RESPONSIVENESS SUMMARY
HUDSON RIVER PCBs SITE RECORD OF DECISION

JANUARY 2002

For

U.S. Environmental Protection Agency
Region 2
and
U.S. Army Corps of Engineers
Kansas City District

BOOK 3 OF 3

FIGURES, TABLES & APPENDICES

TAMS Consultants, Inc.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ACHP	Advisory Council on Historic Preservation
AGC	Annual Guideline Concentration
AOC	Administrative Order on Consent
ANOVA	Analysis of Variance
APEG	Alkaline (Alkali Metal Hydroxide) Polyethylene Glycol
ARAR	Applicable or Relevant and Appropriate Requirement
ARCC	Adirondack Regional Chambers of Commerce
ARCS	Assessment and Remediation of Contaminated Sediments Program
ATSDR	Agency for Toxic Substance and Disease Registry
AWQC	Ambient Water Quality Criterion
BAT	Best Achievable Technology
BBL	Blasland, Bouck, and Lee
BCD	Base-Catalyzed Decomposition
BMR	Baseline Modeling Report
CADD	Computer-Aided Drafting and Design
CDF	Confined Disposal Facility
CDI	Chronic Daily Intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIP	Community Interaction Program
CLU-IN	Hazardous Waste Clean-up Information (EPA web site)
COC	Chemical(s) of Concern
COPC	Chemical(s) of Potential Concern
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
CT	Central Tendency
CWA	Clean Water Act
CZM	Coastal Zone Management
DEIR	Data Evaluation and Interpretation Report
DMR	Discharge Monitoring Report
DNAPL	Dense Non-Aqueous Phase Liquid
DOC	Dissolved Organic Carbon
DOSM	Depth of Scour Model
DOT	Department of Transportation
DRE	Destruction and Removal Efficiency
ECD	Electron Capture Detector
ECL	Environmental Conservation Law (New York)
EE/CA	Engineering Evaluation/Cost Analysis
EEC	Extreme Effect Concentration
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ESA	Endangered Species Act
ETWG	Engineering/Technology Work Group
FAIR	Farmers Against Irresponsible Remediation

FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FR	Federal Register
FRTR	Federal Remediation Technologies Roundtable
FS	Feasibility Study
FSSOW	Feasibility Study Scope of Work
FWIA	Fish & Wildlife Impact Analysis
g/m^2	Grams per meter squared
GAC	Granular Activated Carbon
GC	Gas Chromatography
GCL	Geosynthetic Clay Liner
GE	General Electric Company
GIS	Geographic Information System
GLNPO	(EPA's) Great Lakes National Program Office
GRA	General Response Action
HDPE	High Density Polyethylene
HHRA	Human Health Risk Assessment
HHRASOW	Human Health Risk Assessment Scope of Work
HI	Hazard Index
HMTA	Hazardous Materials Transportation Act
hp	Horsepower
HQ	Hazard Quotient
HROC	Hudson River PCB Oversight Committee
HSI	Habitat Suitability Index
HTTD	High Temperature Thermal Desorption
HUDTOX	Upper Hudson River Toxic Chemical Model
IBI	Index of Biotic Integrity
IRIS	Integrated Risk Information System
ITT	Innovative Treatment Technologies (database)
kg	Kilogram
KPEG	Potassium polyethylene glycol
LOAEL	Lowest Observed Adverse Effect Level
LRC, LRCR	Low Resolution Sediment Coring Report
LTI	LimnoTech, Inc.
LTTD	Low Temperature Thermal Desorption
LWA	Length-Weighted Average
MANOVA	Multivariate Analysis of Variance
M&E	Metcalf and Eddy
MBI	Macroinvertebrate Biotic Index
MCA	Menzie-Cura and Associates
MCACES	Cost Estimating Software (USACE)
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDEQ	Michigan Department of Environmental Quality
MDPR	Molar Dechlorination Product Ratio
MEC	Mid-Range Effects Concentration
mg/kg	Milligrams per Kilogram (generally equivalent to parts per million, or ppm)
mg/L	Milligrams per Liter (generally equivalent to ppm)
MNA	Monitored Natural Attenuation
MPA	Mass per Unit Area

MS	Mass Spectroscopy
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Coding System
NAS	National Academy of Sciences
NCP	National Oil Spill and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
ng/L	Nanograms per Liter, parts per trillion
NHPA	National Historic Preservation Act
NiMo	Niagara Mohawk Power Company
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No Observed Adverse Effect Level
NPL	National Priorities List
NRC	National Research Council
NTCRA	Non-Time Critical Removal Action
NYCRR	New York Code of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOL	New York State Department of Labor
NYSDOT	New York State Department of Transportation
NYSPDES	New York State Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OPRHP	Office of Parks, Recreation, and Historic Preservation
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response (EPA)
OU	Operable Unit
PCB	Polychlorinated Biphenyl
PCRDMP	Post-Construction Remnant Deposit Monitoring Plan
PEL	Probable Effects Level
PMCR	Preliminary Modeling Calibration Report
ppm	part(s) per million (mg/kg or mg/L)
PRG	Preliminary Remediation Goal
PSG	Project Sponsor Group
PVC	Polyvinyl Chloride
RAMP	Remedial Action Master Plan
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RBMR	Revised Baseline Modeling Report
REACH IT	Remediation and Characterization Innovative Technologies (EPA database)
RfD	Reference Dose
RI/FS	Remedial Investigation/Feasibility Study
RI	Remedial Investigation
RIMS	Remediation Information Management System
RM	River Mile
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SAV	Submerged Aquatic Vegetation
SEC	Sediment Effect Concentration
SHPO	State Historic Preservation Office
SITE	Superfund Innovative Technology Evaluation Program
SPDES	State Pollution Discharge Elimination System

SQRT	Screening Quick Reference Tables
STC	Scientific and Technical Committee
T&E	Threatened and Endangered
TAG	Technical Assistance Grant
TAGM	Technical Assistance Guidance Memorandum (NYSDEC)
TBC	To-be-considered
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TCP	2,4,6-Trichlorophenol
TEC	Threshold Effect Concentration
TEF	Toxicity Equivalency Factor
TEQ	(Dioxin-like) Toxic Equivalent Quotient
TI	Thompson Island
TID	Thompson Island Dam
TIN	Triangulated Irregular Network
TIP	Thompson Island Pool
TLV	Threshold Limit Value
TOC	Total Organic Carbon
TOGS	Technical and Operational Guidance Series (NYSDEC)
TOPS	Trace Organics Platform Sampler
TQ	Toxicity Quotient
TR	Target Risk
TRV	Toxicity Reference Value
TSCA	Toxic Substances Control Act
TWA	Time-Weighted Average
UCL	Upper Confidence Limit
UET	Upper Effects Threshold
µg/kg	Micrograms per Kilogram, (generally equivalent to parts per billion, or ppb)
µg/L	Micrograms per Liter, (generally equivalent to parts per billion, or ppb)
USACE	United States Army Corps of Engineers
USBEA	United States Bureau of Economic Analysis
USBLS	United States Bureau of Labor Statistics
USC	United States Code
USDOC	United States Department of Commerce
USDOD	United States Department of Defense
USDOE	United States Department of Energy
USDOI	United States Department of Interior
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VISITT	Vendor Information System for Innovative Treatment Technologies (EPA Program)
VLDPE	Very Low Density Polyethylene
WHO	World Health Organization

COMMENTS AND RESPONSES

Section 2
BACKGROUND AND REMEDIAL INVESTIGATION

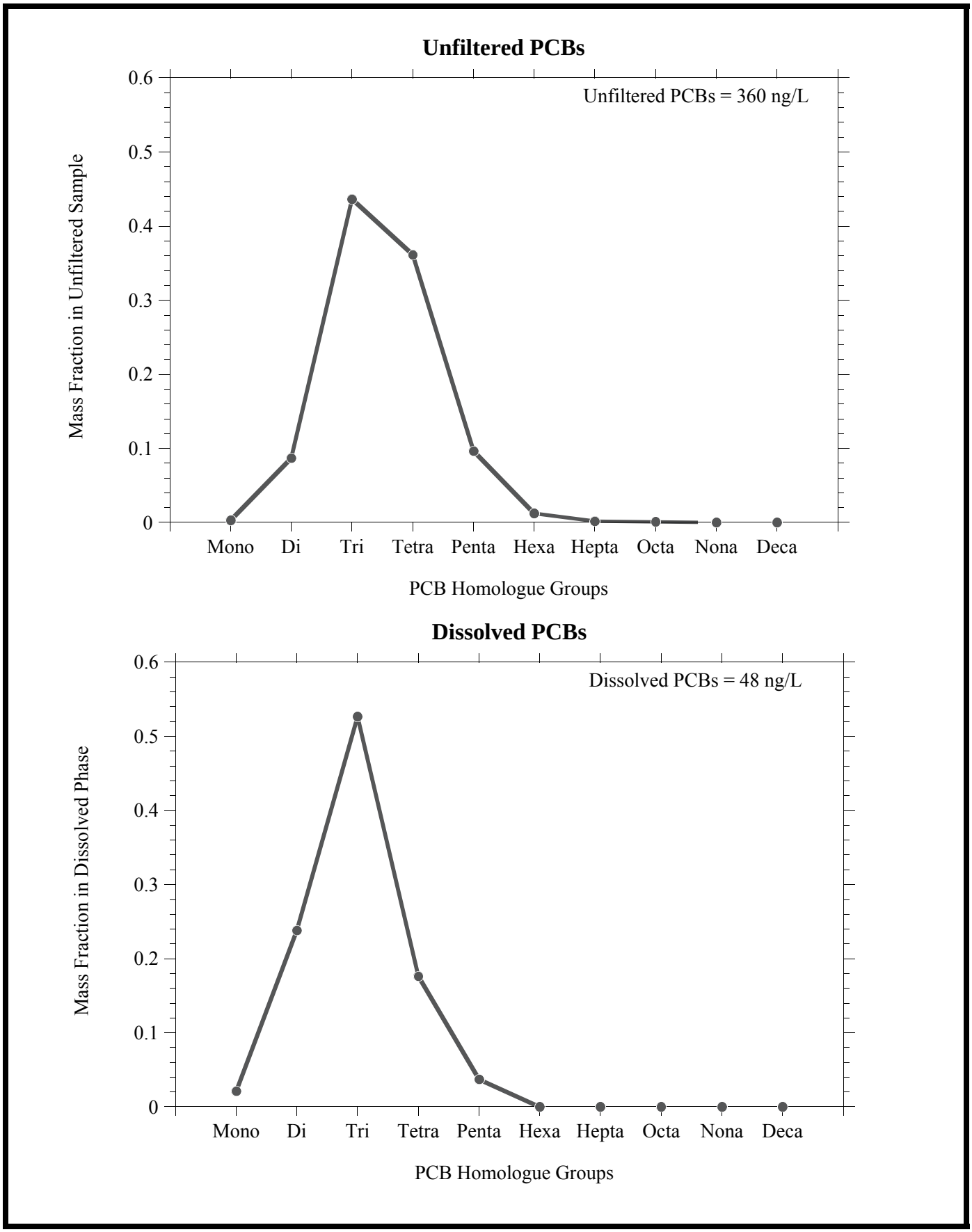

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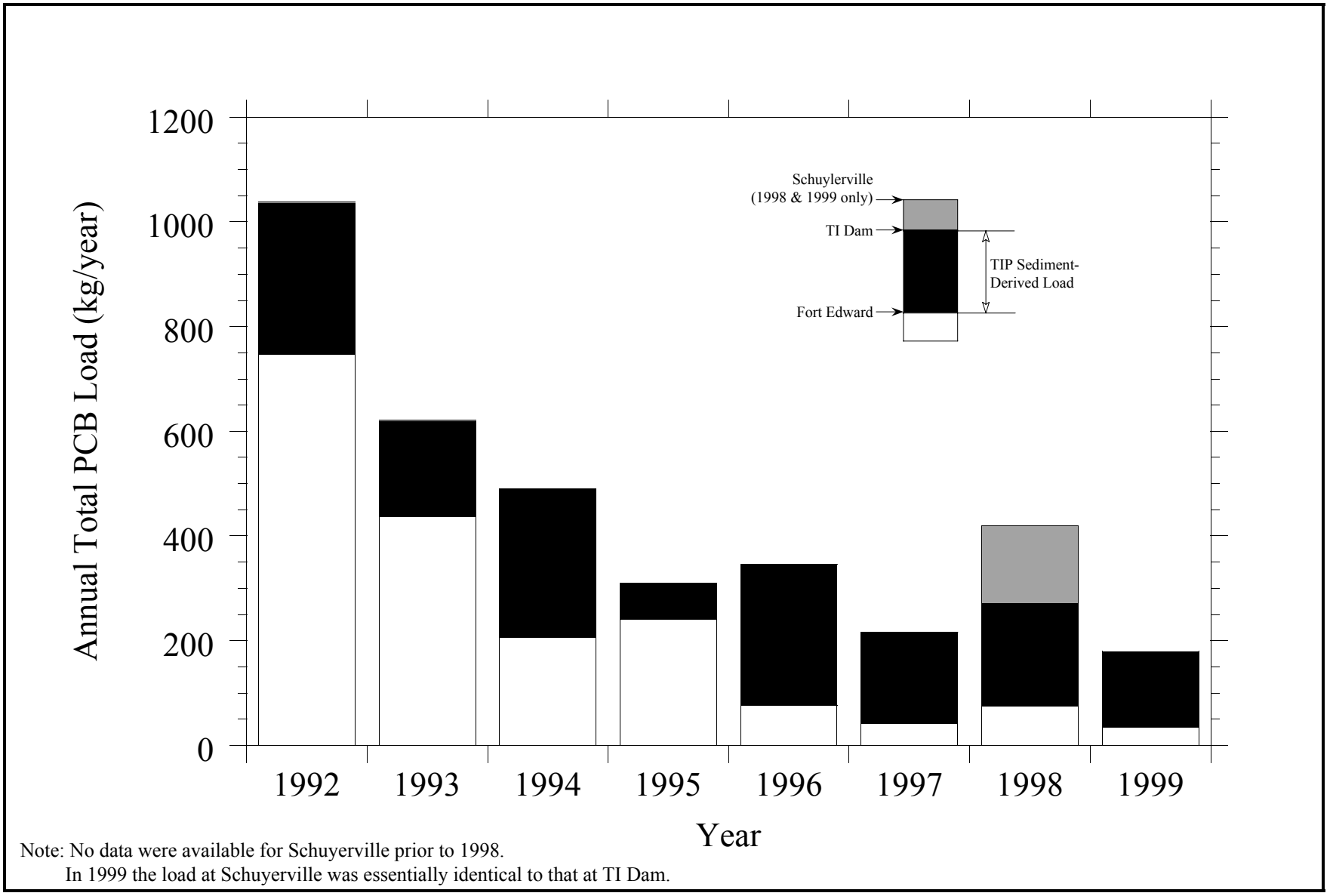
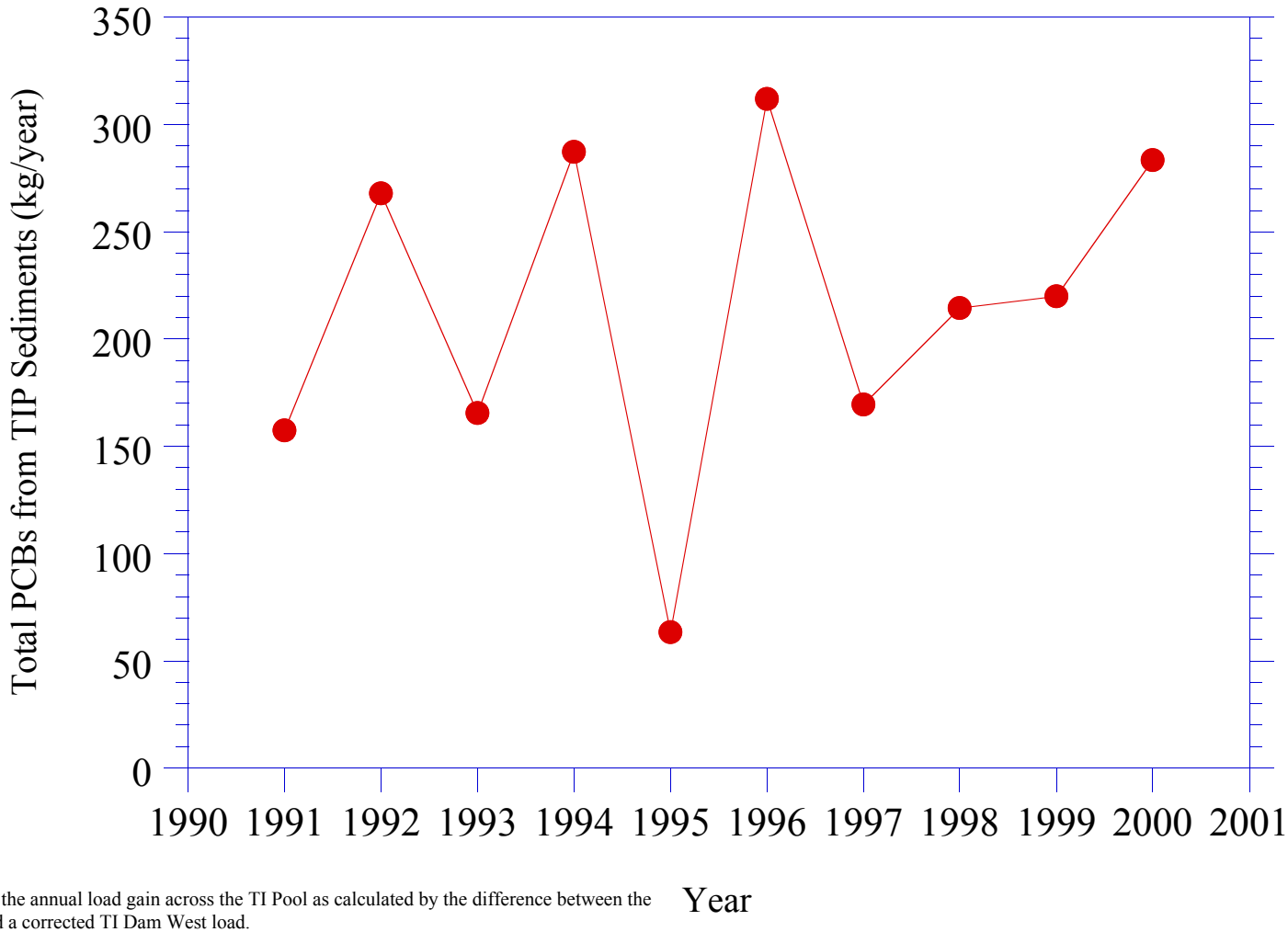
Figure 573-1
Mass Fraction of PCB Homologue Groups in Water Column Samples from Transect 4 at Rogers Island During High Flow



Note: No data were available for Schuyerville prior to 1998.
In 1999 the load at Schuyerville was essentially identical to that at TI Dam.

TAMS

Figure 573-2
Water Column Total PCB Annual Load at Fort Edward, TI Dam, and Schuylerville from GE Data (Ratio Estimator)



1. Net loss represents the annual load gain across the TI Pool as calculated by the difference between the Rogers Island load and a corrected TI Dam West load.
2. Data were only available for April to December in 1991. The annual load was calculated using the average montly load of April to December.

Figure 577-1
Net Annual Release of Total PCBs from Thompson Island Pool Sediments

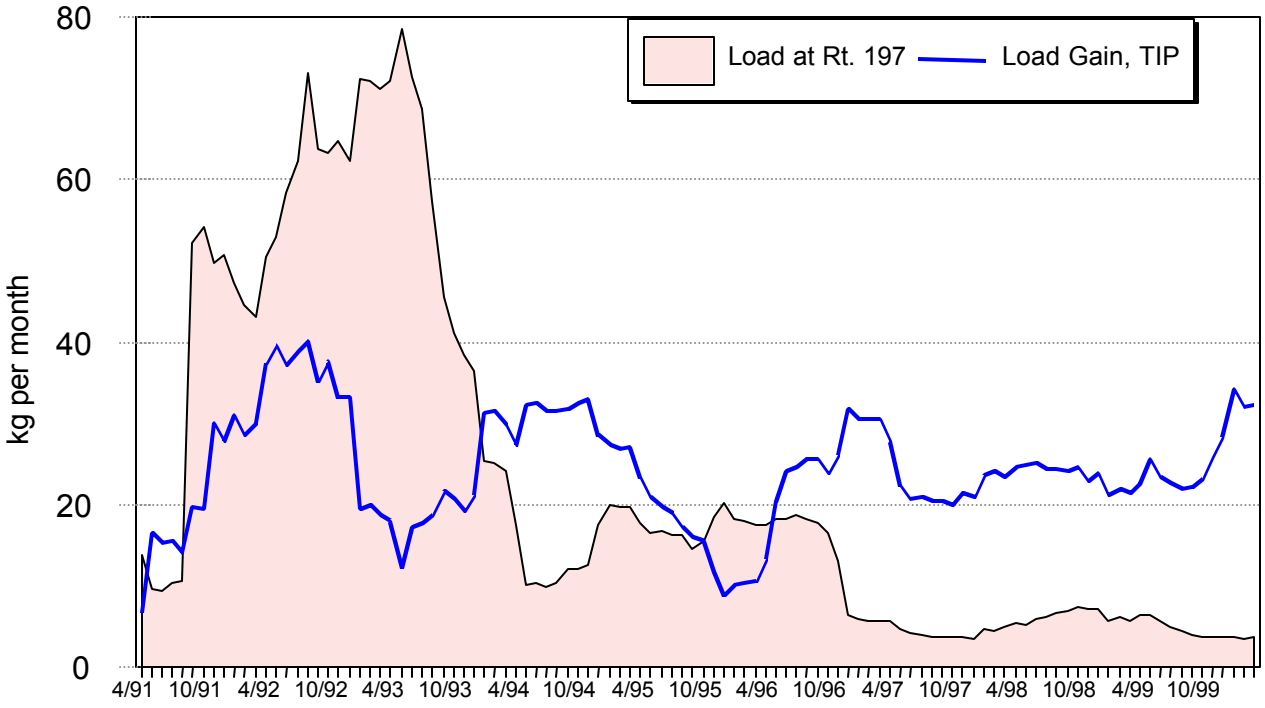


Figure 617-1. PCB Load at Rt. 197 and Load Gain across the TIP (from GE data)

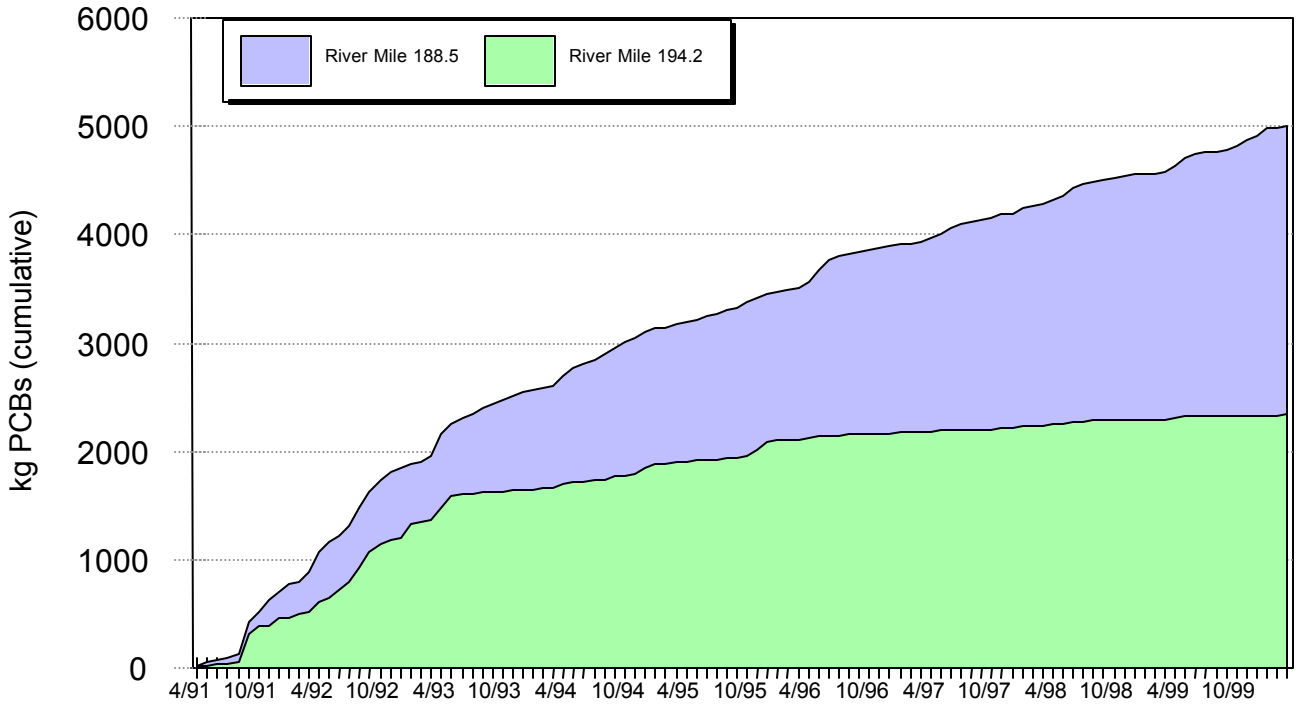


Figure 621-1. Cumulative Total PCB Load at River Mile 194.2 (Rogers Island) and River Mile 188.5 (TID-WEST), Estimated from GE Monitoring Data for April 1991--March 2000.

