394099		06394102
Keechelus	Reach 1	KE CTT-1	CTT	181	245	9/7/06	06394099		06394102
Keechelus	Reach 1	KE CTT-1	CTT	107	217	9/7/06	06394099		06394102
Keechelus	Reach 1	KE CTT-1	CTT	103	215	9/7/06	06394099		06394102
			Mean	**203**	**259**				
Keechelus	Reach 1	KE CTT-2	CTT	291	322	9/7/06	06394100		06394102
Keechelus	Reach 1	KE CTT-2	CTT	164	258	9/7/06	06394100		06394102
Keechelus	Reach 1	KE CTT-2	CTT	151	243	9/7/06	06394100		06394102
Keechelus	Reach 1	KE CTT-2	CTT	113	220	9/7/06	06394100		06394102
Keechelus	Reach 1	KE CTT-2	CTT	92	215	9/7/06	06394100		06394102
			Mean	**162**	**252**				
Keechelus	Reach 1	KE CTT-3	CTT	204	283	9/7/06	06394101		06394102
Keechelus	Reach 1	KE CTT-3	CTT	185	268	9/7/06	06394101		06394102
Keechelus	Reach 1	KE CTT-3	CTT	152	236	9/7/06	06394101		06394102
Keechelus	Reach 1	KE CTT-3	CTT	129	233	9/7/06	06394101		06394102
Keechelus	Reach 1	KE CTT-3	CTT	97	214	9/7/06	06394101		06394102

Table C1 continued.

Sample Reach Name	Sample Reach Number	Composite ID	Species	Weight (g)	Total Length (mm)	Collection Date	Pest/PCB sample No. (fillet)	Pest/PCB sample No. (Whole body)	Dioxin Sample No. (fillets)
			Mean	**153**	**247**				
Keechelus	Reach 1	KE MWF-1	MWF	682	391	9/7/06	06394103		06394105
Keechelus	Reach 1	KE MWF-1	MWF	136	254	9/7/06	06394103		06394105
Keechelus	Reach 1	KE MWF-1	MWF	129	249	9/7/06	06394103		06394105
Keechelus	Reach 1	KE MWF-1	MWF	54	184	9/7/06	06394103		06394105
			Mean	**250**	**270**				
Keechelus	Reach 1	KE MWF-2	MWF	415	337	9/7/06	06394104		06394105
Keechelus	Reach 1	KE MWF-2	MWF	143	259	9/7/06	06394104		06394105
Keechelus	Reach 1	KE MWF-2	MWF	64	198	9/7/06	06394104		06394105
Keechelus	Reach 1	KE MWF-2	MWF	62	193	9/7/06	06394104		06394105
			Mean	**171**	**247**				
Kachess	Reach 2	KA LSS-1	LSS	924	466	9/6/06	06394080		06394083
Kachess	Reach 2	KA LSS-1	LSS	832	428	9/6/06	06394080		06394083
Kachess	Reach 2	KA LSS-1	LSS	709	425	9/6/06	06394080		06394083
Kachess	Reach 2	KA LSS-1	LSS	642	407	9/6/06	06394080		06394083
Kachess	Reach 2	KA LSS-1	LSS	614	403	9/6/06	06394080		06394083
			Mean	**744**	**426**				
Kachess	Reach 2	KA LSS-2	LSS	890	455	9/6/06	06394081		06394083
Kachess	Reach 2	KA LSS-2	LSS	760	432	9/6/06	06394081		06394083
Kachess	Reach 2	KA LSS-2	LSS	738	424	9/6/06	06394081		06394083
Kachess	Reach 2	KA LSS-2	LSS	682	414	9/6/06	06394081		06394083
Kachess	Reach 2	KA LSS-2	LSS	550	392	9/6/06	06394081		06394083
			Mean	**724**	**423**				
Kachess	Reach 2	KA LSS-3	LSS	916	455	9/6/06	06394082		06394083
Kachess	Reach 2	KA LSS-3	LSS	764	438	9/6/06	06394082		06394083
Kachess	Reach 2	KA LSS-3	LSS	768	421	9/6/06	06394082		06394083
Kachess	Reach 2	KA LSS-3	LSS	732	415	9/6/06	06394082		06394083
Kachess	Reach 2	KA LSS-3	LSS	566	383	9/6/06	06394082		06394083
			Mean	**749**	**422**				
Kachess	Reach 2	KA NPM-1	NPM	803	442	9/6/06	06394084		06394087
Kachess	Reach 2	KA NPM-1	NPM	432	388	9/6/06	06394084		06394087
Kachess	Reach 2	KA NPM-1	NPM	494	386	9/6/06	06394084		06394087
Kachess	Reach 2	KA NPM-1	NPM	319	352	9/6/06	06394084		06394087
Kachess	Reach 2	KA NPM-1	NPM	228	322	9/6/06	06394084		06394087
			Mean	**455**	**378**				
Kachess	Reach 2	KA NPM-2	NPM	610	433	9/6/06	06394085		06394087
Kachess	Reach 2	KA NPM-2	NPM	501	395	9/6/06	06394085		06394087
Kachess	Reach 2	KA NPM-2	NPM	430	378	9/6/06	06394085		06394087
Kachess	Reach 2	KA NPM-2	NPM	292	355	9/6/06	06394085		06394087
Kachess	Reach 2	KA NPM-2	NPM	269	321	9/6/06	06394085		06394087
			Mean	**420**	**376**				
Kachess	Reach 2	KA NPM-3	NPM	453	410	9/6/06	06394086		06394087
Kachess	Reach 2	KA NPM-3	NPM	555	403	9/6/06	06394086		06394087
Kachess	Reach 2	KA NPM-3	NPM	374	362	9/6/06	06394086		06394087
Kachess	Reach 2	KA NPM-3	NPM	364	355	9/6/06	06394086		06394087
Kachess	Reach 2	KA NPM-3	NPM	221	321	9/6/06	06394086		06394087
			Mean	**393**	**370**				
Cle Elum	Reach 3	CE MWF-1	MWF	408	371	9/25/06	06414068		06414071
Cle Elum	Reach 3	CE MWF-1	MWF	307	319	9/25/06	06414068		06414071
Cle Elum	Reach 3	CE MWF-1	MWF	289	319	9/25/06	06414068		06414071
Cle Elum	Reach 3	CE MWF-1	MWF	198	274	9/25/06	06414068		06414071
Cle Elum	Reach 3	CE MWF-1	MWF	200	273	9/25/06	06414068		06414071
			Mean	**280**	**311**				
Cle Elum	Reach 3	CE MWF-2	MWF	443	364	9/25/06	06414069		06414071
Cle Elum	Reach 3	CE MWF-2	MWF	309	321	9/25/06	06414069		06414071
Cle Elum	Reach 3	CE MWF-2	MWF	303	317	9/25/06	06414069		06414071
Cle Elum	Reach 3	CE MWF-2	MWF	206	281	9/25/06	06414069		06414071
Cle Elum	Reach 3	CE MWF-2	MWF	162	262	9/25/06	06414069		06414071
			Mean	**285**	**309**				
Cle Elum	Reach 3	CE MWF-3	MWF	389	350	9/25/06	06414070		06414071
Cle Elum	Reach 3	CE MWF-3	MWF	337	335	9/25/06	06414070		06414071
Cle Elum	Reach 3	CE MWF-3	MWF	263	301	9/25/06	06414070		06414071
Cle Elum	Reach 3	CE MWF-3	MWF	215	300	9/25/06	06414070		06414071
Cle Elum	Reach 3	CE MWF-3	MWF	151	260	9/25/06	06414070		06414071

Table C1 continued.

Sample Reach Name	Sample Reach Number	Composite ID	Species	Weight (g)	Total Length (mm)	Collection Date	Pest/PCB sample No. (fillet)	Pest/PCB sample No. (Whole body)	Dioxin Sample No. (fillets)
			Mean	**910**	**437**				
Cle Elum	Reach 3	CE BLS-3	LSS	1148	480	9/25/06	06414074		06414075
Cle Elum	Reach 3	CE BLS-3	LSS	1123	470	9/25/06	06414074		06414075
Cle Elum	Reach 3	CE BLS-3	LSS	1026	431	9/25/06	06414074		06414075
Cle Elum	Reach 3	CE BLS-3	BLS	947	428	9/25/06	06414074		06414075
Cle Elum	Reach 3	CE BLS-3	BLS	573	371	9/25/06	06414074		06414075
			Mean	**963**	**436**				
Cle Elum	Reach 3	CE NPM-1	NPM	628	401	9/25/06	06414076		06414079
Cle Elum	Reach 3	CE NPM-1	NPM	586	367	9/25/06	06414076		06414079
Cle Elum	Reach 3	CE NPM-1	NPM	598	365	9/25/06	06414076		06414079
Cle Elum	Reach 3	CE NPM-1	NPM	244	295	9/25/06	06414076		06414079
Cle Elum	Reach 3	CE NPM-1	NPM	213	287	9/25/06	06414076		06414079
			Mean	**454**	**343**				
Cle Elum	Reach 3	CE NPM-2	NPM	652	397	9/25/06	06414077		06414079
Cle Elum	Reach 3	CE NPM-2	NPM	627	383	9/25/06	06414077		06414079
Cle Elum	Reach 3	CE NPM-2	NPM	440	345	9/25/06	06414077		06414079
Cle Elum	Reach 3	CE NPM-2	NPM	312	318	9/25/06	06414077		06414079
Cle Elum	Reach 3	CE NPM-2	NPM	206	277	9/25/06	06414077		06414079
			Mean	**447**	**344**				
Cle Elum	Reach 3	CE NPM-3	NPM	686	390	9/25/06	06414078		06414079
Cle Elum	Reach 3	CE NPM-3	NPM	626	387	9/25/06	06414078		06414079
Cle Elum	Reach 3	CE NPM-3	NPM	410	340	9/25/06	06414078		06414079
Cle Elum	Reach 3	CE NPM-3	NPM	353	322	9/25/06	06414078		06414079
Cle Elum	Reach 3	CE NPM-3	NPM	208	272	9/25/06	06414078		06414079
			Mean	**457**	**342**				
Canyon	Reach 4	CAN MWF-1	MWF	429	374	9/11/06	06414050	06414050-06414053	06414056
Canyon	Reach 4	CAN MWF-1	MWF	297	336	9/11/06	06414050	06414050-06414053	06414056
Canyon	Reach 4	CAN MWF-1	MWF	377	335	9/13/06	06414050	06414050-06414053	06414056
Canyon	Reach 4	CAN MWF-1	MWF	216	298	9/13/06	06414050	06414050-06414053	06414056
Canyon	Reach 4	CAN MWF-1	MWF	259	295	9/13/06	06414050	06414050-06414053	06414056
			Mean	**316**	**328**				
Canyon	Reach 4	CAN MWF-2	MWF	343	347	9/13/06	06414051	06414051-06414054	06414056
Canyon	Reach 4	CAN MWF-2	MWF	414	339	9/13/06	06414051	06414051-06414054	06414056
Canyon	Reach 4	CAN MWF-2	MWF	318	325	9/11/06	06414051	06414051-06414054	06414056
Canyon	Reach 4	CAN MWF-2	MWF	300	309	9/13/06	06414051	06414051-06414054	06414056
Canyon	Reach 4	CAN MWF-2	MWF	231	282	9/13/06	06414051	06414051-06414054	06414056
			Mean	**321**	**320**				
Canyon	Reach 4	CAN MWF-3	MWF	337	346	9/11/06	06414052	06414052-06414055	06414056
Canyon	Reach 4	CAN MWF-3	MWF	378	340	9/13/06	06414052	06414052-06414055	06414056
Canyon	Reach 4	CAN MWF-3	MWF	353	325	9/13/06	06414052	06414052-06414055	06414056
Canyon	Reach 4	CAN MWF-3	MWF	310	324	9/11/06	06414052	06414052-06414055	06414056
Canyon	Reach 4	CAN MWF-3	MWF	204	273	9/11/06	06414052	06414052-06414055	06414056
			Mean	**316**	**322**				
Canyon	Reach 4	CAN NPM-1	NPM	820	450	9/11/06	06414057		06414060
Canyon	Reach 4	CAN NPM-1	NPM	447	356	9/11/06	06414057		06414060
Canyon	Reach 4	CAN NPM-1	NPM	489	355	9/11/06	06414057		06414060
Canyon	Reach 4	CAN NPM-1	NPM	383	335	9/11/06	06414057		06414060
Canyon	Reach 4	CAN NPM-1	NPM	406	335	9/11/06	06414057		06414060
			Mean	**509**	**366**				
Canyon	Reach 4	CAN NPM-2	NPM	510	378	9/11/06	06414058		06414060
Canyon	Reach 4	CAN NPM-2	NPM	483	361	9/11/06	06414058		06414060
Canyon	Reach 4	CAN NPM-2	NPM	391	353	9/13/06	06414058		06414060
Canyon	Reach 4	CAN NPM-2	NPM	397	344	9/11/06	06414058		06414060
Canyon	Reach 4	CAN NPM-2	NPM	320	328	9/11/06	06414058		06414060

Table C1 continued.

Sample Reach Name	Sample Reach Number	Composite ID	Species	Weight (g)	Total Length (mm)	Collection Date	Pest/PCB sample No. (fillet)	Pest/PCB sample No. (Whole body)	Dioxin Sample No. (fillets)
			Mean	**420**	**353**				
Canyon	Reach 4	CAN NPM-3	NPM	512	370	9/13/06	06414059		06414060
Canyon	Reach 4	CAN NPM-3	NPM	443	369	9/13/06	06414059		06414060
Canyon	Reach 4	CAN NPM-3	NPM	422	350	9/11/06	06414059		06414060
Canyon	Reach 4	CAN NPM-3	NPM	347	345	9/13/06	06414059		06414060
Canyon	Reach 4	CAN NPM-3	NPM	312	319	9/13/06	06414059		06414060
			Mean	**407**	**351**				
Canyon	Reach 4	CAN BLS-1	LSS	1247	479	9/13/06	06414061	06414061-06414064	06414067
Canyon	Reach 4	CAN BLS-1	BLS	563	364	9/13/06	06414061	06414061-06414064	06414067
Canyon	Reach 4	CAN BLS-1	BLS	423	320	9/13/06	06414061	06414061-06414064	06414067
Canyon	Reach 4	CAN BLS-1	LSS	261	289	9/11/06	06414061	06414061-06414064	06414067
Canyon	Reach 4	CAN BLS-1	BLS	265	279	9/11/06	06414061	06414061-06414064	06414067
			Mean	**552**	**346**				
Canyon	Reach 4	CAN BLS-2	BLS	826	446	9/13/06	06414062	06414062-06414065	06414067
Canyon	Reach 4	CAN BLS-2	BLS	653	390	9/13/06	06414062	06414062-06414065	06414067
Canyon	Reach 4	CAN BLS-2	BLS	348	318	9/11/06	06414062	06414062-06414065	06414067
Canyon	Reach 4	CAN BLS-2	BLS	281	292	9/11/06	06414062	06414062-06414065	06414067
Canyon	Reach 4	CAN BLS-2	LSS	200	266	9/13/06	06414062	06414062-06414065	06414067
			Mean	**462**	**342**				
Canyon	Reach 4	CAN BLS-3	LSS	860	426	9/13/06	06414063	06414063-06414066	06414067
Canyon	Reach 4	CAN BLS-3	BLS	722	390	9/13/06	06414063	06414063-06414066	06414067
Canyon	Reach 4	CAN BLS-3	BLS	332	308	9/11/06	06414063	06414063-06414066	06414067
Canyon	Reach 4	CAN BLS-3	BLS	356	307	9/11/06	06414063	06414063-06414066	06414067
Canyon	Reach 4	CAN BLS-3	BLS	193	264	9/11/06	06414063	06414063-06414066	06414067
			Mean	**493**	**339**				
Wap - Topenish	Reach 7	WT LSS-1	LSS	1640	575	11/20/06	06484230	06484230-06484242	06484233
Wap - Topenish	Reach 7	WT LSS-1	LSS	968	474	11/20/06	06484230	06484230-06484242	06484233
Wap - Topenish	Reach 7	WT LSS-1	LSS	938	463	11/20/06	06484230	06484230-06484242	06484233
Wap - Topenish	Reach 7	WT LSS-1	LSS	560	379	11/20/06	06484230	06484230-06484242	06484233
Wap - Topenish	Reach 7	WT LSS-1	LSS	451	355	11/20/06	06484230	06484230-06484242	06484233
			Mean	**911**	**449**				
Wap - Topenish	Reach 7	WT LSS-2	LSS	1555	515	11/20/06	06484231	06484231-06484243	06484233
Wap - Topenish	Reach 7	WT LSS-2	LSS	1263	493	11/20/06	06484231	06484231-06484243	06484233
Wap - Topenish	Reach 7	WT LSS-2	LSS	806	426	11/20/06	06484231	06484231-06484243	06484233
Wap - Topenish	Reach 7	WT LSS-2	LSS	589	387	11/20/06	06484231	06484231-06484243	06484233
Wap - Topenish	Reach 7	WT LSS-2	LSS	365	332	11/20/06	06484231	06484231-06484243	06484233
			Mean	**916**	**431**				
Wap - Topenish	Reach 7	WT LSS-3	LSS	1067	496	11/20/06	06484232	06484232-06484244	06484233
Wap - Topenish	Reach 7	WT LSS-3	LSS	1090	495	11/20/06	06484232	06484232-06484244	06484233
Wap - Topenish	Reach 7	WT LSS-3	LSS	536	397	11/20/06	06484232	06484232-06484244	06484233
Wap - Topenish	Reach 7	WT LSS-3	LSS	650	393	11/20/06	06484232	06484232-06484244	06484233
Wap - Topenish	Reach 7	WT LSS-3	LSS	371	351	11/20/06	06484232	06484232-06484244	06484233
			Mean	**743**	**426**				
Wap - Topenish	Reach 7	WT NPM-1	NPM	659	406	11/20/06	06484234	06484234-06484245	06484237
Wap - Topenish	Reach 7	WT NPM-1	NPM	315	332	11/20/06	06484234	06484234-06484245	06484237
Wap - Topenish	Reach 7	WT NPM-1	NPM	281	328	11/20/06	06484234	06484234-06484245	06484237
Wap - Topenish	Reach 7	WT NPM-1	NPM	264	307	11/20/06	06484234	06484234-06484245	06484237
Wap - Topenish	Reach 7	WT NPM-1	NPM	251	306	11/20/06	06484234	06484234-06484245	06484237
			Mean	**354**	**336**				
Wap - Topenish	Reach 7	WT NPM-2	NPM	534	389	11/20/06	06484235	06484235-06484246	06484237
Wap - Topenish	Reach 7	WT NPM-2	NPM	331	335	11/20/06	06484235	06484235-06484246	06484237
Wap - Topenish	Reach 7	WT NPM-2	NPM	289	326	11/20/06	06484235	06484235-06484246	06484237
Wap - Topenish	Reach 7	WT NPM-2	NPM	253	315	11/20/06	06484235	06484235-06484246	06484237
Wap - Topenish	Reach 7	WT NPM-2	NPM	234	304	11/20/06	06484235	06484235-06484246	06484237
			Mean	**328**	**334**				
Wap - Topenish	Reach 7	WT NPM-3	NPM	422	347	11/20/06	06484236	06484236-06484247	06484237
Wap - Topenish	Reach 7	WT NPM-3	NPM	351	342	11/20/06	06484236	06484236-06484247	06484237
Wap - Topenish	Reach 7	WT NPM-3	NPM	255	319	11/20/06	06484236	06484236-06484247	06484237
Wap - Topenish	Reach 7	WT NPM-3	NPM	282	317	11/20/06	06484236	06484236-06484247	06484237
Wap - Topenish	Reach 7	WT NPM-3	NPM	240	297	11/20/06	06484236	06484236-06484247	06484237

Table C1 continued.

