APPENDIX S

Field and Laboratory Operations

FIELD AND LABORATORY OPERATIONS

Sample Collection

Sample collections were obtained using a Smith-Root Model VII and Model XIA Portable Electrofishers; a Smith-Root SR-16E electrofishing boat; variable mesh, woven, and monofilament gill nets; baited hoop nets measuring three feet in diameter with one inch square mesh; or beach seines of varying lengths, widths, and material. Collected fish were kept in clean stainless steel buckets until they could be double-wrapped in extra-heavy duty aluminum foil (dull side inward), labeled, and packed in dry ice where they were frozen.

Laboratory Analysis

A detailed description of procedures and techniques discussed below can be found in the Department of Fish and Game's (DFG) Laboratory Quality Assurance Program Plan (DFG 1990). The following is a summary of the 1992-93 Quality Assurance/Quality Control (QA\QC) results provided by the DFG's Water Pollution Control Laboratory. Copies of the Laboratory Quality Assurance Program Plan and QA\QC results are available upon request.

Trace Elements Analytical Techniques in Tissues

A Varian Model Spectra 300 atomic absorption spectrophotometer was used for techniques employing conventional (flame) atomic absorption spectrophotometry (copper and zinc). A Varian Model VGA-76 Hydride Generator was used for hydride generation atomic absorption spectrophotometry (arsenic and selenium), and cold vapor technique for mercury (Adrian 1971; Uthe et al. 1974; and Evans et al. 1986). A Perkin-Elmer Model 3030 Zeeman atomic absorption spectrophotometer equipped with a HGA-600 graphite furnace and an AS-60 autosampler was used for techniques requiring a graphite furnace (cadmium, chromium, nickel, lead, and silver). All analytical values were corrected using procedural blanks. Trace element analytical and digestion techniques along with their detection limits are presented in Table S-1. All digestion techniques, except for mercury, are the same as those used since 1988.

Samples were weighed into pre-cleaned 200mm x 25mm glass tubes which had been checked for trace element contamination. Digestion of the sample was accomplished by adding concentrated nitric acid and heating the tube in an aluminum block to reflux the acid. The acid was allowed to reflux until the evolution of NO_x (brown fumes) was no longer apparent (about 2 hours). The block temperature was increased to reduce the volume in the tube by evaporation. When the volume in the tube reached about 0.5 ml the tube was removed and allowed to cool. The digestate was diluted to 40.0 ml with 1% nitric acid solution. The digestate was mixed on a vortex mixer and transferred to a clean polyethylene bottle.

In addition to routine trace element analyses, 10 percent of the samples were analyzed in duplicate to determine precision. The results of duplicate laboratory sample analyses are presented in Table S-2. To protect sample integrity, all materials contacting samples during laboratory operations were analyzed for trace element content. To ensure accuracy, reference materials from the National Institute of Standards and Technology (NIST) and the National Research Council of Canada were analyzed (Table S-3).

Synthetic Organic Compounds Analytical Techniques in Tissues

A 10 gram sample of the flesh-water (1:1) paste was spiked with nonachlorobiphenyl (PCB congener No. 206) and extracted twice with acetonitrile by shaking for two minutes. The sample extracts were combined, filtered, and partitioned with petroleum ether. An aliquot of the petroleum ether extract was eluted through a Florisil^{R} column. The Florisil^{R} columns were eluted with petroleum ether (Fraction 1), six percent ethyl ether (Fraction 2), and 15 percent ethyl ether (Fraction 3). Fractions 2 and 3 were spiked with nonachlorobiphenyl and all of the fractions were concentrated to an appropriate volume in a Zymark^{R} Turbovap concentrator prior to analysis by gas chromatography. The nonachlorobiphenyl was used as an internal standard to determine relative retention times and gas chromatograph operation. A mixture of synthetic standards was eluted through the Florisil^{R} column to determine the recovery and separation characteristics of the column. The distribution of synthetic organic compounds in the three fractions is listed in Table S-4. The detection levels for synthetic organics in flesh are presented in Table S-5.

In 1993, samples were spiked with a mixture of 4,4'-dibromo-octafluorobiphenyl, decachlorobiphenyl and dibutychlorendate (DBOB, DCB and DBCE) instead of the nonachlorobiphenyl. The decachlorobiphenyl was used as an internal standard to determine relative retention times and analyte recovery of the Florisil^{R} F1 compounds . DBOB was used to check the analyte recovery of the F2 compounds but was found to elute with the F1 compounds. DBCE was used to check the analyte recovery of the F3 compounds.

At stations where the TSMP had previously detected endosulfan, samples were analyzed for endosulfan I, endosulfan II, and endosulfan sulfate. This required an additional elution through Florisil^{R} with 50 percent ethyl ether in petroleum ether (Fraction 4, Table S-4). All other stations were initially analyzed for endosulfan I only. This fraction was also spiked with nonachlorobiphenyl prior to the concentration step. In 1993, decachlorobiphenyl was added to this fraction instead of nonachlorobiphenyl. Due to the high lipid content of the fraction all of the 50 percent extracts were diluted with iso-octane by a factor of ten prior to analysis by gas chromatography.