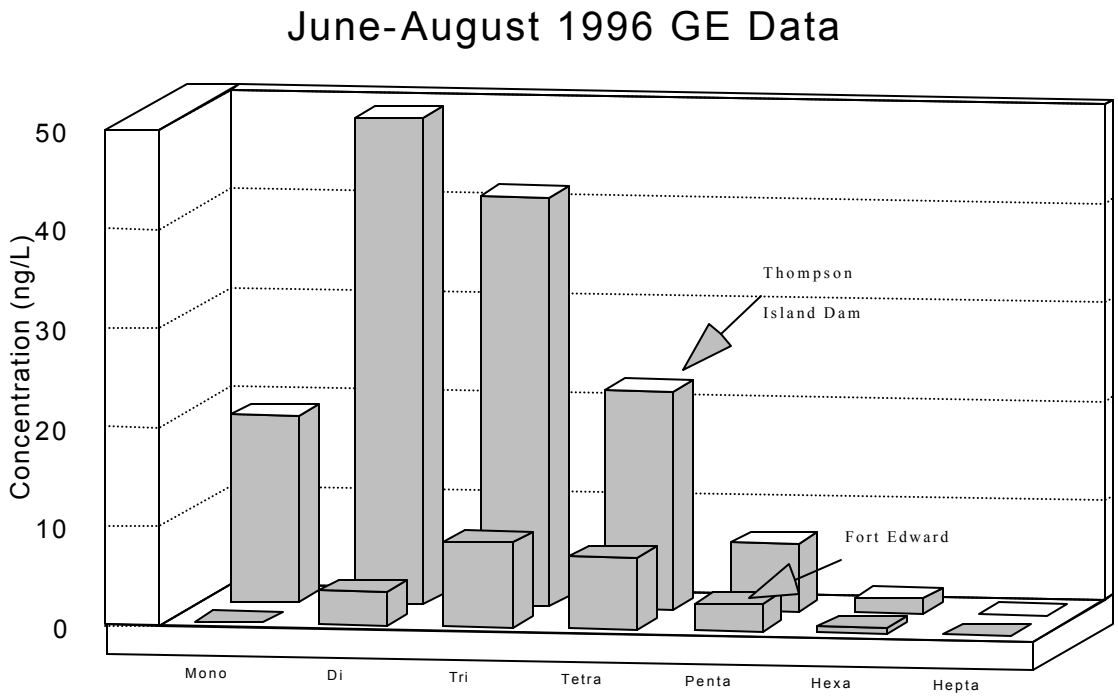
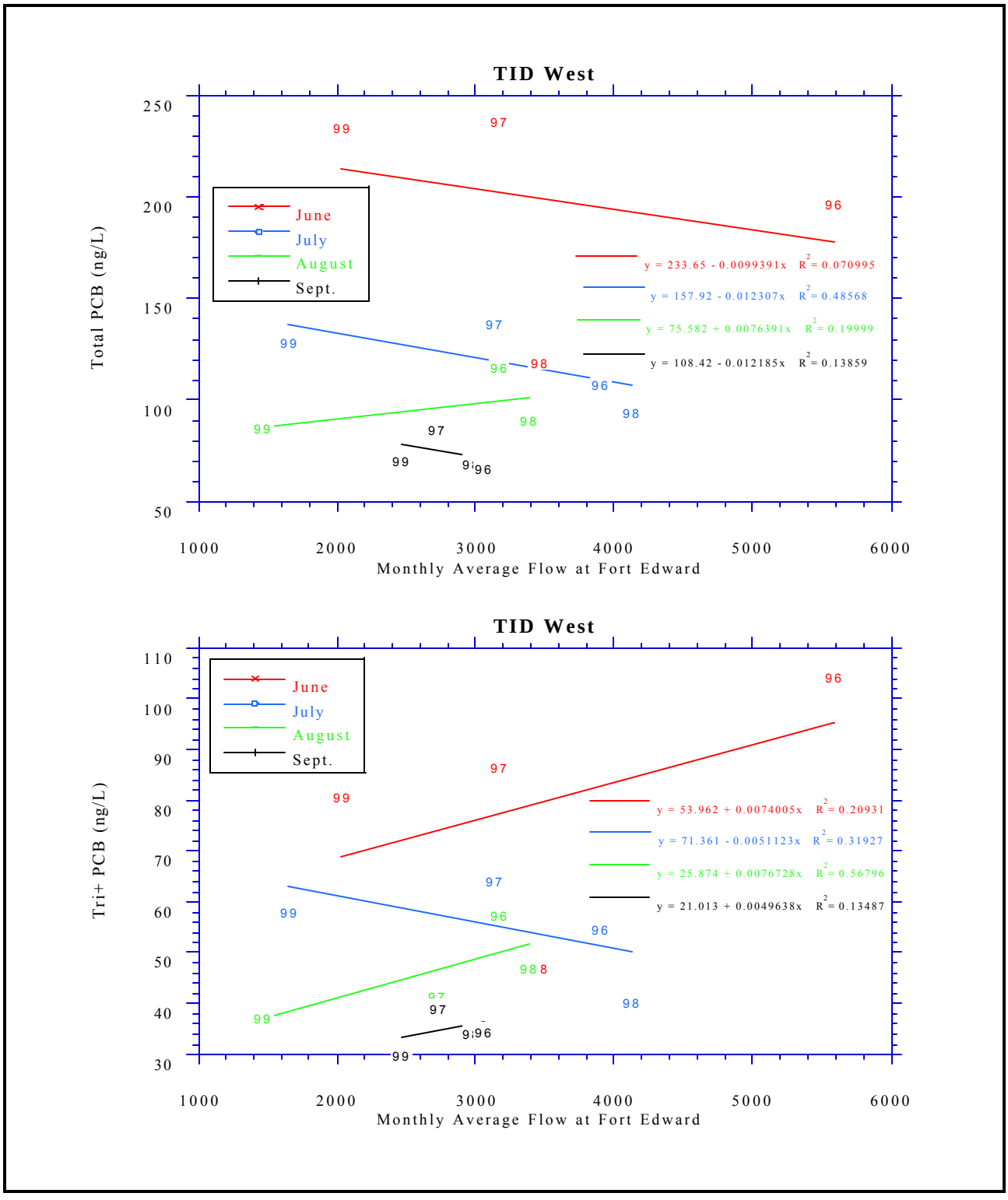


Figure 621-2. Shift in PCB Homologue Pattern across the Thompson Island Pool, Summer 1996



June 22, 2000

Figure 621-3.
Summer Water Column Concentration at TID West versus Monthly Average Flow at Fort Edward, 1996 - 1999

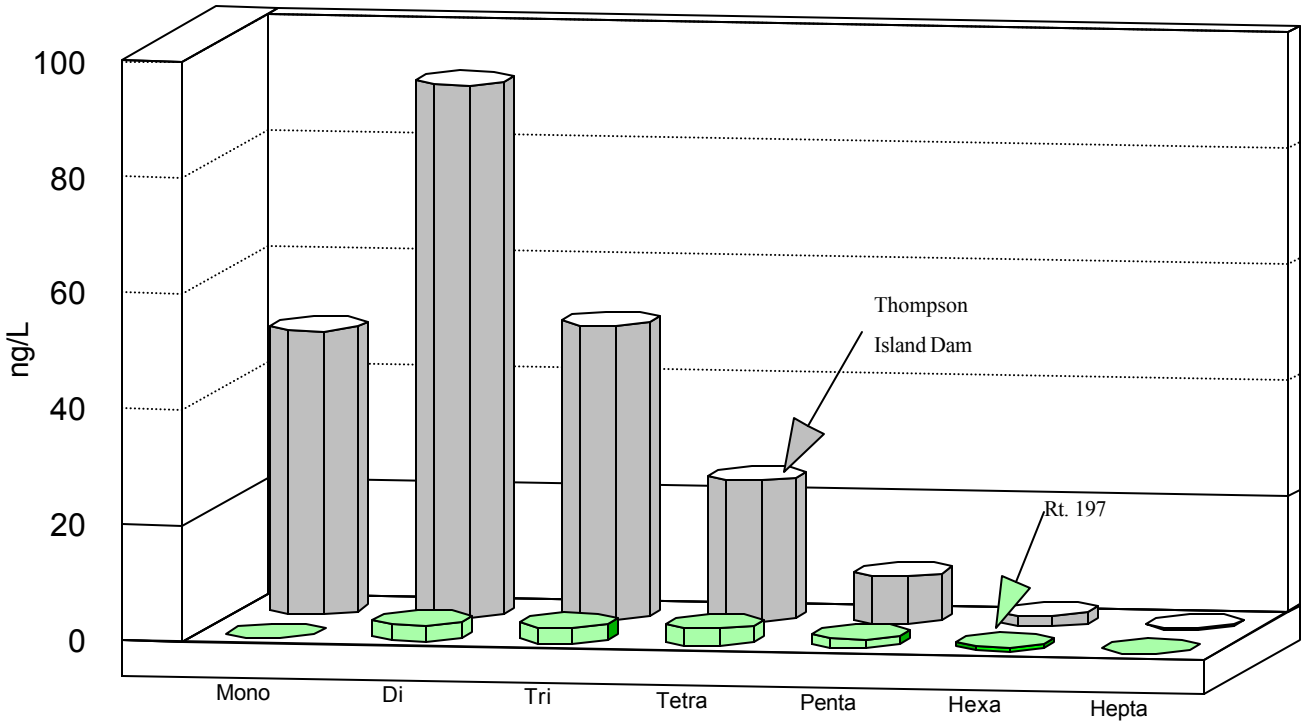


Figure 623-1. PCB Homologue Shift across the TIP, June-August 1997 GE Observations

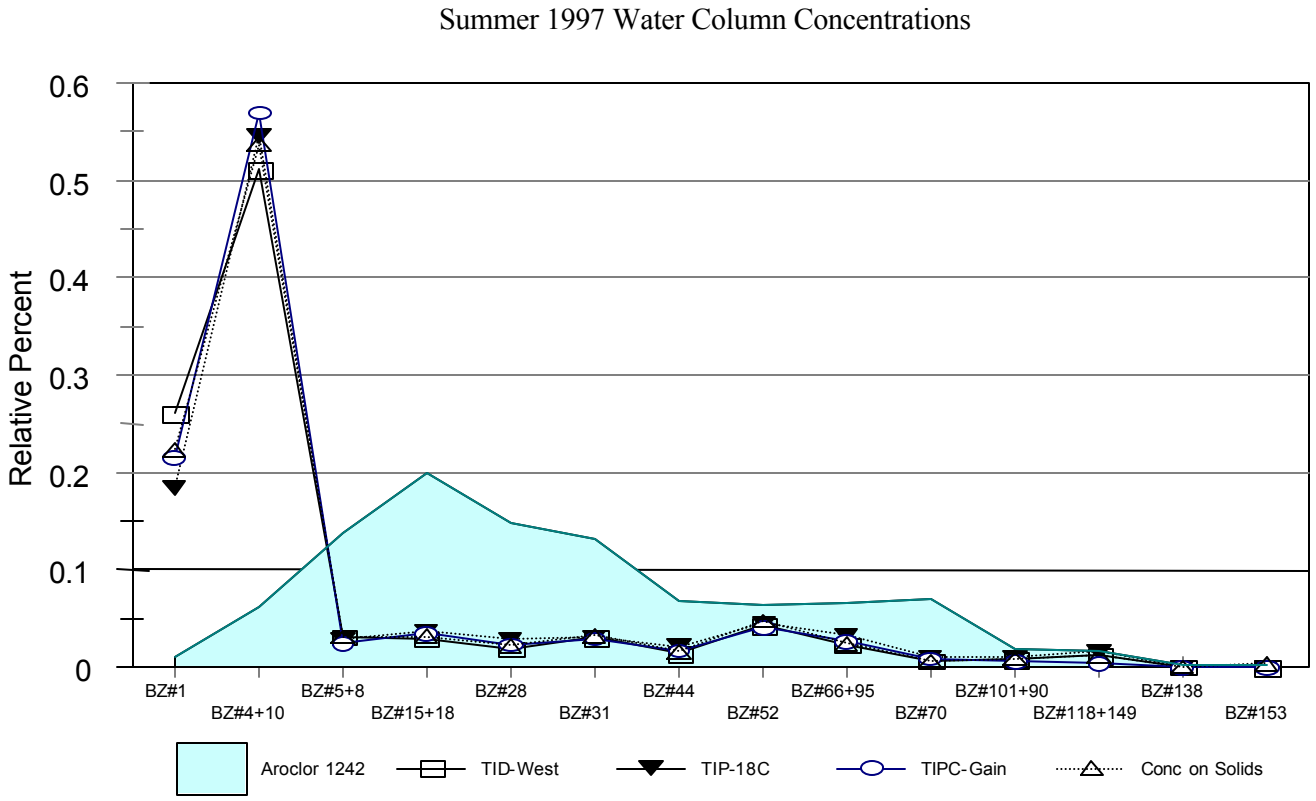


Figure 623-2. Summer 1997 Water Column Relative PCB Congener Concentrations near the Thompson Island Dam, Compared to Aroclor 1242

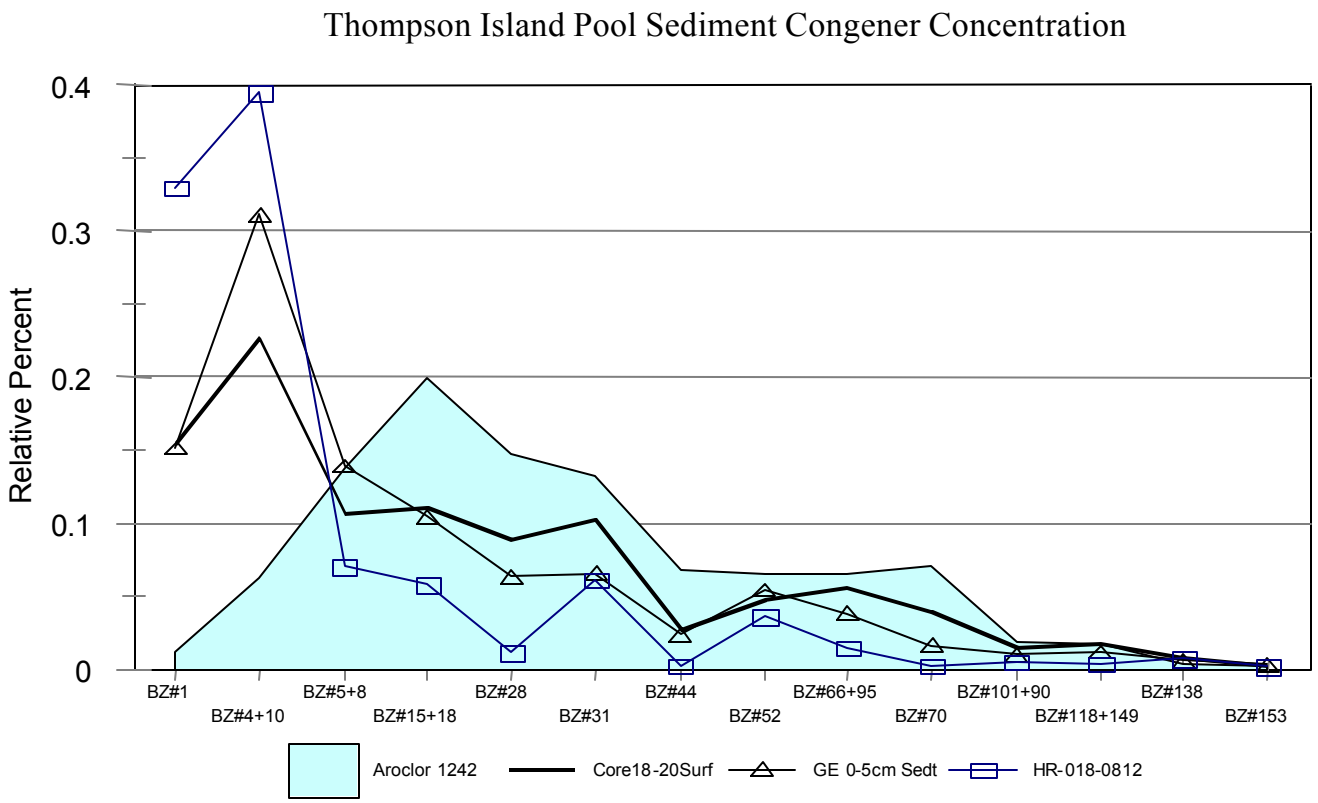


Figure 623-3. Congener Pattern in TIP Sediment Compared to Aroclor 1242

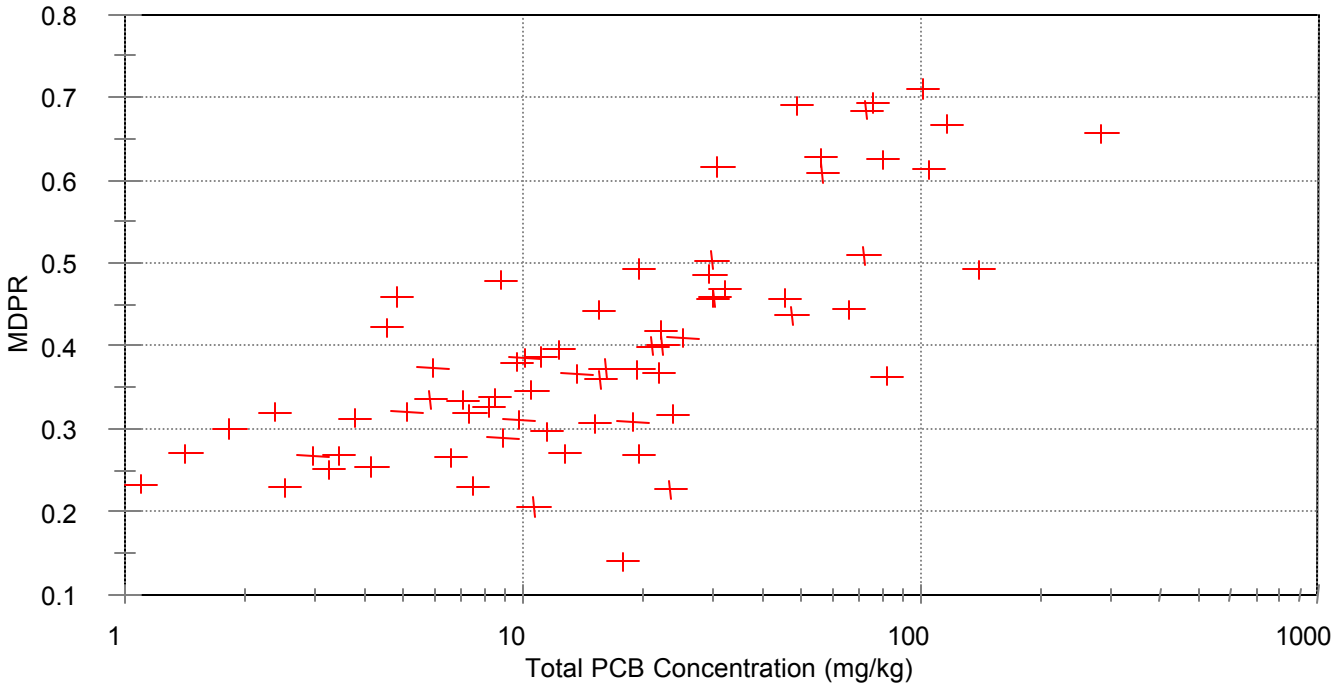


Figure 623-4. MDPR versus Total PCB Concentration for GE 0-5 cm Sediment Concentrations in the Thompson Island Pool.