Sample Reach Name	Sample Reach Number	Composite ID	Species	Weight (g)	Total Length (mm)	Collection Date	Pest/PCB sample No. (fillet)	Pest/PCB sample No. (Whole body)	Dioxin Sample No. (fillets)
			Mean	**310**	**324**				
Wap - Topenish	Reach 7	WT MWF-1	MWF	454	388	11/20/06	06484238	06484238-06484248	06484241
Wap - Topenish	Reach 7	WT MWF-1	MWF	401	356	11/20/06	06484238	06484238-06484248	06484241
Wap - Topenish	Reach 7	WT MWF-1	MWF	349	350	11/20/06	06484238	06484238-06484248	06484241
Wap - Topenish	Reach 7	WT MWF-1	MWF	197	295	11/20/06	06484238	06484238-06484248	06484241
Wap - Topenish	Reach 7	WT MWF-1	MWF	201	292	11/20/06	06484238	06484238-06484248	06484241
			Mean	**320**	**336**				
Wap - Topenish	Reach 7	WT MWF-2	MWF	446	378	11/20/06	06484239	06484239-06484249	06484241
Wap - Topenish	Reach 7	WT MWF-2	MWF	394	362	11/20/06	06484239	06484239-06484249	06484241
Wap - Topenish	Reach 7	WT MWF-2	MWF	346	335	11/20/06	06484239	06484239-06484249	06484241
Wap - Topenish	Reach 7	WT MWF-2	MWF	234	305	11/20/06	06484239	06484239-06484249	06484241
Wap - Topenish	Reach 7	WT MWF-2	MWF	188	288	11/20/06	06484239	06484239-06484249	06484241
			Mean	**322**	**334**				
Wap - Topenish	Reach 7	WT MWF-3	MWF	408	375	11/20/06	06484240	06484240-06484250	06484241
Wap - Topenish	Reach 7	WT MWF-3	MWF	408	365	11/20/06	06484240	06484240-06484250	06484241
Wap - Topenish	Reach 7	WT MWF-3	MWF	244	315	11/20/06	06484240	06484240-06484250	06484241
Wap - Topenish	Reach 7	WT MWF-3	MWF	247	309	11/20/06	06484240	06484240-06484250	06484241
Wap - Topenish	Reach 7	WT MWF-3	MWF	187	278	11/20/06	06484240	06484240-06484250	06484241
			Mean	**299**	**328**				
Prosser	Reach 8	PRO SMB-1	SMB	540	342	10/12/06	06444234	06444234-06474230	06444237
Prosser	Reach 8	PRO SMB-1	SMB	?	300	9/6/06	06444234	06444234-06474230	06444237
Prosser	Reach 8	PRO SMB-1	SMB	247	279	10/12/06	06444234	06444234-06474230	06444237
Prosser	Reach 8	PRO SMB-1	SMB	193	241	10/12/06	06444234	06444234-06474230	06444237
Prosser	Reach 8	PRO SMB-1	SMB	161	232	10/12/06	06444234	06444234-06474230	06444237
			Mean	**n/a**	**279**				
Prosser	Reach 8	PRO SMB-2	SMB	404	316	10/12/06	06444235	06444235-06474231	06444237
Prosser	Reach 8	PRO SMB-2	SMB	428	305	10/12/06	06444235	06444235-06474231	06444237
Prosser	Reach 8	PRO SMB-2	SMB	252	275	10/12/06	06444235	06444235-06474231	06444237
Prosser	Reach 8	PRO SMB-2	SMB	241	267	10/12/06	06444235	06444235-06474231	06444237
Prosser	Reach 8	PRO SMB-2	SMB	?	230	9/6/06	06444235	06444235-06474231	06444237
			Mean	**n/a**	**279**				
Prosser	Reach 8	PRO SMB-3	SMB	308	314	10/12/06	06444236	06444236-06474232	06444237
Prosser	Reach 8	PRO SMB-3	SMB	?	305	9/6/06	06444236	06444236-06474232	06444237
Prosser	Reach 8	PRO SMB-3	SMB	223	271	10/12/06	06444236	06444236-06474232	06444237
Prosser	Reach 8	PRO SMB-3	SMB	247	271	10/12/06	06444236	06444236-06474232	06444237
Prosser	Reach 8	PRO SMB-3	SMB	105	227	10/12/06	06444236	06444236-06474232	06444237
			Mean	**n/a**	**278**				
Prosser	Reach 8	PRO LSS-1	LSS	1453	539	10/12/06	06444238	06444238-06474233	06444241
Prosser	Reach 8	PRO LSS-1	LSS	1056	494	10/12/06	06444238	06444238-06474233	06444241
Prosser	Reach 8	PRO LSS-1	LSS	1209	488	10/12/06	06444238	06444238-06474233	06444241
Prosser	Reach 8	PRO LSS-1	LSS	277	311	10/12/06	06444238	06444238-06474233	06444241
Prosser	Reach 8	PRO LSS-1	LSS	292	310	10/12/06	06444238	06444238-06474233	06444241
			Mean	**857**	**428**				
Prosser	Reach 8	PRO LSS-2	LSS	1278	535	10/12/06	06444239	06444239-06474234	06444241
Prosser	Reach 8	PRO LSS-2	LSS	1233	500	10/12/06	06444239	06444239-06474234	06444241
Prosser	Reach 8	PRO LSS-2	LSS	1139	487	10/12/06	06444239	06444239-06474234	06444241
Prosser	Reach 8	PRO LSS-2	LSS	401	338	10/12/06	06444239	06444239-06474234	06444241
Prosser	Reach 8	PRO LSS-2	LSS	306	305	10/12/06	06444239	06444239-06474234	06444241
			Mean	**871**	**433**				
Prosser	Reach 8	PRO LSS-3	LSS	1305	522	10/12/06	06444240	06444240-06474235	06444241
Prosser	Reach 8	PRO LSS-3	LSS	1302	514	10/12/06	06444240	06444240-06474235	06444241
Prosser	Reach 8	PRO LSS-3	LSS	1090	463	10/12/06	06444240	06444240-06474235	06444241
Prosser	Reach 8	PRO LSS-3	LSS/BLS?	510	401	10/12/06	06444240	06444240-06474235	06444241
Prosser	Reach 8	PRO LSS-3	LSS	246	290	10/12/06	06444240	06444240-06474235	06444241
			Mean	**891**	**438**				
Prosser	Reach 8	PRO CRP-1	CRP	>	680	10/12/06	06454105		06454114
Prosser	Reach 8	PRO CRP-1	CRP	>	642	10/12/06	06454105		06454114
Prosser	Reach 8	PRO CRP-1	CRP	>	629	10/12/06	06454105		06454114
Prosser	Reach 8	PRO CRP-1	CRP	>	599	10/12/06	06454105		06454114
Prosser	Reach 8	PRO CRP-1	CRP	2990	598	10/12/06	06454105		06454114

Table C1 continued.

Sample Reach Name	Sample Reach Number	Composite ID	Species	Weight (g)	Total Length (mm)	Collection Date	Pest/PCB sample No. (fillet)	Pest/PCB sample No. (Whole body)	Dioxin Sample No. (fillets)
			Mean	**n/a**	**630**				
Prosser	Reach 8	PRO CRP-2	CRP	>	668	10/12/06	06454106		06454114
Prosser	Reach 8	PRO CRP-2	CRP	3195	655	10/12/06	06454106		06454114
Prosser	Reach 8	PRO CRP-2	CRP	>	628	10/12/06	06454106		06454114
Prosser	Reach 8	PRO CRP-2	CRP	2848	601	10/12/06	06454106		06454114
Prosser	Reach 8	PRO CRP-2	CRP	>	593	10/12/06	06454106		06454114
			Mean	**n/a**	**629**				
Prosser	Reach 8	PRO CRP-3	CRP	>	665	10/12/06	06454107		06454114
Prosser	Reach 8	PRO CRP-3	CRP	>	661	10/12/06	06454107		06454114
Prosser	Reach 8	PRO CRP-3	CRP	>	606	10/12/06	06454107		06454114
Prosser	Reach 8	PRO CRP-3	CRP	>	603	10/12/06	06454107		06454114
Prosser	Reach 8	PRO CRP-3	CRP	>	545	10/12/06	06454107		06454114
			Mean	**n/a**	**616**				
Horn	Reach 9	HR SMB-1	SMB	2375	516	10/11/06	06454108	06454108-06474236	06454115
Horn	Reach 9	HR SMB-1	SMB	809	383	10/11/06	06454108	06454108-06474236	06454115
Horn	Reach 9	HR SMB-1	SMB	720	362	10/11/06	06454108	06454108-06474236	06454115
Horn	Reach 9	HR SMB-1	SMB	310	292	10/11/06	06454108	06454108-06474236	06454115
Horn	Reach 9	HR SMB-1	SMB	273	275	10/11/06	06454108	06454108-06474236	06454115
			Mean	**897**	**366**				
Horn	Reach 9	HR SMB-2	SMB	1954	503	10/11/06	06454109	06454109-06474237	06454115
Horn	Reach 9	HR SMB-2	SMB	1396	441	10/11/06	06454109	06454109-06474237	06454115
Horn	Reach 9	HR SMB-2	SMB	780	361	10/11/06	06454109	06454109-06474237	06454115
Horn	Reach 9	HR SMB-2	SMB	457	338	10/10/06	06454109	06454109-06474237	06454115
Horn	Reach 9	HR SMB-2	SMB	238	271	10/11/06	06454109	06454109-06474237	06454115
			Mean	**965**	**383**				
Horn	Reach 9	HR SMB-3	SMB	1326	463	10/11/06	06454110	06454110-06474238	06454115
Horn	Reach 9	HR SMB-3	SMB	1461	462	10/11/06	06454110	06454110-06474238	06454115
Horn	Reach 9	HR SMB-3	SMB	590	357	10/11/06	06454110	06454110-06474238	06454115
Horn	Reach 9	HR SMB-3	SMB	640	352	10/11/06	06454110	06454110-06474238	06454115
Horn	Reach 9	HR SMB-3	SMB	211	261	10/11/06	06454110	06454110-06474238	06454115
			Mean	**846**	**379**				
Horn	Reach 9	HR CRP-1	CRP	>	761	10/10/06	06444230		06444233
Horn	Reach 9	HR CRP-1	CRP	>	668	10/11/06	06444230		06444233
Horn	Reach 9	HR CRP-1	CRP	>	640	10/11/06	06444230		06444233
Horn	Reach 9	HR CRP-1	CRP	3080	624	10/10/06	06444230		06444233
Horn	Reach 9	HR CRP-1	CRP	2786	604	10/10/06	06444230		06444233
			Mean	**n/a**	**659**				
Horn	Reach 9	HR CRP-2	CRP	>	710	10/10/06	06444231		06444233
Horn	Reach 9	HR CRP-2	CRP	>	669	10/11/06	06444231		06444233
Horn	Reach 9	HR CRP-2	CRP	>	632	10/10/06	06444231		06444233
Horn	Reach 9	HR CRP-2	CRP	>	627	10/11/06	06444231		06444233
Horn	Reach 9	HR CRP-2	CRP	2835	602	10/10/06	06444231		06444233
			Mean	**n/a**	**648**				
Horn	Reach 9	HR CRP-3	CRP	>	676	10/11/06	06444232		06444233
Horn	Reach 9	HR CRP-3	CRP	>	674	10/11/06	06444232		06444233
Horn	Reach 9	HR CRP-3	CRP	>	629	10/11/06	06444232		06444233
Horn	Reach 9	HR CRP-3	CRP	>	628	10/11/06	06444232		06444233
Horn	Reach 9	HR CRP-3	CRP	2473	561	10/11/06	06444232		06444233
			Mean	**n/a**	**634**				
Horn	Reach 9	HR LSS-1	LSS	1680	549	10/11/06	06454111	06454111-06474239	06454116
Horn	Reach 9	HR LSS-1	LSS	1354	489	10/10/06	06454111	06454111-06474239	06454116
Horn	Reach 9	HR LSS-1	LSS	1301	488	10/11/06	06454111	06454111-06474239	06454116
Horn	Reach 9	HR LSS-1	LSS	628	410	10/10/06	06454111	06454111-06474239	06454116
Horn	Reach 9	HR LSS-1	LSS	540	370	10/11/06	06454111	06454111-06474239	06454116
			Mean	**1101**	**461**				
Horn	Reach 9	HR LSS-2	LSS	1464	513	10/10/06	06454112	06454112-06474240	06454116
Horn	Reach 9	HR LSS-2	LSS	1364	490	10/11/06	06454112	06454112-06474240	06454116
Horn	Reach 9	HR LSS-2	LSS	1073	465	10/10/06	06454112	06454112-06474240	06454116
Horn	Reach 9	HR LSS-2	LSS	676	414	10/10/06	06454112	06454112-06474240	06454116
Horn	Reach 9	HR LSS-2	LSS	431	346	10/10/06	06454112	06454112-06474240	06454116

Table C1 continued.

Sample Reach Name	Sample Reach Number	Composite ID	Species	Weight (g)	Total Length (mm)	Collection Date	Pest/PCB sample No. (fillet)	Pest/PCB sample No. (Whole body)	Dioxin Sample No. (fillets)
			Mean	**1002**	**446**				
Horn	Reach 9	HR LSS-3	LSS	1633	508	10/11/06	06454113	06454113-06474241	06454116
Horn	Reach 9	HR LSS-3	LSS	1399	505	10/11/06	06454113	06454113-06474241	06454116
Horn	Reach 9	HR LSS-3	LSS	1023	456	10/11/06	06454113	06454113-06474241	06454116
Horn	Reach 9	HR LSS-3	LSS	1023	443	10/10/06	06454113	06454113-06474241	06454116
Horn	Reach 9	HR LSS-3	LSS	298	302	10/10/06	06454113	06454113-06474241	06454116
			Mean	**1075**	**443**				
Horn	Reach 9	HR NPM-1	NPM	651	430	10/11/06	06444242	06444242-06474242	06444245
Horn	Reach 9	HR NPM-1	NPM	204	291	10/11/06	06444242	06444242-06474242	06444245
Horn	Reach 9	HR NPM-1	NPM	211	301	10/11/06	06444242	06444242-06474242	06444245
			Mean	**355**	**341**				
Horn	Reach 9	HR NPM-2	NPM	101	230	10/11/06	06444243	06444243-06474243	06444245
Horn	Reach 9	HR NPM-2	NPM	222	303	10/11/06	06444243	06444243-06474243	06444245
Horn	Reach 9	HR NPM-2	NPM	317	337	10/11/06	06444243	06444243-06474243	06444245
Horn	Reach 9	HR NPM-2	NPM	175	274	10/11/06	06444243	06444243-06474243	06444245
			Mean	**204**	**286**				
Horn	Reach 9	HR NPM-3	NPM	121	246	10/11/06	06444244	06444244-06474244	06444245
Horn	Reach 9	HR NPM-3	NPM	282	331	10/11/06	06444244	06444244-06474244	06444245
Horn	Reach 9	HR NPM-3	NPM	255	318	10/11/06	06444244	06444244-06474244	06444245
Horn	Reach 9	HR NPM-3	NPM	166	270	10/11/06	06444244	06444244-06474244	06444245

Appendix D. Historical Yakima River Fish Fillet Data

Table D1. Historical Data on Chlorinated Pesticides in Yakima River Fish Fillet Samples, 1983-2001 (ug/Kg, wet weight; parts per billion)