Synthetic Organic Compounds Analytical Techniques in Sediment

A 30 gram sample of sediment was dried by mixing with sodium sulfate. The sample was then spiked with tetrachloro-m-xylene, dibutylchlorendate and decachlorobiphenyl. The sample was sonicated with a 1:1 solution of acetone dichloromethane for three minutes, and then filtered. This extraction step was repeated twice. The sample extract was eluted through a Florisil^{R} column as was done with tissue samples. The nonachlorobiphenyl was used as an internal standard to determine relative retention times and gas chromatographic operation. The spiking compounds were used to determine extraction efficiency.

In 1993, the sediment samples were spiked with the DBOB, DCB and DBCE solution. After adding approximately 200 ml of a 1:1 solution of acetone dichloromethane, the sample was placed on a Lab-Line Orbit Shaker and shaken for two hours at 400 rpm. This step was repeated after the sample was filtered. After evaporating and exchanging solvents, the sample extract was eluted through a Florisil^{R} column as was done with tissue samples.

Synthetic organic compound concentrations in sediments are reported on a dry weight basis. The moisture content of sediments can widely vary. The detection limit is dependent on sample size, therefore, the detection limit varies with moisture content. Table S-6 lists each 1992 sediment sample analyzed and its respective detection limit. The moisture content of the three sediment samples

analyzed in 1993 were similar, therefore the detection limits are the same (Table S-7). Ten percent of the samples were analyzed in duplicate (Table S-8). All materials and solutions contacting the sample were analyzed for organic contamination. To preclude errors due to contamination, a vertical solvent blank analyzed for each set of glassware before introducing a new sample.

Instrument and Analytical Conditions for Chlorinated Hydrocarbons

1992/93

Chlorinated hydrocarbons were determined with a Varian Model 3500 gas chromatograph equipped with a model 8035 autosampler, temperature programmable on-column injector, and dual Ni^{63} electron capture detectors. A 5 meter J&W DB5 fused silica capillary pre-column is connected to the temperature programmable injector, the column effluent is split using a press-fit "Y" connector to a 60 meter J&W DB5 and a 60 meter J&W DB17 column. The DB5 and DB17 columns are connected to the electron capture detectors. All three columns have a 0.25 mm ID and a 25 um liquid phase thickness. Helium was used as the carrier gas at a linear velocity of 35 cm/sec and nitrogen was used as the detector makeup gas at a flow of 25 ml/min. Chromatographic data were acquired and processed with a Hewlett-Packard Chem-Station, version A.03.02.

All samples were analyzed using a single injection for each extract under the following conditions:

Injector temperature program:	
	Initial temperature - 70 °C
	Program rate - 300 °C/min
	Final temperature - 280°C
	Final temperature hold time - 70 min
Column temperature program:	
	Initial temperature - 70°C
	Program rate 1 - 15°C/min to 210°
	Program 1 hold time - 10 min
	Program rate 2 - 2°C/min to 280°C
	Final temperature hold time - 11 min
Detector temperature:	330°C

Analytical Techniques for Polynuclear Aromatic Hydrocarbon Compounds (PAHs) in Flesh

A 20 gram tissue sample was dried with sodium sulfate, spiked with deuterated PAH compounds and extracted with dichloromethane. Sample extracts were cleaned up using gel permeation chromatography followed by alumina and silica gel chromatography.

Sample extracts were analyzed using a Varian Saturn II Ion Trap GC-MS. One microliter of sample extract was injected into a J&W Scientific DB-5MS, 30 meter x 0.25 mm I.D. fused silica capillary column having a 0.25 um film thickness. The GC oven temperature was initially held at 70°C for two minutes.

The temperature ramp was 15°C per minute until the oven reached 150°C. The second temperature ramp was 2°C per minute to a final temperature of 280°C and held for 5 minutes. Initial injector temperature was 70° and was programmed to 280° at 300°/min immediately after injection. The GC carrier gas was helium at a linear velocity of 37 cm/sec. Detection limits of the PAHs are reported in Table S-9.

Procedure for Lipid Determination

As synthetic organic concentrations in organisms may vary with lipid content, it is customary to provide lipid data when reporting tissue concentrations. A thoroughly homogenized sample weighing approximately 5 g (wet weight) is macerated and dried with anhydrous granular Na_2SO_4. The dried sample is transferred to a blender with 150 ml of petroleum ether and blended for two minutes at high speed. The liquid is vacuum-filtered into a 250 ml filter flask through a 10 cm Buchner funnel containing Whatman #1 filter paper. The sample is blended once more with an additional 150 ml of petroleum ether and filtered. The filtrate is concentrated to approximately 25 ml with heat (steam bath) and nitrogen steam. The remaining filtrate is then quantitatively transferred into a 50 ml pre-weighed planchet. The petroleum ether is evaporated, the planchet containing the residue is reweighed, and the percent lipid is calculated.