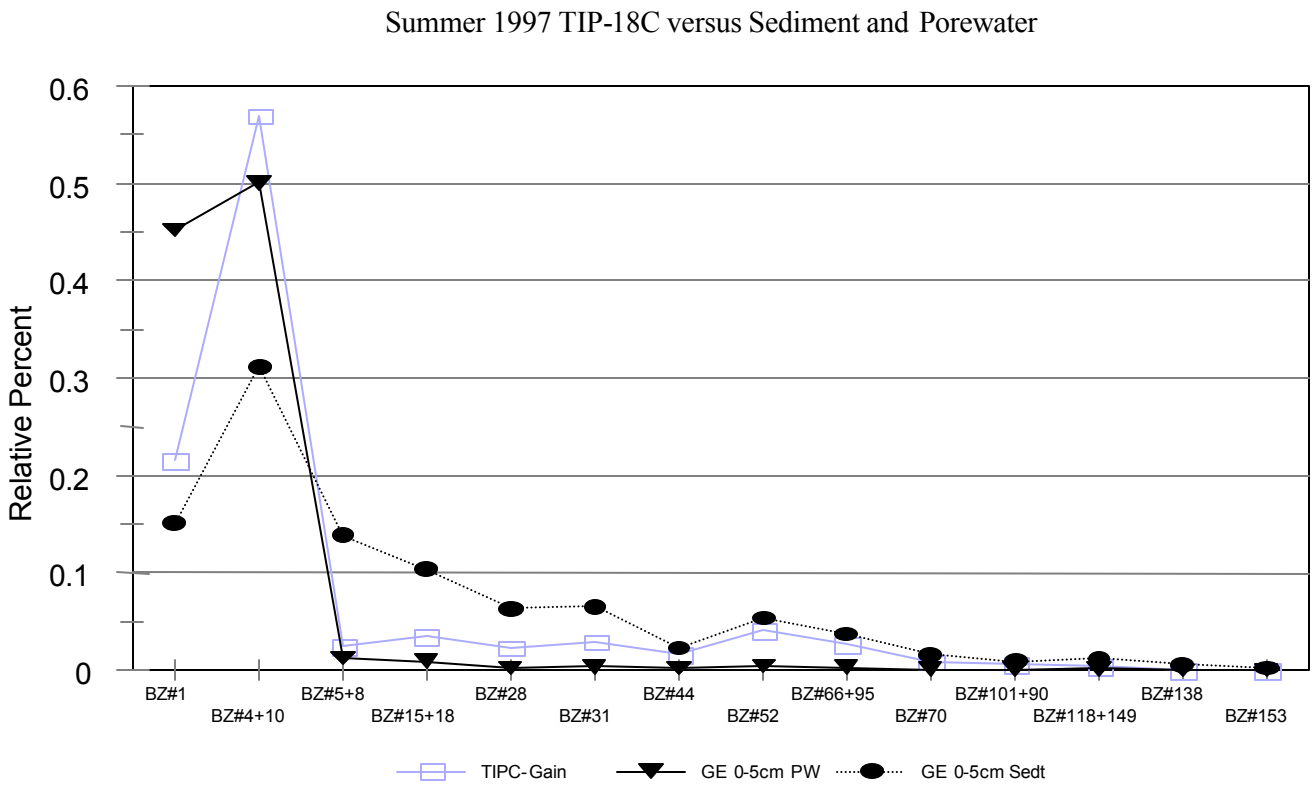


Figure 623-5. Relative Percent Patterns in Water Column Gain at TIP-18C, Surface Sediment, and Surface Sediment Porewater

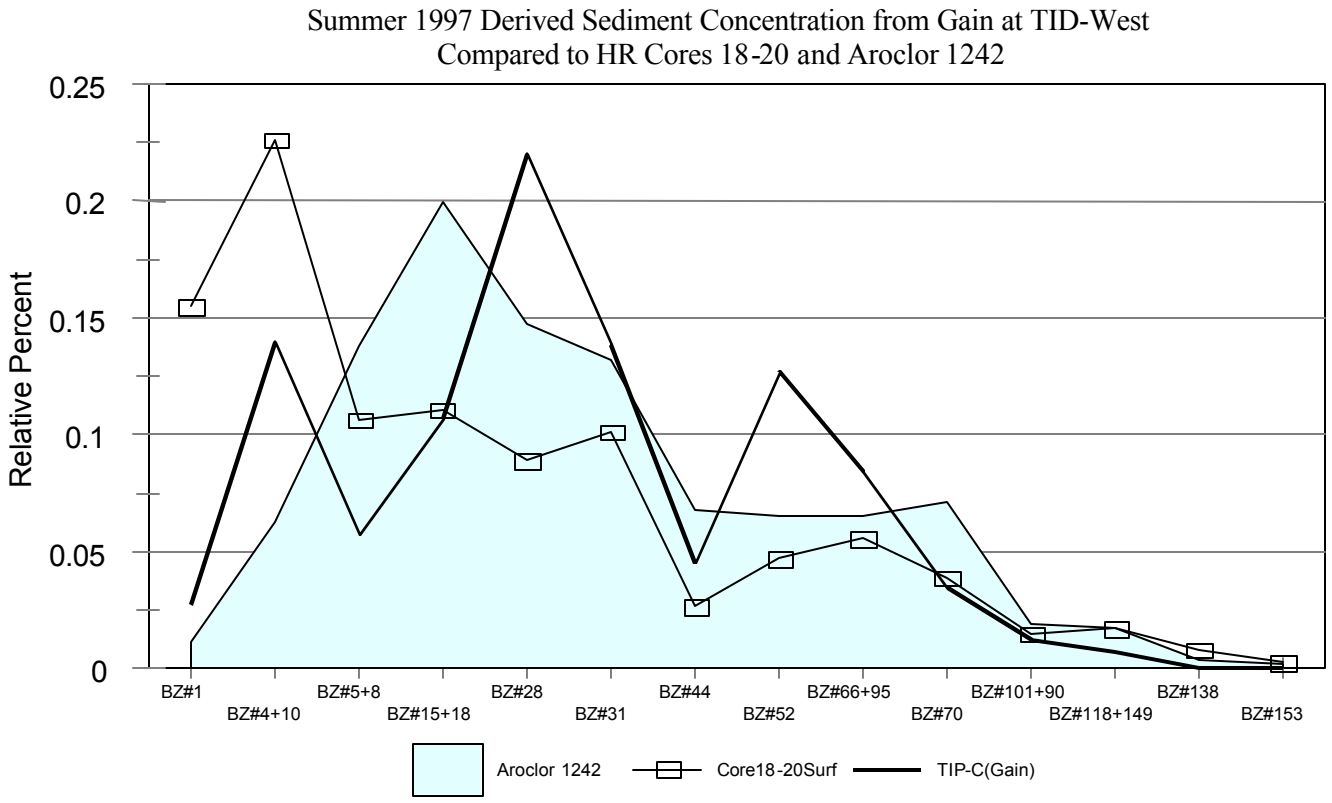


Figure 623-6. Sediment Congener Pattern Derived from Summer 1997 Gain at TIP-18C Attributed to Porewater Flux

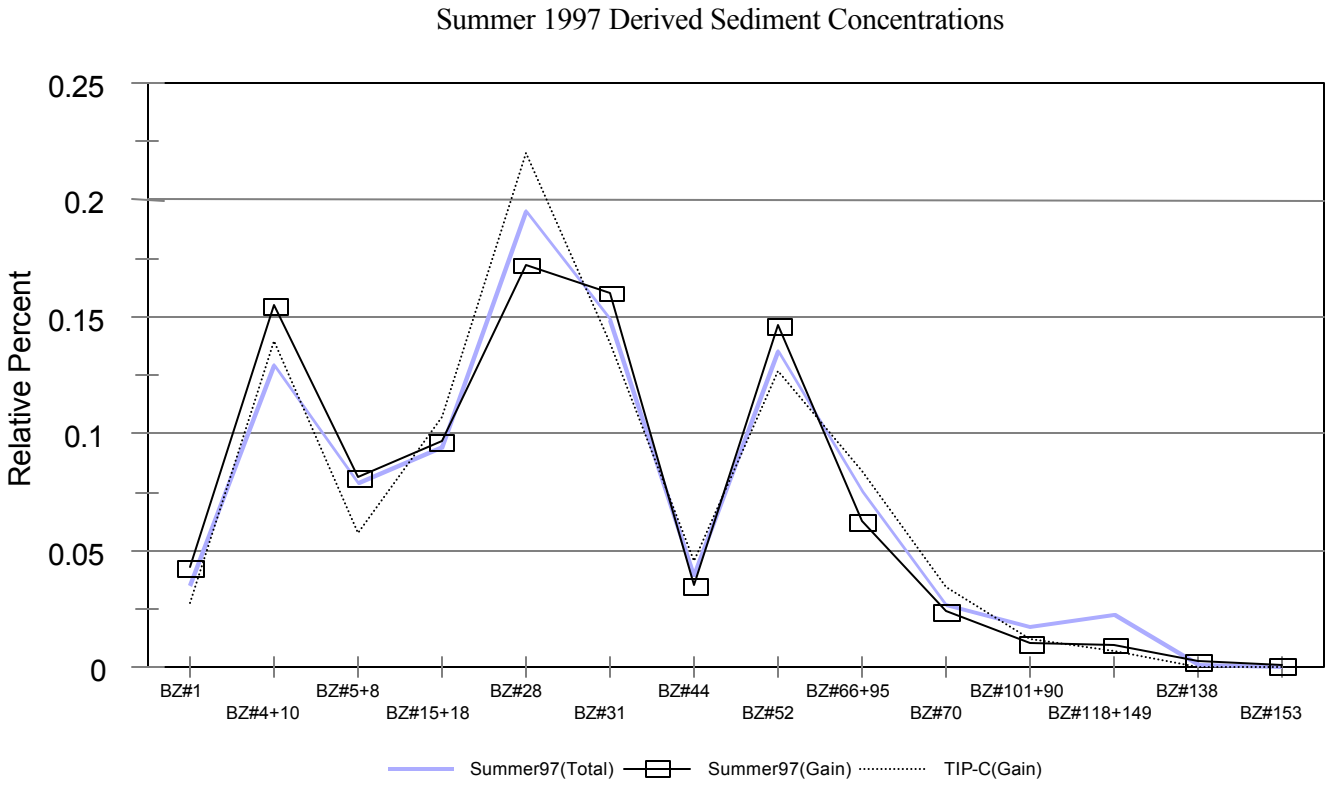


Figure 623-7. Sediment Relative Concentrations Required to Support Observed Water Column Concentrations via Porewater Flux

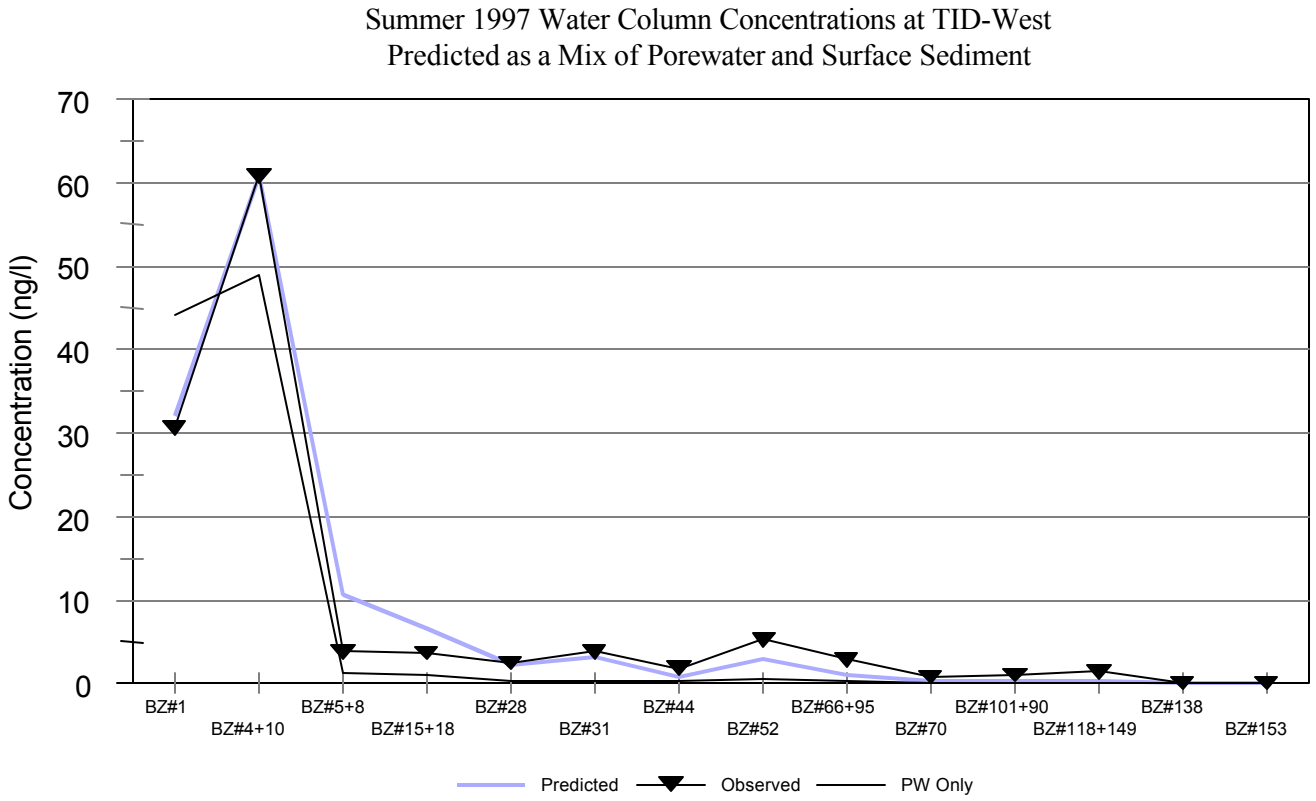


Figure 623-8. Concentrations at TID-West Predicted as a Mixture of Porewater and Sediment Exchange

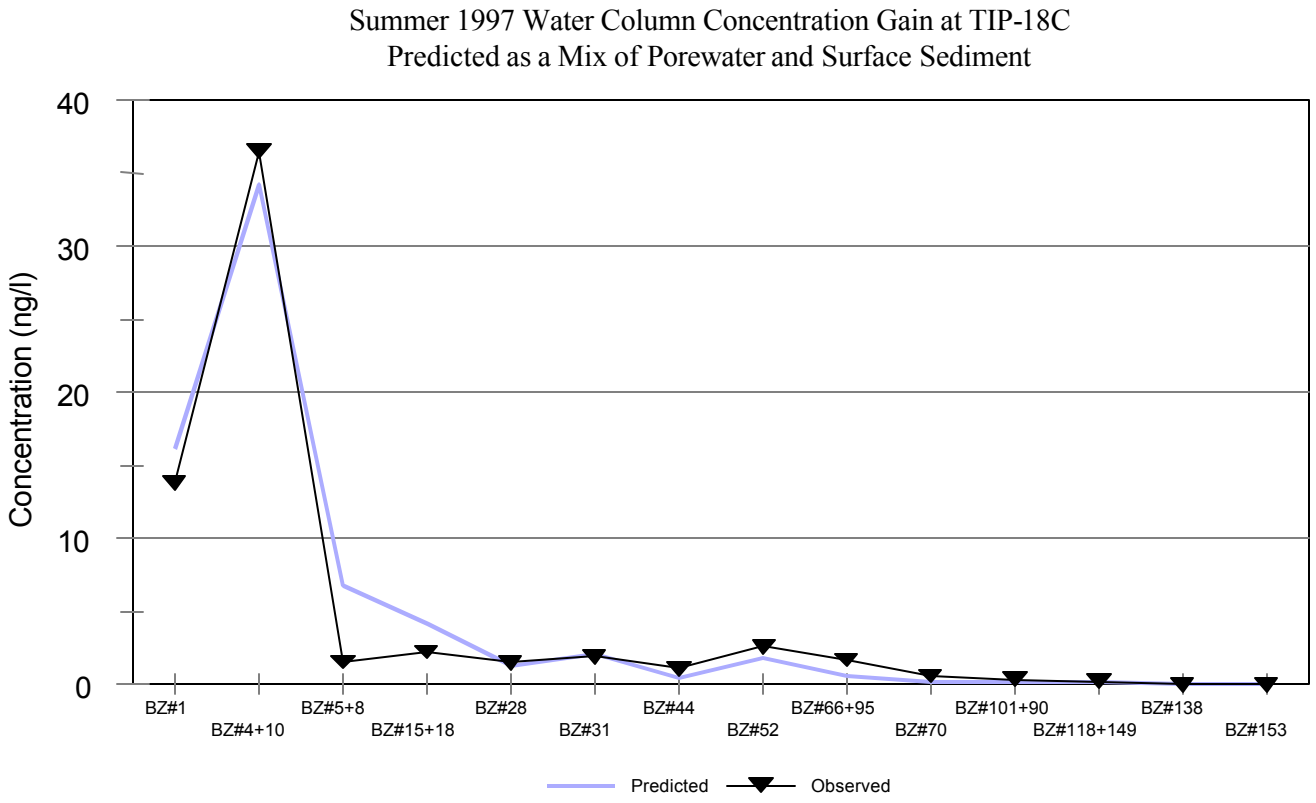


Figure 623-9. Concentration Gain at TIP-18C Predicted as a Mixture of Porewater and Sediment Exchange

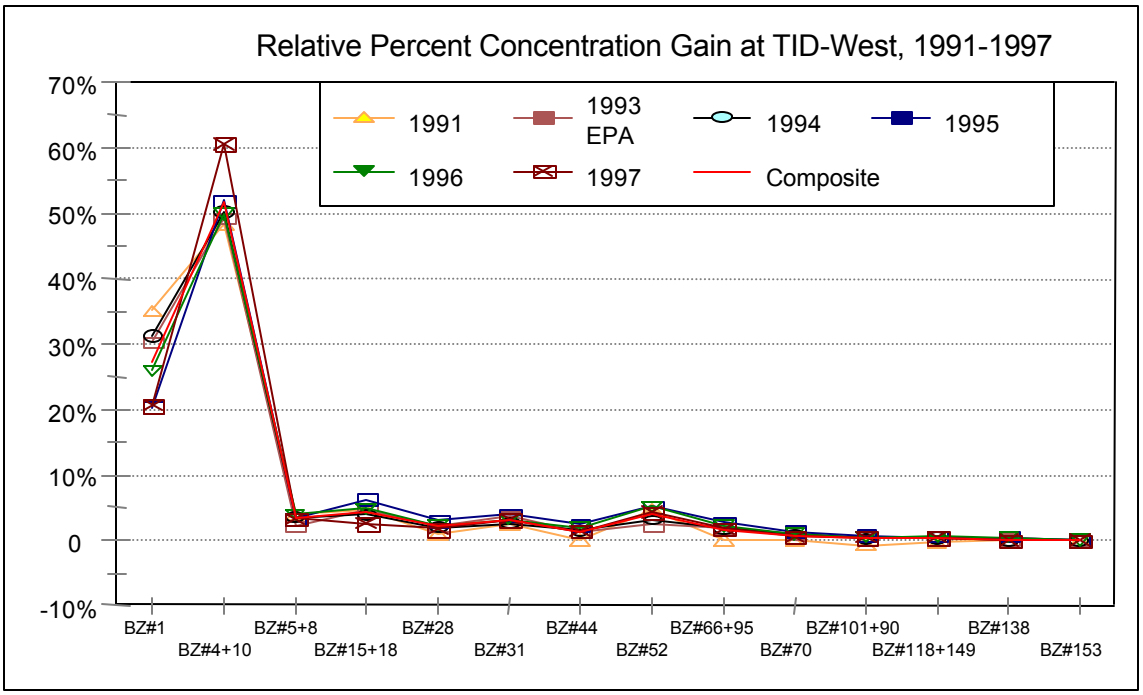


Figure 623-10. Relative Concentration Gain at TID-West, 1991-1997

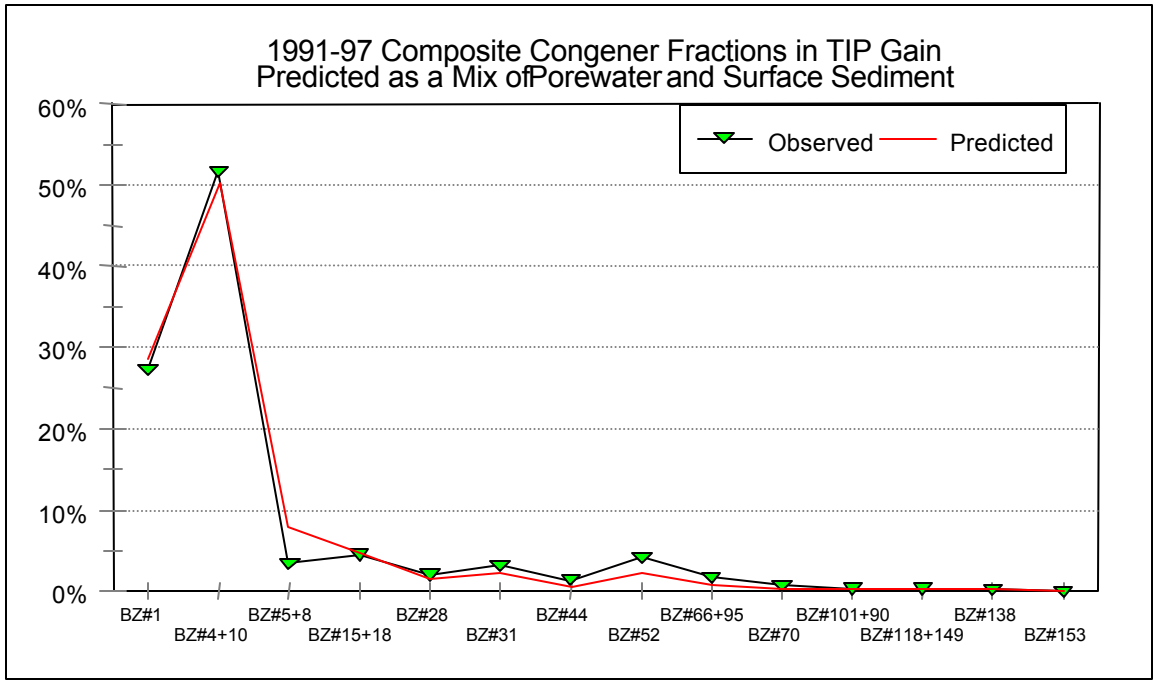
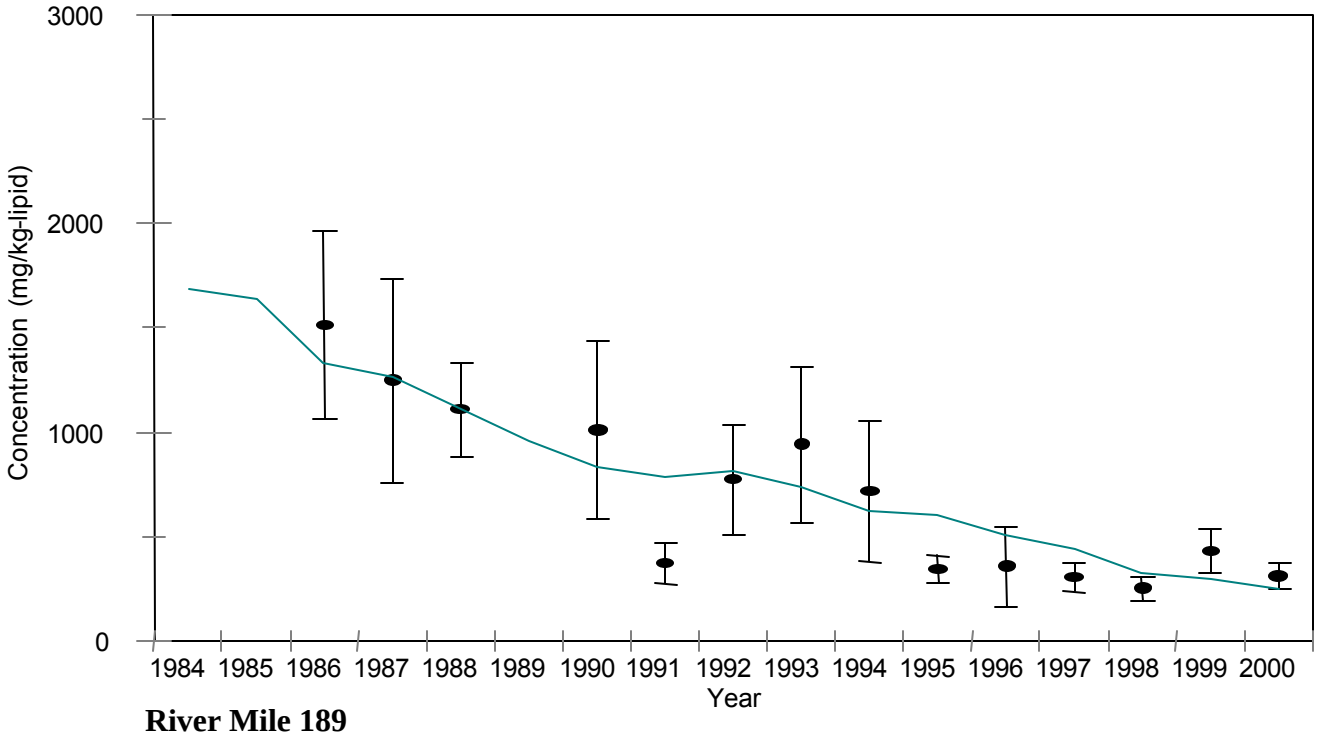
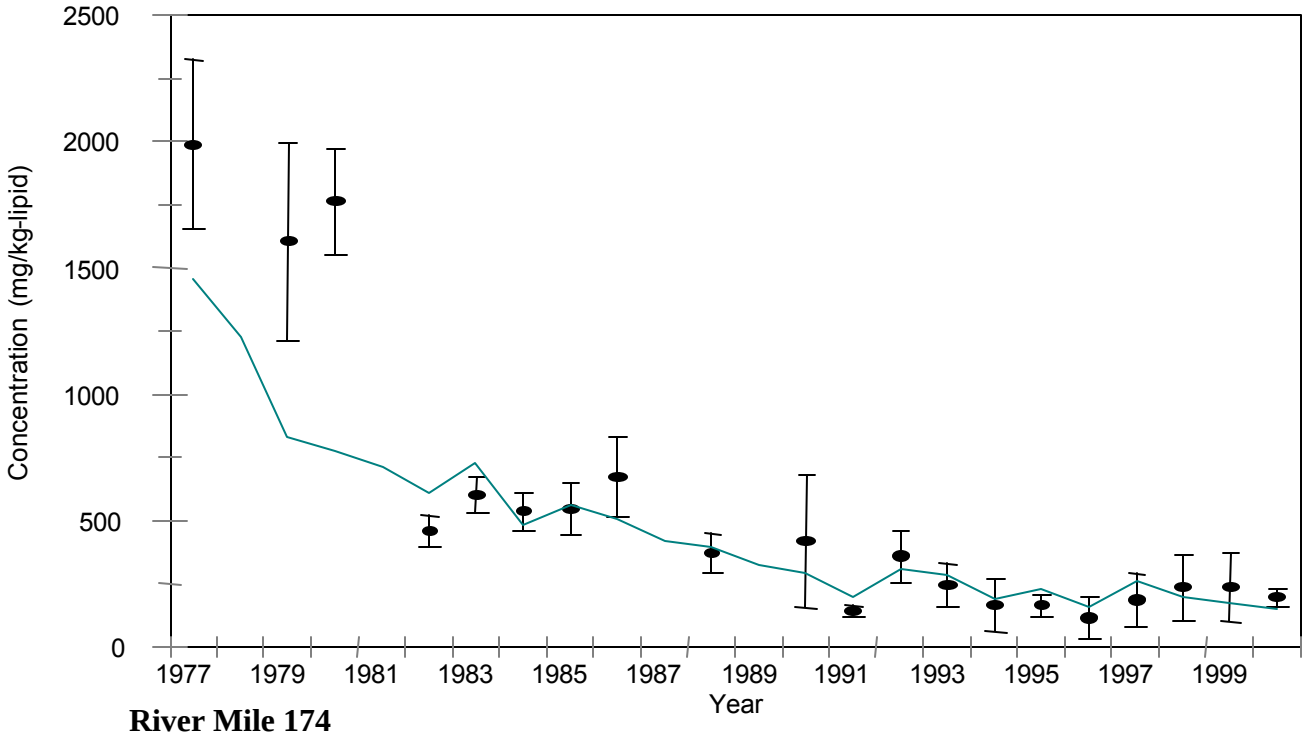


Figure 623-11. 1991-97 Composite Congener Concentrations in TIP Load Gain Predicted as a Mixture of Porewater and Surface Sediment



River Mile 189



River Mile 174

Figure 629-1. Concentration Trends in Brown Bullhead, Including 2000 Data
Vertical bars show arithmetic means and 95% confidence limits for NYSDEC observations, converted to a consistent Tri+ basis. Solid line shows FISHRAND median predictions.