Reach	Location	Date	Species	Lipids (%)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDT	Cis-Chlordane	Cis-Nonachlor	Oxychlordane	Trans-Chlordane	Trans-Nonachlor	Total Chlordane	Methoxychlor	Alpha-BHC	Beta-BHC	Delta-BHC	Gamma-BHC (Lindane)	Aldrin
Keechelus Lake	Keechelus Lake	Aug-01	MWF	3.4	2 U	**0.8 J**	2 U	**0.8 J**	4 U	4 U	4 U	--	4 U	4 U	20 U	10 U	4 U	4 U	2 U	4 U
Cle Elum	Cle Elum	Aug-85	MWF	7.8	40 U	**90**	40 U	**90**	--	--	--	--	--	--	--	--	--	--	--	--
Cle Elum	Cle Elum	Sep-85	RBT	0.9	20 U	40 U	40 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--
Cle Elum	Cle Elum	Oct-99	MWF	3.9	**0.4**	**2.8**	**0.5**	**3.7**	--	--	--	--	--	--	--	--	--	--	--	--
Cle Elum	Cle Elum	Oct-99	MWF	4.5	**1.1**	**18**	**2.7**	**22**	--	--	--	--	--	--	--	--	--	--	--	--
Cle Elum	Cle Elum	Oct-99	RBT	1.8	**0.2 J**	**1.2**	**0.2 J**	**1.6 J**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Wymer	Aug-85	MWF	9	40 U	**150**	40 U	**150**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Wymer	Aug-85	BLS	3.3	40 U	**60**	40 U	**60**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Wymer	Aug-85	NPM	1.3	40 U	**190**	40 U	**190**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Wymer	Aug-85	RBT	3.3	40 U	**30**	40 U	**30**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Rosa Dam	May-85	CHNK	13.2	40 U	**390**	40 U	**390**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Rosa Dam	May-85	CHNK	10.7	40 U	**50**	40 U	**50**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Rosa Dam	Jul-85	CHNK	3.6	40 U	**20**	40 U	**20**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Rosa Dam	Jul-85	CHNK	6.8	40 U	**30**	40 U	**30**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Wymer	Oct-99	RBT	2.5	**1.4**	**28**	**2.6**	**32**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Wymer	Oct-99	BLS	2.7	**2**	**14**	**4.6**	**21**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Near Umtanum	Sep-96	RBT	3.4	2.4 U	**38**	**2.9**	**41**	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U
Yakima Canyon	Near Umtanum	Sep-96	RBT	3.2	2.4 U	**42**	**5.1**	**47**	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U
Yakima Canyon	Near Umtanum	Sep-96	RBT	3.7	2.4 U	**54**	**3.3**	**57**	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	2.5	**91**	**740**	**78**	**909**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	3	**3.7**	**36**	**10**	**50**	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	2.3	**2.1 J**	**59**	**11**	**72**	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	13 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Yakima-Parker	Moxee Drain	Sep-83	MWF	11.2	**110**	**469**	**235**	**814**	1 U	1 U	--	1 U	1 U	1 U	1 U	**13**	--	--	1 U	1 U
Yakima-Parker	Moxee Drain	Sep-83	BLS	4.5	**280**	**1847**	**669**	**2796**	1 U	1 U	--	1 U	1 U	1 U	1 U	**3.9**	--	--	1 U	1 U
Buena	Buena	Aug-85	MWF	8.1	**70**	**1100**	**200**	**1370**	--	--	--	--	--	--	--	--	--	--	--	--
Buena	Buena	Aug-85	MWF	5.7	40 U	**290**	**40**	**330**	--	--	--	--	--	--	--	--	--	--	--	--
Buena	Buena	Aug-85	LSS/BLS	4.1	40 U	**130**	**40**	**170**	--	--	--	--	--	--	--	--	--	--	--	--
Buena	Buena	Aug-85	LSS/BLS	3.7	40 U	**130**	40 U	**130**	--	--	--	--	--	--	--	--	--	--	--	--
Buena	Buena	Aug-85	NPM	1.8	40 U	**200**	40 U	**200**	--	--	--	--	--	--	--	--	--	--	--	--
Granger-Grandview	Grandview	Sep-95	SMB	0.4	**8.2**	**180**	**17**	**205**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Granger-Grandview	Grandview	Sep-95	CRP	0.8	**46**	**845**	**10.2**	**901**	**5**	**2.7 J**	**0.35 J**	**1 J**	**6.1**	**15.2**	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U
Granger-Grandview	Granger	Apr-98	LSS	2.8	**20**	**480**	**50**	**550**	**1.3 J**	2 U	2 U	2 U	**3**	**4.3**	40 U	2 U	2 U	2 U	2 U	2 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	8.4	**37**	**580**	**44**	**661**	1.9 U	**8.6**	1.9 U	1.9 U	**4.1**	**12.7**	37 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	7.7	**56**	**780**	**47**	**883**	1.9 U	**10**	1.9 U	1.9 U	**5.2**	**15.2**	38 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	8.6	**44**	**910**	**58**	**1012**	1.8 U	**15**	1.8 U	1.8 U	**7.4**	**22**	36 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	3.5	**5.5**	**23**	**6.3**	**35**	2 U	2 U	2 U	2 U	**2.3**	**2.3**	--	2 U	2 U	2 U	2 U	2 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	3.1	**5.5**	**23**	**5.8**	**34**	2 U	2 U	2 U	2 U	**2.2**	**2.2**	--	2 U	2 U	2 U	2 U	2 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	5.1	2 U	**23**	**3.2**	**26**	2 U	2 U	2 U	2 U	**2.7**	**2.7**	--	2 U	2 U	2 U	2 U	2 U
Prosser Area	Prosser	May-97	CHNK	11.9	**2.6 J**	**16**	**6.3**	**25**	1.9 U	1.9 U	1.9 U	1.9 U	**3.4**	**3.4**	--	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Prosser	May-97	CHNK	10.8	**2.2 J**	**17**	**6.3**	**26**	1.9 U	1.9 U	1.9 U	1.9 U	**3.2**	**3.2**	--	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Prosser	May-97	CHNK	15.3	**2.9 J**	**16**	**7.1**	**26.0**	1.9 U	1.9 U	1.9 U	1.9 U	**3.3**	**3.3**	--	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U

Table D1 continued.

Reach	Location	Date	Species	Lipids (%)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDT	Cis-Chlordane	Cis-Nonachlor	Oxychlordane	Trans-Chlordane	Trans-Nonachlor	Total Chlordane	Methoxychlor	Alpha-BHC	Beta-BHC	Delta-BHC	Gamma-BHC (Lindane)	Aldrin
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	1.9	**4.8**	**15**	2 U	**20**	2 U	2 U	2 U	2 U	2 U	2 U	40 U	2 U	2 U	2 U	2 U	2 U
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	3.4	**8.7**	**16**	1.8 U	**25**	1.8 U	1.8 U	1.8 U	1.8 U	**1.8**	**1.8**	36 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	3	**8.8**	**28**	1.9 U	**37**	1.9 U	1.9 U	1.9 U	1.9 U	**1.5 J**	**1.5 J**	39 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Horn Rapids-Kiona	Kiona	Aug-85	LSS	4.9	40 U	**80**	**50**	**130**	--	--	--	--	--	--	--	--	--	--	--	--
Horn Rapids-Kiona	Kiona	Aug-85	NPM	1.4	40 U	**250**	40 U	**250**	--	--	--	--	--	--	--	--	--	--	--	--
Horn Rapids-Kiona	Kiona	Aug-85	SMB	0.5	40 U	**40**	40 U	**40**	--	--	--	--	--	--	--	--	--	--	--	--
Horn Rapids-Kiona	Kiona	May-85	CAT	8.3	**80**	**1300**	**130**	**1510**	--	--	--	--	--	--	--	--	--	--	--	--
Horn Rapids-Kiona	Horn Rapids	Aug-87	SMB	0.7	--	**64 J**	--	**64 J**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	--	--	2.5 U	--
Horn Rapids-Kiona	Horn Rapids	Sep-92	SMB	0.06	**3.2 J**	**45**	**1.3 J**	**50**	**0.4 NJ**	8 U	**0.5 J**	**0.4 NJ**	**0.7 J**	**2**	8 U	8 U	8 U	8 U	8 U	8 U
Horn Rapids-Kiona	Horn Rapids	Sep-92	SMB	0.05	**2 J**	**43**	**1 J**	**46**	**0.3 NJ**	**0.5 J**	**0.5 J**	**0.3 NJ**	**0.4 J**	**2**	8 U	8 U	8 U	8 U	8 U	8 U
Horn Rapids-Kiona	near Horn Rapids	Apr-98	SMB	--	**85**	**1200**	**48**	**1333**	**4.1**	2 U	**1.6 J**	**14**	**8.6**	**28**	39 U	2 U	2 U	2 U	2 U	2 U
Horn Rapids-Kiona	3 mi above HR Dam	Apr-98	SMB	--	**30**	**480**	**23**	**533**	1.8 U	1.8 U	1.8 U	1.8 U	**2.6**	**2.6**	36 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Horn Rapids-Kiona	3 mi above HR Dam	Apr-98	SMB	--	**39**	**630**	**31**	**700**	2.3 U	2.3 U	2.3 U	2.3 U	**2.8**	**2.8**	46 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	**41**	**620**	**17**	**678**	**2.6**	1.9 U	**1 NJ**	1.9 U	**5.8**	**9.4**	38 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	**120**	**1100**	**42**	**1262**	**6.1**	**2.6**	**1.2 J**	**1.5 J**	**13**	**24.4**	39 U	2 U	2 U	2 U	2 U	2 U
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	**150**	**1300**	**87**	**1537**	**7.4**	1.9 U	**1.2 J**	**0.97 J**	**11**	**20.6**	39 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Yakima Tributary	Cowiche Creek	Sep-95	RBT	2	**20**	**740**	**53**	**813**	**0.94 NJ**	3.8 U	**0.75 NJ**	3.8 U	**3.1 J**	**4.8**	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U
Yakima Tributary	Marion Drain	Apr-98	LSS	2.1	**22**	**680**	**92**	**794**	**1.2 J**	2 U	2 U	2 U	**4.2**	**5.4**	40 U	2 U	2 U	2 U	2 U	2 U
Yakima Tributary	Marion Drain	Apr-98	LSS	3.5	**20**	**430**	**51**	**501**	**2**	2 U	2 U	**2**	**2.2**	**2.2**	39 U	2 U	2 U	2 U	2 U	2 U

(--) Not analyzed for
U = The analyte was not detected at or above the reported result.
J = The analyte was positively identified. The associated numerical result is an estimate.
UJ = The analyte was not detected at or above the reported estimated result.
NJ = There is evidence that the analyte is present. The associated numerical result is an estimate.

MWF = mountain whitefish
LSS = largescale sucker
BLS = bridgelip sucker
RBT = rainbow trout
NPM = northern pikeminnow

CAT = channel catfish
CRP = common carp
SMB = smallmouth bass
CHNK = chinook salmon
STHD = steelhead

Table D1 continued.

Reach	Location	Date	Species	Dieldrin	Endrin	Endrin Aldehyde	Endrin ketone	Heptachlor	Heptachlor Epoxide	Hexachloro-benzene	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Toxaphene	References
Keechelus Lake	Keechelus Lake	Aug-01	MWF	1 U	**10**	--	--	2 U	2 U	333 U	4 U	40 U	10 U	100 U	EPA, Unpublished
Cle Elum	Cle Elum	Aug-85	MWF	20 U	**20**	--	--	--	--	--	20 U	--	--	--	Johnson et. al., 1986
Cle Elum	Cle Elum	Sep-85	RBT	20 U	**20**	--	--	--	--	--	20 U	--	--	--	"
Cle Elum	Cle Elum	Oct-99	MWF	**0.2 J**	--	--	--	--	--	--	--	--	--	--	Rogowski, 2000
Cle Elum	Cle Elum	Oct-99	MWF	**1.3**	--	--	--	--	--	--	--	--	--	--	"
Cle Elum	Cle Elum	Oct-99	RBT	**0.4**	--	--	--	--	--	--	--	--	--	--	"
Yakima Canyon	Wymer	Aug-85	MWF	20 U	20 U	--	--	--	--	--	20 U	--	--	--	Johnson et. al., 1986
Yakima Canyon	Wymer	Aug-85	BLS	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Yakima Canyon	Wymer	Aug-85	NPM	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Yakima Canyon	Wymer	Aug-85	RBT	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Yakima Canyon	Rosa Dam	May-85	CHNK	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Yakima Canyon	Rosa Dam	May-85	CHNK	**20**	20 U	--	--	--	--	--	20 U	--	--	--	"
Yakima Canyon	Rosa Dam	Jul-85	CHNK	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Yakima Canyon	Rosa Dam	Jul-85	CHNK	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Yakima Canyon	Wymer	Oct-99	RBT	**1.9**	--	--	--	--	--	--	--	--	--	--	Rogowski, 2000
Yakima Canyon	Wymer	Oct-99	BLS	**1.5**	--	--	--	--	--	--	--	--	--	--	"
Yakima Canyon	Near Umtanum	Sep-96	RBT	**2.8 J**	12 U	12 UJ	12 U	2.4 U	2.4 UJ	2.4 U	12 U	12 U	2.4 UJ	57 U	EPA, 2002
Yakima Canyon	Near Umtanum	Sep-96	RBT	**5.1 J**	12 U	12 UJ	12 U	2.4 U	2.4 UJ	2.4 U	12 U	12 U	2.4 UJ	57 U	"
Yakima Canyon	Near Umtanum	Sep-96	RBT	**3.8 J**	12 U	12 UJ	12 U	2.4 U	2.4 UJ	2.4 U	12 U	12 U	2.4 UJ	57 U	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	**25**	12 U	12 UJ	12 U	2.5 U	2.5 UJ	2.5 U	**6.2 J**	12 U	2.5 UJ	60 U	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	**2.9 J**	11 U	11 UJ	11 U	2.2 U	2.2 UJ	2.2 U	11 U	11 U	2.2 UJ	54 U	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	**3.7 J**	13 U	13 UJ	13 U	2.6 U	2.6 UJ	2.6 U	13 U	13 U	2.6 UJ	63 U	"
Yakima-Parker	Moxee Drain	Sep-83	MWF	1 U	1 U	--	--	--	--	1 U	--	--	--	--	Hopkins et. al., 1985
Yakima-Parker	Moxee Drain	Sep-83	BLS	1 U	1 U	--	--	--	--	1 U	--	--	--	--	"
Buena	Buena	Aug-85	MWF	**20**	20 U	--	--	--	--	--	**30**	--	--	--	Johnson et. al., 1986
Buena	Buena	Aug-85	MWF	20 U	20 U	--	--	--	--	--	**30**	--	--	--	"
Buena	Buena	Aug-85	LSS/BLS	20 U	20 U	--	--	--	--	--	**20**	--	--	--	"
Buena	Buena	Aug-85	LSS/BLS	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Buena	Buena	Aug-85	NPM	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Granger-Grandview	Grandview	Sep-95	SMB	**4.7**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.8 U	3.7 U	3.7 U	3.7 U	110 U	Davis et. al., 1998
Granger-Grandview	Grandview	Sep-95	CRP	**8.8**	3.8 U	3.8 U	3.8 U	3.8 U	**0.61 NJ**	**0.49 J**	3.8 U	3.8 U	3.8 U	120 U	"
Granger-Grandview	Granger	Apr-98	LSS	**5.2 NJ**	40 U	40 UJ	40 U	2 U	2 U	2 U	**1.2 NJ**	40 U	**1.6 J**	60 U	EPA, 2002
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	37 U	37 U	37 UJ	37 U	1.9 U	1.9 U	**0.84 J**	**9.5 J**	**4.1 J**	1.9 U	56 U	EPA, 2002
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	38 U	38 U	38 UJ	38 U	1.9 U	1.9 U	**1.2 J**	**7.7 J**	**2.9 J**	1.9 U	58 U	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	**6 NJ**	36 U	36 UJ	36 U	1.8 U	1.8 U	**1.3 J**	**10 J**	**4.5 J**	1.8 U	54 U	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	--	--	--	--	2 U	2 UJ	**1.6 J**	--	--	--	59 U	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	--	--	--	--	2 U	2 UJ	**2**	--	--	--	60 U	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	--	--	--	--	2 U	2 UJ	**1.8 J**	--	--	--	59 U	"
Prosser Area	Prosser	May-97	CHNK	--	--	--	--	1.9 U	1.9 U	**3.2**	--	--	--	58 U	"
Prosser Area	Prosser	May-97	CHNK	--	--	--	--	**1.9**	1.9 U	**2.8**	--	--	--	57 U	"
Prosser Area	Prosser	May-97	CHNK	--	--	--	--	1.9 U	1.9 U	**2.4**	--	--	--	56 U	"

Table D1 continued.

Reach	Location	Date	Species	Dieldrin	Endrin	Endrin Aldehyde	Endrin ketone	Heptachlor	Heptachlor Epoxide	Hexachloro-benzene	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Toxaphene	References
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	40 U	40 UJ	40 UJ	40 U	2 U	**2**	**2 J**	**1.7 J**	**0.83 NJ**	2 U	59 U	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	36 U	36 UJ	36 UJ	36 U	1.8 U	1.8 U	**1.7 J**	**4 J**	**1.6 J**	1.8 U	54 U	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	**2.7 NJ**	39 U	39 UJ	39 U	1.9 U	**1.9**	**1.6 J**	**2.5 J**	**0.91 NJ**	1.9 U	58 U	"
Horn Rapids-Kiona	Kiona	Aug-85	LSS	**80**	20 U	--	--	--	--	--	20 U	--	--	--	Johnson et. al., 1986
Horn Rapids-Kiona	Kiona	Aug-85	NPM	**30**	20 U	--	--	--	--	--	20 U	--	--	--	"
Horn Rapids-Kiona	Kiona	Aug-85	SMB	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Horn Rapids-Kiona	Kiona	May-85	CAT	**120**	20 U	--	--	--	--	--	20 U	--	--	--	"
Horn Rapids-Kiona	Horn Rapids	Aug-87	SMB	**5.3**	2.5 U	--	--	2.5 U	2.5 U	2.5 U	--	--	--	--	EPA, 1992
Horn Rapids-Kiona	Horn Rapids	Sep-92	SMB	**3.3 J**	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	400 U	Davis & Johnson, 1994
Horn Rapids-Kiona	Horn Rapids	Sep-92	SMB	**3.3 J**	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	400 U	"
Horn Rapids-Kiona	near Horn Rapids	Apr-98	SMB	**18**	39 U	39 UJ	39 U	2 U	2 U	**2.4**	39 U	39 U	**3**	59 U	EPA, 2002
Horn Rapids-Kiona	3 mi above HR Dam	Apr-98	SMB	**9.6**	36 U	36 UJ	36 U	1.8 U	1.8 U	1.8 U	36 U	36 U	**1.5 J**	54 U	"
Horn Rapids-Kiona	3 mi above HR Dam	Apr-98	SMB	**8.2 J**	46 U	46 UJ	46 U	2.3 U	2.3 U	2.3 U	46 U	46 U	**1.9 J**	68 U	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	**16**	38 U	38 UJ	38 U	1.9 U	1.9 U	1.9 U	**2.1 J**	**1.1 NJ**	**1.9**	57 U	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	**9.2**	39 U	39 UJ	39 U	**2.6**	**2.6**	**2.4**	**2 J**	**1.8 NJ**	**3.1**	59 U	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	**16**	**39**	39 UJ	39 U	1.9 U	1.9 U	**3.7**	**2.4 J**	**1.3 J**	**2.7**	58 U	"
Yakima Tributary	Cowiche Creek	Sep-95	RBT	**1.5 J**	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	**0.79 J**	3.8 U	3.8 U	3.8 U	110 U	Davis et. al., 1998
Yakima Tributary	Marion Drain	Apr-98	LSS	**4.6 NJ**	40 U	40 UJ	40 U	2 U	2 U	2 U	**1.5 J**	40 U	**1.8 J**	59 U	EPA, 2002
Yakima Tributary	Marion Drain	Apr-98	LSS	**5.1 J**	39 U	39 UJ	39 U	2 U	2 U	2 U	**18 J**	**1.2 NJ**	**2.4**	59 U	"

(--) Not analyzed for

U = The analyte was not detected at or above the reported result.