TABLE S-1

Toxic Substances Monitoring Program
1992/93 Digestion Techniques and Detection Limits in Fish Tissue

Element	Digestion Techniques	Instrumental Analysis	Detection Limits (ug/g wet weight)
Arsenic	Dry Ash w/ $Mg(NO_3)_2 \cdot 6H_2O$	$NaBH_4$ Reduction A.A.	0.05
Mercury	HNO_3 reflux	Cold Vapor A.A.	0.02
Copper	HNO_3 reflux	Flame A.A. or Graphite Furnace	0.02
Zinc	$HN0_3$ reflux	Flame A.A.	0.05
Cadmium	HNO_3 reflux	Graphite Furnace (Ammonium phosphate/magnesium nitrate)	0.01
Chromium	HNO_3 reflux	Graphite Furnace	0.02
Lead	HNO_3 reflux	Graphite Furnace (Ammonium phosphate/magnesium nitrate)	0.1
Nickel	HNO_3 reflux	Graphite Furnace	0.1
Selenium	Dry Ash w/ $Mg(NO_3)_2 \cdot 6H_2O$	$NaBH_4$ Reduction A.A.	0.05
Silver	HNO_3 reflux	Graphite Furnace	0.02

TABLE S-2

Toxic Substances Monitoring Program
Results of Duplicate Sample Analysis: 1992 Trace Metal Quality Control
(ug/g wet weight)

Station Number	Station Name	Species Code*	Tissue	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
105.38.29	Klamath River/U/S Copco Reservoir	RBT	L		<0.1	<0.02	23.	<0.1		<0.1		0.21	20.
105.38.29	Klamath River/U/S Copco Reservoir	RBT	L		<0.1	<0.02	23.	<0.1		<0.1		0.20	20.
510.00.03	Sacramento River/Hood	WCF	F						0.28				
510.00.03	Sacramento River/Hood	WCF	F						0.25				
111.63.13	Lake Pillsbury/Eel River Arm	LMB	L	0.06	0.24	<0.02	52.	<0.1	1.7	<0.1	1.7	0.04	42.
111.63.13	Lake Pillsbury/Eel River Arm	LMB	L	<0.05	0.24	<0.02	52.	<0.1	1.7	<0.1	1.8	0.05	43.
801.11.07	San Diego Creek/Michelson Drive	PRS	W	0.14	0.07	0.02	1.0	<0.1	0.03	<0.1	1.4	<0.02	37.
801.11.07	San Diego Creek/Michelson Drive	PRS	W	0.13	0.07	0.04	1.1	<0.1	0.03	<0.1	1.4	<0.02	38.
723.10.48	Greeson Drain	TLZ	F						0.03				
723.10.48	Greeson Drain	TLZ	F						0.03				
310.22.13	Chorro Creek/U/S Reservoir	SH	F						0.07		0.30		
310.22.13	Chorro Creek/U/S Reservoir	SH	F						0.08		0.31		
114.32.00	Lake Mendocino	RSF	F						0.25		0.25		
114.32.00	Lake Mendocino	RSF	F						0.26		0.25		
114.32.00	Lake Mendocino	RSF	L	0.79	0.15	<0.02	1.7	<0.1		<0.1		<0.02	14.
114.32.00	Lake Mendocino	RSF	L	0.79	0.15	<0.02	1.7	<0.1		<0.1		<0.02	14.
105.50.04	Shasta River	DC	W		0.01	0.04	1.5	<0.1	0.32	0.1		<0.02	62.
105.50.04	Shasta River	DC	W		<0.01	0.04	1.5	<0.1	0.34	0.1		<0.02	65.
205.50.94	Stevens Creek	SH	F						0.46		0.68		
205.50.94	Stevens Creek	SH	F						0.47		0.72		
723.10.28	Peach Drain	MOL	W	0.51	0.01	0.14	4.5	<0.1		0.1		0.03	16.
723.10.28	Peach Drain	MOL	W	0.51	0.01	0.15	4.5	<0.1		0.1		0.02	18.
601.00.92	June Lake	BN	F						0.84				
601.00.92	June Lake	BN	F						0.69				
601.00.92	June Lake	BN	L	<0.05	0.02	<0.02	9.8	<0.1		<0.1		0.17	15.
601.00.92	June Lake	BN	L	<0.05	<0.01	<0.02	9.6	<0.1		<0.1		0.16	15.

* Tables 3, 4, and 5 list code names for species. L = Liver. F = Filet. W = Whole Body.

TABLE S-2 (continued)

Toxic Substances Monitoring Program

Results of Duplicate Sample Analysis: 1992 Trace Metal Quality Control

(ug/g wet weight)