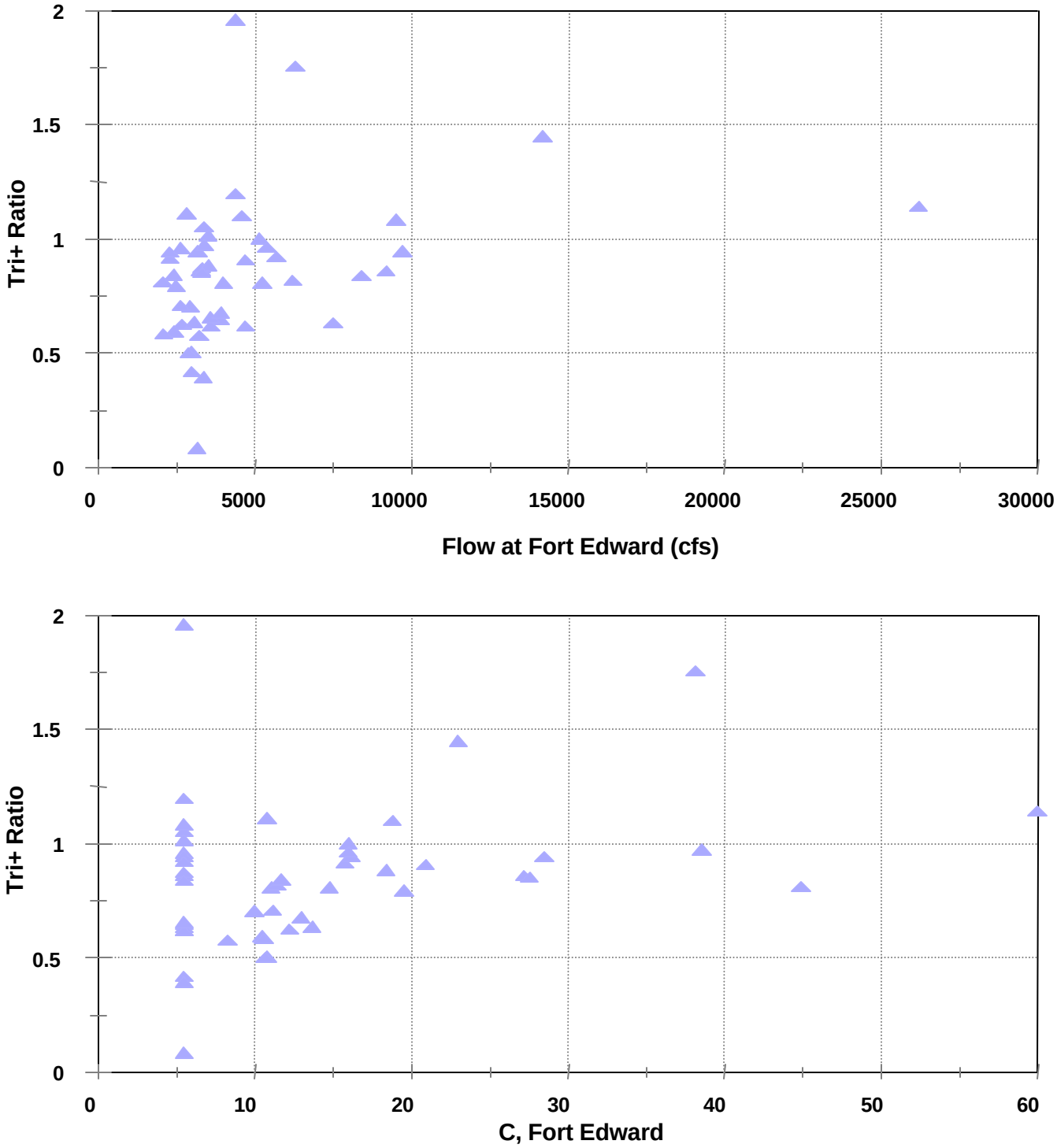


Figure 631-1. Ratio of Tri+ at Center Channel to TID-West, Plotted against Upstream Flow and Concentration

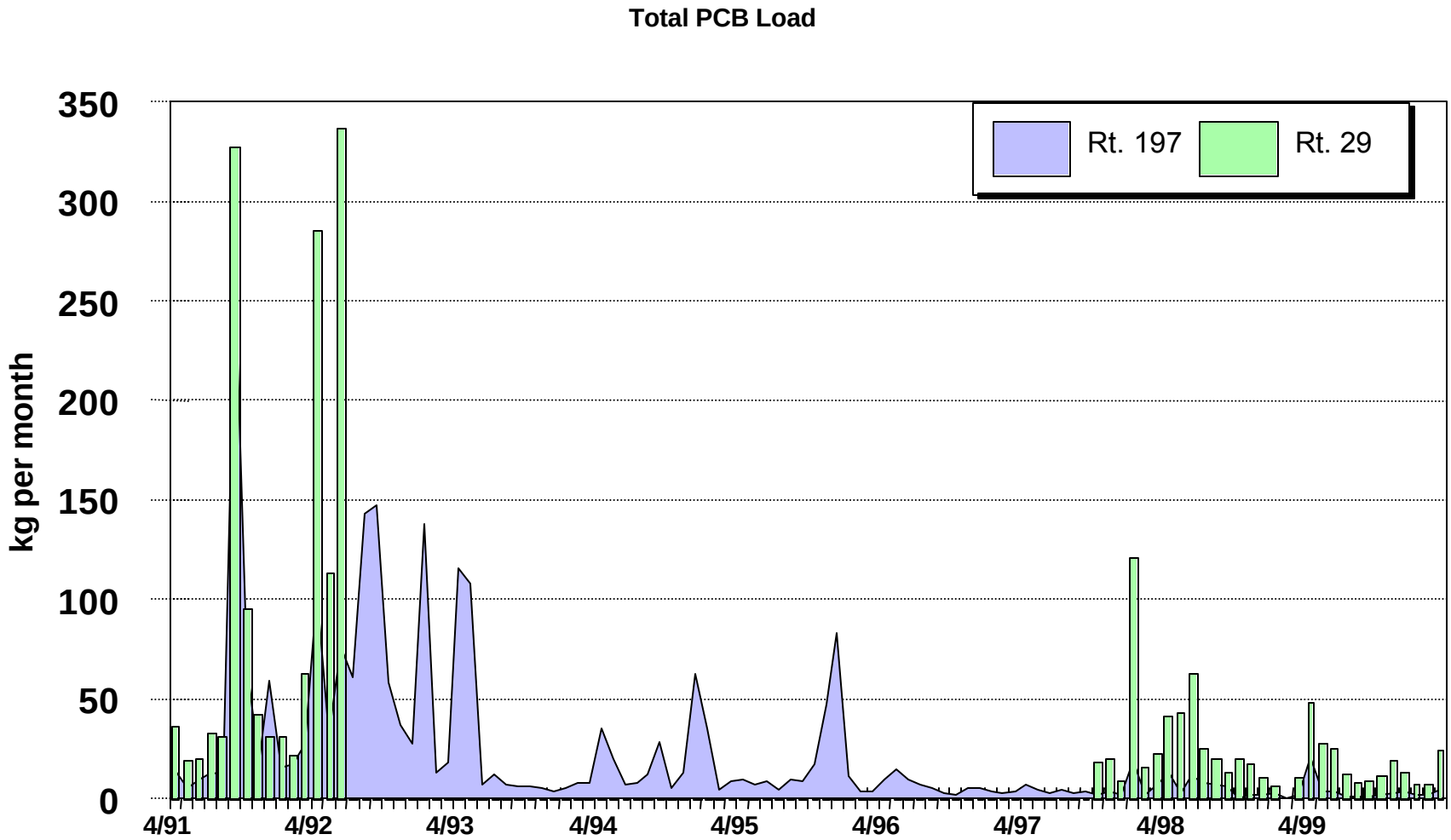


Figure 631-2. Monthly Total PCB Loads at Rt. 197 (Fort Edward) and Rt. 29 (Schuylerville) Estimated from GE Data

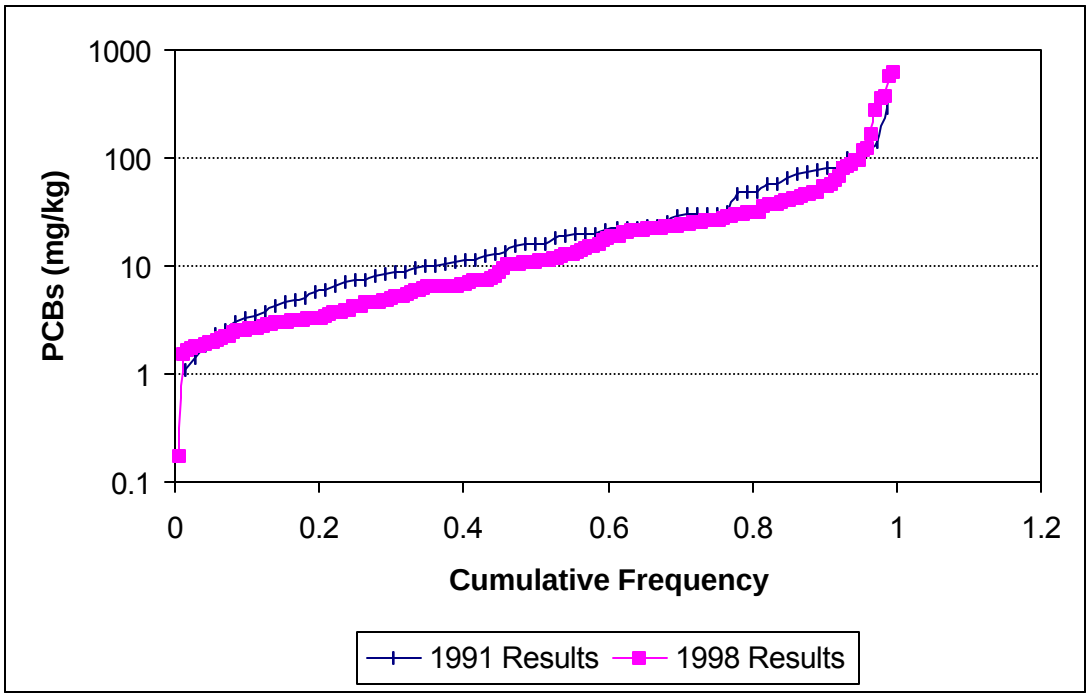


Figure 633-1. Cumulative Frequency Distribution of Total PCB Concentration in Surface Sediments in the Thompson Island Pool, 1991 and 1998 GE Data

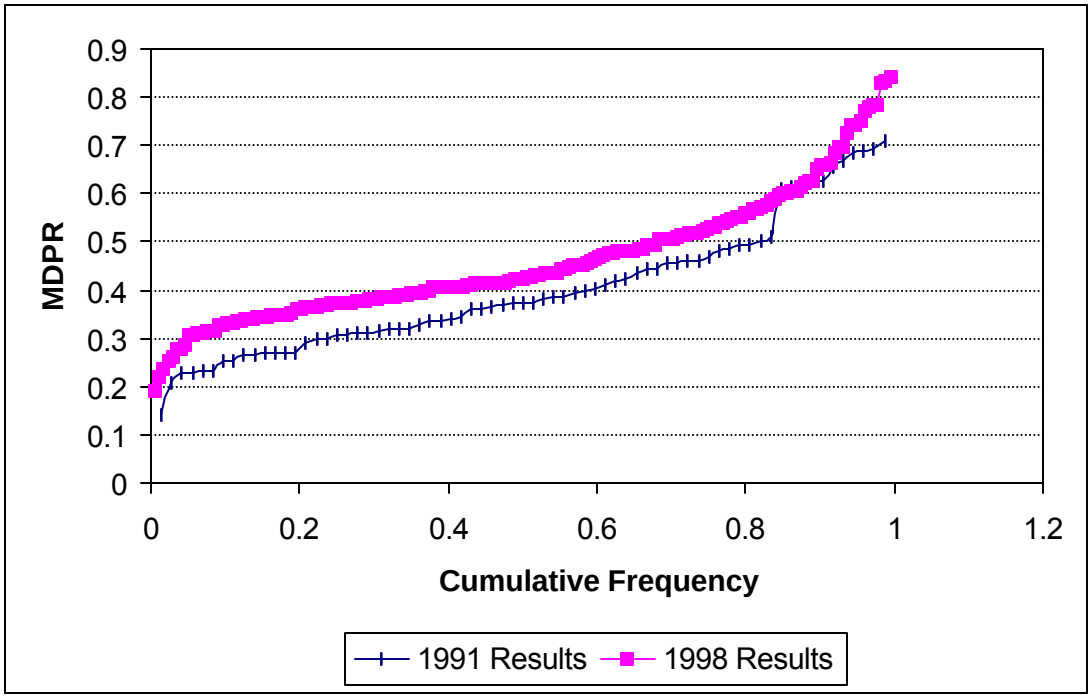


Figure 633-2. Cumulative Frequency Distribution of MDPR in Surface Sediments in the Thompson Island Pool, 1991 and 1998 GE Data

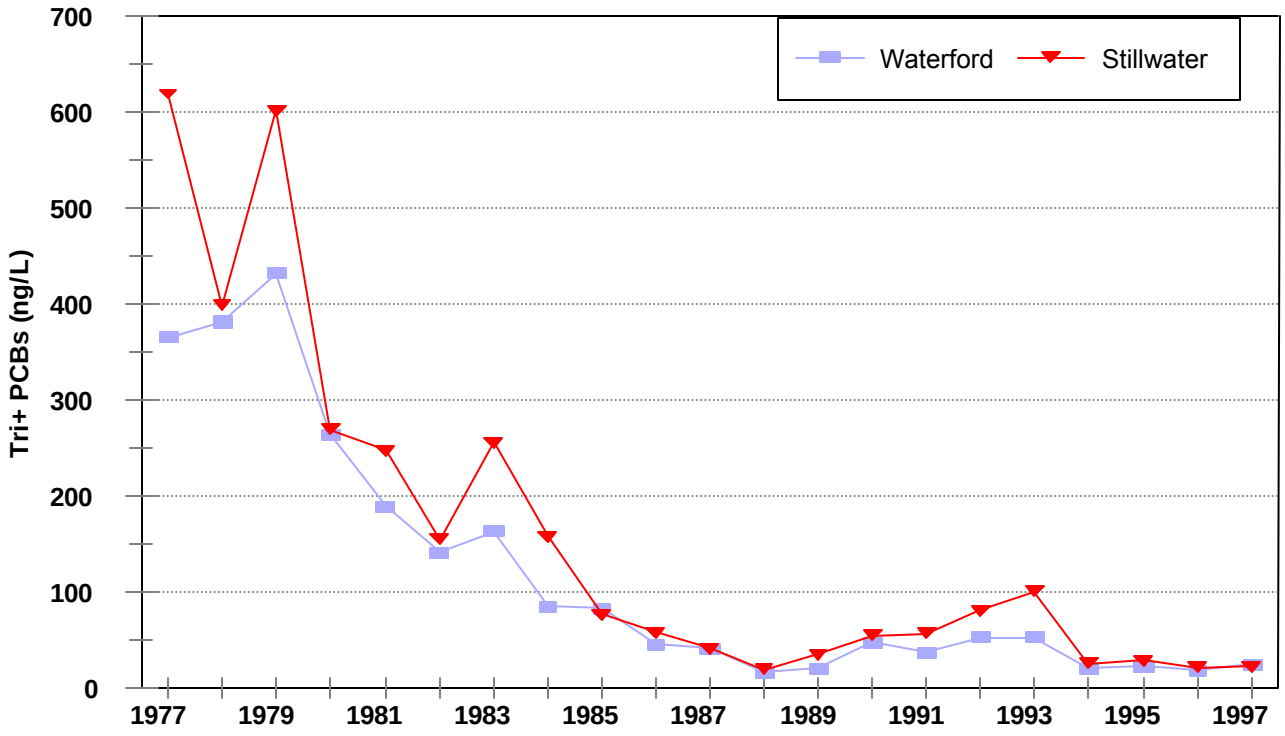


Figure 635-1. Annual Average PCB Tri+ Concentrations from USGS Monitoring at Waterford and Stillwater

FIGURE 3

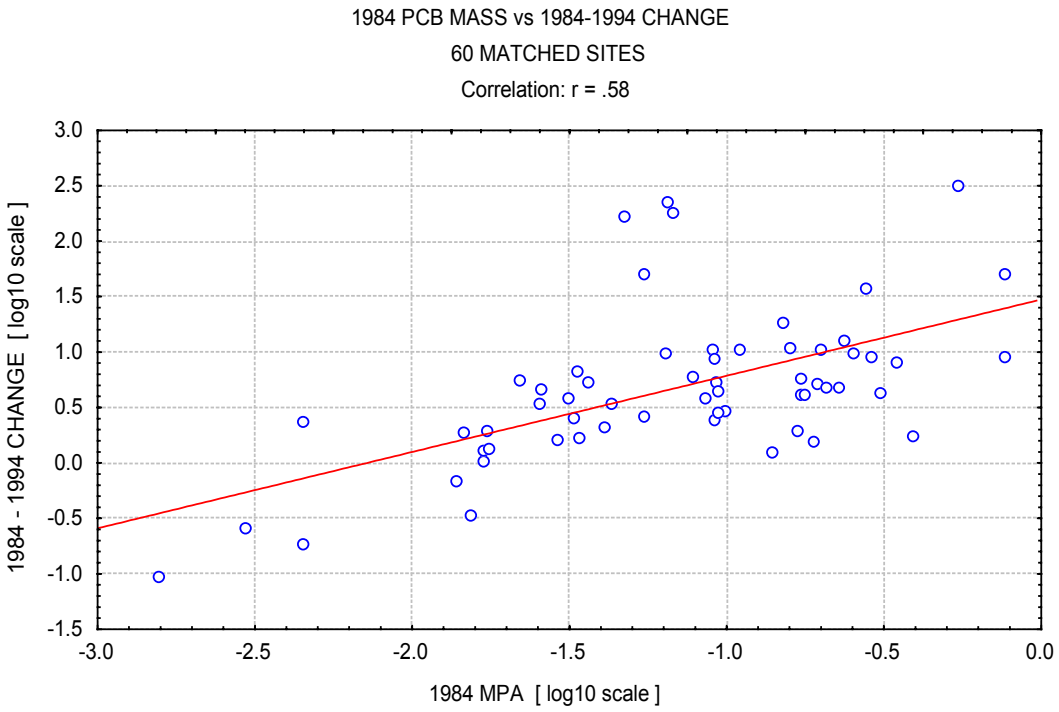


Figure 641-1. Reproduction of Figure 3 from GE Comments, Appendix F.1

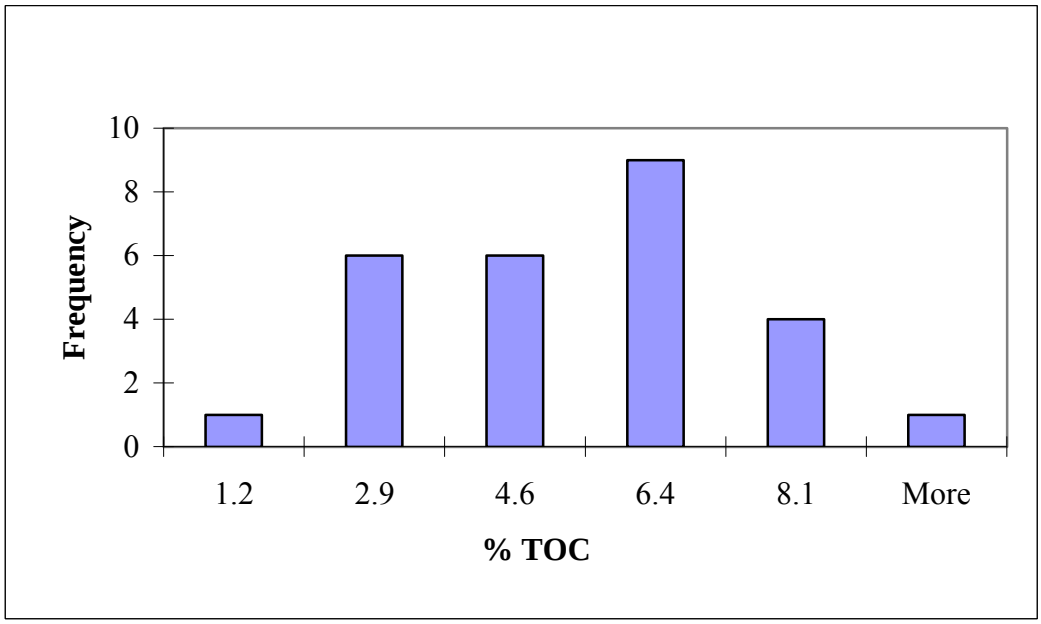
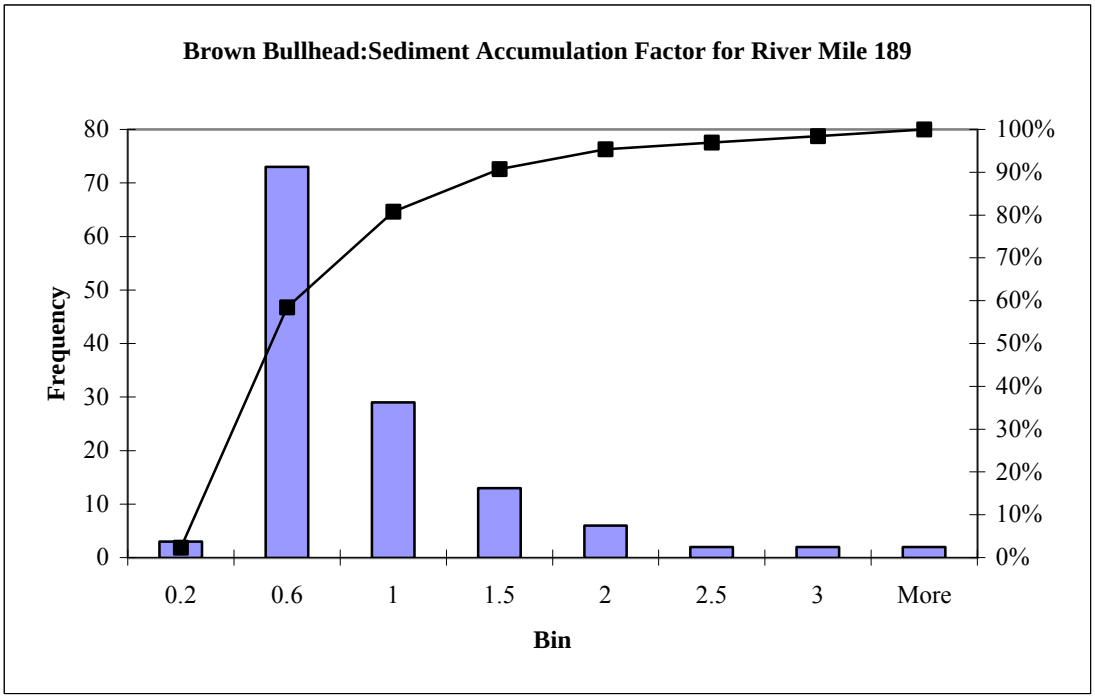


Figure 779-1: Total Organic Carbon in Sediment at RM 189 (TIP)