J = The analyte was positively identified. The associated numerical result is an estimate.

UJ = The analyte was not detected at or above the reported estimated result.

NJ = There is evidence that the analyte is present. The associated numerical result is an estimate.

Table D2. Historical Data on PCBs in Yakima River Fish Fillet Samples, 1983-2001 (ug/Kg, wet weight, parts per billions)

Reach	Location	Date	Species	Lipids (%)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCB Aroclors	Total PCB Congeners	References
Keechelus Lake	Keechelus Lake	Aug-01	MWF	3.4	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**7.9 J**	EPA, Unpublished
Cle Elum	Cle Elum	Aug-85	MWF	7.8	--	--	--	--	--	--	100 U	100 U	--	Johnson et. al., 1986
Cle Elum	Cle Elum	Sep-85	RBT	0.9	--	--	--	--	--	--	100 U	100 U	--	"
Yakima Canyon	Wymer	Aug-85	MWF	9	--	--	--	--	--	--	100 U	100 U	--	Johnson et. al., 1986
Yakima Canyon	Wymer	Aug-85	BLS	3.3	--	--	--	--	--	--	100 U	100 U	--	"
Yakima Canyon	Wymer	Aug-85	NPM	1.3	--	--	--	--	--	--	100 U	100 U	--	"
Yakima Canyon	Wymer	Aug-85	RBT	3.3	--	--	--	--	--	--	100 U	100 U	--	"
Yakima Canyon	Rosa Dam	May-85	CHNK	13.2	--	--	--	--	--	--	100 U	100 U	--	"
Yakima Canyon	Rosa Dam	May-85	CHNK	10.7	--	--	--	--	--	--	100 U	100 U	--	"
Yakima Canyon	Rosa Dam	Jul-85	CHNK	3.6	--	--	--	--	--	--	100 U	100 U	--	"
Yakima Canyon	Rosa Dam	Jul-85	CHNK	6.8	--	--	--	--	--	--	100 U	100 U	--	"
Yakima Canyon	Near Umtanum	Sep-96	RBT	3.4	19 U	19 U	19 U	19 U	19 U	**10 J**	19 U	**10 J**	**2.5**	EPA, 2002*
Yakima Canyon	Near Umtanum	Sep-96	RBT	3.2	19 U	19 U	19 U	19 U	19 U	**11 J**	19 U	**11 J**	**2.4**	"
Yakima Canyon	Near Umtanum	Sep-96	RBT	3.7	19 U	19 U	19 U	19 U	19 U	**14 J**	19 U	**14 J**	**2.7**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	2.5	20 U	20 U	20 U	20 U	20 U	**46**	**58**	**104**	**2.3**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	3	18 U	18 U	18 U	18 U	18 U	18 U	18 U	**1.5**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	2.3	21 U	21 U	21 U	21 U	21 U	**13 J**	21 U	**13 J**	**2.9**	"
Yakima-Parker	Moxee Drain	Sep-83	MWF	11.2	--	--	--	--	--	**128**	10 U	**128**	--	Hopkins et. al., 1985
Yakima-Parker	Moxee Drain	Sep-83	BLS	4.5	--	--	--	--	--	**296**	10 U	**296**	--	"
Buena	Buena	Aug-85	MWF	8.1	--	--	--	--	--	--	**230**	**230**	--	Johnson et. al., 1986
Buena	Buena	Aug-85	MWF	5.7	--	--	--	--	--	--	100 U	100 U	--	"
Buena	Buena	Aug-85	LSS/BLS	4.1	--	--	--	--	--	--	100 U	100 U	--	"
Buena	Buena	Aug-85	LSS/BLS	3.7	--	--	--	--	--	--	100 U	100 U	--	"
Buena	Buena	Aug-85	NPM	1.8	--	--	--	--	--	--	100 U	100 U	--	"
Granger-Grandview	Grandview	Sep-95	SMB	0.4	--	--	37 U	37 U	37 U	37 U	**25 J**	**25 J**	--	Davis et. al., 1998
Granger-Grandview	Grandview	Sep-95	CRP	0.8	--	--	38 U	38 U	38 U	**29 J**	**106**	**135**	--	"
Granger-Grandview	Granger	Apr-98	LSS	2.8	20 U	20 U	20 U	20 U	20 U	**20**	**50**	**70**	**10.7**	EPA, 2002*
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	8.4	19 U	19 U	19 U	19 U	19 U	**47**	**98**	**145**	**25**	EPA, 2002*
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	7.7	19 U	19 U	19 U	19 U	19 U	**53**	**130**	**183**	**25**	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	8.6	18 U	18 U	18 U	18 U	18 U	**58**	**190**	**248**	**31**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	3.5	20 U	20 U	20 U	20 U	20 U	**15 J**	20 U	**15 J**	**1.4**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	3.1	20 U	20 U	20 U	20 U	20 U	**14 J**	20 U	**14 J**	**1.1**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	5.1	20 U	20 U	20 U	20 U	20 U	**14 J**	20 U	**14 J**	**1.2**	"
Prosser Area	Prosser	May-97	CHNK	11.9	19 U	19 U	19 U	19 U	19 U	**18 J**	19 U	**18 J**	**1.3**	"
Prosser Area	Prosser	May-97	CHNK	10.8	19 U	19 U	19 U	19 U	19 U	**18 J**	19 U	**18 J**	**1.3**	"
Prosser Area	Prosser	May-97	CHNK	15.3	19 U	19 U	19 U	19 U	19 U	**15 J**	19 U	**15 J**	**1.2**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	1.9	20 U	20 U	20 U	20 U	20 U	**10 J**	20 U	**10 J**	**1.0**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	3.4	18 U	18 U	18 U	18 U	18 U	**17 J**	**6.6 J**	**24 J**	**1.5**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	3	19 U	19 U	19 U	19 U	19 U	**17 J**	**7.3 J**	**24 J**	**1.5**	"
Horn Rapids-Kiona	Kiona	Aug-85	LSS	4.9	--	--	--	--	--	--	100 U	100 U	--	Johnson et. al., 1986
Horn Rapids-Kiona	Kiona	Aug-85	NPM	1.4	--	--	--	--	--	--	100 U	100 U	--	"
Horn Rapids-Kiona	Kiona	Aug-85	SMB	0.5	--	--	--	--	--	--	100 U	100 U	--	"
Horn Rapids-Kiona	Kiona	May-85	CAT	8.3	--	--	--	--	--	--	**180**	**180**	--	"
Horn Rapids-Kiona	Horn Rapids	Aug-87	SMB	0.7	--	--	--	--	--	--	--	**2.9**	--	EPA, 1992
Horn Rapids-Kiona	Horn Rapids	Sep-92	SMB	0.06	80 U	80 U	160 U	80 U	80 U	**7 J**	**9 J**	**16 J**	--	Davis & Johnson, 1994
Horn Rapids-Kiona	Horn Rapids	Sep-92	SMB	0.05	80 U	80 U	160 U	80 U	80 U	80 U	**8 J**	**8 J**	--	"
Horn Rapids-Kiona	near Horn Rapids	Apr-98	SMB	--	20 U	20 U	20 U	20 U	20 U	**83 J**	**220**	**303**	--	EPA, 2002
Horn Rapids-Kiona	3 mi above HR Dam	Apr-98	SMB	--	18 U	18 U	18 U	18 U	18 U	**38 J**	**69**	**107**	--	"
Horn Rapids-Kiona	3 mi above HR Dam	Apr-98	SMB	--	23 U	23 U	23 U	23 U	23 U	**43**	**68**	**111**	--	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	19 U	19 U	19 U	19 U	19 U	**29 J**	**57**	**86**	--	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	20 U	20 U	20 U	20 U	20 U	**56 J**	**120**	**176**	--	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	19 U	19 U	19 U	19 U	19 U	**69 J**	**130**	**199**	--	"
Yakima Tributary	Cowiche Creek	Sep-95	RBT	2	--	--	38 U	38 U	38 U	**71**	**25 J**	**96**	--	Davis et. al., 1998
Yakima Tributary	Marion Drain	Apr-98	LSS	2.1	20 U	20 U	20 U	20 U	20 U	**20**	**75**	**95**	**15**	EPA, 2002*
Yakima Tributary	Marion Drain	Apr-98	LSS	3.5	20 U	20 U	20 U	20 U	20 U	**16 J**	**43**	**59**	**9**	"

* Total PCB congener results from EPA, 2002 consisted of only 13 congeners.
(--) Not analyzed for
U = The analyte was not detected at or above the reported result.
J = The analyte was positively identified. The associated numerical result is an estimate.

MWF = mountain whitefish
LSS = largescale sucker
BLS = bridgelip sucker
RBT = rainbow trout
NPM = northern pikeminnow
CAT = channel catfish
CRP = common carp
SMB = smallmouth bass
CHNK = chinook salmon
STHD = steelhead

Table D3. Historical Data on Dioxins and Furans in Yakima River Fish Fillet Samples, 1987-2001 (ng/Kg, wet weight; parts per trillion)

Reach	Location	Date	Species	Lipids (%)	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF
Keechelus Lake	Keechelus Lake	Aug-01	MWF	3.4	0.1 U	**0.09 J**	0.5 U	0.5 U	0.5 U	**0.1 J**	1 UJ	**0.2**	0.5 U	**0.09 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Yakima Canyon	Near Umtanum	Sep-96	RBT	3.4	**0.09**	0.01 U	**0.12**	**0.1**	0.01 U	**0.16**	**0.21**	**0.14**	**0.04**	**0.04**	**0.02**	0.01 U	**0.15**	**0.08**	**0.09**	0.02 U
Yakima Canyon	Near Umtanum	Sep-96	RBT	3.2	**0.15**	**0.33**	**0.27**	0.02 U	**0.32**	**0.44**	**1.4**	**0.17**	**0.18**	0.02 U	**0.18**	**0.21**	**0.36**	**0.38**	**0.35**	**0.34**
Yakima Canyon	Near Umtanum	Sep-96	RBT	3.7	**0.13**	**0.2**	**0.11**	**0.12**	**0.04**	**0.19**	**0.19**	**0.15**	**0.04**	**0.05**	**0.02**	**0.04**	**0.15**	0.01 U	**0.08**	0.03 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	2.5	0.01 U	0.01 U	0.01 U	**0.07**	**0.05**	**0.15**	**0.23**	**0.09**	**0.04**	**0.03**	**0.02**	**0.03**	**0.15**	0.01 U	**0.1**	0.01 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	3	**0.04**	**0.12**	**0.09**	**0.05**	**0.02**	0.01 U	**0.2**	**0.1**	**0.03**	**0.02**	0.01 U	**0.02**	**0.13**	**0.06**	0.02 U	0.02 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	2.3	0.02 U	**0.18**	0.02 U	**0.14**	0.02 U	0.01 U	**0.54**	**0.11**	**0.08**	0.02 U	**0.08**	**0.1**	**0.23**	**0.2**	**0.19**	**0.19**
Granger-Grandview	Granger	Apr-98	LSS	2.8	0.03 U	**0.1**	0.04 U	**0.08**	**0.04**	**0.14**	**0.26**	**0.38**	0.02 U	**0.1**	0.04 U	0.04 U	0.04 U	0.04 U	0.05 U	0.05 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	8.4	0.05 U	0.02 U	0.07 U	**0.11**	0.07 U	**0.15**	0.09 U	**3.26**	0.06 U	**0.18**	**0.03**	0.02 U	0.02 U	0.02 U	0.1 U	0.1 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	7.7	**0.13**	**0.22**	0.03 U	**0.17**	0.03 U	**0.38**	**1.6**	**3.91**	**0.13**	**0.23**	0.06 U	0.06 U	0.06 U	0.06 U	0.07 U	0.07 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	8.6	**0.18**	**0.23**	**0.06**	**0.22**	0.01 U	**0.29**	**0.33**	**4.28**	**0.1**	0.02 U	0.02 U	**0.02**	**0.04**	0.02 U	0.02 U	0.02 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	3.5	0.05 U	0.07 U	0.07 U	0.07 U	0.07 U	0.11 U	0.21 U	**0.61**	0.05 U	0.05 U	0.04 U	0.04 U	0.04 U	0.04 U	0.07 U	0.07 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	3.1	0.04 U	0.06 U	0.03 U	0.03 U	0.03 U	0.02 U	**0.42**	**0.49**	0.03 U	0.03 U	0.04 U	0.04 U	0.04 U	0.04 U	0.02 U	0.02 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	5.1	0.03 U	**0.11**	0.06 U	0.06 U	0.06 U	**0.13**	0.06 U	**0.65**	0.04 U	0.04 U	0.06 U	0.06 U	0.06 U	0.06 U	0.03 U	0.03 U
Prosser Area	Prosser	May-97	CHNK	11.9	**0.04**	**0.09**	0.03 U	**0.06**	0.03 U	**0.1**	**0.14**	**0.68**	**0.1**	**0.15**	0.02 U	**0.02**	0.02 U	0.02 U	0.04 U	0.04 U
Prosser Area	Prosser	May-97	CHNK	10.8	0.02 U	0.02 U	0.03 U	**0.06**	0.03 U	**0.08**	0.1 U	**0.64**	**0.11**	**0.13**	0.02 U	**0.02**	**0.03**	0.02 U	0.05 U	0.05 U
Prosser Area	Prosser	May-97	CHNK	15.3	0.03 U	0.03 U	0.03 U	**0.06**	**0.04**	0.04 U	**0.22**	**0.72**	**0.12**	**0.17**	**0.03**	**0.02**	0.02 U	0.02 U	0.04 U	0.04 U
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	1.9	0.02 U	**0.04**	**0.02**	0.02 U	**0.03**	**0.09**	**0.18**	**0.36**	0.02 U	**0.13**	0.01 U	0.01 U	**0.02**	0.01 U	0.02 U	0.02 U
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	3.4	0.03 U	**0.09**	0.01 U	**0.05**	0.01 U	0.01 U	0.01 U	**0.51**	**0.09**	0.01 U	**0.03**	0.01 U	**0.04**	0.01 U	0.01 U	**0.01**
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	3	**0.04**	**0.07**	**0.02**	0.01 U	**0.04**	**0.15**	**0.23**	**0.4**	0.02 U	**0.16**	0.01 U	**0.01**	0.01 U	0.01 U	0.01 U	**0.02**
Yakima Tributary	Marion Drain	Apr-98	LSS	2.1	**0.04**	0.03 U	0.03 U	0.03 U	0.03 U	**0.05**	**0.13**	**0.12**	0.03 U	0.03 U	0.02 U	0.02 U	0.02 U	0.02 U	0.03 U	0.03 U
Yakima Tributary	Marion Drain	Apr-98	LSS	3.5	**0.04**	0.01 U	0.01 U	**0.06**	0.01 U	0.01 U	0.04 U	**0.37**	0.02 U	0.02 U	**0.01**	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U

U = The analyte was not detected at or above the reported result.

J = The analyte was positively identified. The associated numerical result is an estimate.

UJ = The analyte was not detected at or above the reported estimated result.

TEQ = 2,3,7,8-TCDD toxicity equivalent based on toxicity equivalency factors from Van den Berg et. al., 1998; Only detected chemicals were used in calculation.

MWF = mountain whitefish

LSS = largescale sucker

RBT = rainbow trout

CHNK = chinook salmon

STHD = steelhead

Table D3 continued.

Reach	Location	Date	Species	OCDF	TEQ	Reference
Keechelus Lake	Keechelus Lake	Aug-01	MWF	1 U	**0.16**	EPA, Unpublished
Yakima Canyon	Near Umtanum	Sep-96	RBT	**0.08**	**0.18**	EPA 2002
Yakima Canyon	Near Umtanum	Sep-96	RBT	**0.91**	**0.69**	"
Yakima Canyon	Near Umtanum	Sep-96	RBT	**0.05**	**0.42**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	**0.06**	**0.06**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	0.01 U	**0.22**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	**0.3**	**0.27**	"
Granger-Grandview	Granger	Apr-98	LSS	0.1 U	**0.20**	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	0.09 U	**0.43**	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	0.07 U	**0.88**	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	**0.05**	**0.88**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	0.26 U	**0.06**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	0.1 U	**0.05**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	0.07 U	**0.18**	"
Prosser Area	Prosser	May-97	CHNK	0.05 U	**0.29**	"
Prosser Area	Prosser	May-97	CHNK	0.09 U	**0.15**	"
Prosser Area	Prosser	May-97	CHNK	0.05 U	**0.18**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	0.01 U	**0.15**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	0.01 U	**0.16**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	0.01 U	**0.24**	"
Yakima Tributary	Marion Drain	Apr-98	LSS	0.04 U	**0.05**	"
Yakima Tributary	Marion Drain	Apr-98	LSS	0.02 U	**0.08**	"

U = The analyte was not detected at or above the reported result.