Station Number	Station Name	Species Code*	Tissue	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
723.10.32	Barbara Worth Drain	MOL	W						<0.02		0.62		
723.10.32	Barbara Worth Drain	MOL	W						<0.02		0.62		
634.30.00	Lake Tahoe/Homewood	BN	L	<0.05	0.05	<0.02	24.	<0.1		<0.01		0.13	20.
634.30.00	Lake Tahoe/Homewood	BN	L	<0.05	0.04	<0.02	26.	<0.1		<0.01		0.14	20.
309.82.04	Lake Nacimiento/Dip Creek	SED		3.2	0.42	40.	16.	11.	0.08	53.	0.19	<0.03	52.
309.82.04	Lake Nacimiento/Dip Creek	SED		2.9	0.49	41.	15.	13.	0.07	62.	0.09	<0.03	55.
405.15.04	San Gabriel River	SED		1.0	0.39	4.8	5.6	11.	0.02	3.9	<0.08	0.06	40.
405.15.04	San Gabriel River	SED		1.0	0.44	2.5	5.8	12.	0.02	3.9	<0.08	0.07	49.
405.21.16	Los Angeles River/Sepulveda Basin	SED		1.9	0.73	6.4	10.	5.3	0.02	6.8	0.16	0.24	30.
405.21.16	Los Angeles River/Sepulveda Basin	SED		1.8	0.70	7.1	9.0	5.0	<0.02	9.2	0.17	0.21	33.
405.21.06	Los Angeles River/Los Feliz Road	SED		0.49	0.11	2.8	4.6	5.0	0.02	3.3	<0.08	0.06	18.
405.21.06	Los Angeles River/Los Feliz Road	SED		0.57	0.09	2.4	4.1	4.3	0.04	2.3	<0.08	0.07	18.
404.21.04	Malibu Creek/Tapia Park	SED		2.4	4.0	26.	11.	3.0	<0.02	30.	<0.08	<0.03	31.
404.21.04	Malibu Creek/Tapia Park	SED		2.0	1.5	22.	9.9	2.9	<0.02	26.	0.25	<0.03	28.
403.11.91	Mugu Lagoon	SED		2.9	0.22	5.2	3.5	3.0	<0.02	6.5	<0.08	<0.03	14.
403.11.91	Mugu Lagoon	SED		3.2	0.22	5.0	3.4	2.9	<0.02	7.8	<0.08	<0.03	17.
635.20.09	Trout Creek	SED		2.5	0.21	7.8	14.	19.	0.02	18.	<0.08	<0.03	88.
635.20.09	Trout Creek	SED		1.7	0.22	5.6	13.	19.	0.02	14.	<0.08	<0.03	74.
635.20.10	Trout Creek/U/S Meeks Lumber	SED		1.3	0.10	6.0	12.	7.2	0.06	13.	<0.08	<0.03	56.
635.20.10	Trout Creek/U/S Meeks Lumber	SED		1.4	0.19	8.8	16.	10.	0.02	16.	<0.08	<0.03	71.

* Tables 3, 4, and 5 list code names for species. L = Liver. F = Filet. W = Whole Body.

TABLE S-2 (continued)

Toxic Substances Monitoring Program

Results of Duplicate Sample Analysis: 1992 Trace Metal Quality Control

(ug/g wet weight)

Station Number	Station Name	Species Code*	Tissue	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
519.22.90	Feather River/d/s/ Hwy 99 Bridge	CC	L			0.06	2.6	<0.1				<0.02	22.
519.22.90	Feather River/d/s/ Hwy 99 Bridge	CC	L			0.07	2.5	<0.1				<0.02	22.
541.10.92	San Joaquin River/Mossdale	LMB	L			<0.02	11.	<0.1				0.08	22.
541.10.92	San Joaquin River/Mossdale	LMB	L			<0.02	11.	<0.1				0.08	22.
801.25.00	Santa Ana River/Prado Dam	BBB	L			<0.02	4.9	<0.1				<0.02	18.
801.25.00	Santa Ana River/Prado Dam	BBB	L			<0.02	4.9	<0.1				<0.02	18.
723.10.58	New River/International Bndry	CP	F		<0.01					<0.1			
723.10.58	New River/International Bndry	CP	F		<0.01					<0.1			
723.10.02	New River/Westmorland	CCF	L			0.02	2.5	<0.1				<0.02	27.
723.10.02	New River/Westmorland	CCF	L			<0.02	2.6	<0.1				<0.02	28.
309.82.08	Lake Nacimiento/Las Tablas	BG	F						0.54				
309.82.08	Lake Nacimiento/Las Tablas	BG	F						0.54				
309.82.08	Lake Nacimiento/Las Tablas	LMB	F	0.09	<0.01				0.77	<0.1	0.55		
309.82.08	Lake Nacimiento/Las Tablas	LMB	F	0.08	<0.01				0.76	<0.1	0.54		
111.63.13	Lake Pillsbury/Eel River Arm	SSQ	F						1.6				
111.63.13	Lake Pillsbury/Eel River Arm	SSQ	F						1.6				
111.63.13	Lake Pillsbury/Eel River Arm	LMB	F		<0.01					<0.1			
111.63.13	Lake Pillsbury/Eel River Arm	LMB	F		<0.01					<0.1			
207.10.90	Suisun Bay	WS	F								1.8		
207.10.90	Suisun Bay	WS	F								1.8		
114.32.00	Lake Mendocino	RSF	F						0.27				
114.32.00	Lake Mendocino	RSF	F						0.27				
801.11.96	Peters Canyon Channel	RS	W	0.07	0.14	0.03	1.1	<0.1	0.02	0.1	1.1	<0.02	39.
801.11.96	Peters Canyon Channel	RS	W	0.07	0.15	0.03	1.1	<0.1	0.02	0.1	1.1	<0.02	41.
403.64.03	Arroyo Conejo/d/s Forks	BB	L			<0.02	10.	<0.1				0.76	19.
403.64.03	Arroyo Conejo/d/s Forks	BB	L			<0.02	11.	<0.1				0.79	20.
635.20.10	Trout Cr/Truckee/u/s Meeks Lumber	RBT	F	<0.05	<0.01	0.03			<0.1	0.05			
635.20.10	Trout Cr/Truckee/u/s Meeks Lumber	RBT	F	<0.05	<0.01	0.03			<0.1	<0.05			

* Tables 3, 4, and 5 list code names for species. L = Liver. F = Filet. W = Whole Body.