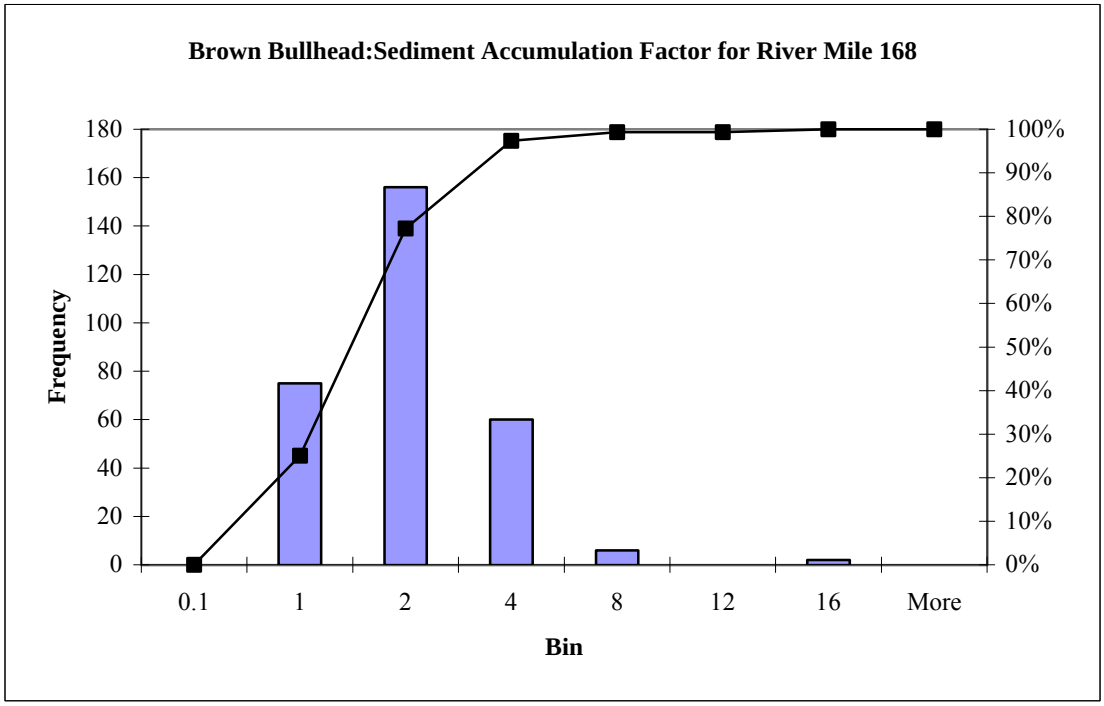


Figure 779-2. Brown Bullhead: Sediment Accumulation Factors

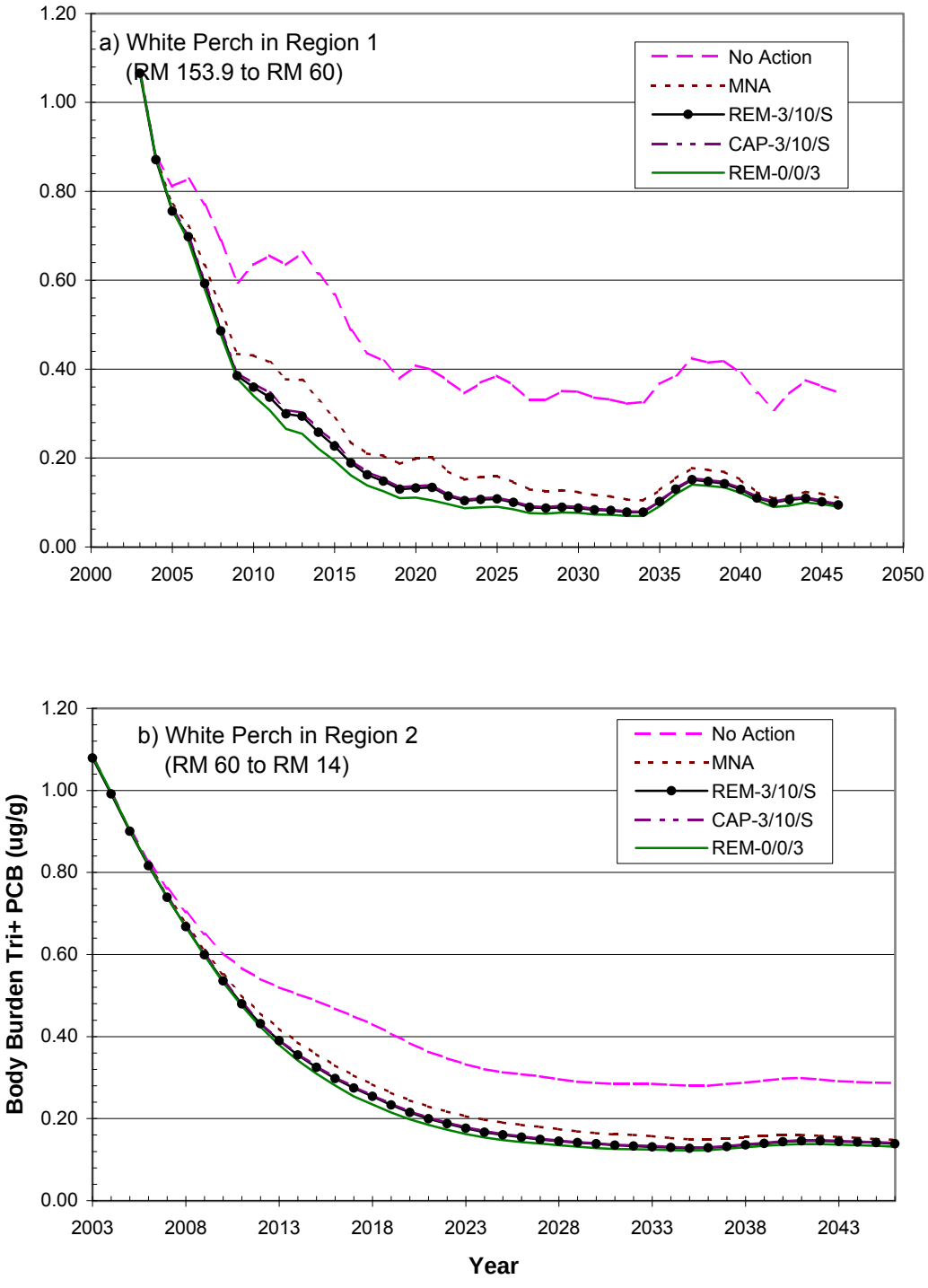


Figure 313787-1. Forecasts of white perch Tri+ PCB body burdens from Farley model

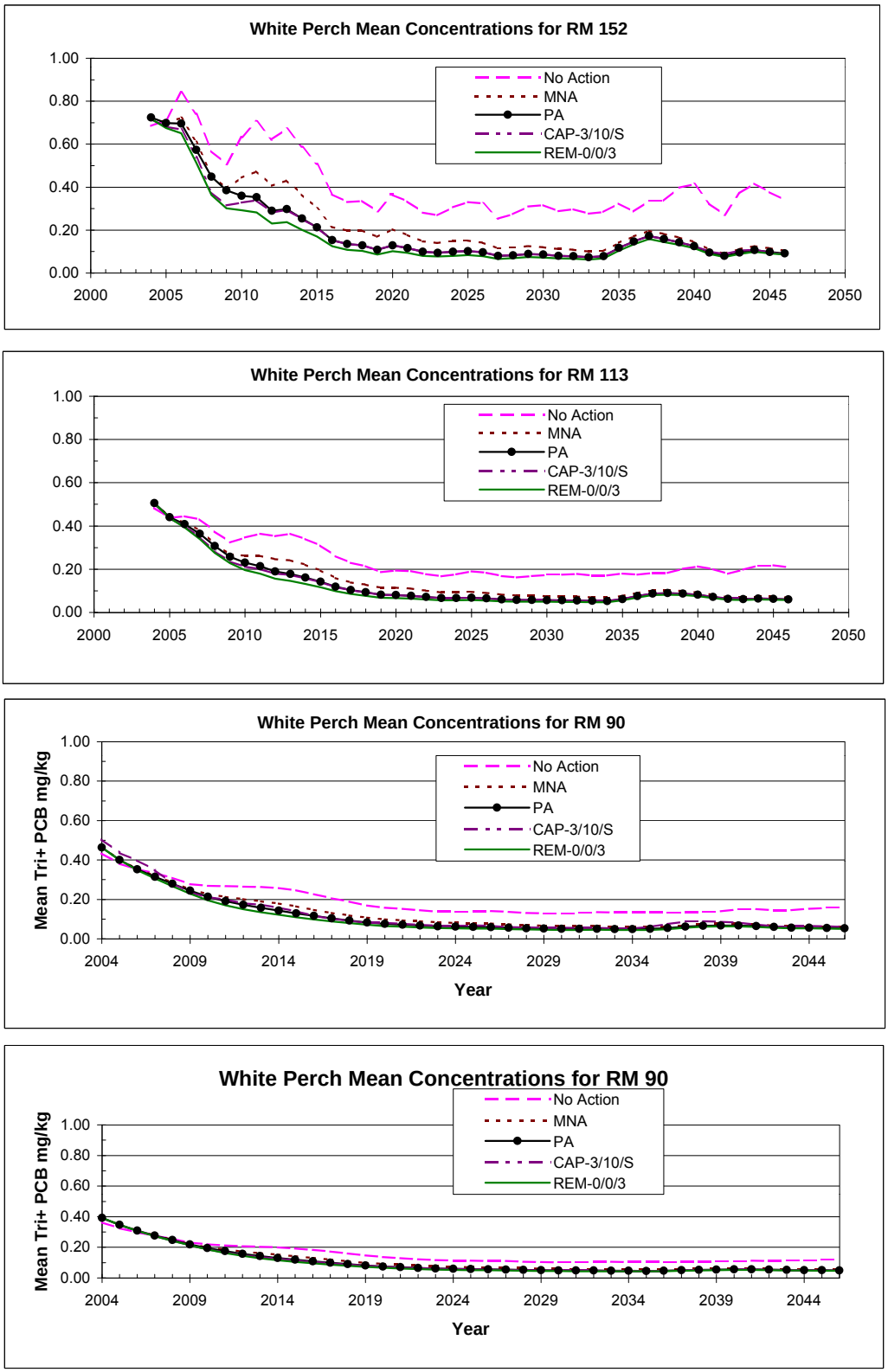


Figure 313787-2. Forecasts of white perch Tri+ PCB body burdens from FISHRAND

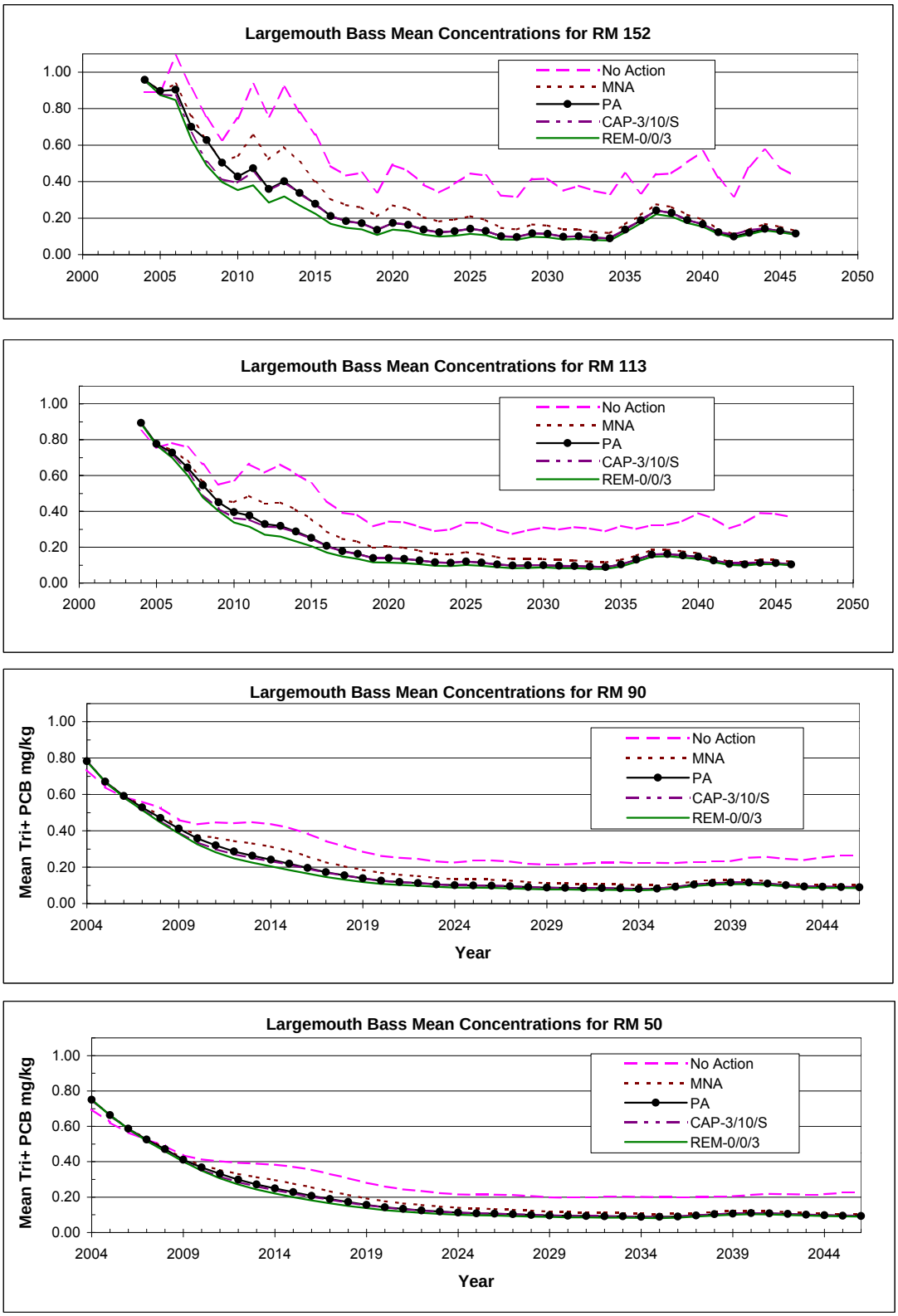
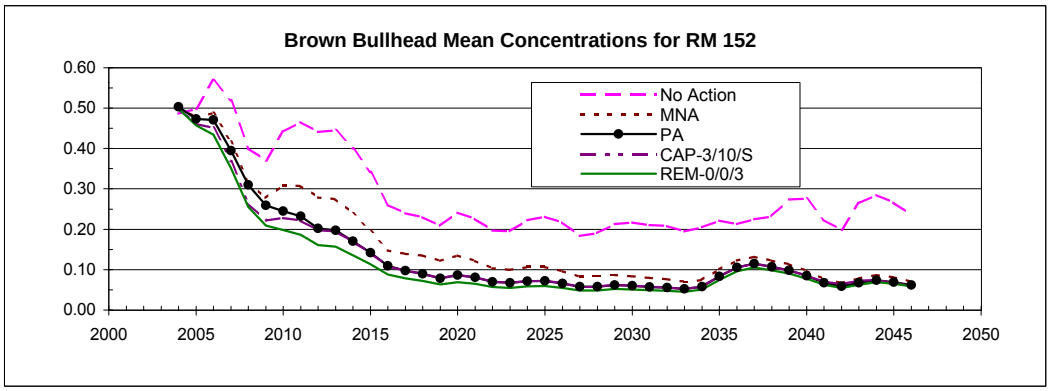
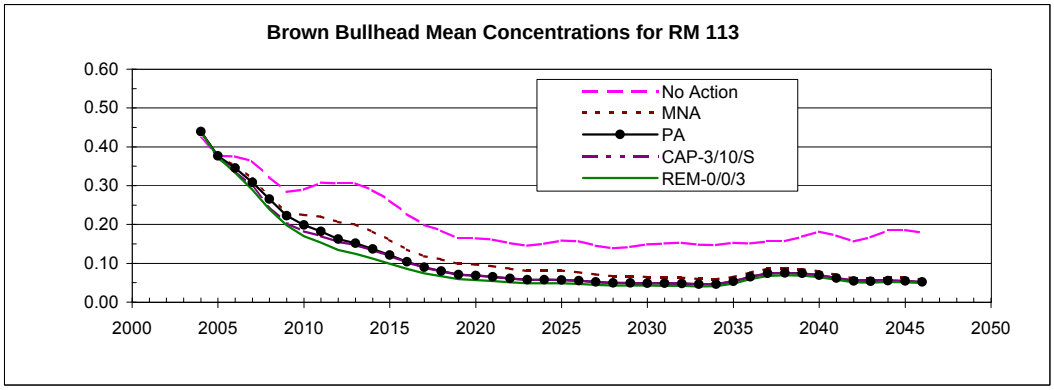
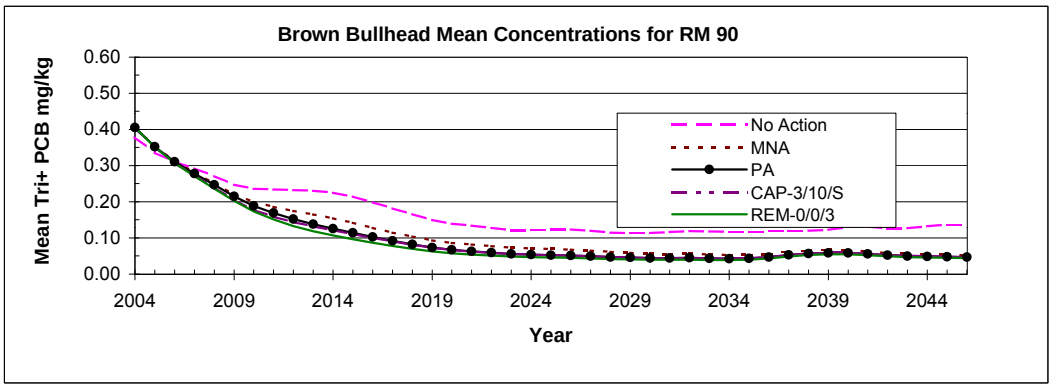


Figure 313787-3. Forecasts of largemouth bass Tri+ PCB body burdens from FISHRAND







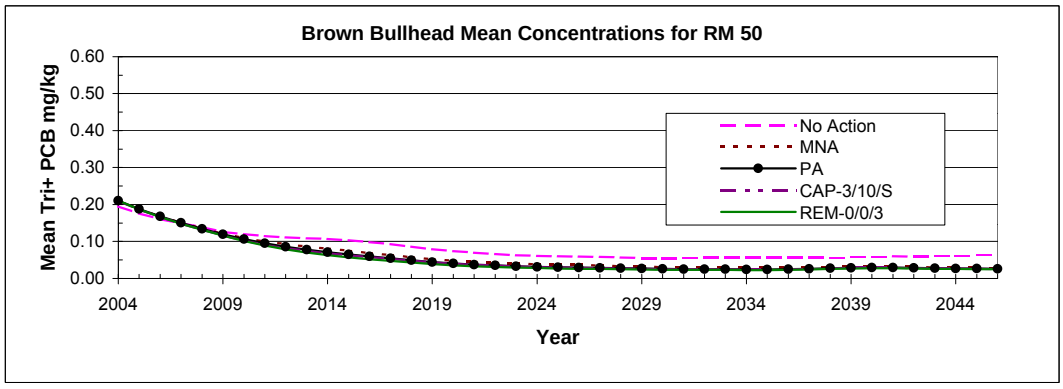
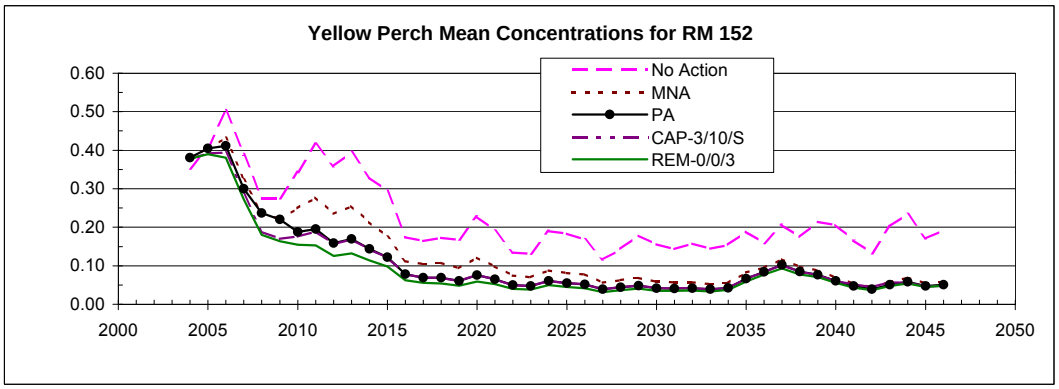
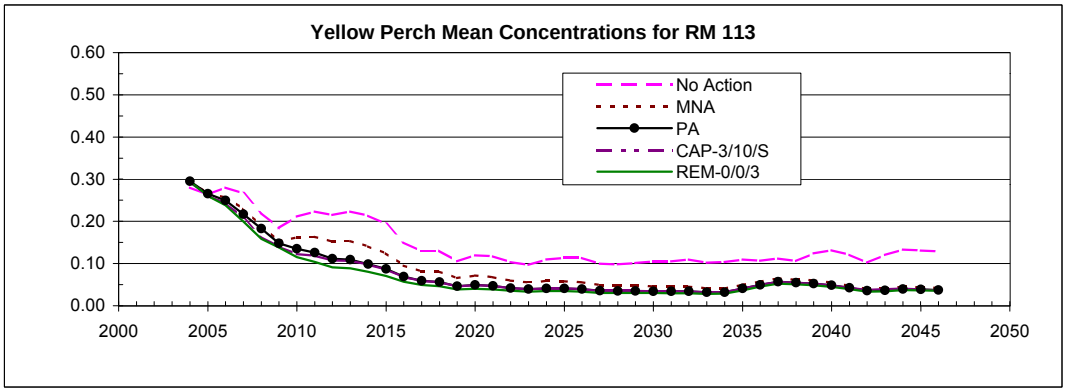
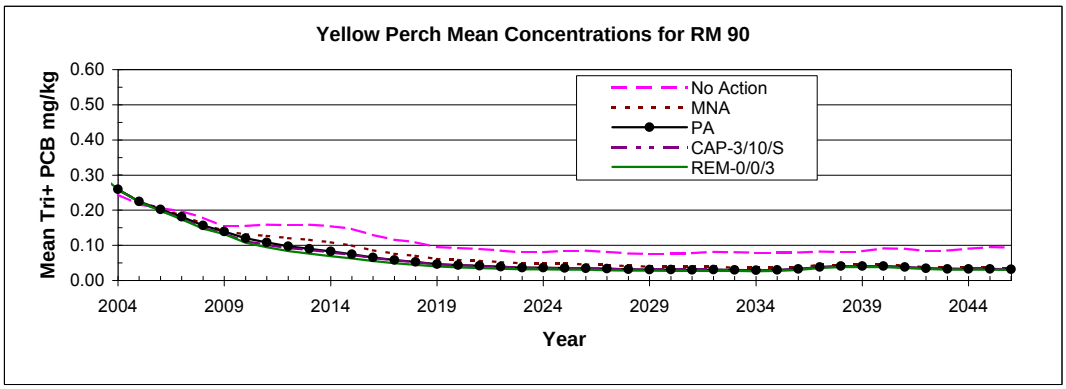


Figure 313787--4. Forecasts of brown bullhead Tri+ PCB body burdens from FISHRAND