J = The analyte was positively identified. The associated numerical result is an estimate.

UJ = The analyte was not detected at or above the reported estimated result.

TEQ = 2,3,7,8-TCDD toxicity equivalent based on toxicity equivalency factors from Van den Berg et. al., 1998; Only detected chemicals were used in calculation.

MWF = mountain whitefish

LSS = largescale sucker

RBT = rainbow trout

CHNK = chinook salmon

STHD = steelhead

Appendix E. Historical Yakima River Whole Fish Data

Table E1. Historical Data on Chlorinated Pesticides in Yakima River Whole Fish Samples, 1970-2001 (ug/Kg, wet weight; parts per billion)

Reach	Location	Date	Species	Lipids (%)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDT	Cis-Chlordane	Cis-Nonachlor	Oxychlordane	Trans-Chlordane	Trans-Nonachlor	Total Chlordane	Methoxychlor	Alpha-BHC	Beta-BHC	Delta-BHC	Gamma-BHC (Lindane)	Aldrin
Keechelus Lake	Keechelus Lake	Aug-01	LSS	3.3	2 U	**2.3 J**	2 U	**2.3 J**	4 U	4 U	4 U	--	4 U	4 U	20 U	10 U	**2.2 J**	4 U	2 U	4 U
Cle Elum	Cle Elum	Aug-85	MWF	11.5	40 U	**50**	40 U	50	--	--	--	--	--	--	--	--	--	--	--	--
Cle Elum	Cle Elum	Nov-89	MWF	6.6	**10**	**70**	**30**	**110**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Cle Elum	Cle Elum	Nov-90	MWF	5.8	**10**	**70**	**10**	**90**	**10**	10 U	10 U	10 U	**10**	**20**	--	10 U	10 U	10 U	10 U	--
Yakima Canyon	Wymer	Aug-85	MWF	12	40 U	**280**	**50**	**330**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Wymer	Aug-85	BLS	6.6	40 U	**80**	40 U	**80**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Wymer	Aug-85	NPM	3.7	40 U	**560**	40 U	**560**	--	--	--	--	--	--	--	--	--	--	--	--
Yakima Canyon	Umtanum	Nov-89	RBT	5.9	**10**	**160**	**40**	**210**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Yakima Canyon	Umtanum	Nov-90	LSS	6.6	**30**	**210**	**50**	**290**	**10**	10 U	**10**	10 U	**10**	**30**	--	10 U	10 U	10 U	10 U	--
Yakima Canyon	Near Umtanum	Sep-96	RBT	6.8	5.4 U	**84**	**12**	**96**	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	14 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U
Yakima Canyon	Near Umtanum	Sep-96	RBT	5.8	**1.7** J	**73**	**9.8**	**83**	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U
Yakima Canyon	Near Umtanum	Sep-96	RBT	5.8	**1.9** J	**76**	**9.7**	**86**	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	13 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	4.7	**11**	**130**	**29**	**170**	5 U	5 U	5 U	5 U	5 U	5 U	13 U	5 U	5 U	5 U	5 U	5 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	8	**16**	**240**	**52**	**308**	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	6.3	**23**	**190**	**56**	**269**	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U
Yakima-Parker	Moxee Drain	Sep-83	BLS	5.1	**858**	**3433**	**780**	**5071**	1 U	1 U	--	1 U	1 U	1 U	1 U	**7.2**	--	--	1 U	1 U
Yakima-Parker	Moxee Drain	Sep-83	MWF	9.1	**141**	**578**	**314**	**1033**	1 U	1 U	--	1 U	1 U	1 U	1 U	**15**	--	--	1 U	1 U
Yakima-Parker	Moxee Drain	Sep-83	NPM	0.8	**252**	**2157**	**131**	**2540**	1 U	1 U	--	1 U	1 U	1 U	1 U	**5.5**	--	--	1 U	1 U
Yakima-Parker	Parker	Nov-89	LSS	3.6	**60**	**420**	**80**	**560**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Yakima-Parker	Parker	Nov-90	LSS	3.1	**70**	**620**	**110**	**800**	**10**	10 U	10 U	10 U	**10**	**20**	--	10 U	10 U	10 U	10 U	--
Buena	Buena	Aug-85	MWF	11.7	**550**	40 U	**80**	**630**	--	--	--	--	--	--	--	--	--	--	--	--
Buena	Buena	Aug-85	MWF	12.8	**540**	40 U	**110**	**650**	--	--	--	--	--	--	--	--	--	--	--	--
Buena	Buena	Aug-85	LSS/BLS	8.4	**370**	40 U	**120**	**490**	--	--	--	--	--	--	--	--	--	--	--	--
Buena	Buena	Aug-85	LSS/BLS	10	**210**	40 U	**80**	**290**	--	--	--	--	--	--	--	--	--	--	--	--
Buena	Buena	Aug-85	NPM	3.7	**890**	40 U	40 U	**890**	--	--	--	--	--	--	--	--	--	--	--	--
Granger-Grandview	Grandview	Sep-95	LSS	3.8	**200**	**3150**	**285**	**3635**	**9.1 J**	**4.3**	**2**	**2.9**	**18**	**36**	**3**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Granger-Grandview	Grandview	Sep-95	LSS	2.5	**150**	**3000**	**250**	**3400**	**7.6 J**	**4 J**	**2.1 J**	**2.2 J**	**14**	**30**	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U
Granger-Grandview	Grandview	Sep-95	LSS	2.5	**140**	**1900**	**180**	**2220**	**9.4 J**	**5 J**	**2 J**	**1.5 NJ**	**12**	**30**	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U
Granger-Grandview	Granger	1970	BLS	7.9	**480**	**660**	**1030**	**2170**	--	--	--	--	--	--	--	**20**	--	--	--	*
Granger-Grandview	Granger	1970	CRP	5.6	**30**	**890**	**150**	**1070**	--	--	--	--	--	--	--	**10**	--	--	--	*
Granger-Grandview	Granger	1970	CRP	5	**350**	**1700**	**170**	**2220**	--	--	--	--	--	--	--	**10**	--	--	--	*
Granger-Grandview	Granger	1970	LMB	3.9	**510**	**1660**	**420**	**2590**	--	--	--	--	--	--	--	**10**	--	--	--	*
Granger-Grandview	Granger	1971	BCR	1.9	**140**	**490**	**180**	**810**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1971	BCR	2.3	**140**	**550**	**160**	**850**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1971	CRP	4.4	**250**	**1070**	**170**	**1490**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1971	CRP	5	**380**	**1020**	**80**	**1480**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1971	LSS	4.9	**520**	**1120**	**1040**	**2680**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1971	LSS	5.4	**380**	**710**	**550**	**1640**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1972	CRP	6.4	**420**	**2200**	**140**	**2760**	--	--	--	--	--	--	--	--	--	--	--	ND
Granger-Grandview	Granger	1972	LSS	4.3	**440**	**920**	**640**	**2000**	--	--	--	--	--	--	--	--	--	--	--	ND
Granger-Grandview	Granger	1972	LSS	4.2	**550**	**1100**	**780**	**2430**	--	--	--	--	--	--	--	--	--	--	--	ND
Granger-Grandview	Granger	1972	NPM	3.8	**340**	**2700**	**10**	**3050**	--	--	--	--	--	--	--	--	--	--	--	ND
Granger-Grandview	Granger	1973	CRP	5.4	ND	**520**	ND	**520**	--	--	--	--	--	--	--	--	--	--	--	*

Table E1 continued.

Reach	Location	Date	Species	Lipids (%)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDT	Cis-Chlordane	Cis-Nonachlor	Oxychlordane	Trans-Chlordane	Trans-Nonachlor	Total Chlordane	Methoxychlor	Alpha-BHC	Beta-BHC	Delta-BHC	Gamma-BHC (Lindane)	Aldrin
Granger-Grandview	Granger	1973	LSS	6	**390**	**880**	**510**	**1780**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1973	LSS	12	**470**	**1000**	**670**	**2140**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1973	LMB	4.2	**140**	**770**	**110**	**1020**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1974	CRP	4.9	**800**	**3100**	**440**	**4340**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1974	CRP	4.9	**550**	**2200**	**190**	**2940**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1974	LSS	5.1	**690**	**1100**	**540**	**2330**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1974	SMB	4.8	**390**	**1400**	**310**	**2100**	--	--	--	--	--	--	--	--	--	--	--	*
Granger-Grandview	Granger	1976	BCR	3	**300**	**780**	**100**	**1180**	ND	ND	--	**10**	ND	**10**	--	**10**	--	--	ND	*
Granger-Grandview	Granger	1976	LSS	6.9	**280**	**810**	**40**	**1130**	ND	ND	--	**10**	ND	**10**	--	**10**	--	--	ND	*
Granger-Grandview	Granger	1976	LSS	4.5	**190**	**400**	**20**	**610**	**30**	ND	--	**30**	ND	**60**	--	**10**	--	--	ND	*
Granger-Grandview	Granger	1978	CRP	4.7	**280**	**1240**	ND	**1520**	**40**	**10**	ND	**10**	**10**	**70**	--	ND	--	--	ND	--
Granger-Grandview	Granger	1978	CRP	5.3	**230**	**1190**	**10**	**1430**	**50**	ND	ND	**10**	ND	**60**	--	ND	--	--	ND	--
Granger-Grandview	Granger	1978	WCR	3.1	**110**	**100**	**50**	**260**	**10**	**10**	ND	ND	**10**	**30**	--	ND	--	--	ND	--
Granger-Grandview	Granger	1980	BCR	2.5	**40**	**350**	ND	**390**	ND	ND	ND	**10**	ND	**10**	--	ND	--	--	ND	--
Granger-Grandview	Granger	1980	LSS	3.8	**70**	**320**	**14**	**404**	ND	**10**	ND	**10**	**10**	**30**	--	ND	--	--	ND	--
Granger-Grandview	Granger	1980	LSS	2	**30**	**200**	ND	**230**	ND	ND	ND	ND	ND	ND	ND	ND	--	--	ND	--
Granger-Grandview	Granger	1984	BCR	2.4	**50**	**300**	**30**	**380**	**10**	**10**	ND	ND	**10**	**30**	--	ND	--	--	ND	--
Granger-Grandview	Granger	1984	LSS	3.3	**50**	**220**	**10**	**280**	ND	ND	ND	ND	**10**	**10**	--	ND	--	--	ND	--
Granger-Grandview	Granger	1984	LSS	2.6	**30**	**150**	**10**	**190**	ND	ND	ND	ND	ND	ND	--	ND	--	--	ND	--
Granger-Grandview	Sunnyside	Nov-89	MWF	7.5	**90**	**1000**	**110**	**1200**	**10**	10 U	10 U	10 U	**10**	**20**	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	Sunnyside	Nov-89	LSS	7.1	**210**	**1800**	**270**	**2280**	**10**	10 U	10 U	10 U	**10**	**20**	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	Sunnyside	Nov-89	CRP	5.3	**140**	**1700**	**40**	**1880**	**10**	10 U	10 U	10 U	**10**	**20**	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	Grandview	Oct-89	LSS	7.6	**290**	**2500**	**370**	**3160**	**20**	10 U	10 U	10 U	**20**	**40**	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	Grandview	Nov-90	LSS	5.3	**420**	**2500**	**460**	**3380**	**20**	10 U	**10**	**10**	**20**	**60**	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	Granger	Nov-90	LSS	8.2	**140**	**1400**	**210**	**1750**	**10**	10 U	10 U	10 U	**10**	**20**	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	Granger	1997	CRP	5.36	**82**	**970**	**38**	**1090**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	Granger	1997	CRP	3.02	**35**	**460**	**11**	**506**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	Granger	1997	NPM	3.2	**42**	**800**	10 U	**842**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	Granger	1997	SMB	4.8	**70**	**1200**	**120**	**1390**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	Granger	1997	SMB	5.17	**59**	**910**	**56**	**1025**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	Granger	1997	LMB	4.19	**50**	**500**	**310**	**860**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Granger-Grandview	below Granger	Apr-98	LSS	6.1	**49**	**690**	**110**	**849**	1.7 U	**10**	1.7 U	1.7 U	**3.7**	**13.7**	--	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Granger-Grandview	below Granger	Apr-98	LSS	4.8	**100**	**1300**	**180**	**1580**	1.8 U	**17**	1.8 U	1.8 U	**7.2**	**24.2**	--	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Granger-Grandview	Granger	Apr-98	LSS	4.2	**140**	**1100**	**43**	**1283**	1.9 U	1.9 U	**0.97 NJ**	1.9 U	**8.3**	**9.3**	39 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	7.5	**72**	**330**	**50**	**452**	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	140 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	9.5	**52**	**310**	**37**	**399**	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	130 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	7.1	**71**	**560**	**52**	**683**	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	113 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	3.9	**84**	**970**	**72**	**1126**	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	130 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	5.2	**51**	**390**	**31**	**472**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	120 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	3.5	**66**	**880**	**60**	**1006**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	130 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	6.5	**8.2**	**28**	**7.7**	**44**	1.9 U	1.9 U	1.9 U	1.9 U	**3.7**	**3.7**	--	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	5.7	**5.7**	**25**	**6.1**	**37**	1.9 U	1.9 U	1.9 U	1.9 U	**3**	**3**	--	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	7.5	**6.4**	**26**	**7.1**	**40**	1.9 U	1.9 U	1.9 U	1.9 U	**4.4**	**4.4**	--	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Prosser	May-97	CHNK	14.8	**3.2 J**	**15**	**6.6**	**25**	1.9 U	1.9 U	1.9 U	1.9 U	**3.7**	**3.7**	--	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Prosser	May-97	CHNK	13.5	**3 J**	**20**	**6.7**	**30**	2 U	2 U	2 U	2 U	**3.9**	**3.9**	--	2 U	2 U	2 U	2 U	2 U

Table E1 continued.