TABLE S-2 (continued)

Toxic Substances Monitoring Program
Results of Duplicate Sample Analysis: 1992 Trace Metal Quality Control
(ug/g wet weight)

Station Number	Station Name	Species Code*	Tissue	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
405.12.91	Simms Pond	BB	F	<0.05	<0.01				0.05	<0.1	0.05		
405.12.91	Simms Pond	BB	F	<0.05	<0.01				0.05	<0.1	0.05		
206.40.08	Sonoma Creek	HTC	W	0.27					0.09		0.27		
206.40.08	Sonoma Creek	HTC	W	0.27					0.10		0.26		
907.12.07	Lindo Lake	GS	W		<0.01	0.04	0.62	<0.1		<0.1		<0.02	38.
907.12.07	Lindo Lake	GS	W		<0.01	0.04	0.59	<0.1		<0.1		<0.02	38.

* Tables 3, 4, and 5 list code names for species. L = Liver. F = Filet. W = Whole Body.

TABLE S-3

Toxic Substances Monitoring Program
1992/93 Trace Metal Analysis of Reference Materials (ug/g dry weight)*

REFERENCE MATERIAL**	AG	AS	CD	CR	CU	HG	NI	PB	SE	ZN
NBS-1577a		0.059±0.022							0.71±0.05	
(Bovine Liver)		(0.047±0.006)							(0.71±0.07)	
DOLT-1		11.0±2.8	4.34±0.76	0.43±0.22	19.8±2.5	0.277±0.08	0.28±0.19	1.32±0.72	6.39±0.41	91.9±11
(Dogfish Liver)		(10.1±1.4)	(4.18±0.28)	(0.40±0.07)	(20.8±1.2)	(0.225±0.04)	(0.26±0.06)	(1.36±0.29)	(7.34±0.42)	(92.5±2.3)
DOLT-2			19.6±1.9	0.38±0.08	26.2±1.4	2.06±0.10	0.21±0.09	0.22±0.08	5.40±0.27	86.8±3.8
(Dogfish Liver)			(20.8±0.5)	(0.37±0.08)	(25.8±1.1)	(1.99±0.10)	(0.20±0.02)	(0.22±0.02)	(6.06±0.49)	(85.5±2.5)
DORM-1		17.6±3.4	0.098±0.026	3.80±1.0	4.97±1.3	0.748±0.24	1.21±0.39	0.42±0.29	1.54±0.16	19.2±5.0
(Dogfish Muscle)		(17.7±2.1)	(0.086±0.012)	(3.60±0.40)	(5.22±0.33)	(0.798±0.07)	(1.20±0.30)	(0.40±0.12)	(1.62±0.12)	(21.3±1.0)
NBS 1566a	1.54±0.25		4.20±0.69	1.24±0.77	63.8±4.3		2.35±1.2	0.357±0.138		840±66
(Oyster)	(1.63±0.15)		(4.15±0.38)	(1.43±0.46)	(66.3±4.3)		(2.25±0.44)	(0.371±0.014)		(830±57)

* Sample values are given first, followed by reference values in parentheses, both values include 95% confidence interval.

** NBS refers to the National Bureau of Standards; DOLT-1 and DORM-1 are from the National Research Council of Canada.

TABLE S-4

Toxic Substances Monitoring Program
Distribution of Synthetic Organic Compounds Among
Four Fractions of a Standard Florisil[R] Column

(0%) Fraction 1	(6%) Fraction 2	(15%) Fraction 3
HCH, alpha*	HCH, alpha*	dacthal
aldrin	HCH, beta	diazinon
chlordene, alpha	HCH, gamma	dichlorobenzophenone, p,p'
chlordene, gamma	HCH, delta	dieldrin
DDE, o,p'	chlorbenside	endosulfan I
DDE, p,p'	cis-chlordane	endrin
DDMU, p,p'*	trans-chlordane	malathion
DDT, o,p'	chlorpyrifos	oxadiazon
DDT, p,p'*	DDD, o,p'	parathion, ethyl
heptachlor	DDD, p,p'	parathion, methyl
hexachlorobenzene	DDMU p,p'*	tetradifon (tedion)
trans-nonachlor	DDT, p,p'*	
PCB 1248	dicofol (kelthane)	
PCB 1254	ethion	
PCB 1260	heptachlor epoxide	
	methoxychlor	(50%) Fraction 4
	cis-nonachlor	
	oxychlordane	endosulfan II
	toxaphene	endosulfan sulfate

* Found in both 0% and 6% fractions.

TABLE S-5

Toxic Substances Monitoring Program
Synthetic Organic Compounds Analyzed
and Their Detection Limits in Flesh

Compound (ng/g, ppb wet weight)	Detection Limit
aldrin	5
chlorbenside	50
cis-chlordane	5
trans-chlordane	5
chlordene, alpha	5
chlordene, gamma	5
chlorpyrifos	10
dacthal	5
DDD, o,'p	10
DDD, p,p'	10
DDE, o,p'	10
DDE, p,p'	5
DDMS, p,p'	30
DDMU,p,p'	15
DDT, o,p'	10
DDT, p,p'	10
diazinon	50
dichlorobenzophenone-p,p'	30
dicofol (Kelthane)	100
dieldrin	5
endosulfan I	5
endosulfan II	70
endosulfan sulfate	85
endrin	15
ethion	20
HCH, alpha	2
HCH, beta	10
HCH, gamma	2
HCH, delta	5
heptachlor	5
heptachlor epoxide	5
HCB	2
methoxychlor	15
cis-nonachlor	5
trans-nonachlor	5
oxadiazon	5
oxychlordane	5
parathion, ethyl	10
parathion, methyl	10
PCB 1248	50
PCB 1254	50
PCB 1260	50
pentachlorophenol*	2
2,3,5,6-tetrachlorophenol*	2
tetradifon (Tedion)	10
toxaphene	100

* Analyzed only when requested.