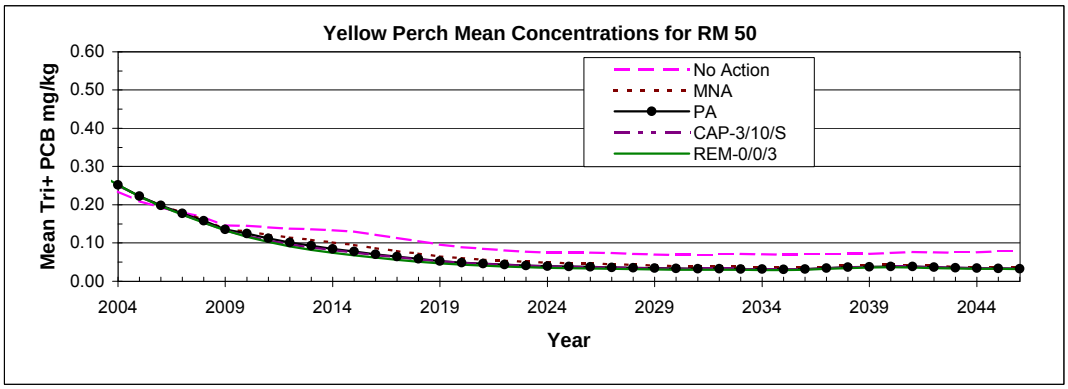


Figure 313787-5;. Forecasts of yellow perch Tri+ PCB body burdens from FISHRAND

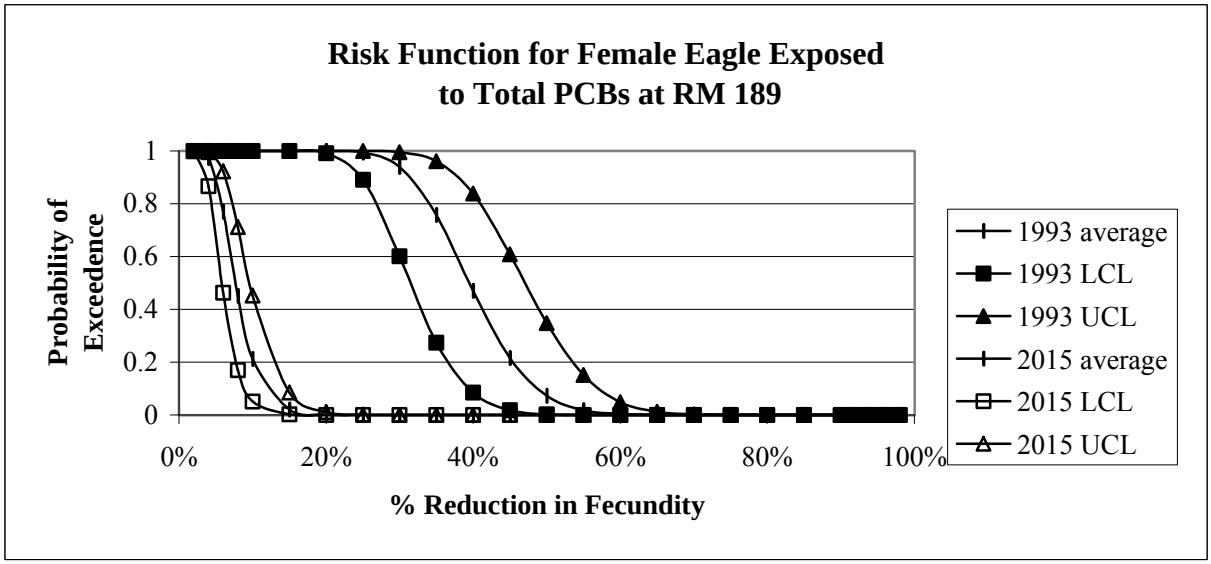
Table 313787-1. Comparison of Tri+ PCB concentrations - water column

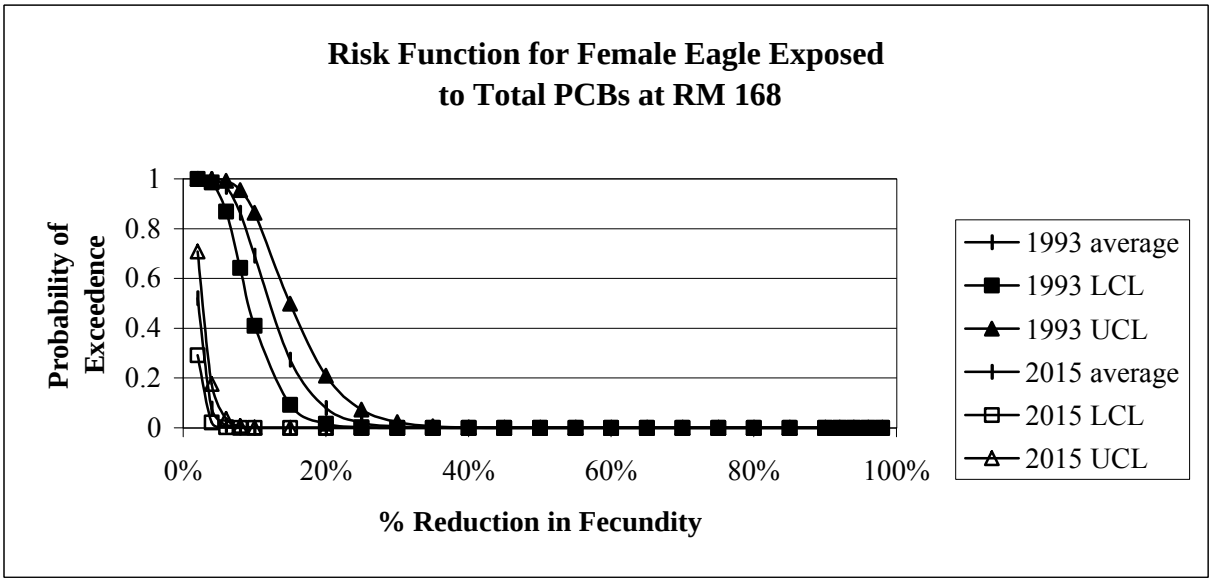
Region 1 (RM 153.5 - RM 60)	Percent Reduction Compared to No Action (%)			Percent Reduction Compared to MNA (%)			Year Construction Completed
Alternatives	Year 2011	Year 2014	Year 2029	Year 2011	Year 2014	Year 2029	
MNA	31	39	64	-	-	-	-
REM-3/10/S	53	60	75	32	34	30	2008
CAP-3/10/S	52	59	74	30	32	27	2008
REM-0/0/3	59	66	78	41	44	39	2010

Region 2 (RM 60 - RM 14)	Percent Reduction Compared to No Action (%)			Percent Reduction Compared to MNA (%)			Year Construction Completed
Alternatives	Year 2011	Year 2014	Year 2029	Year 2011	Year 2014	Year 2029	
MNA	16	24	43	-	-	-	-
REM-3/10/S	27	40	53	13	21	16	2008
CAP-3/10/S	26	39	52	12	19	15	2008
REM-0/0/3	29	44	56	15	26	22	2010

Section 3
BASELINE RISK ASSESSMENTS AND PRGS

Figure 811-1: Risk Functions for Female Eagle Exposed to PCBs





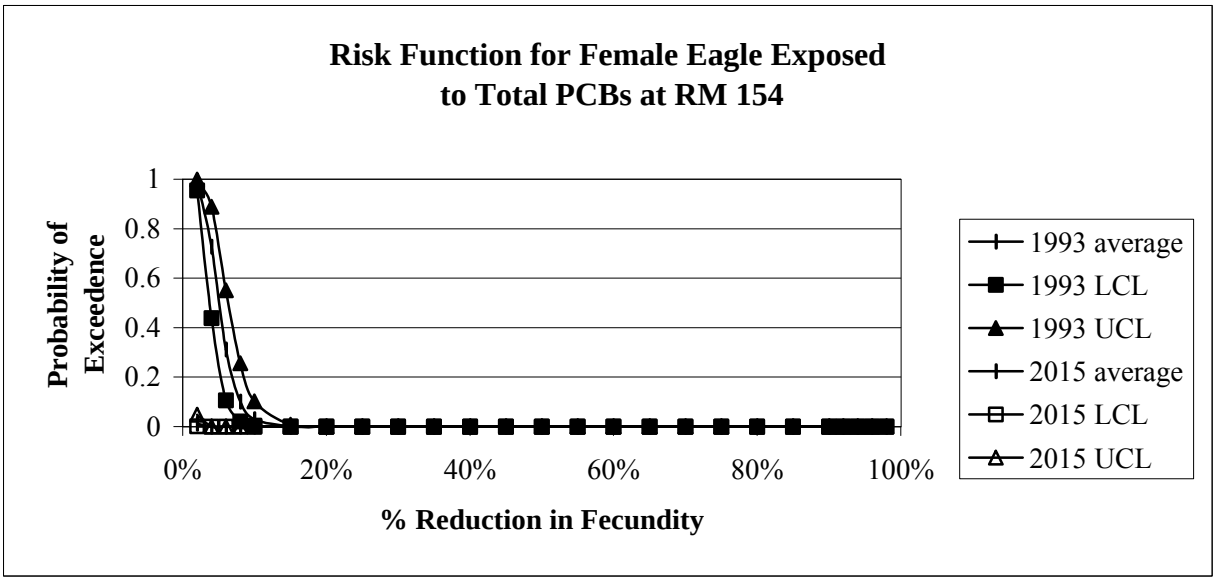
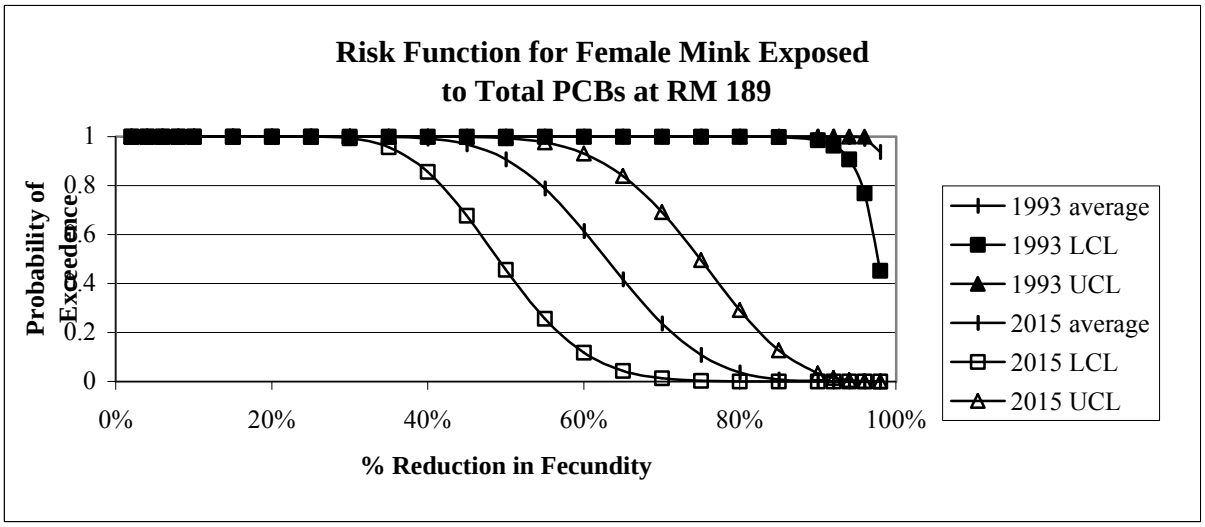
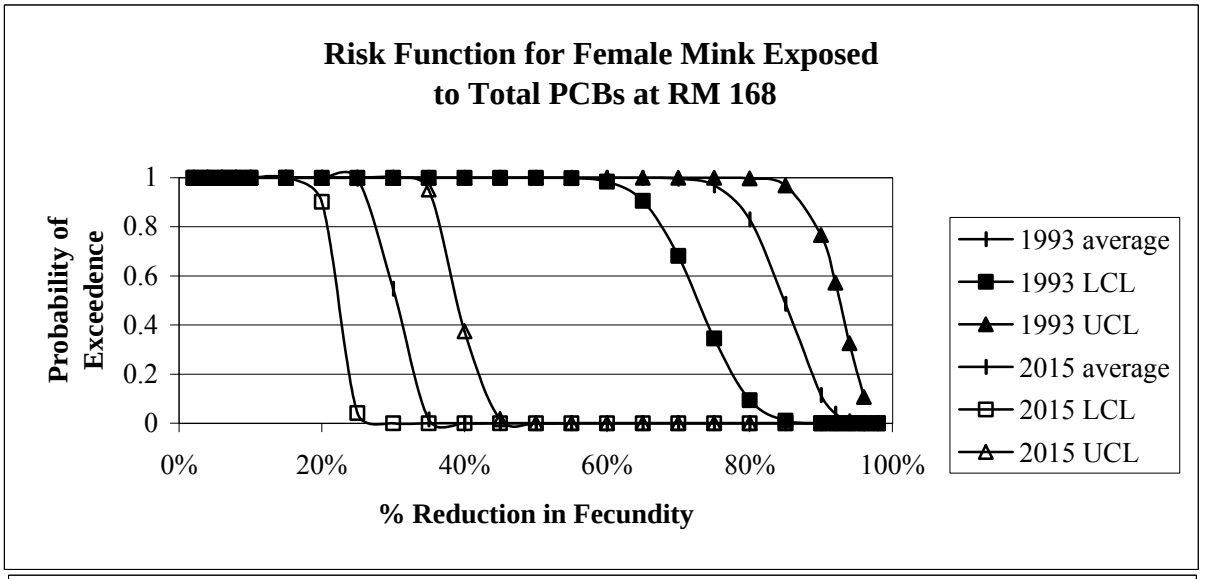


Figure 811-2: Risk Functions for Female Mink Exposed to PCBs





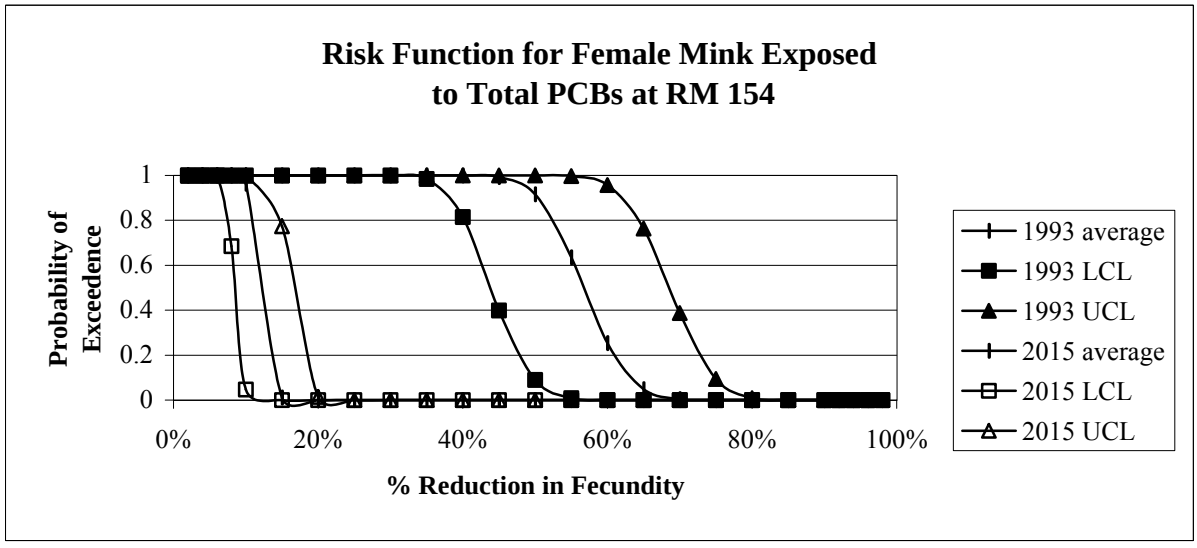
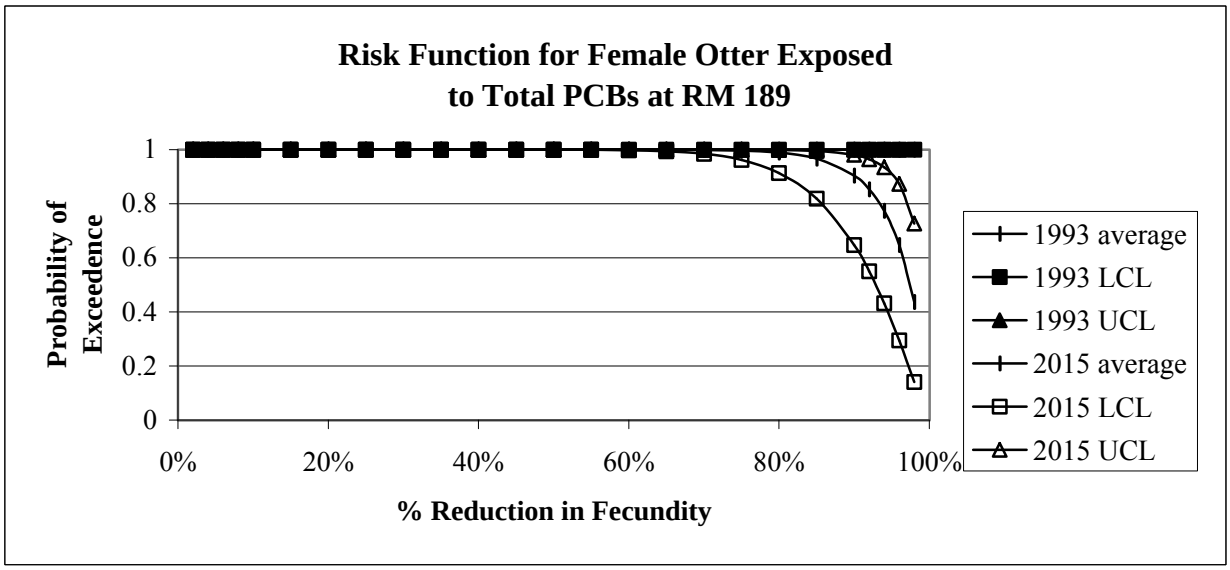
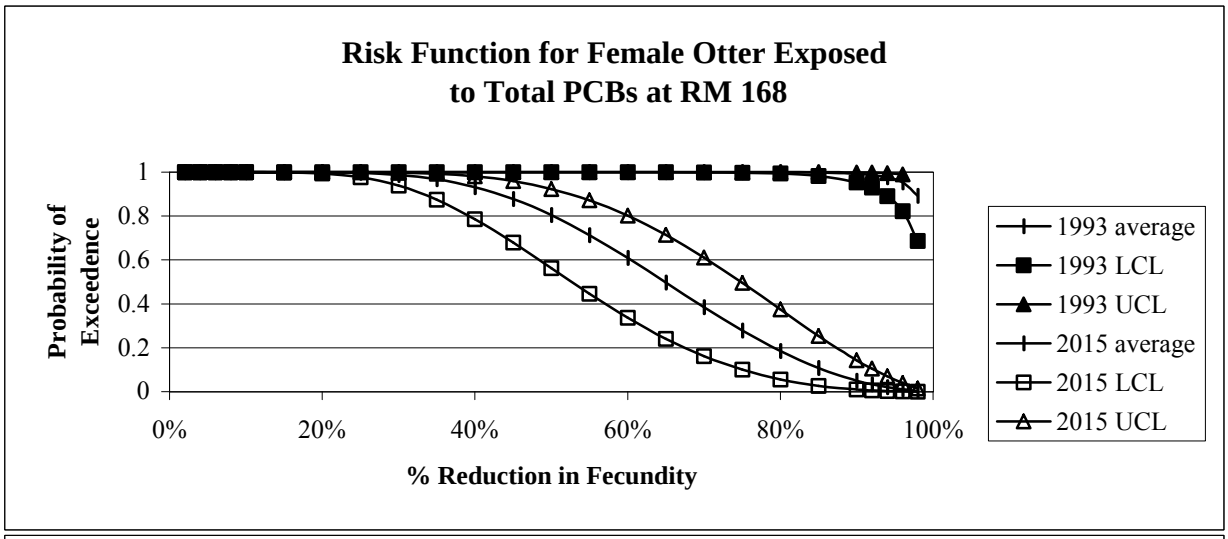


Figure 811-3: Risk Functions for Female Otter Exposed to PCBs





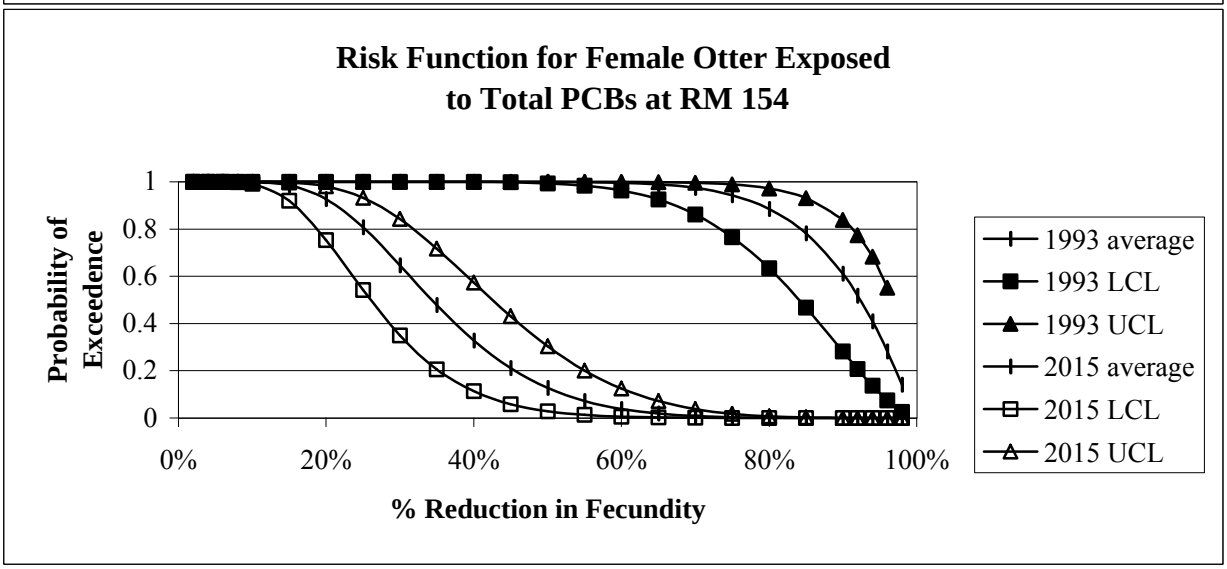


Table 811-1

Summary of Measured PCB Concentrations in Liver of Mink and Otter Caught within 5 Miles of the Hudson River as Compared to TRVs