Reach	Location	Date	Species	Lipids (%)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDT	Cis-Chlordane	Cis-Nonachlor	Oxychlordane	Trans-Chlordane	Trans-Nonachlor	Total Chlordane	Methoxychlor	Alpha-BHC	Beta-BHC	Delta-BHC	Gamma-BHC (Lindane)	Aldrin
Prosser Area	Prosser	May-97	CHNK	15	**4.2 J**	**18**	**8**	**30**	1.9 U	1.9 U	1.9 U	1.9 U	**4.2**	**4.2**	--	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	2.2	**5**	**21**	2 U	**26**	2 U	2 U	2 U	2 U	**1.4 J**	**1.4 J**	41 U	2 U	2 U	2 U	2 U	2 U
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	2.9	**6.6**	**27**	2 U	**34**	2 U	2 U	2 U	2 U	**2.4**	**2.4**	40 U	2 U	2 U	2 U	2 U	2 U
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	2.2	**7.6**	**29**	1.9 U	**37**	1.9 U	1.9 U	1.9 U	1.9 U	**1.5 J**	**1.5 J**	38 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	9.4	**47**	**580**	**31**	**658**	1.9 U	**6**	1.9 U	1.9 U	**3**	**9**	38 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	8.1	**56**	**770**	**49**	**875**	1.9 U	**10**	1.9 U	1.9 U	**5.5**	**15.5**	38 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	10.4	**58**	**640**	**43**	**741**	1.8 U	**8.6**	1.8 U	1.8 U	**4.1**	**12.7**	36 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Horn Rapids-Kiona	Kiona	Sep-80	SMB	3	**76**	**460**	**40**	**576**	**6**	0.5 U	--	0.5 U	**6.6**	**12.6**	0.5 U	**3.7**	--	--	**0.3**	0.5 U
Horn Rapids-Kiona	Kiona	Sep-80	BLS	7.0	**170**	**670**	**57**	**897**	**21**	0.5 U	--	**9.2**	0.5 U	**30.2**	0.5 U	**3.4**	--	--	**0.6**	0.5 U
Horn Rapids-Kiona	Kiona	Sep-81	NPM	7.4	**110**	**1100**	**47**	**1257**	**93**	**32**	--	**5.1**	**9.8**	**140**	0.1 U	0.1 U	--	--	0.1 U	0.1 U
Horn Rapids-Kiona	Kiona	Sep-81	LSS	13	**390**	**2100**	**590**	**3080**	**230**	**73**	--	**17**	1 U	**320**	0.1 U	0.1 U	--	--	0.1 U	0.1 U
Horn Rapids-Kiona	below Kiona	Sep-82	BLS	8.6	**290**	**2040**	**380**	**2710**	1 U	1 U	--	1 U	1 U	1 U	10 U	**6**	--	--	1 U	1 U
Horn Rapids-Kiona	below Kiona	Sep-82	MWF	8.1	**190**	**1020**	**220**	**1430**	1 U	1 U	--	1 U	1 U	1 U	10 U	**6**	--	--	1 U	1 U
Horn Rapids-Kiona	below Kiona	Sep-83	BLS	10.4	**176**	**1268**	**354**	**1798**	1 U	1 U	--	1 U	1 U	1 U	1 U	**9**	--	--	1 U	1 U
Horn Rapids-Kiona	below Kiona	Sep-83	CAT	14.6	**233**	**2365**	**391**	**2989**	1 U	1 U	--	1 U	1 U	1 U	1 U	**9**	--	--	1 U	1 U
Horn Rapids-Kiona	Horn Rapids	Sep-92	LSS	5.9	**151 J**	**1420**	**94**	**1665**	**21**	**8.1**	**7.5**	**15**	**32**	**84**	8 U	8 U	8 U	8 U	8 U	8 U
Horn Rapids-Kiona	Horn Rapids	Sep-92	LSS	4.47	**76**	**532**	**45**	**653**	**7.4 J**	**3.6 J**	**2.9 J**	**6 J**	**15**	**35**	8 U	8 U	8 U	8 U	8 U	8 U
Horn Rapids-Kiona	Kiona	Aug-85	LSS	11.1	**140**	**830**	**90**	**1060**	--	--	--	--	--	--	--	--	--	--	--	--
Horn Rapids-Kiona	Kiona	Aug-85	NPM	5.5	**130**	**2900**	40 U	**3030**	--	--	--	--	--	--	--	--	--	--	--	--
Horn Rapids-Kiona	Horn Rapids	Aug-87	CRP	15.3	--	**2493 J**	--	**2493 J**	**12.3**	2.5 U	2.5 U	**7.3**	**23.9**	**44**	2.5 U	**1.9**	--	--	2.5 U	--
Horn Rapids-Kiona	Kiona	Oct-89	MWF	6.9	**170**	**1500**	10 U	**1670**	**30**	10 U	10 U	10 U	**20**	**50**	--	10 U	10 U	10 U	10 U	--
Horn Rapids-Kiona	Kiona	Nov-90	MWF	7.9	**230**	**1600**	**70**	**1900**	**10**	10 U	**10**	**10**	**20**	**50**	--	10 U	10 U	10 U	10 U	--
Horn Rapids-Kiona	Kiona	Oct-89	SMB	2.9	**90**	**560**	10 U	**650**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Horn Rapids-Kiona	Kiona	Oct-89	LSS	11.6	**190**	**1800**	**240**	**2230**	**20**	10 U	10 U	10 U	**20**	**40**	--	10 U	10 U	10 U	10 U	--
Horn Rapids-Kiona	Kiona	Nov-90	LSS	8.0	**300**	**2000**	**190**	**2490**	**20**	10 U	**10**	**10**	**30**	**70**	--	10 U	10 U	10 U	10 U	--
Horn Rapids-Kiona	Kiona	Nov-90	LSS	11.6	**390**	**2200**	**220**	**2810**	**30**	10 U	**20**	**10**	**40**	**100**	--	10 U	10 U	10 U	10 U	--
Horn Rapids-Kiona	above Kiona	Apr-98	SMB	--	**63**	**970**	**62**	**1095**	2 U	2 U	**2.6 NJ**	2 U	**7.1**	**9.7**	40 U	2 U	2 U	2 U	2 U	2 U
Horn Rapids-Kiona	Kiona	Apr-98	SMB	--	**58**	**1700**	**80**	**1838**	**4.7**	**1.4 J**	**1.4 NJ**	2 U	**14**	**22**	39 U	2 U	2 U	2 U	2 U	2 U
Horn Rapids-Kiona	near Horn Rapids Dam	Apr-98	SMB	--	**40**	**1200**	**44**	**1284**	**3.6**	1.8 U	**1.5 NJ**	1.8 U	**9.8**	**15**	36 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	**58**	**520**	**30**	**608**	**7.6**	**2.3**	**1.4 J**	**1.9**	**11**	**24**	38 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	**100**	**900**	**45**	**1045**	**3.7**	**2.3**	**2.2**	**2.5**	**13**	**24**	38 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	**85**	**770**	**45**	**900**	**2.4**	**2.5**	**1.5 J**	**2.2**	**12**	**21**	39 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Yakima Tributary	Naches River	Nov-90	MWF	5.6	**60**	**590**	**80**	**730**	10 U	10 U	**10**	10 U	**10**	**20**	--	10 U	10 U	10 U	10 U	--
Yakima Tributary	Naches River	Nov-90	LSS	4.7	**50**	**410**	**70**	**530**	**10**	10 U	10 U	10 U	10 U	**10**	--	10 U	10 U	10 U	10 U	--
Yakima Tributary	Wide Hollow Creek	May-89	BLS	6.8	**150**	**750**	**110**	**1010**	**30**	10 U	10 U	10 U	10 U	**30**	--	10 U	10 U	10 U	10 U	--
Yakima Tributary	Wide Hollow Creek	Nov-89	BLS	5	**80**	**180**	**50**	**310**	**10**	10 U	10 U	10 U	**10**	**20**	--	10 U	10 U	10 U	10 U	--
Yakima Tributary	Wide Hollow Creek	Nov-90	LSS	2.8	**80**	**270**	**20**	**370**	**10**	10 U	10 U	10 U	**10**	**20**	--	10 U	10 U	10 U	10 U	--
Yakima Tributary	Moxee Drain	Nov-89	MWF	6.8	**70**	**830**	**110**	**1010**	**10**	10 U	10 U	10 U	**10**	**20**	--	10 U	10 U	10 U	10 U	--
Yakima Tributary	Moxee Drain	Nov-89	LSS	3.9	**70**	**530**	**160**	**760**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Yakima Tributary	Granger Drain	Nov-90	BLS	9	**190**	**730**	**200**	**1120**	**20**	10 U	**10**	**10**	**20**	**60**	--	10 U	10 U	10 U	10 U	--
Yakima Tributary	Granger Drain	Nov-89	LSS	3.7	**150**	**1500**	**260**	**1910**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Yakima Tributary	Toppenish Creek	Nov-89	LSS	5.06	**110**	**1000**	**150**	**1260**	10 U	10 U	10 U	10 U	10 U	10 U	--	10 U	10 U	10 U	10 U	--
Yakima Tributary	Sulfur Creek	Nov-89	LSS	9	**410**	**3400**	**960**	**4770**	**40**	10 U	10 U	10 U	**30**	**70**	--	10 U	10 U	10 U	10 U	--
Yakima Tributary	Cherry Creek	Oct-90	BLS	7.9	**20**	**60**	**30**	**110**	**10**	10 U	**10**	**10**	**10**	**40**	--	10 U	10 U	10 U	10 U	--

Table E1 continued.

Reach	Location	Date	Species	Dieldrin	Endrin	Endrin Aldehyde	Endrin Ketone	Heptachlor	Heptachlor Epoxide	Hexachloro-benzene	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Toxaphene	Reference
Keechelus Lake	Keechelus Lake	Aug-01	LSS	1 U	10 U	--	--	2 U	2 U	333 U	1 U	40 U	10 U	100 U	EPA, Unpublished
Cle Elum	Cle Elum	Aug-85	MWF	20 U	20 U	--	--	--	--	--	20 U	--	--	--	Johnson et. al., 1986
Cle Elum	Cle Elum	Nov-89	MWF	**10**	10 U	--	--	--	10 U	10 U	--	--	--	50 U	Rinella, 1992
Cle Elum	Cle Elum	Nov-90	MWF	**10**	10 U	--	--	--	10 U	10 U	--	--	--	50 U	"
Yakima Canyon	Wymer	Aug-85	MWF	**90**	20 U	--	--	--	--	--	20 U	--	--	--	Johnson et. al., 1986
Yakima Canyon	Wymer	Aug-85	BLS	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Yakima Canyon	Wymer	Aug-85	NPM	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Yakima Canyon	Umtanum	Nov-89	RBT	**20**	10 U	--	--	--	10 U	10 U	--	--	--	50 U	Rinella, 1992
Yakima Canyon	Umtanum	Nov-90	LSS	**10**	10 U	--	--	--	**10**	10 U	--	--	--	50 U	"
Yakima Canyon	Near Umtanum	Sep-96	RBT	**7.3 J**	14 U	14 UJ	14 U	5.4 U	5.4 UJ	5.4 U	14 U	14 U	5.4 UJ	66 U	EPA, 2002
Yakima Canyon	Near Umtanum	Sep-96	RBT	**6.4 NJ**	12 U	12 UJ	12 U	2.4 U	2.4 UJ	2.4 U	12 U	12 U	2.4 UJ	57 U	"
Yakima Canyon	Near Umtanum	Sep-96	RBT	**8 J**	13 U	13 UJ	13 U	2.6 U	2.6 UJ	2.6 U	13 U	13 U	2.6 UJ	63 U	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	**6.1 NJ**	13 U	13 UJ	13 U	5 U	5 UJ	5 U	13 U	13 U	5 UJ	60 U	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	**8.8 J**	12 U	12 UJ	12 U	2.4 U	2.4 UJ	2.4 U	12 U	12 U	2.4 UJ	60 U	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	**7.8 J**	12 U	12 UJ	12 U	2.4 U	2.4 UJ	2.4 U	12 U	12 U	2.4 UJ	57 U	"
Yakima-Parker	Moxee Drain	Sep-83	BLS	1 U	1 U	--	--	--	--	1 U	--	--	--	--	Hopkins et. al., 1985
Yakima-Parker	Moxee Drain	Sep-83	MWF	1 U	1 U	--	--	--	--	1 U	--	--	--	--	"
Yakima-Parker	Moxee Drain	Sep-83	NPM	1 U	1 U	--	--	--	--	1 U	--	--	--	--	"
Yakima-Parker	Parker	Nov-89	LSS	**10**	10 U	--	--	--	10 U	10 U	--	--	--	50 U	Rinella, 1992
Yakima-Parker	Parker	Nov-90	LSS	10 U	10 U	--	--	--	10 U	10 U	--	--	--	50 U	"
Buena	Buena	Aug-85	MWF	20 U	20 U	--	--	--	--	--	**170**	--	--	--	Johnson et. al., 1986
Buena	Buena	Aug-85	MWF	20 U	20 U	--	--	--	--	--	**140**	--	--	--	"
Buena	Buena	Aug-85	LSS/BLS	**20**	**50**	--	--	--	--	--	**50**	--	--	--	"
Buena	Buena	Aug-85	LSS/BLS	**40**	**20**	--	--	--	--	--	20 U	--	--	--	"
Buena	Buena	Aug-85	NPM	20 U	20 U	--	--	--	--	--	20 U	--	--	--	"
Granger-Grandview	Grandview	Sep-95	LSS	**44**	3.7 U	3.7 U	3.7 U	3.7 U	**1 NJ**	**1.7**	3.7 U	3.7 U	3.7 U	**240 J**	Davis et. al., 1998
Granger-Grandview	Grandview	Sep-95	LSS	**38**	3.6 UJ	3.6 U	3.6 U	3.6 U	**0.84 J**	**1.5 J**	3.6 U	3.6 U	3.6 U	**230 J**	"
Granger-Grandview	Grandview	Sep-95	LSS	**35**	3.9 UJ	3.9 U	3.9 U	3.9 U	**0.71 J**	**1.4 J**	3.9 U	3.9 U	3.9 U	**200 J**	"
Granger-Grandview	Granger	1970	BLS	**60**	ND	--	--	ND	--	--	--	--	--	--	Schmitt et. al., 1981
Granger-Grandview	Granger	1970	CRP	**30**	ND	--	--	ND	--	--	--	--	--	--	"
Granger-Grandview	Granger	1970	CRP	**20**	ND	--	--	ND	--	--	--	--	--	--	"
Granger-Grandview	Granger	1970	LMB	**80**	ND	--	--	ND	--	--	--	--	--	--	"
Granger-Grandview	Granger	1971	BCR	**10**	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1971	BCR	**30**	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1971	CRP	**10**	**10**	--	--	ND	--	--	--	--	--	**10**	"
Granger-Grandview	Granger	1971	CRP	**20**	**10**	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1971	LSS	**10**	**10**	--	--	ND	--	--	--	--	--	**10**	"
Granger-Grandview	Granger	1971	LSS	**20**	**10**	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1972	CRP	ND	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1972	LSS	ND	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1972	LSS	ND	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1972	NPM	ND	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1973	CRP	ND	ND	--	--	ND	--	--	--	--	--	ND	"

Table E1 continued.

Reach	Location	Date	Species	Dieldrin	Endrin	Endrin Aldehyde	Endrin Ketone	Heptachlor	Heptachlor Epoxide	Hexachloro-benzene	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Toxaphene	Reference
Granger-Grandview	Granger	1973	LSS	ND	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1973	LSS	**160**	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1973	LMB	ND	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1974	CRP	**170**	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1974	CRP	**120**	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1974	LSS	**80**	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1974	SMB	**80**	ND	--	--	ND	--	--	--	--	--	ND	"
Granger-Grandview	Granger	1976	BCR	**30**	ND	--	--	ND	*	ND	--	--	--	ND	Schmitt et. al., 1983
Granger-Grandview	Granger	1976	LSS	**30**	ND	--	--	**10**	*	**10**	--	--	--	ND	"
Granger-Grandview	Granger	1976	LSS	**30**	ND	--	--	ND	*	ND	--	--	--	ND	"
Granger-Grandview	Granger	1978	CRP	**10**	ND	--	--	ND	*	ND	--	--	--	ND	"
Granger-Grandview	Granger	1978	CRP	**10**	ND	--	--	ND	*	ND	--	--	--	ND	"
Granger-Grandview	Granger	1978	WCR	**10**	ND	--	--	ND	*	ND	--	--	--	ND	"
Granger-Grandview	Granger	1980	BCR	ND	ND	--	--	ND	*	ND	--	--	--	ND	Schmitt et. al., 1985
Granger-Grandview	Granger	1980	LSS	ND	ND	--	--	ND	*	ND	--	--	--	**40**	"
Granger-Grandview	Granger	1980	LSS	ND	ND	--	--	ND	*	ND	--	--	--	ND	"
Granger-Grandview	Granger	1984	BCR	**10**	ND	--	--	ND	*	ND	--	--	--	ND	Schmitt et. al., 1990
Granger-Grandview	Granger	1984	LSS	ND	ND	--	--	ND	*	ND	--	--	--	ND	"
Granger-Grandview	Granger	1984	LSS	ND	ND	--	--	ND	*	ND	--	--	--	ND	"
Granger-Grandview	Sunnyside	Nov-89	MWF	**40**	10 U	--	--	--	10 U	10 U	--	--	--	50 U	Rinella, 1992
Granger-Grandview	Sunnyside	Nov-89	LSS	**40**	10 U	--	--	--	10 U	10 U	--	--	--	**350**	"
Granger-Grandview	Sunnyside	Nov-89	CRP	**20**	10 U	--	--	--	10 U	10 U	--	--	--	**220**	"
Granger-Grandview	Grandview	Oct-89	LSS	**80**	10 U	--	--	--	10 U	10 U	--	--	--	**520**	"
Granger-Grandview	Grandview	Nov-90	LSS	**50**	10 U	--	--	--	**10**	10 U	--	--	--	**930**	"
Granger-Grandview	Granger	Nov-90	LSS	**20**	10 U	--	--	--	10 U	10 U	--	--	--	**300**	"
Granger-Grandview	Granger	1997	CRP	**22**	10 U	--	--	--	10 U	10 U	--	--	--	30 U	Hinck et. al., 2004
Granger-Grandview	Granger	1997	CRP	10 U	10 U	--	--	--	10 U	10 U	--	--	--	30 U	"
Granger-Grandview	Granger	1997	NPM	10 U	10 U	--	--	--	10 U	10 U	--	--	--	30 U	"
Granger-Grandview	Granger	1997	SMB	**23**	10 U	--	--	--	10 U	10 U	--	--	--	30 U	"
Granger-Grandview	Granger	1997	SMB	**14**	10 U	--	--	--	10 U	10 U	--	--	--	30 U	"
Granger-Grandview	Granger	1997	LMB	10 U	10 U	--	--	--	10 U	10 U	--	--	--	30 U	"
Granger-Grandview	below Granger	Apr-98	LSS	--	--	--	--	1.7 U	1.7 U	1.7 U	--	--	1.7 U	52 U	EPA, 2002
Granger-Grandview	below Granger	Apr-98	LSS	--	--	--	--	1.8 U	1.8 U	1.8 U	--	--	1.8 U	53 U	"
Granger-Grandview	Granger	Apr-98	LSS	**4.1 NJ**	39 U	39 UJ	39 U	1.9 U	1.9 U	**1.2 J**	**2.5 J**	39 U	**2**	58 U	"
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	**16**	12 U	12 U	140 U	2.8 U	2.8 U	2.8 U	12 U	12 U	**5**	83 U	"
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	**18**	11 U	11 U	11 U	3.5 U	3.5 U	3.5 U	11 U	11 U	**3.5**	80 U	"
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	**21.9**	12 U	12 U	12 U	2.8 U	2.8 U	2.8 U	**7.9 J**	12 U	**5.4**	85 U	"
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	**19.2**	11 U	11 U	130 U	2.7 U	2.7 U	2.7 U	11 U	11 U	**6.5**	81 U	"
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	**20**	10 U	10 U	10 U	2.5 U	2.5 U	2.5 U	10 U	10 U	2.5 U	75 U	"
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	**12.7**	11 U	11 U	130 U	2.5 U	2.5 U	2.5 U	11 U	11 U	2.5 U	76 U	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	--	--	--	--	1.9 U	1.9 UJ	**2.9**	--	--	--	58 U	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	--	--	--	--	1.9 U	1.9 UJ	**2.6**	--	--	--	56 U	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	--	--	--	--	1.9 U	1.9 UJ	**2.8**	--	--	--	57 U	"
Prosser Area	Prosser	May-97	CHNK	--	--	--	--	1.9 U	1.9 U	**2.8**	--	--	--	57 U	"
Prosser Area	Prosser	May-97	CHNK	--	--	--	--	2 U	2 U	**3.5**	--	--	--	59 U	"

Table E1 continued.