TABLE S-6

Toxic Substances Monitoring Program
Detection Limits: 1992 Synthetic Organic Compounds in Sediments
(ng/g dry weight)

Station Name	Santa Clara River	San Gabrial River	Los Angeles River/ Sepulvada Basin
Station No.	403.51.05	405.15.04	405.21.16
Species*	SED	SED	SED
COMPOUNDS			
aldrin	0.37	0.44	0.34
chlorbenside	3.7	4.4	3.4
cis-chlordane	0.37	0.44	0.34
cis-nonachlor	0.37	0.44	0.34
gamma-chlordene	0.37	0.44	0.34
oxychlordane	0.37	0.44	0.34
trans-chlordane	0.37	0.44	0.34
trans-nonachlor	0.37	0.44	0.34
chlorpyrifos	0.75	0.88	0.68
dacthal	0.37	0.44	0.34
DDD, o,p'	0.75	0.88	0.68
DDD, p,p'	0.75	0.88	0.68
DDE, o,p'	0.75	0.88	0.68
DDE, p,p'	0.37	0.44	0.34
DDT, o,p'	0.75	0.88	0.68
DDT, p,p'	0.75	0.88	0.68
DDMU,p,p'	1.1	1.3	1.0
diazinon	3.7	4.4	3.4
dieldrin	0.37	0.44	0.34
endosulfan I	0.37	0.44	0.34
endosulfan II	5.2	6.1	4.8
endosulfan sulfate	6.3	7.5	5.8
ethion	1.5	1.8	1.4
hexachlorobenzene	0.15	0.18	0.14
alpha-HCH	0.15	0.18	0.14
beta-HCH	0.75	0.88	0.68
gamma-HCH	0.15	0.18	0.14
heptachlor	0.37	0.44	0.34
heptachlor epoxide	0.37	0.44	0.34
oxadiazon	0.75	0.88	0.68
PCB 1248	3.7	4.4	3.4
PCB 1254	3.7	4.4	3.4
PCB 1260	3.7	4.4	3.4
toxaphene	7.5	8.8	6.8
percent moisture	10.9	24.0	10.5

TABLE S-6 (continued)

Toxic Substances Monitoring Program
Detection Limits: 1992 Synthetic Organic Compounds in Sediments
(ng/g dry weight)

Station Name	Revlon Slough	Mugu Lagoon	Los Angeles River/ Los Feliz Road
Station No.	403.11.04	403.11.91	405.21.06
Species*	SED	SED	SED
COMPOUNDS			
aldrin	0.37	0.38	0.34
chlorbenside	3.7	3.8	3.4
cis-chlordane	0.37	0.38	0.34
cis-nonachlor	0.37	0.38	0.34
gamma-chlordene	0.37	0.38	0.34
oxychlordane	0.37	0.38	0.34
trans-chlordane	0.37	0.38	0.34
trans-nonachlor	0.37	0.38	0.34
chlorpyrifos	0.75	0.77	0.68
dacthal	0.37	0.38	0.34
DDD, o,p'	0.75	0.77	0.68
DDD, p,p'	0.75	0.77	0.68
DDE, o,p'	0.75	0.77	0.68
DDE, p,p'	0.37	0.38	0.34
DDT, o,p'	0.75	0.77	0.68
DDT, p,p'	0.75	0.77	0.68
DDMU,p,p'	1.1	1.2	1.0
diazinon	3.7	3.8	3.4
dieldrin	0.37	0.38	0.34
endosulfan I	0.37	0.38	0.34
endosulfan II	5.2	5.4	4.8
endosulfan sulfate	6.3	6.5	5.8
ethion	1.5	1.5	1.4
hexachlorobenzene	0.15	0.15	0.14
alpha-HCH	0.15	0.15	0.14
beta-HCH	0.75	0.77	0.68
gamma-HCH	0.15	0.15	0.14
heptachlor	0.37	0.38	0.34
heptachlor epoxide	0.37	0.38	0.34
oxadiazon	0.75	0.77	0.68
PCB 1248	3.7	3.8	3.4
PCB 1254	3.7	3.8	3.4
PCB 1260	3.7	3.8	3.4
toxaphene	7.5	7.7	6.8
percent moisture	13.7	13.4	4.64

TABLE S-6 (continued)

Toxic Substances Monitoring Program
Detection Limits: 1992 Synthetic Organic Compounds in Sediments
(ng/g dry weight)