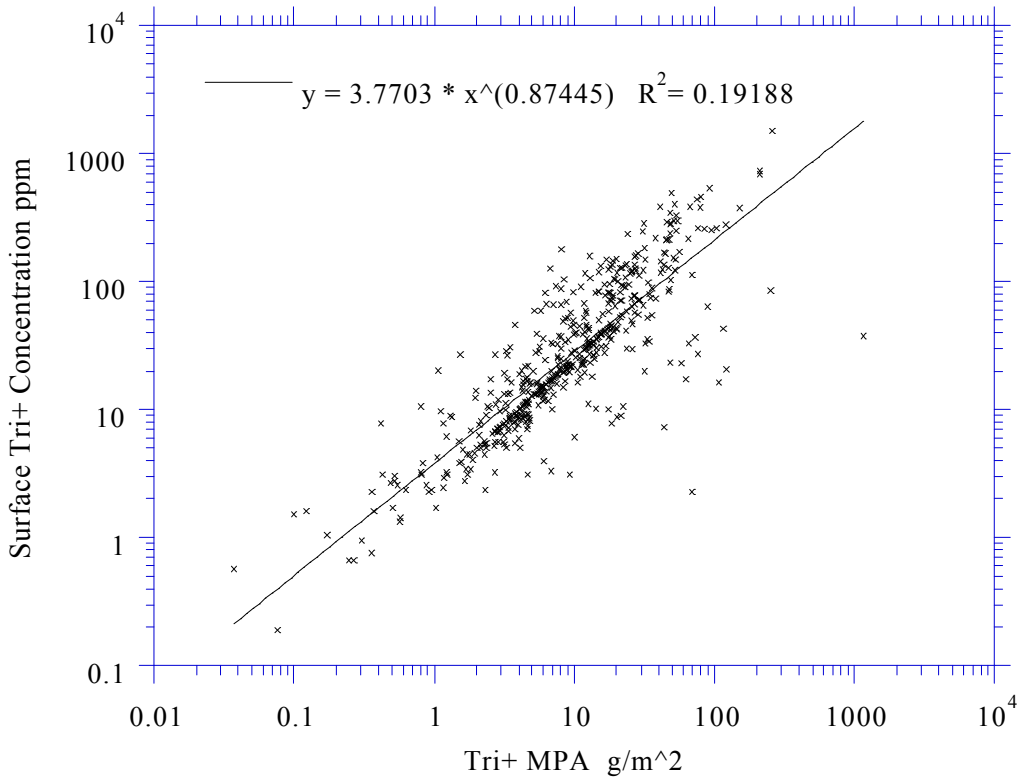
Date	Species	County	Town	% Lipid	Total PCB ww ppm	Exceed wet-weight NOAEL?	Exceed wet-weight LOAEL?	Lipid-Normalized Total PCB ppm	Exceed lipid-based NOAEL?	Exceed lipid-based LOAEL?	Location Descriptor	Distance to River (miles)
19971130	otter	RENSSELAER	TROY	2.5	1.19	y	y	47.87	y	y	Trib	1.0
19971202	otter	RENSSELAER	TROY	3.85	1.16	y	y	30.97	y	y	Trib	1.0
19980106	otter	RENSSELAER	NORTH GREENBUSH	2.26	0.86	y	y	38.12	y	y	Trib	4.3
19990318	otter	ALBANY	COHOES	3.861	0.72	y	y	18.54	y	y	Trib	0.6
199903	otter	SARATOGA	HALFMOON	2.2	4.41	y	y	200.37	y	y	Land	0.2
199912	otter	SARATOGA	NORTHUMBERLAND	2.93	1.08	y	y	36.83	y	y	Land	2.1
19991116	otter	SARATOGA	NORTHUMBERLAND	5.22	22.50	y	y	431.03	y	y	Land	2.2
19980730	mink	SARATOGA	STILLWATER	2.3	0.70	y		30.39	y		River	0
19991208	mink	WASHINGTON	GREENWICH	2.4	3.34	y	y	139.00	y	y	River	0
19991204	mink	SARATOGA	SCHUYLERVILLE	3.61	0.29	y		8.06	y		River	0
19991214	mink	SARATOGA	SCHUYLERVILLE	2.88	0.04			1.39			River	0
19991206	mink	SARATOGA	SARATOGA	2.7	0.08			3.07	y		River	0
19991209	mink	WASHINGTON	EASTON	2.15	0.62	y		29.02	y		Trib	0.3
199912	mink	WASHINGTON	EASTON	3.02	1.27	y		42.12	y		Trib	0.4
19991103	mink	SARATOGA	NORTHUMBERLAND	2.9	0.92	y		31.66	y		Land	0.6
19991111	mink	SARATOGA	MOREAU	1.9	0.32	y		16.84	y		Trib	0.9
1993	mink	SARATOGA	STILLWATER	3.3	0.21	y		6.34	y		Trib	1
1989	mink	SARATOGA	STILLWATER	3.8	3.06	y	y	80.58	y	y	Trib	1
19900830	mink	SARATOGA	STILLWATER	2.2	0.14	y		6.41	y		Trib	1
200003	mink	COLUMBIA	STOCKPORT	3.3	1.36	y		41.33	y		Trib	1.6
200003	mink	COLUMBIA	STOCKPORT	5.3	0.04			0.81			Trib	1.6
19981218	mink	COLUMBIA	CLAVERACK	2.7	0.04			1.55			Trib	1.7
199902	mink	SARATOGA	STILLWATER	4.24	0.08			1.89			Land	1.9
19991105	mink	SARATOGA	NORTHUMBERLAND	1.7	0.02			1.12			Trib	2.2
19991102	mink	SARATOGA	NORTHUMBERLAND	3.2	0.14	y		4.50	y		Trib	2.3
19991106	mink	SARATOGA	NORTHUMBERLAND	2.4	0.07			2.72	y		Trib	2.3
19991205	mink	WASHINGTON	KINGSBURY	1.5	0.12	y		7.80	y		Trib	2.3
19991211	mink	WASHINGTON	KINGSBURY	4.21	0.46	y		10.82	y		Trib	2.3
19991102	mink	SARATOGA	MOREAU	2.3	0.03			1.50			Trib	2.6
19981217	mink	SARATOGA	SARATOGA	3.55	0.02			0.67			Trib	2.8
19991208	mink	SARATOGA	SARATOGA	2.5	0.23	y		9.04	y		Trib	2.8
19991129	mink	SARATOGA	SARATOGA	3.1	0.05			1.61			Trib	2.8
19991201	mink	SARATOGA	SARATOGA	3.2	0.02			0.54			Trib	2.8
19991129	mink	SARATOGA	SARATOGA	3	0.07			2.20	y		Trib	2.8
19990305	mink	SARATOGA	HALFMOON	3.1	0.06			2.05	y		Trib	2.9
19990621	mink	SARATOGA	STILLWATER	2.6	0.03			1.19			Trib	3.2
19991106	mink	SARATOGA	MOREAU	3.3	0.03			0.95			Trib	3.3
19981206	mink	SARATOGA	SARATOGA	2.4	0.02			0.99			Trib	4.2
19981214	mink	SARATOGA	SARATOGA	9.2	0.11	y		1.24			Trib	4.2
20000107	mink	RENSSELAER	SCHAGHTICOKE	2.66	0.05			1.79			Lake	4.4
19991123	mink	SARATOGA	HALFMOON	2.1	0.20	y		9.29	y		Trib	4.5
19991230	mink	WASHINGTON	KINGSBURY	2.9	0.11	y		3.69	y		Trib	4.6
19981130	mink	SARATOGA	SARATOGA	3.3	0.06			1.91			Trib	4.7
19981204	mink	SARATOGA	SARATOGA	3.7	0.02			0.61			Trib	4.7
19981201	mink	SARATOGA	SARATOGA	3.2	0.35	y		10.92	y		Trib	4.7
19991222	mink	WASHINGTON	KINGSBURY	3.2	0.05			1.53			Trib	4.75
19991211	mink	WASHINGTON	KINGSBURY	3.74	0.25	y		6.58	y		Trib	4.9

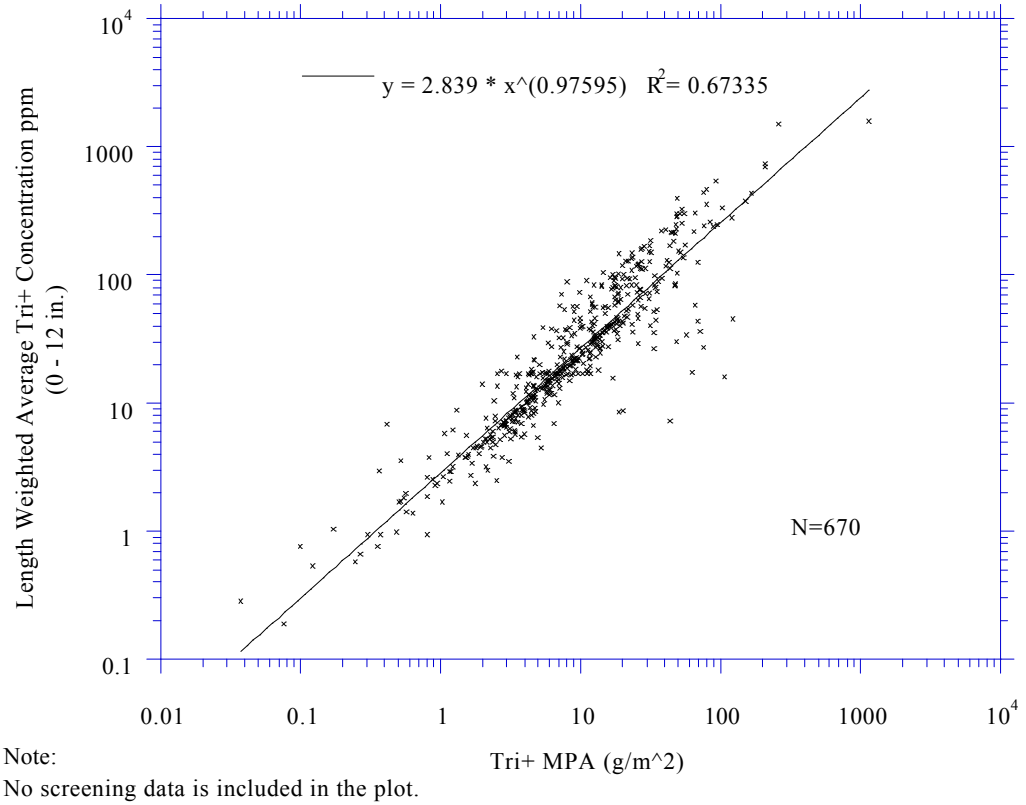
Table 811-2: Summary of Distributions and Distribution Parameters Used in Joint Probability Analysis

Input Variable	Units	Distribution Type[1]	Parameters[2] for Eagle	Parameters[2] for Mink	Parameters[2] for Otter
Piscivorous fish concentration at RM189 in 1993	mg/kg wet weigh	Lognormal, U	45.62 (10.65)		45.62 (10.65)
Piscivorous fish concentration at RM168 in 1993	mg/kg wet weigh	Lognormal, U	12.82 (5.50)		12.82 (5.50)
Piscivorous fish concentration at RM154 in 1993	mg/kg wet weigh	Lognormal, U	5.11 (1.98)		5.11 (1.98)
Piscivorous fish concentration at RM189 in 2015	mg/kg wet weigh	Lognormal, U	7.07 (2.50)		7.07 (2.50)
Piscivorous fish concentration at RM168 in 2015	mg/kg wet weigh	Lognormal, U	2.04 (1.01)		2.04 (1.01)
Piscivorous fish concentration at RM154 in 2015	mg/kg wet weigh	Lognormal, U	0.83 (0.33)		0.83 (0.33)
Forage fish concentration at RM189 in 1993	mg/kg wet weigh	Lognormal, U		14.77 (4.85)	
Forage fish concentration at RM168 in 1993	mg/kg wet weigh	Lognormal, U		3.00 (1.34)	
Forage fish concentration at RM154 in 1993	mg/kg wet weigh	Lognormal, U		1.13 (0.45)	
Forage fish concentration at RM189 in 2015	mg/kg wet weigh	Lognormal, U		2.85 (1.22)	
Forage fish concentration at RM168 in 2015	mg/kg wet weigh	Lognormal, U		0.48 (0.14)	
Forage fish concentration at RM154 in 2015	mg/kg wet weigh	Lognormal, U		0.17 (0.06)	
Benthic invertebrate concentration at RM189 in 199	mg/kg wet weigh	Triangular, U	NA	15.17 (13.65-16.68)	15.17 (13.65-16.68)
Benthic invertebrate concentration at RM168 in 199	mg/kg wet weigh	Triangular, U	NA	9.30 (9.03-9.94)	9.30 (9.03-9.94)
Benthic invertebrate concentration at RM154 in 199	mg/kg wet weigh	Triangular, U	NA	4.52 (4.07-4.97)	4.52 (4.07-4.97)
Benthic invertebrate concentration at RM189 in 201	mg/kg wet weigh	Triangular, U	NA	2.24 (2.01-2.46)	2.24 (2.01-2.46)
Benthic invertebrate concentration at RM168 in 201	mg/kg wet weigh	Triangular, U	NA	1.87 (1.68-2.06)	1.87 (1.68-2.06)
Benthic invertebrate concentration at RM154 in 201	mg/kg wet weigh	Triangular, U	NA	0.69 (0.62-0.76)	0.69 (0.62-0.76)
Body weight	kg	Triangular, V	5.1 (4.5-5.6)	0.827 (0.550-1.101)	7.32 (6.73-7.90)
Ingestion rate	g/day	Triangular, V	0.642 (0.585-0.690)	0.132 (0.119-0.145)	0.9 (0.7-1.1)
Area use factor	fraction	Triangular, V	0.75 (0.5, 1.0)	0.75 (0.5, 1.0)	0.75 (0.5, 1.0)
Percentage of diet consisting of fish	fraction	Triangular, V	0.9 (0.8 - 1.0)	0.30 (0.19-0.37)	0.88 (0.70-1.00)
Percentage of diet consisting of invertebrates	fraction	Triangular, V	0	0.16 (0.13-0.18)	1-% fish
Water intake rate	L/day	Triangular, V	0.175 (0.162-0.187)	0.08 (0.05-0.10)	0.59 (0.55-0.64)

Notes:
1 - U refers to unknown quantities, V refers to variability
2 - Parameters for lognormal distribution are specified as mean (standard deviation).
Parameters for triangular distribution are specified as mode (min, max).

Section 4
REMEDIAL ACTION OBJECTIVES AND SELECTION OF TARGET AREAS





Note:
No screening data is included in the plot.

Figure 597-1
Correlations Among PCB Metrics for 1984 NYSDEC Sediment Survey

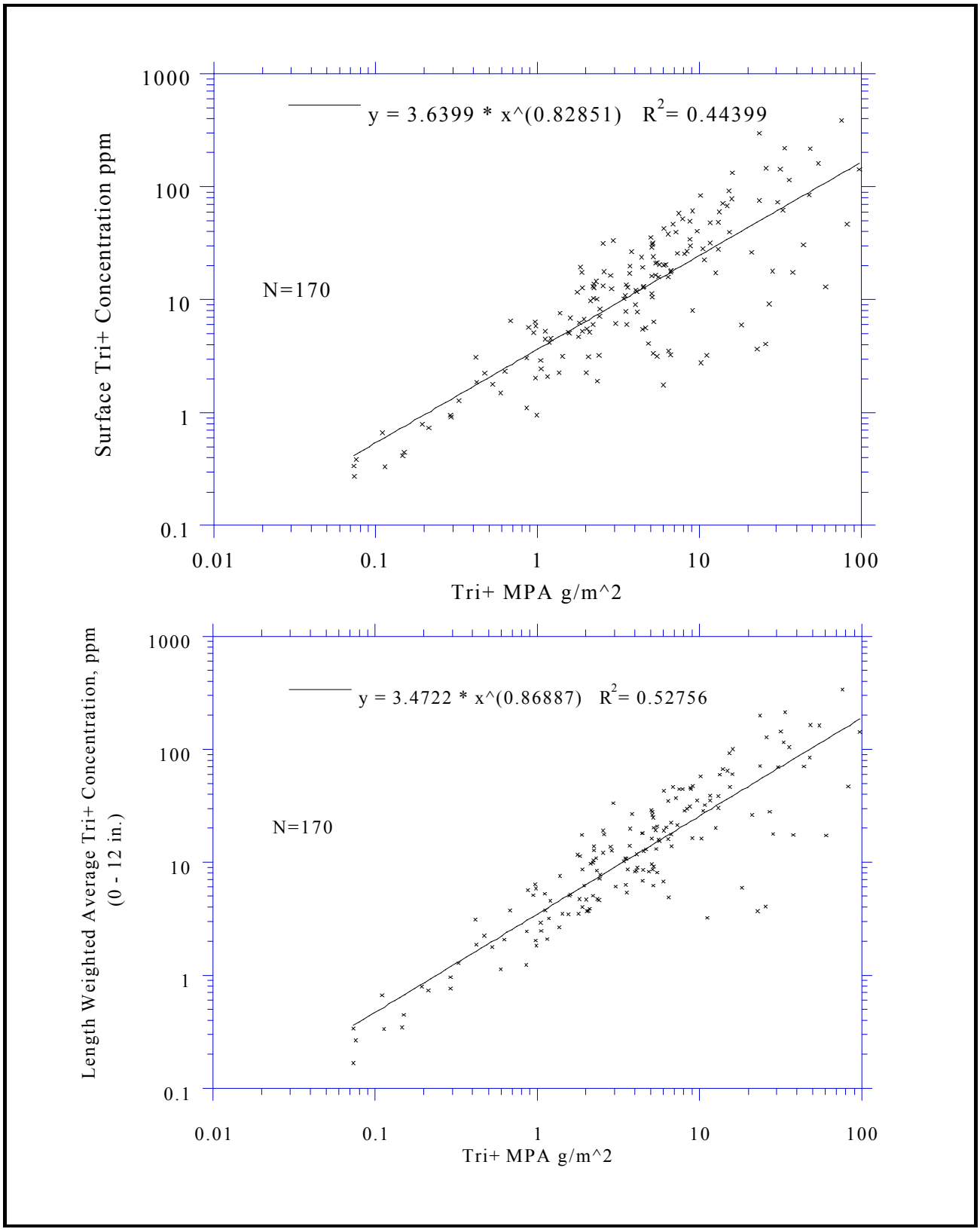


Figure 597-2
Correlations Among PCB Metrics for USEPA Low Resolution Sediment Coring Survey

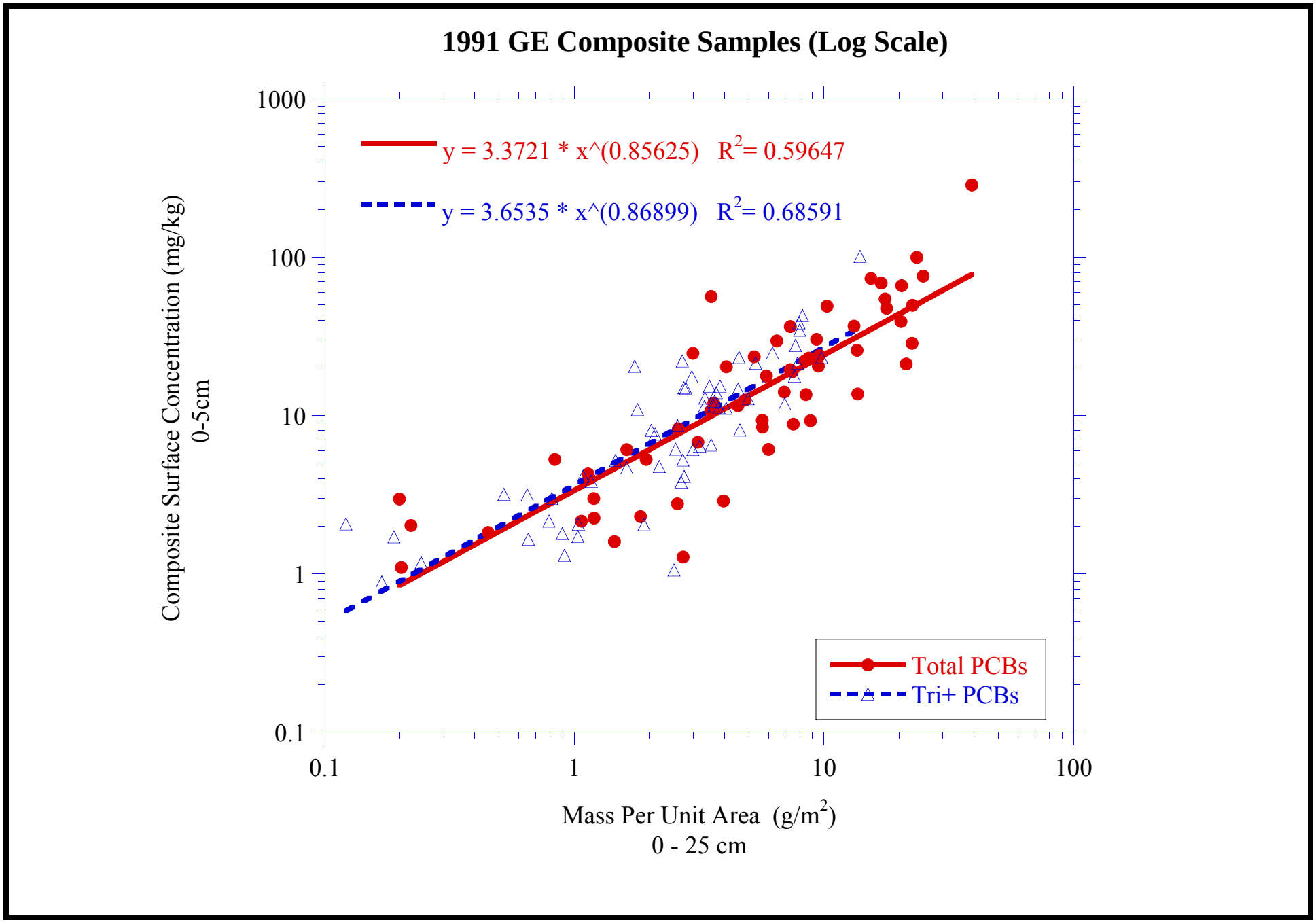
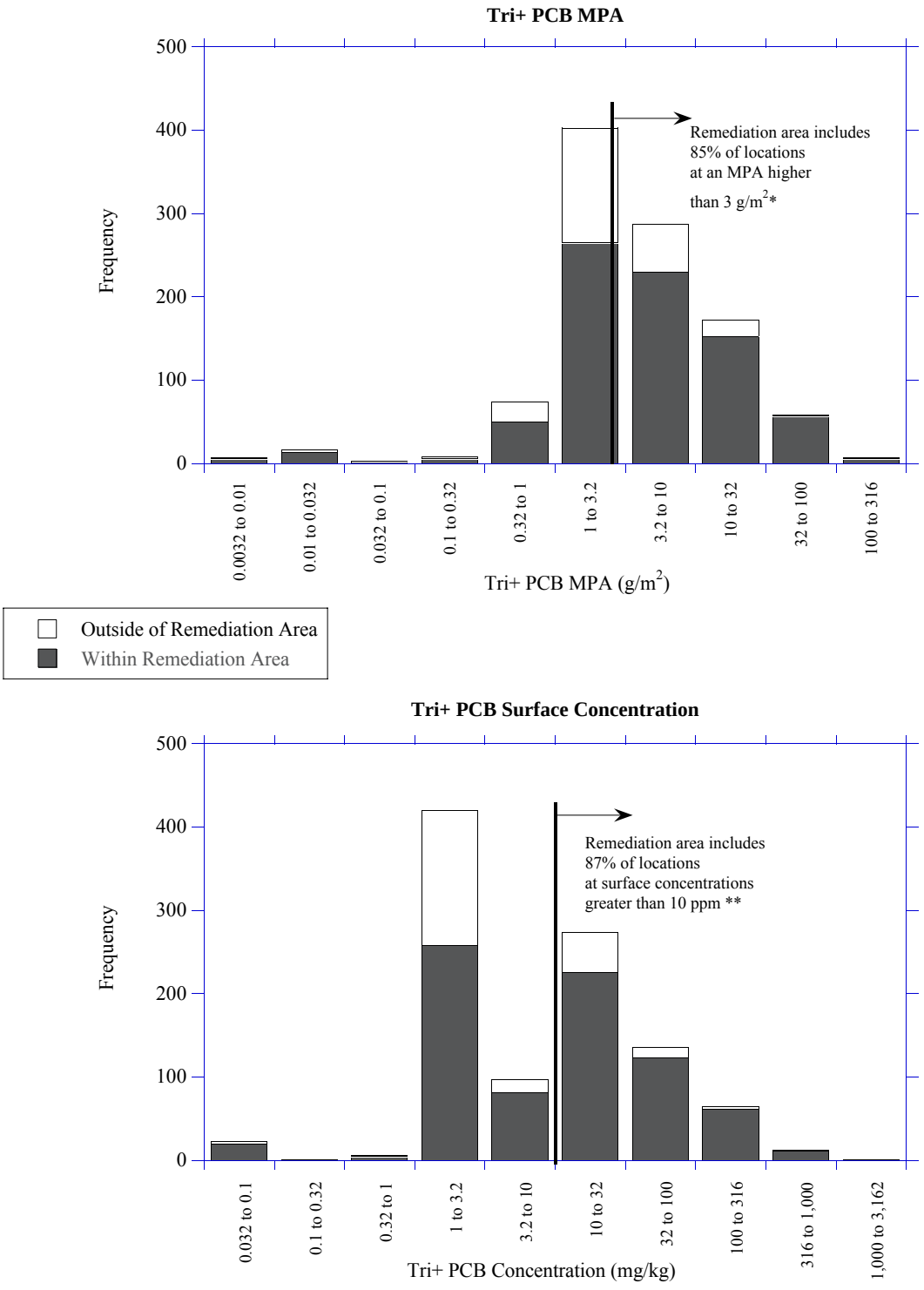
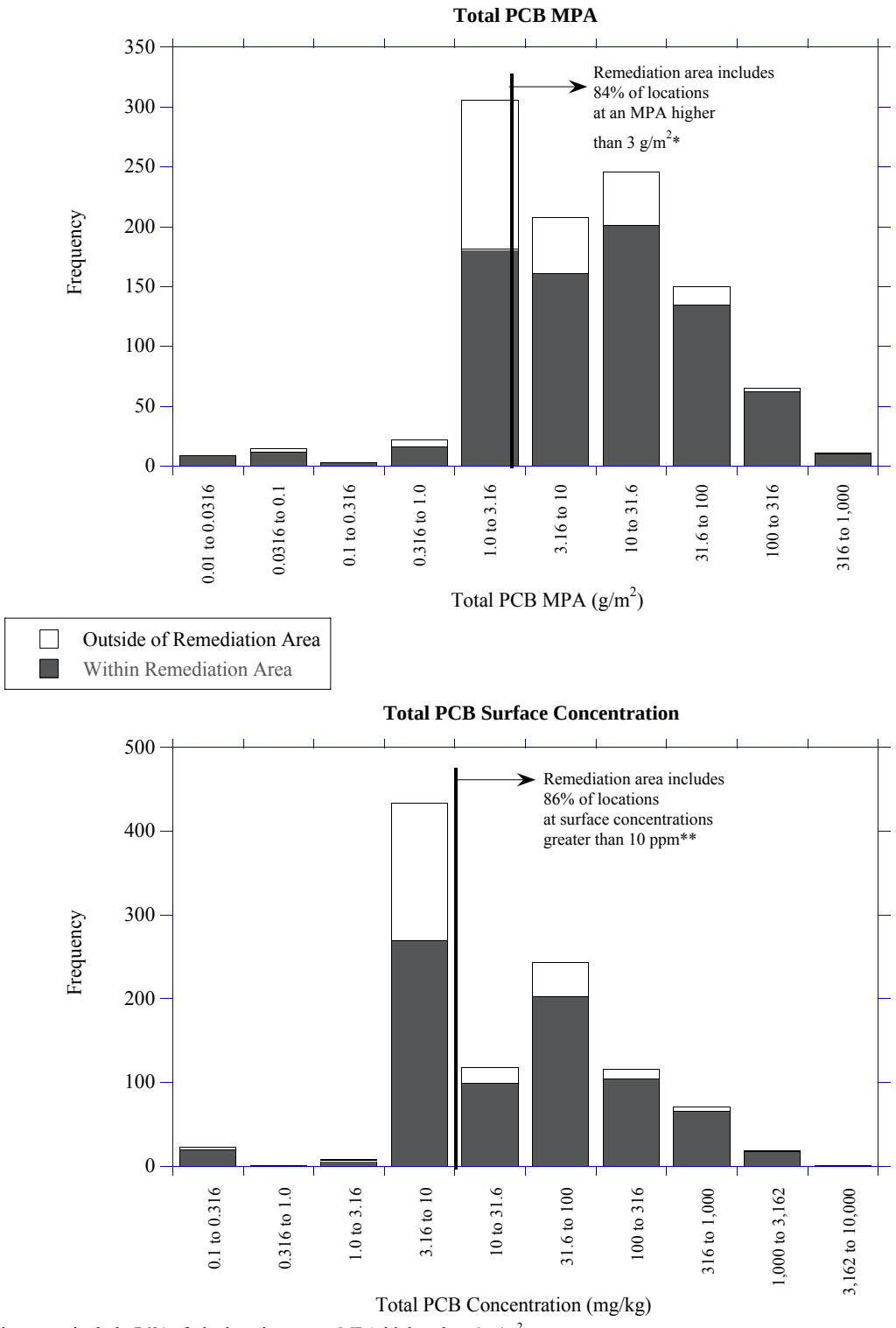