Reach	Location	Date	Species	Dieldrin	Endrin	Endrin Aldehyde	Endrin Ketone	Heptachlor	Heptachlor Epoxide	Hexachloro-benzene	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Toxaphene	Reference
Prosser Area	Prosser	May-97	CHNK	--	--	--	--	1.9 U	1.9 U	**3.8**	--	--	--	57 U	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	41 U	41 U	41 UJ	41 U	2 U	2 U	**1.1 J**	**2.4 NJ**	41 U	2 U	61 U	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	40 U	40 U	40 UJ	40 U	2 U	2 U	**2.1**	**2.2 J**	40 U	2 U	60 U	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	38 U	38 U	38 UJ	38 U	1.9 U	1.9 U	**1.5 J**	**2.1 J**	**1.1 NJ**	1.9 U	58 U	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	**7.3 NJ**	38 U	38 UJ	38 U	1.9 U	1.9 U	**0.94 J**	**8.1 J**	**3.2 J**	1.9 U	56 U	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	**7.6 NJ**	38 U	38 UJ	38 U	1.9 U	1.9 U	**1 J**	**7.4 J**	**3 J**	1.9 U	57 U	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	**5.5 NJ**	36 U	36 UJ	36 U	1.8 U	1.8 U	**1.2 J**	**7.2 J**	**3.8 J**	1.8 U	54 U	"
Horn Rapids-Kiona	Kiona	Sep-80	SMB	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	Hopkins et. al., 1985
Horn Rapids-Kiona	Kiona	Sep-80	BLS	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	"
Horn Rapids-Kiona	Kiona	Sep-81	NPM	**48**	**0.7**	--	--	--	--	--	--	--	--	--	"
Horn Rapids-Kiona	Kiona	Sep-81	LSS	**76**	**0.5**	--	--	--	--	--	--	--	--	--	"
Horn Rapids-Kiona	below Kiona	Sep-82	BLS	1 U	1 U	--	--	--	--	1 U	--	--	--	--	"
Horn Rapids-Kiona	below Kiona	Sep-82	MWF	1 U	1 U	--	--	--	--	1 U	--	--	--	--	"
Horn Rapids-Kiona	below Kiona	Sep-83	BLS	1 U	1 U	--	--	--	--	1 U	--	--	--	--	"
Horn Rapids-Kiona	below Kiona	Sep-83	CAT	1 U	1 U	--	--	--	--	1 U	--	--	--	--	"
Horn Rapids-Kiona	Horn Rapids	Sep-92	LSS	**42**	8 U	8 U	8 U	8 U	8 U	**1.7 J**	8 U	8 U	8 U	400 U	Davis & Johnson, 1994
Horn Rapids-Kiona	Horn Rapids	Sep-92	LSS	**31**	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	400 U	"
Horn Rapids-Kiona	Kiona	Aug-85	LSS	**240**	20 U	--	--	--	--	--	20 U	--	--	--	Johnson et. al., 1986
Horn Rapids-Kiona	Kiona	Aug-85	NPM	**90**	20 U	--	--	--	--	--	20 U	--	--	--	"
Horn Rapids-Kiona	Horn Rapids	Aug-87	CRP	**103**	2.5 U	--	--	2.5 U	**3.6**	**4.6**	--	--	--	--	EPA, 1992
Horn Rapids-Kiona	Kiona	Oct-89	MWF	**60**	10 U	--	--		10 U	10 U	--	--	--	50 U	Rinella, 1992
Horn Rapids-Kiona	Kiona	Nov-90	MWF	**50**	10 U	--	--		**10**	10 U	--	--	--	**360**	"
Horn Rapids-Kiona	Kiona	Oct-89	SMB	**50**	10 U	--	--		10 U	10 U	--	--	--	50 U	"
Horn Rapids-Kiona	Kiona	Oct-89	LSS	**100**	10 U	--	--		10 U	10 U	--	--	--	**310**	"
Horn Rapids-Kiona	Kiona	Nov-90	LSS	**60**	10 U	--	--		**10**	10 U	--	--	--	**710**	"
Horn Rapids-Kiona	Kiona	Nov-90	LSS	**90**	10 U	--	--		**20**	10 U	--	--	--	**720**	"
Horn Rapids-Kiona	above Kiona	Apr-98	SMB	**34**	40 U	40 UJ	40 U	2 U	2 U	**1.4 J**	40 U	40 U	**5.6**	60 U	EPA, 2002
Horn Rapids-Kiona	Kiona	Apr-98	SMB	**22**	39 U	39 UJ	39 U	2 U	2 U	**1.2 J**	39 U	39 U	**2.4**	59 U	"
Horn Rapids-Kiona	near Horn Rapids Dam	Apr-98	SMB	**33**	36 U	36 UJ	36 U	1.8 U	1.8 U	**1.1 J**	36 U	36 U	**3.4**	55 U	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	38 U	38 U	38 UJ	38 U	1.9 U	1.9 U	**3.1**	38 U	38 U	**1.8 J**	57 U	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	**11**	38 U	38 UJ	38 U	1.9 U	1.9 U	**6.7**	**4 J**	38 U	**1.9**	57 U	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	**15**	39 U	39 UJ	39 U	1.9 U	1.9 U	**5.4**	39 U	39 U	**2.1**	58 U	"
Yakima Tributary	Naches River	Nov-90	MWF	**10**	10 U	--	--	--	**10**	10 U	--	--	--	50 U	Rinella, 1992
Yakima Tributary	Naches River	Nov-90	LSS	10 U	10 U	--	--	--	10 U	10 U	--	--	--	50 U	"
Yakima Tributary	Wide Hollow Creek	May-89	BLS	**30**	10 U	--	--	--	10 U	10 U	--	--	--	50 U	"
Yakima Tributary	Wide Hollow Creek	Nov-89	BLS	**40**	10 U	--	--	--	10 U	10 U	--	--	--	50 U	"
Yakima Tributary	Wide Hollow Creek	Nov-90	LSS	**10**	10 U	--	--	--	10 U	**10**	--	--	--	50 U	"
Yakima Tributary	Moxee Drain	Nov-89	MWF	**20**	10 U	--	--	--	10 U	10 U	--	--	--	50 U	"
Yakima Tributary	Moxee Drain	Nov-89	LSS	**10**	10 U	--	--	--	10 U	10 U	--	--	--	50 U	"
Yakima Tributary	Granger Drain	Nov-90	BLS	**80**	10 U	--	--	--	**20**	10 U	--	--	--	**410**	"
Yakima Tributary	Granger Drain	Nov-89	LSS	**70**	10 U	--	--	--	10 U	10 U	--	--	--	50 U	"
Yakima Tributary	Toppenish Creek	Nov-89	LSS	**20**	10 U	--	--	--	10 U	10 U	--	--	--	50 U	"
Yakima Tributary	Sulfur Creek	Nov-89	LSS	**170**	10 U	--	--	--	10 U	10 U	--	--	--	**1200**	"
Yakima Tributary	Cherry Creek	Oct-90	BLS	**30**	10 U	--	--	--	**20**	10 U	--	--	--	50 U	"

Table E1 continued.

* Aldrin included in dieldrin result and heptachlor epoxide included in heptachlor result
(--) Not analyzed for
ND = Not detected
U = The analyte was not detected at or above the reported result.
J = The analyte was positively identified. The associated numerical result is an estimate.
UJ = The analyte was not detected at or above the reported estimated result.
NJ = There is evidence that the analyte is present. The associated numerical result is an estimate.

MWF = mountain whitefish
LSS = largescale sucker
BLS = bridgelip sucker
RBT = rainbow trout
NPM = northern pikeminnow
CAT = channel catfish
CRP = common carp

WCR = white crappie
BCR = black crappie
SMB = smallmouth bass
LMB = largemouth bass
CHNK = chinook salmon
STHD = steelhead

Table E2. Historical Data on PCBs in Yakima River Whole Fish Samples, 1970-2001 (ug/Kg, wet weight; parts per billion)

Reach	Location	Date	Species	Lipids (%)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCB Aroclors	Total PCB Congeners	Reference
Keechelus Lake	Keechelus Lake	Aug-01	LSS	3.3	20 U	20 U	20 U	20 U	20 U	20 U	**32**	**32**	**29 J**	EPA, Unpublished
Cle Elum	Cle Elum	Aug-85	MWF	11.5	--	--	--	--	--	--	100 U	100 U	--	Johnson et. al., 1986
Cle Elum	Cle Elum	Nov-89	MWF	6.6	--	--	--	--	--	--	--	50 U	--	Rinella, 1992
Cle Elum	Cle Elum	Nov-90	MWF	5.8	--	--	--	--	--	--	--	50 U	--	"
Yakima Canyon	Wymer	Aug-85	MWF	12	--	--	--	--	--	--	100 U	100 U	--	Johnson et. al., 1986
Yakima Canyon	Wymer	Aug-85	BLS	6.6	--	--	--	--	--	--	100 U	100 U	--	"
Yakima Canyon	Wymer	Aug-85	NPM	3.7	--	--	--	--	--	--	**270**	**270**	--	"
Yakima Canyon	Umtanum	Nov-89	MWF	5.9	--	--	--	--	--	--	--	50 U	--	Rinella, 1992
Yakima Canyon	Umtanum	Nov-90	LSS	6.6	--	--	--	--	--	--	--	50 U	--	"
Yakima Canyon	Near Umtanum	Sep-96	RBT	6.8	22 U	22 U	22 U	22 U	22 U	**17 J**	22 U	**17 J**	**3.8**	EPA, 2002*
Yakima Canyon	Near Umtanum	Sep-96	RBT	5.8	19 U	19 U	19 U	19 U	19 U	**12 J**	19 U	**12 J**	**3.5**	"
Yakima Canyon	Near Umtanum	Sep-96	RBT	5.8	21 U	21 U	21 U	21 U	21 U	**14 J**	21 U	**14 J**	**3.5**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	4.7	20 U	20 U	20 U	20 U	20 U	**28**	20 U	**28**	**6.9**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	8	20 U	20 U	20 U	20 U	20 U	**32**	**17 J**	**49**	**7.4**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	6.3	19 U	19 U	19 U	19 U	19 U	**25**	**16 J**	**41**	**5.7**	"
Yakima-Parker	Moxee Drain	Sep-83	BLS	5.1	--	--	--	--	--	**606**	89 U	**606**	--	Hopkins et. al., 1985
Yakima-Parker	Moxee Drain	Sep-83	MWF	9.1	--	--	--	--	--	**168**	10 U	**168**	--	"
Yakima-Parker	Moxee Drain	Sep-83	NPM	0.8	--	--	--	--	--	**510**	10 U	**510**	--	"
Yakima-Parker	Parker	Nov-89	LSS	3.6	--	--	--	--	--	--	--	50 U	--	Rinella, 1992
Yakima-Parker	Parker	Nov-90	LSS	3.1	--	--	--	--	--	--	--	**170**	--	"
Buena	Buena	Aug-85	MWF	11.7	--	--	--	--	--	--	**200**	**200**	--	Johnson et. al., 1986
Buena	Buena	Aug-85	MWF	12.8	--	--	--	--	--	--	**200**	**200**	--	"
Buena	Buena	Aug-85	LSS/BLS	8.4	--	--	--	--	--	--	100 U	100 U	--	"
Buena	Buena	Aug-85	LSS/BLS	10	--	--	--	--	--	--	100 U	100 U	--	"
Buena	Buena	Aug-85	NPM	3.7	--	--	--	--	--	--	**120**	**120**	--	"
Granger-Grandview	Grandview	Sep-95	LSS	3.8	--	--	37 U	37 U	37 U	**81**	**220**	**301**	--	Davis et. al., 1998
Granger-Grandview	Grandview	Sep-95	LSS	2.5	--	--	36 U	36 U	36 U	**77 J**	**220**	**297**	--	"
Granger-Grandview	Grandview	Sep-95	LSS	2.5	--	--	39 U	39 U	39 U	**77 J**	**150**	**227**	--	"
Granger-Grandview	Granger	1970	BLS	7.9	--	--	--	--	--	**440**	--	**440**	--	Schmitt et. al., 1981
Granger-Grandview	Granger	1970	CRP	5.6	--	--	--	--	--	**1930**	--	**1930**	--	"
Granger-Grandview	Granger	1970	CRP	5	--	--	--	--	--	**560**	--	**560**	--	"
Granger-Grandview	Granger	1970	LMB	3.9	--	--	--	--	--	**630**	--	**630**	--	"
Granger-Grandview	Granger	1971	BCR	1.9	--	--	--	--	--	**280**	--	**280**	--	"
Granger-Grandview	Granger	1971	BCR	2.3	--	--	--	--	--	**210**	--	**210**	--	"
Granger-Grandview	Granger	1971	CRP	4.4	--	--	--	--	--	**150**	--	**150**	--	"
Granger-Grandview	Granger	1971	CRP	5	--	--	--	--	--	**300**	--	**300**	--	"
Granger-Grandview	Granger	1971	LSS	4.9	--	--	--	--	--	**330**	--	**330**	--	"
Granger-Grandview	Granger	1971	LSS	5.4	--	--	--	--	--	**340**	--	**340**	--	"
Granger-Grandview	Granger	1972	CRP	6.4	--	--	--	--	--	**1700**	--	**1700**	--	"
Granger-Grandview	Granger	1972	LSS	4.3	--	--	--	--	--	**1400**	--	**1400**	--	"

Table E2 continued.

Reach	Location	Date	Species	Lipids (%)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCB Aroclors	Total PCB Congeners	Reference
Granger-Grandview	Granger	1972	LSS	4.2	--	--	--	--	--	**1700**	--	**1700**	--	"
Granger-Grandview	Granger	1972	NPM	3.8	--	--	--	--	--	**3000**	--	**3000**	--	"
Granger-Grandview	Granger	1973	CRP	5.4	--	--	--	ND	--	ND	ND	ND	--	"
Granger-Grandview	Granger	1973	LSS	6	--	--	--	ND	--	ND	ND	ND	--	"
Granger-Grandview	Granger	1973	LSS	12	--	--	--	ND	--	ND	ND	ND	--	"
Granger-Grandview	Granger	1973	LMB	4.2	--	--	--	ND	--	ND	ND	ND	--	"
Granger-Grandview	Granger	1974	CRP	4.9	--	--	--	ND	--	ND	**200**	**200**	--	"
Granger-Grandview	Granger	1974	CRP	4.9	--	--	--	ND	--	ND	**100**	**100**	--	"
Granger-Grandview	Granger	1974	LSS	5.1	--	--	--	ND	--	ND	**200**	**200**	--	"
Granger-Grandview	Granger	1974	SMB	4.8	--	--	--	ND	--	ND	**200**	**200**	--	"
Granger-Grandview	Granger	1976	BCR	3	--	--	--	ND	ND	**200**	**100**	**300**	--	Schmitt et. al., 1983
Granger-Grandview	Granger	1976	LSS	6.9	--	--	--	ND	ND	**200**	**200**	**400**	--	"
Granger-Grandview	Granger	1976	LSS	4.5	--	--	--	ND	ND	ND	ND	ND	--	"
Granger-Grandview	Granger	1978	CRP	4.7	--	--	--	ND	ND	**200**	**300**	**500**	--	"
Granger-Grandview	Granger	1978	CRP	5.3	--	--	--	ND	ND	**140**	**300**	**440**	--	"
Granger-Grandview	Granger	1978	WCR	3.1	--	--	--	ND	ND	**120**	ND	**120**	--	"
Granger-Grandview	Granger	1980	BCR	2.5	--	--	--	--	ND	ND	**100**	**100**	--	Schmitt et. al., 1985
Granger-Grandview	Granger	1980	LSS	3.8	--	--	--	--	ND	ND	**100**	**100**	--	"
Granger-Grandview	Granger	1980	LSS	2	--	--	--	--	ND	ND	ND	ND	--	"
Granger-Grandview	Granger	1984	BCR	2.4	--	--	--	--	ND	ND	**100**	**100**	--	Schmitt et. al., 1990
Granger-Grandview	Granger	1984	LSS	3.3	--	--	--	--	ND	ND	**100**	**100**	--	"
Granger-Grandview	Granger	1984	LSS	2.6	--	--	--	--	ND	ND	ND	ND	--	"
Granger-Grandview	Sunnyside	Nov-89	MWF	7.5	--	--	--	--	--	--	--	50 U	--	Rinella, 1992
Granger-Grandview	Sunnyside	Nov-89	LSS	7.1	--	--	--	--	--	--	--	**100**	--	"
Granger-Grandview	Sunnyside	Nov-89	CRP	5.3	--	--	--	--	--	--	--	50 U	--	"
Granger-Grandview	Grandview	Oct-89	LSS	7.6	--	--	--	--	--	--	--	**290**	--	"
Granger-Grandview	Grandview	Nov-90	LSS	5.3	--	--	--	--	--	--	--	**780**	--	"
Granger-Grandview	Granger	Nov-90	LSS	8.2	--	--	--	--	--	--	--	**370**	--	"
Granger-Grandview	Granger	1997	CRP	5.36	--	--	--	--	--	--	--	**160**	--	Hinck et. al., 2004
Granger-Grandview	Granger	1997	CRP	3.02	--	--	--	--	--	--	--	**37**	--	"
Granger-Grandview	Granger	1997	NPM	3.2	--	--	--	--	--	--	--	**170**	--	"
Granger-Grandview	Granger	1997	SMB	4.8	--	--	--	--	--	--	--	**150**	--	"
Granger-Grandview	Granger	1997	SMB	5.17	--	--	--	--	--	--	--	**620**	--	"
Granger-Grandview	Granger	1997	LMB	4.19	--	--	--	--	--	--	--	**120**	--	"
Granger-Grandview	below Granger	Apr-98	LSS	6.1	17 U	17 U	17 U	17 U	17 U	**33**	**74**	**107**	**13.5**	EPA, 2002*
Granger-Grandview	below Granger	Apr-98	LSS	4.8	18 U	18 U	18 U	18 U	18 U	**46**	**100**	**146**	**14.4**	"
Granger-Grandview	Granger	Apr-98	LSS	4.2	19 U	19 U	19 U	19 U	19 U	**32**	**71**	**103**	**14.7**	"
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	7.5	22 U	22 U	22 U	22 U	22 U	**26**	**27**	**53**	**5.1**	EPA, 2002*
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	9.5	21 U	21 U	21 U	21 U	21 U	**18 J**	**27**	**45**	**5**	"
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	7.1	23 U	23 U	23 U	23 U	23 U	**32**	**49**	**81**	**8**	"
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	3.9	22 U	22 U	22 U	22 U	22 U	**44**	**93**	**137**	**8**	"
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	5.2	20 U	20 U	20 U	20 U	20 U	**23**	**44**	**67**	**6.5**	"

Table E2 continued.