Station Name	Calleguas Creek	Malibu Creek/ Tapia Park	Malibur Creek/ Tapia Park
Station No.	403.12.06	404.21.04	404.21.04
Species*	SED	SED	SED
COMPOUNDS			
aldrin	0.41	0.41	0.41
chlorbenside	4.1	4.1	4.1
cis-chlordane	0.41	0.41	0.41
cis-nonachlor	0.41	0.41	0.41
gamma-chlordene	0.41	0.41	0.41
oxychlordane	0.41	0.41	0.41
trans-chlordane	0.41	0.41	0.41
trans-nonachlor	0.41	0.41	0.41
chlorpyrifos	0.82	0.81	0.83
dacthal	0.41	0.41	0.41
DDD, o,p'	0.82	0.81	0.83
DDD, p,p'	0.82	0.81	0.83
DDE, o,p'	0.82	0.81	0.83
DDE, p,p'	0.41	0.41	0.41
DDT, o,p'	0.82	0.81	0.83
DDT, p,p'	0.82	0.81	0.83
DDMU,p,p'	1.2	1.2	1.2
diazinon	4.1	4.1	4.1
dieldrin	0.41	0.41	0.41
endosulfan I	0.41	0.41	0.41
endosulfan II	5.8	5.7	5.8
endosulfan sulfate	7.0	6.9	7.1
ethion	1.6	1.6	1.7
hexachlorobenzene	0.16	0.16	0.17
alpha-HCH	0.16	0.16	0.17
beta-HCH	0.82	0.81	0.83
gamma-HCH	0.16	0.16	0.17
heptachlor	0.41	0.41	0.41
heptachlor epoxide	0.41	0.41	0.41
oxadiazon	0.82	0.81	0.83
PCB 1248	4.1	4.1	4.1
PCB 1254	4.1	4.1	4.1
PCB 1260	4.1	4.1	4.1
toxaphene	8.2	8.1	8.3
percent moisture	10.9	20.9	21.5

TABLE S-7

Toxic Substances Monitoring Program
Detection Limits: 1993 Synthetic Organic Compounds in Sediments
(ng/g dry weight)

COMPOUNDS	
aldrin	0.50
chlorbenside	5.0
cis-chlordane	0.50
cis-nonachlor	0.50
gamma-chlordene	0.50
oxychlordane	0.50
trans-chlordane	0.50
trans-nonachlor	0.50
chlorpyrifos	1.0
dacthal	0.50
DDD, o,p'	1.0
DDD, p,p'	1.0
DDE, o,p'	1.0
DDE, p,p'	0.50
DDT, o,p'	1.0
DDT, p,p'	1.0
DDMU,p,p'	1.5
diazinon	5.0
dieldrin	0.50
endosulfan I	0.50
endosulfan II	7.0
endosulfan sulfate	8.5
ethion	2.0
hexachlorobenzene	0.20
alpha-HCH	0.20
beta-HCH	1.0
gamma-HCH	0.20
heptachlor	0.50
heptachlor epoxide	0.50
oxadiazon	1.0
PCB 1248	5.0
PCB 1254	5.0
PCB 1260	1.0
toxaphene	10.0

Note: The moisture content of the three sediment samples analyzed in 1993 were similiar, therefore the detection limits are the same.

TABLE S-8

Toxic Substances Monitoring Program
Results of Duplicate Sample Analysis: 1992 Synthetic Organic Compounds Quality Control
(ng/g wet weight)

Station Name	San Diego Creek/ Michelson Drive		Los Angeles River/ Los Feliz Road		Escondido Creek/ Camino Del Norte		Greeson Drain	
Station No.	801.11.07		405.21.06		904.61.04		723.10.48	
Species*	PRS		FHM		CP		TLZ	
REPLICATE	1	2	1	2	1	2	1	2
COMPOUNDS								
cis-chlordane	12.	14.	15.	14.				
cis-nonachlor	7.8	7.7						
gamma-chlordene								
oxychlordane								
trans-chlordane	7.4	8.6	12.	12.				
trans-nonachlor	19.	21.	14.	12.				
chlorpyrifos			16.	16.				
dacthal	5.1	10.					740.	740.
DDD, o,p'	12.	12.						
DDD, p,p'	60.	60.						
DDE, o,p'								
DDE, p,p'	590.	620.	22.	20.	6.7	6.1	13.	14.
DDT, o,p'	20.	20.						
DDT, p,p'	17.	18.						
DDMU,p,p'								
diazinon								
dieldrin	6.8	6.8	7.5	7.1				
endosulfan I								
endosulfan II								
endosulfan sulfate								
hexachlorobenzene								
alpha-HCH								
gamma-HCH			9.0	8.4				
heptachlor epoxide								
oxadiazon	200.	200.						
PCB 1248								
PCB 1254	77.	83.						
PCB 1260	150.	130.						
toxaphene								
percent moisture	75.2	75.4	79.6	79.7	82.8	82.9	78.2	78.7
percent lipid	5.77	5.77	4.21	4.10	0.432	0.457	0.248	0.119

* Tables 3, 4, and 5 list code names for species.
< Below detection limit.