Reach	Location	Date	Species	Lipids (%)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCB Aroclors	Total PCB Congeners	Reference
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	3.5	20 U	20 U	20 U	20 U	20 U	**39**	**79**	**118**	**8.5**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	6.5	19 U	19 U	19 U	19 U	19 U	**25**	19 U	**25**	**2**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	5.7	19 U	19 U	19 U	19 U	19 U	**15 J**	19 U	**15 J**	**1.2**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	7.5	19 U	19 U	19 U	19 U	19 U	**16 J**	19 U	**16 J**	**1.1**	"
Prosser Area	Prosser	May-97	CHNK	14.8	19 U	19 U	19 U	19 U	19 U	**16 J**	19 U	**16 J**	**1.2**	"
Prosser Area	Prosser	May-97	CHNK	13.5	20 U	20 U	20 U	20 U	20 U	**19 J**	20 U	**19 J**	**1.3**	"
Prosser Area	Prosser	May-97	CHNK	15	19 U	19 U	19 U	19 U	19 U	**18 J**	19 U	**18 J**	**1.3**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	2.2	20 U	20 U	20 U	20 U	20 U	**15 J**	20 U	**15 J**	**1.4**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	2.9	20 U	20 U	20 U	20 U	20 U	**25**	**8.4 J**	**33.4**	**1.8**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	2.2	19 U	19 U	19 U	19 U	19 U	**17 J**	**7.6 J**	**24.6**	**1.5**	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	9.4	19 U	19 U	19 U	19 U	19 U	**34**	**100**	**134**	**29.5**	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	8.1	19 U	19 U	19 U	19 U	19 U	**46**	**130**	**176**	**31.5**	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	10.4	18 U	18 U	18 U	18 U	18 U	**38**	**92**	**130**	**21.8**	"
Horn Rapids-Kiona	Kiona	Sep-80	SMB	3	--	--	--	--	--	--	--	**50**	--	Hopkins et. al., 1985
Horn Rapids-Kiona	Kiona	Sep-80	BLS	7.0	--	--	--	--	--	--	--	**120**	--	"
Horn Rapids-Kiona	Kiona	Sep-81	NPM	7.4	--	--	--	--	--	--	--	**160**	--	"
Horn Rapids-Kiona	Kiona	Sep-81	LSS	13	--	--	--	--	--	--	--	**410**	--	"
Horn Rapids-Kiona	below Kiona	Sep-82	BLS	8.6	--	--	--	--	--	10 U	10 U	10 U	--	"
Horn Rapids-Kiona	below Kiona	Sep-82	MWF	8.1	--	--	--	--	--	10 U	10 U	10 U	--	"
Horn Rapids-Kiona	below Kiona	Sep-83	BLS	10.4	--	--	--	--	--	**346**	10 U	**346**	--	"
Horn Rapids-Kiona	below Kiona	Sep-83	CAT	14.6	--	--	--	--	--	**746**	10 U	**746**	--	"
Horn Rapids-Kiona	Horn Rapids	Sep-92	LSS	5.9	80 U	80 U	160 U	80 U	80 U	**68 J**	**164**	**232**	--	Davis & Johnson, 1994
Horn Rapids-Kiona	Horn Rapids	Sep-92	LSS	4.47	80 U	80 U	160 U	80 U	80 U	**27 J**	**49 J**	**76**	--	"
Horn Rapids-Kiona	Kiona	Aug-85	LSS	11.1	--	--	--	--	--	--	**110**	**110**	--	Johnson et. al., 1986
Horn Rapids-Kiona	Kiona	Aug-85	NPM	5.5	--	--	--	--	--	--	**300**	**300**	--	"
Horn Rapids-Kiona	Horn Rapids	Aug-87	CRP	15.3	--	--	--	--	--	--	--	**331**	--	EPA, 1992
Horn Rapids-Kiona	Kiona	Oct-89	MWF	6.9	--	--	--	--	--	--	--	50 U	--	Rinella, 1992
Horn Rapids-Kiona	Kiona	Nov-90	MWF	7.9	--	--	--	--	--	--	--	**620**	--	"
Horn Rapids-Kiona	Kiona	Oct-89	SMB	2.9	--	--	--	--	--	--	--	50 U	--	"
Horn Rapids-Kiona	Kiona	Oct-89	LSS	11.6	--	--	--	--	--	--	--	50 U	--	"
Horn Rapids-Kiona	Kiona	Nov-90	LSS	8.0	--	--	--	--	--	--	--	**790**	--	"
Horn Rapids-Kiona	Kiona	Nov-90	LSS	11.6	--	--	--	--	--	--	--	**900**	--	"
Horn Rapids-Kiona	above Kiona	Apr-98	SMB	--	20 U	20 U	20 U	20 U	20 U	**58 J**	**80**	**138**	--	EPA, 2002
Horn Rapids-Kiona	Kiona	Apr-98	SMB	--	20 U	20 U	20 U	20 U	20 U	**94 J**	**190**	**284**	--	"
Horn Rapids-Kiona	near Horn Rapids Dam	Apr-98	SMB	--	18 U	18 U	18 U	18 U	18 U	**46 J**	**120**	**166**	--	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	19 U	19 U	19 U	19 U	19 U	**36 J**	**84**	**120**	--	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	19 U	19 U	19 U	19 U	19 U	**58 J**	**140**	**198**	--	"
Yakima @ mouth	Yakima @ mouth	May-98	CAT	--	19 U	19 U	19 U	19 U	19 U	**38 J**	**81**	**119**	--	"
Yakima Tributary	Naches River	Nov-90	MWF	5.6	--	--	--	--	--	--	--	50 U	--	Rinella, 1992
Yakima Tributary	Naches River	Nov-90	LSS	4.7	--	--	--	--	--	--	--	50 U	--	"

Table E2 continued.

Reach	Location	Date	Species	Lipids (%)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCB Aroclors	Total PCB Congeners	Reference
Yakima Tributary	Wide Hollow Creek	May-89	BLS	6.8	--	--	--	--	--	--	--	50 U	--	"
Yakima Tributary	Wide Hollow Creek	Nov-89	BLS	5	--	--	--	--	--	--	--	50 U	--	"
Yakima Tributary	Wide Hollow Creek	Nov-90	LSS	2.8	--	--	--	--	--	--	--	50 U	--	"
Yakima Tributary	Moxee Drain	Nov-89	MWF	6.8	--	--	--	--	--	--	--	50 U	--	"
Yakima Tributary	Moxee Drain	Nov-89	LSS	3.9	--	--	--	--	--	--	--	50 U	--	"
Yakima Tributary	Granger Drain	Nov-90	BLS	9	--	--	--	--	--	--	--	**220**	--	"
Yakima Tributary	Granger Drain	Nov-89	LSS	3.7	--	--	--	--	--	--	--	50 U	--	"
Yakima Tributary	Toppenish Creek	Nov-89	LSS	5.06	--	--	--	--	--	--	--	50 U	--	"
Yakima Tributary	Sulfur Creek	Nov-89	LSS	9	--	--	--	--	--	--	--	**610**	--	"
Yakima Tributary	Cherry Creek	Oct-90	BLS	7.9	--	--	--	--	--	--	--	50 U	--	"

* Total PCB congener results from EPA, 2002 consisted of only 13 congeners.
(--) Not analyzed for
ND = Not detected
U = The analyte was not detected at or above the reported result.
J = The analyte was positively identified. The associated numerical result is an estimate.

MWF = mountain whitefish
LSS = largescale sucker
BLS = bridgelip sucker
RBT = rainbow trout
NPM = northern pikeminnow
CAT = channel catfish
CRP = common carp

WCR = white crappie
BCR = black crappie
SMB = smallmouth bass
LMB = largemouth bass
CHNK = chinook salmon
STHD = steelhead

Table E3. Historical Data on Dioxins and Furans in Yakima River Whole Fish Samples, 1987-2001 (ng/Kg, wet weight; parts per trillion)

Reach	Location	Date	Species	Lipids (%)	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF
Keechelus Lake	Keechelus Lake	Aug-01	LSS	3.3	**0.04** J	**0.06** J	0.5 U	0.5 U	0.5 U	0.5 UJ	1 UJ	**0.1 J**	0.5 U	**0.06 J**	0.5 U	0.5 U	0.5 U	0.5 U	**0.2 J**	0.5 U
Yakima Canyon	Near Umtanum	Sep-96	RBT	6.8	**0.2**	**0.26**	**0.14**	**0.21**	**0.06**	**0.25**	**0.36**	**0.36**	**0.08**	**0.1**	**0.04**	**0.06**	**0.21**	**0.09**	0.03 U	0.03 U
Yakima Canyon	Near Umtanum	Sep-96	RBT	5.8	**0.16**	**0.22**	**0.13**	**0.17**	**0.05**	**0.28**	**0.48**	**0.27**	**0.05**	**0.08**	0.01 U	**0.04**	**0.16**	**0.08**	**0.08**	0.01 U
Yakima Canyon	Near Umtanum	Sep-96	RBT	5.8	**0.14**	**0.21**	**0.12**	0.01 U	0.01 U	**0.24**	**0.38**	**0.24**	0.01 U	**0.07**	**0.03**	**0.04**	**0.16**	**0.07**	**0.08**	0.02 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	4.7	**0.05**	**0.14**	**0.12**	**0.07**	0.01 U	**0.18**	**0.47**	**0.18**	**0.03**	**0.03**	**0.01**	**0.02**	**0.15**	**0.06**	**0.08**	0.01 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	8	**0.09**	**0.18**	**0.11**	**0.1**	**0.03**	**0.24**	**0.46**	**0.39**	**0.04**	**0.06**	**0.02**	**0.03**	**0.15**	**0.06**	**0.08**	0.01 U
Yakima Canyon	Near Umtanum	Sep-96	LSS	6.3	**0.07**	**0.16**	**0.11**	0.01 U	**0.03**	**0.18**	**0.31**	**0.26**	**0.05**	**0.05**	0.01 U	**0.03**	**0.15**	**0.06**	**0.07**	0.01 U
Granger-Grandview	below Granger	Apr-98	LSS	6.1	**0.08**	0.01 U	**0.05**	0.01 U	0.01 U	**0.3**	**0.63**	**0.55**	**0.04**	**0.12**	**0.02**	**0.02**	0.01 U	0.01 U	0.01 U	0.01 U
Granger-Grandview	below Granger	Apr-98	LSS	4.8	**0.1**	**0.14**	0.01 U	**0.1**	**0.03**	**0.31**	**0.95**	**0.5**	**0.03**	**0.15**	**0.03**	0.01 U	0.01 U	0.01 U	**0.08**	0.03 U
Granger-Grandview	Granger	Apr-98	LSS	4.2	0.02 U	0.01 U	**0.02**	0.01 U	0.01 U	**0.21**	**0.5**	**0.29**	0.01 U	**0.07**	**0.01**	0.01 U	0.01 U	0.01 U	0.05 U	0.05 U
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	7.5	**0.07**	**0.18**	**0.13**	**0.17**	**0.06**	**0.42**	**0.95**	**1.01**	**0.06**	**0.12**	**0.02**	**0.03**	**0.14**	**0.05**	0.01 U	0.01 U
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	9.5	**0.06**	**0.18**	**0.12**	**0.14**	**0.05**	**0.41**	**0.98**	**1.11**	**0.05**	**0.11**	**0.02**	**0.04**	**0.15**	**0.06**	**0.12**	0.01 U
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	7.1	**0.08**	**0.18**	**0.12**	**0.14**	**0.05**	**0.36**	**0.75**	**0.76**	**0.05**	**0.12**	**0.02**	**0.03**	**0.13**	**0.06**	**0.11**	0.01 U
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	5.2	**0.07**	**0.19**	**0.12**	**0.16**	**0.06**	**0.43**	**0.93**	**0.7**	**0.05**	**0.13**	**0.03**	0.01 U	**0.14**	**0.05**	**0.12**	0.01 U
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	3.5	0.01 U	**0.17**	**0.11**	**0.13**	**0.04**	**0.3**	**0.76**	**0.41**	**0.04**	**0.1**	0.01 U	**0.03**	**0.14**	**0.06**	**0.09**	0.01 U
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	3.9	**0.1**	**0.23**	**0.14**	**0.21**	**0.07**	**0.46**	**0.94**	**0.71**	**0.06**	**0.19**	**0.03**	**0.04**	**0.14**	**0.05**	**0.12**	0.01 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	6.5	0.06 U	**0.09**	0.02 U	0.02 U	0.02 U	**0.11**	0.04 U	**1.09**	0.03 U	0.03 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	5.7	0.03 U	0.05 U	0.04 U	**0.06**	0.04 U	0.03 U	**0.25**	**0.72**	0.04 U	0.04 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	7.5	0.03 U	**0.08**	0.02 U	**0.07**	0.02 U	**0.12**	**0.64**	**0.83**	0.03 U	0.03 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.12**	0.02 U
Prosser Area	Prosser	May-97	CHNK	14.8	0.1 U	**0.2**	**0.13**	**0.08**	**0.04**	**0.16**	**0.26**	**0.57**	0.02 U	**0.16**	0.01 U	0.01 U	**0.14**	0.01 U	**0.07**	0.02 U
Prosser Area	Prosser	May-97	CHNK	13.5	0.03 U	**0.38**	**0.19**	**0.25**	**0.05**	**0.43**	**0.95**	**1.04**	**0.36**	**0.26**	**0.15**	**0.13**	**0.34**	0.02 U	**0.2**	0.03 U
Prosser Area	Prosser	May-97	CHNK	15	0.02 U	**0.09**	0.03 U	**0.07**	0.03 U	**0.09**	**0.16**	**0.7**	**0.12**	**0.16**	0.02 U	0.02 U	**0.03**	0.02 U	0.04 U	0.04 U
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	2.2	**0.03**	0.02 U	**0.03**	**0.08**	0.02 U	**0.19**	**0.27**	**0.42**	**0.1**	**0.2**	0.01 U	0.01 U	**0.03**	0.01 U	0.01 U	0.01 U
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	2.9	0.03 U	**0.09**	0.01 U	0.01 U	**0.05**	**0.15**	**0.23**	**0.6**	**0.14**	**0.29**	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	2.2	**0.03**	**0.05**	0.02 U	**0.07**	**0.03**	**0.02**	**0.22**	**0.34**	0.02 U	0.02 U	**0.02**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	9.4	**0.19**	**0.27**	**0.06**	0.03 U	**0.06**	**0.38**	**0.61**	**5.52**	**0.12**	**0.28**	**0.05**	**0.04**	**0.03**	0.03 U	0.08 U	0.08 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	8.1	**0.23**	0.03 U	**0.07**	**0.29**	**0.09**	**0.35**	**0.47**	**6.18**	**0.15**	**0.36**	**0.04**	**0.06**	**0.05**	0.02 U	0.04 U	0.04 U
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	10.4	**0.14**	**0.2**	0.01 U	**0.2**	0.01 U	**0.25**	0.01 U	**5.12**	**0.11**	**0.25**	0.01 U	0.01 U	**0.03**	0.01 U	0.03 U	0.03 U
Horn Rapids-Kiona	Horn Rapids	Aug-87	CRP	15.3	**0.79**	**1.2**	ND	**2.93**	ND	**6.88**	--	**9.14**	**0.65**	ND	**0.42**	ND	**0.47**	ND	**0.91**	ND

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ND = Not detected
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J = The analyte was positively identified. The associated numerical result is an estimate.
UJ = The analyte was not detected at or above the reported estimated result.

TEQ = 2,3,7,8-TCDD toxicity equivalent based on toxicity equivalency factors from Van den Berg et. al., 1998; Only detected chemicals were used in calculation.

MWF = mountain whitefish
LSS = largescale sucker
BLS = bridgelip sucker
RBT = rainbow trout
CRP = common carp
CHNK = chinook salmon
STHD = steelhead

Table E3 continued.

Reach	Location	Date	Species	OCDF	TEQ	Reference
Keechelus Lake	Keechelus Lake	Aug-01	LSS	1 U	**0.14**	EPA, Unpublished
Yakima Canyon	Near Umtanum	Sep-96	RBT	**0.07**	**0.63**	EPA, 2002
Yakima Canyon	Near Umtanum	Sep-96	RBT	0.01 U	**0.52**	"
Yakima Canyon	Near Umtanum	Sep-96	RBT	0.01 U	**0.45**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	**0.06**	**0.27**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	0.01 U	**0.39**	"
Yakima Canyon	Near Umtanum	Sep-96	LSS	**0.04**	**0.32**	"
Granger-Grandview	below Granger	Apr-98	LSS	**0.08**	**0.21**	"
Granger-Grandview	below Granger	Apr-98	LSS	**0.1**	**0.39**	"
Granger-Grandview	Granger	Apr-98	LSS	**0.11**	**0.07**	"
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	**0.07**	**0.48**	"
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	**0.08**	**0.47**	"
Prosser Area	Chandler Canal Entrance	Jul-96	BLS	**0.05**	**0.46**	"
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	**0.07**	**0.46**	"
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	**0.06**	**0.32**	"
Prosser Area	Chandler Canal Entrance	Jul-96	LSS	0.01 U	**0.57**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	0.06 U	**0.20**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	0.1 U	**0.08**	"
Prosser Area	Chandler Canal Entrance	Oct-97	CHNK	0.06 U	**0.17**	"
Prosser Area	Prosser	May-97	CHNK	0.04 U	**0.38**	"
Prosser Area	Prosser	May-97	CHNK	**0.13**	**0.75**	"
Prosser Area	Prosser	May-97	CHNK	0.05 U	**0.26**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	**0.06**	**0.19**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	0.01 U	**0.31**	"
Prosser Area	Chandler Canal Entrance	Mar-98	STHD	0.01 U	**0.13**	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	0.01 U	**1.19**	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	0.01 U	**1.10**	"
Prosser Area	Chandler Canal Entrance	Mar-98	MWF	0.01 U	**1.01**	"
Horn Rapids-Kiona	Horn Rapids	Aug-87	CRP	--	**3.40**	EPA, 1992

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