TABLE S-8 (continued)

Toxic Substances Monitoring Program
Results of Duplicate Sample Analysis: 1992 Synthetic Organic Compounds Quality Control
(ng/g wet weight)

Station Name	Palo Verde Outfall Drain		Chorro Creek/U/S Reservoir		Anza Channel		Lake Mendocino	
Station No.	715.40.08		310.22.13		801.26.03		114.32.00	
Species*	CP		SH		FHM		RSF	
REPLICATE	1	2	1	2	1	2	1	2
COMPOUNDS								
aldrin					7.5	8.0		
cis-chlordane					27.	30.		
cis-nonachlor					14.	16.		
gamma-chlordene					<5.0	5.3		
oxychlordane					6.1	6.9		
trans-chlordane					15.	17.		
trans-nonachlor					55.	59.		
chlorpyrifos	66.	60.						
dacthal	15.	15.						
DDD, o,p'					10.	11.		
DDD, p,p'	36.	37.			38.	40.		
DDE, o,p'								
DDE, p,p'	380.	400.			370.	400.		
DDT, o,p'								
DDT, p,p'								
DDMU,p,p'								
diazinon								
dieldrin					13.	14.		
endosulfan I	7.8	7.6						
endosulfan II								
endosulfan sulfate								
hexachlorobenzene								
alpha-HCH								
gamma-HCH								
heptachlor epoxide								
oxadiazon					57.	62.		
PCB 1254					340.	360.		
PCB 1260					78.	79.		
toxaphene								
percent moisture	76.0	75.8	73.4	73.7	76.1	75.9	78.2	78.1
percent lipid	4.14	4.10	4.25	4.20	4.57	4.85	0.172	0.179

* Tables 3, 4, and 5 list code names for species.
< Below detection limit.

TABLE S-8 (continued)

Toxic Substances Monitoring Program
Results of Duplicate Sample Analysis: 1992 Synthetic Organic Compounds Quality Control
(ng/g wet weight)

Station Name	Stevens Creek Tapia Park		Malibu Creek/	
Station No.	205.50.94		404.21.04	
Species*	SH		SED	
REPLICATE	1	2	1	2
COMPOUNDS				
aldrin				
cis-chlordane				
cis-nonachlor				
gamma-chlordene				
oxychlordane				
trans-chlordane				
trans-nonachlor				
chlorpyrifos				
dacthal				
DDD, o,p'				
DDD, p,p'				
DDE, o,p'				
DDE, p,p'			0.69	0.70
DDT, o,p'				
DDT, p,p'			0.85	<0.83
DDMU,p,p'				
diazinon				
dieldrin				
endosulfan I				
endosulfan II				
endosulfan sulfate				
hexachlorobenzene				
alpha-HCH				
gamma-HCH				
heptachlor epoxide				
oxadiazon				
PCB 1254				
PCB 1260				
toxaphene				
percent moisture	78.3	78.3	20.9	21.5
percent lipid	1.12	1.12		

* Tables 3, 4, and 5 list code names for species.
< Below detection limit.

TABLE S-8 (continued)

Toxic Substances Monitoring Program
Results of Duplicate Sample Analysis: 1993 Synthetic Organic Compounds Quality Control
(ng/g wet weight)

Station Name	New River/ International Boundry		Peters Canyon Channel		Sims Pond		Lindo Lake	
Station No.	723.10.58		801.11.96		405.12.91		907.12.07	
Species*	CP		RS		BB		GS	
REPLICATE	1	2	1	2	1	2	1	2
COMPOUNDS								
cis-chlordane	39.	56.	19.	17.			8.7	8.3
cis-nonachlor	12.	18.	15.	13.			6.1	5.7
gamma-chlordene								
oxychlordane			5.2	<5.0				
trans-chlordane	30.	44.	10.	9.0			5.4	5.2
trans-nonachlor	44.	53.	25.	22.			11.	11.
chlorpyrifos			15.	12.				
dacthal	17.	14.	7.9	7.9			740.	740.
DDD, o,p'	21.	34.	10.	11.				
DDD, p,p'	120.	180.	56.	50.				
DDE, o,p'								
DDE, p,p'	520.	510.	1300.	1100.	8.7	8.0	24.	24.
DDT, o,p'			42.	37.				
DDT, p,p'			76.	66.				
DDMU,p,p'	<15.	30.	28.	24.				
diazinon	70.	<50.						
dieldrin	6.8	7.6	9.9	9.8				
endosulfan I								
endosulfan II								
endosulfan sulfate								
hexachlorobenzene								
alpha-HCH								
gamma-HCH	2.5	3.7						
heptachlor epoxide								
hexachlorobenzene	<2.0	4.9						
oxadiazon			200.	200.	27.	27.		
PCB 1248								
PCB 1254	55.	64.						
PCB 1260	80.	84.						
toxaphene			390.	340.				
percent moisture	72.5	72.4	76.7	76.7	82.0	82.0	75.4	75.4
percent lipid	8.64	8.05	5.35	5.36	0.392	0.602	1.91	1.83

* Tables 3, 4, and 5 list code names for species.
< Below detection limit.

TABLE S-9

Toxic Substances Monitoring Program
Polynuclear Aromatic Hydrocarbons (PAHs) Analyzed
and Their Detection Limits in Flesh

Compound	Detection Limit (ng/g, ppb wet weight) 1991
naphthalene	100
1-methylnaphthalene	100
2-methylnaphthalene	100
biphenyl	100
2,6-dimethylnaphthalene	100
acenaphthylene	100
acenaphthene	100
2,3,5-trimethylnaphthalene	100
fluorene	100
phenanthrene	100
anthracene	100
1-methylphenanthrene	100
fluoranthene	100
pyrene	100
benz[a]anthracene	100
chrysene	100
benzo[b]fluoranthene	100
benzo[k]fluoranthene	100
benzo[e]pyrene	100
benzo[a]pyrene	100
perylene	100
indeno[1,2,3-cd]pyrene	100
dibenz[a,h]anthracene	100
benzo[ghi]perylene	100