Figure 597-3
Correlation of Surface Concentration and MPA for
GE 1991 Composite Samples



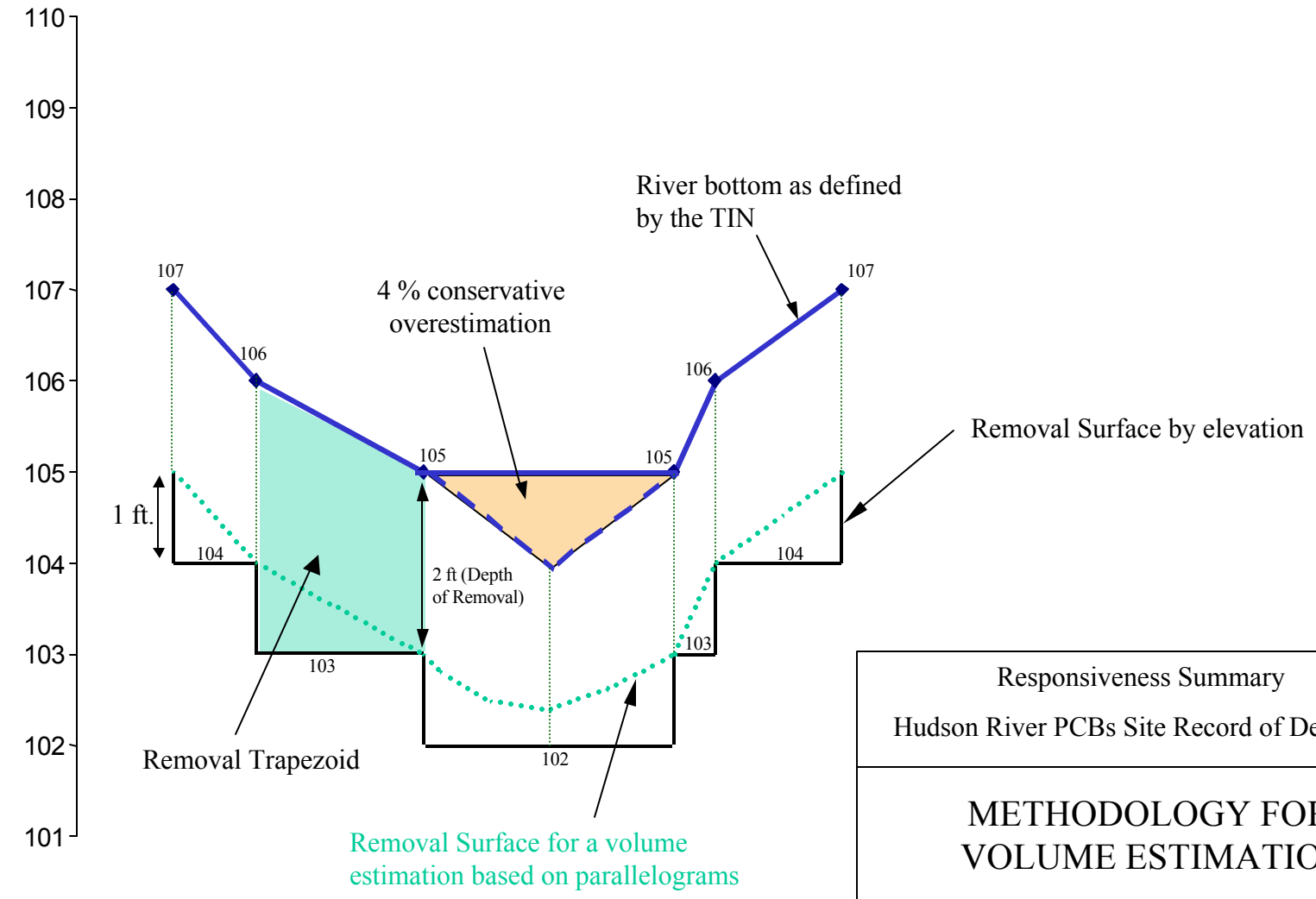
* Remediation areas include 77% of the locations at an MPA higher than 1 g/m^2
**Remediation areas include 86% of the locations at surface concentration greater than 3.2 ppm

Figure 597-4
Assessment of the Capture Efficiency for the Expanded Hotspot Remediation
Tri+ PCB Concentration and MPA Histograms for 1984 NYSDEC Data
Within and Outside of Remedial Area



* Remediation areas include 76% of the locations at an MPA higher than 1 g/m^2
**Remediation areas include 76% of the locations at surface concentration greater than 3.2 ppm

Figure 597-5
Assessment of the Capture Efficiency for the Expanded Hot Spot Remediation
Total PCB Concentration and MPA Histograms for 1984 NYSDEC Data
Within and Outside of Remedial Area



Responsiveness Summary

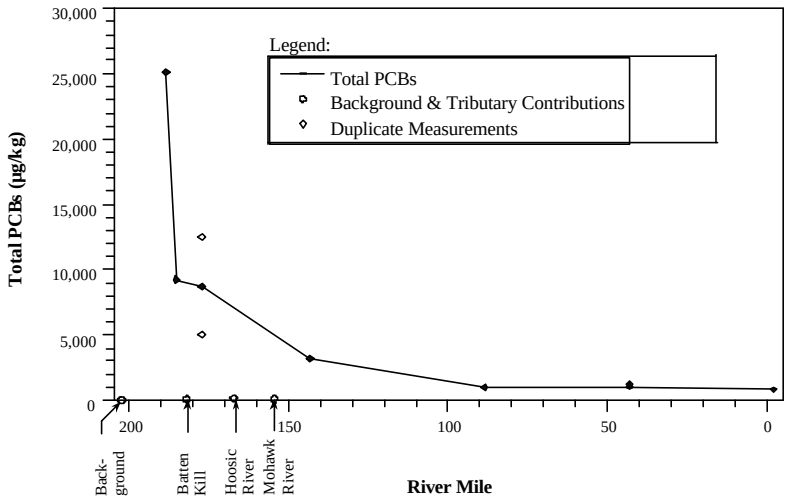
Hudson River PCBs Site Record of Decision

METHODOLOGY FOR VOLUME ESTIMATION

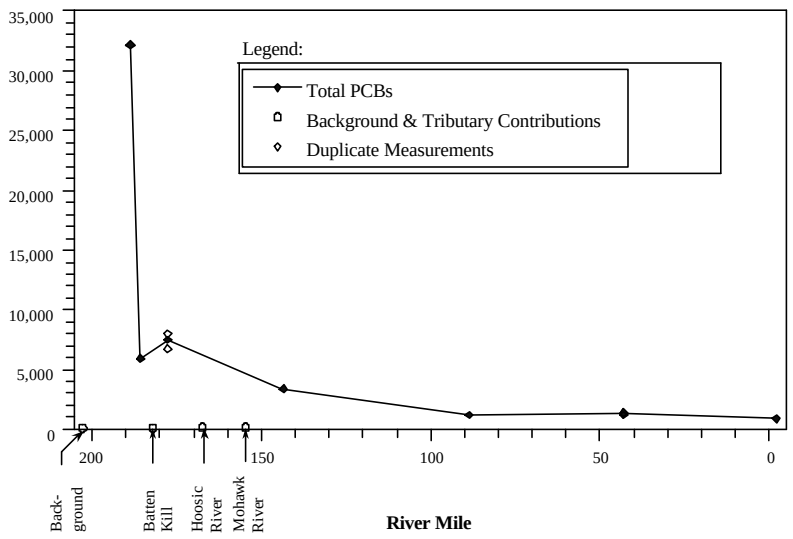
Figure 313219-1

Section 5
TECHNOLOGY EVALUATION AND REMEDIAL ALTERNATIVE DEVELOPMENT

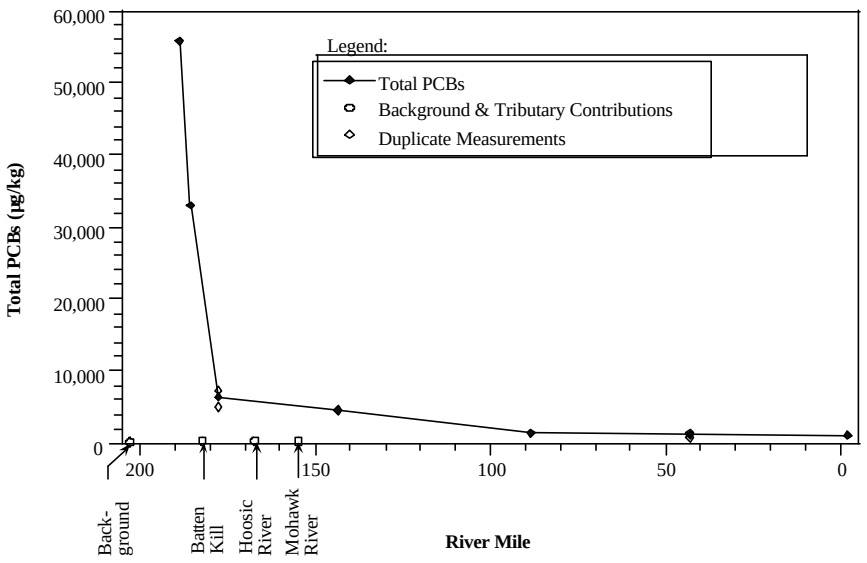
Sediment Deposited Between 1991 and 1992



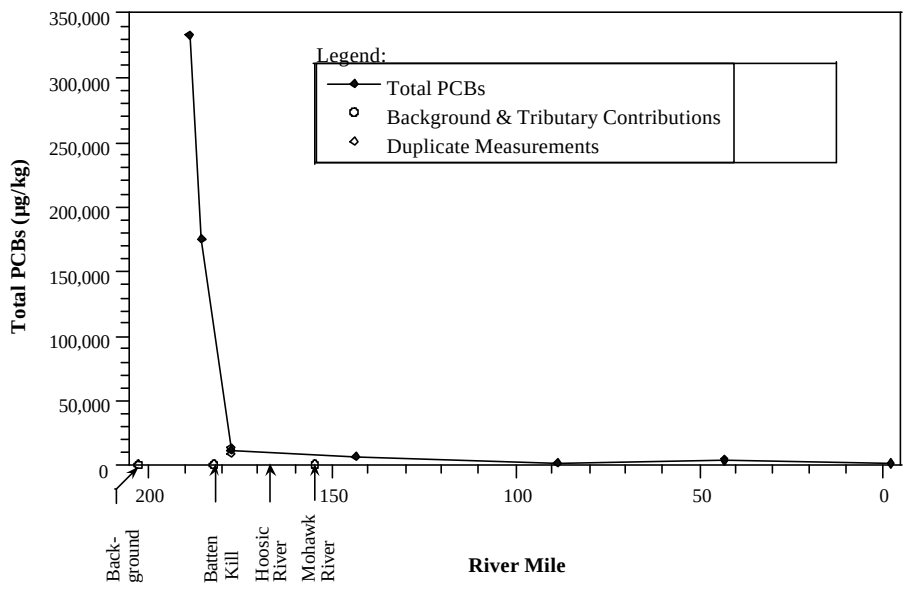
Sediment Deposited Between 1987 and 1990



Sediment Deposited Between 1982 and 1986



Sediment Deposited Between 1975 and 1981



Note:

a. Vertical axis range increases in successive diagrams as age of sediment represented increases.

b. Duplicate pairs exist on all graphs at River Miles 177.8 and 43.2. The solid symbol represents the mean of the duplicate pair.

TAMS/Cadmus/Gradient

Figure 405965-1
Total PCB Content in Sediment vs River Mile

Section 6
MODELING ASSUMPTIONS AND INTERPRETATION

Table 799-1
Mid-Hudson River
Species-Weighted Fish Fillet Average PCB Concentration (in mg/kg)

	No Action Alternative			MNA			CAP-3/10/S			Preferred Alternative (REM-3/10/S)			REM-0/0/3		
Year	River Section 1 (RM 152)	River Section 2 (RM 113)	River Section 3 (RM 90)	River Section 1 (RM 152)	River Section 2 (RM 113)	River Section 3 (RM 90)	River Section 1 (RM 152)	River Section 2 (RM 113)	River Section 3 (RM 90)	River Section 1 (RM 152)	River Section 2 (RM 113)	River Section 3 (RM 90)	River Section 1 (RM 152)	River Section 2 (RM 113)	River Section 3 (RM 90)
1999	1.663	0.814	0.732	1.906	0.977	0.825	1.906	0.977	0.825	1.885	0.973	0.822	1.905	0.977	0.825
2000	1.676	0.756	0.648	1.788	0.871	0.743	1.788	0.871	0.743	1.773	0.867	0.741	1.788	0.871	0.743
2001	1.867	0.777	0.617	1.939	0.854	0.694	1.939	0.854	0.694	1.934	0.851	0.692	1.939	0.854	0.694
2002	1.594	0.729	0.591	1.668	0.770	0.643	1.668	0.770	0.643	1.657	0.767	0.641	1.668	0.770	0.643
2003	1.381	0.650	0.539	1.439	0.680	0.579	1.439	0.680	0.579	1.430	0.678	0.577	1.439	0.680	0.578
2004	0.988	0.529	0.475	1.047	0.550	0.502	1.044	0.549	0.502	1.036	0.546	0.500	1.044	0.549	0.502
2005	0.989	0.473	0.420	0.982	0.476	0.435	0.957	0.472	0.433	0.948	0.469	0.431	0.952	0.471	0.432
2006	1.176	0.480	***0.392***	1.011	0.449	***0.388***	0.942	0.432	***0.382***	0.941	0.431	***0.380***	0.914	0.425	***0.380***
2007	1.010	0.462	0.371	0.833	0.408	0.349	0.738	***0.378***	0.337	0.728	***0.376***	0.336	0.701	***0.366***	0.332
2008	0.828	0.414	0.349	0.674	***0.344***	0.311	0.556	0.306	0.292	0.547	0.304	0.292	0.536	0.297	0.287
2009	0.713	***0.353***	0.309	0.559	0.286	0.269	0.456	0.254	0.250	0.445	0.251	0.248	0.437	0.246	0.244
2010	0.836	0.360	0.294	0.601	0.279	0.245	0.443	0.227	0.217	0.429	0.222	0.215	***0.395***	0.211	0.209
2011	0.992	0.399	0.300	0.681	0.285	0.232	0.483	0.216	***0.195***	0.464	0.210	0.192	0.405	***0.193***	***0.183***
2012	0.845	0.383	0.296	0.565	0.262	0.218	***0.390***	***0.194***	0.176	***0.376***	***0.189***	***0.173***	0.319	0.167	0.160
2013	0.970	0.398	0.299	0.614	0.261	0.209	0.422	0.189	0.164	0.408	0.184	0.161	0.340	0.158	0.146
2014	0.838	0.371	0.290	0.530	0.236	***0.195***	0.361	0.171	0.151	0.346	0.165	0.147	0.289	0.142	0.131
2015	0.714	0.337	0.274	0.423	0.207	0.179	0.299	0.151	0.137	0.287	0.147	0.134	0.242	0.125	0.118
2016	0.540	0.289	0.254	***0.324***	***0.171***	0.159	0.229	0.127	0.122	0.219	0.123	0.119	***0.185***	0.105	0.104
2017	0.486	0.251	0.229	0.292	0.148	0.141	0.201	0.110	0.109	0.192	0.106	0.106	0.161	0.091	0.093
2018	0.488	0.236	0.209	0.280	0.139	0.128	***0.188***	0.100	0.098	***0.180***	0.097	0.095	0.151	0.083	0.084
2019	***0.395***	0.206	***0.190***	0.235	0.122	0.116	0.154	0.087	0.088	0.149	0.084	0.085	0.122	0.072	0.075
2020	0.525	0.215	0.179	0.289	0.124	0.109	0.187	0.086	0.081	0.179	0.083	0.079	0.147	0.071	0.069
2021	0.493	0.212	0.173	0.267	0.119	0.103	0.175	0.083	0.077	0.170	0.080	0.075	0.139	0.068	0.065
2022	0.421	***0.200***	0.168	0.221	0.109	0.097	0.149	0.077	0.072	0.145	0.075	0.070	0.119	0.064	0.062
2023	0.385	0.187	0.159	***0.200***	0.100	0.090	0.135	0.071	0.068	0.132	0.070	0.066	0.109	0.059	0.058
2024	0.432	0.189	0.154	0.212	0.100	0.088	0.143	0.071	0.065	0.140	0.070	0.064	0.115	0.059	0.056
2025	0.485	0.209	0.162	0.226	0.104	0.087	0.153	0.073	0.065	0.150	0.071	0.064	0.123	0.061	0.056
2026	0.464	0.205	0.160	0.205	0.098	0.084	0.141	0.070	0.063	0.137	0.068	0.062	0.115	0.058	0.054
2027	0.365	0.186	0.155	0.163	0.088	0.080	0.114	0.064	0.060	0.111	0.063	0.059	0.093	0.054	0.052
2028	0.363	0.175	0.147	0.157	0.083	0.075	0.111	0.061	0.057	0.108	0.059	0.056	0.092	0.052	***0.050***
2029	0.447	0.185	0.147	0.180	0.083	0.073	0.127	0.061	0.056	0.123	0.060	0.055	0.106	0.052	0.049
2030	0.450	0.192	0.147	0.173	0.082	0.071	0.124	0.061	0.055	0.119	0.059	0.054	0.103	0.053	0.048
2031	0.395	0.187	0.147	0.154	0.079	0.069	0.111	0.059	0.054	0.108	0.058	0.053	0.094	0.051	0.048
2032	0.417	0.194	0.152	0.153	0.078	0.069	0.111	0.059	0.054	0.108	0.057	0.053	0.094	0.051	0.048
2033	0.387	0.188	0.151	0.139	0.074	0.067	0.104	0.057	0.053	0.101	0.055	0.052	0.089	***0.049***	0.047
2034	0.379	0.182	0.148	0.136	0.072	0.065	0.103	0.056	0.052	0.101	0.055	0.051	0.089	0.049	0.046
2035	0.477	0.200	0.155	0.187	0.081	0.067	0.155	0.066	0.055	0.153	0.064	0.054	0.138	0.058	0.049
2036	0.394	0.196	0.156	0.238	0.096	0.073	0.206	0.081	0.061	0.205	0.080	0.060	0.187	0.074	0.056
2037	0.479	0.206	0.160	0.289	0.111	0.081	0.254	0.096	0.069	0.250	0.094	0.068	0.231	0.088	0.064
2038	0.487	0.208	0.162	0.273	0.111	0.085	0.238	0.097	0.074	0.233	0.095	0.073	0.217	0.089	0.068
2039	0.546	0.211	0.156	0.237	0.108	0.085	0.205	0.094	0.075	0.201	0.092	0.074	0.187	0.086	0.069
2040	0.594	0.232	0.167	0.207	0.101	0.084	0.180	0.088	0.074	0.176	0.086	0.073	0.164	0.081	0.069
2041	0.456	0.215	0.165	0.155	0.087	0.078	0.140	0.078	0.070	0.136	0.076	0.068	0.125	0.071	0.065
2042	0.368	0.193	0.162	0.127	0.075	0.071	0.124	0.069	0.065	0.121	0.068	0.064	0.104	0.062	0.060
2043	0.521	0.205	0.157	0.153	0.074	0.068	0.148	0.070	0.063	0.144	0.068	0.061	0.123	0.061	0.057
2044	0.603	0.234	0.168	0.181	0.079	0.067	0.157	0.071	0.062	0.154	0.070	0.061	0.142	0.065	0.056
2045	0.522	0.233	0.173	0.166	0.078	0.066	0.139	0.069	0.060	0.135	0.067	0.059	0.132	0.064	0.056
2046	0.469	0.224	0.175	0.143	0.073	0.064	0.121	0.064	0.058	0.120	0.062	0.057	0.119	0.061	0.054

BOLD-ITALICIZED - First occurrence of species-weighted fish filet average PCB concentration below human-health based fish ingestion Preliminary Remediation Goal (0.05 mg/kg, 1 meal/week), and other targets (0.2mg/kg, 1 meal/month; 0.4 mg/kg, 1 meal/ 2 months).

Table 799-2
Human Health Based Target Levels - Year Reached
Comparison of Feasibility Study Alternatives - Mid-Hudson River

Preferred Alternative	No Action	Monitored Natrual Attenuation	CAP-3/10/Select	REM-3/10/Select	REM-0/0/3
RM 152					
Human Health risk-based PRG 0.05 mg/kg	>2046	>2046	>2046	>2046	>2046
Fish Target Concentration 0.2 mg/kg	>2046	2023	2018	2018	2016
Fish Target Concentration 0.4 mg/kg	2019	2016	2012	2012	2010
RM 113					
Human Health risk-based PRG 0.05 mg/kg	>2046	>2046	>2046	>2046	2033
Fish Target Concentration 0.2 mg/kg	2022	2016	2012	2012	2011
Fish Target Concentration 0.4 mg/kg	2009	2008	2007	2007	2007
RM 90					
Human Health risk-based PRG 0.05 mg/kg	>2046	>2046	>2046	>2046	2028
Fish Target Concentration 0.2 mg/kg	2019	2014	2011	2012	2011
Fish Target Concentration 0.4 mg/kg	2006	2006	2006	2006	2006

Table 799-3
Long-Term Fish Ingestion Non-Cancer Hazards
Reasonable Maximum Exposure and Central Tendency
Mid-Hudson River - Adult Angler

Scenario Time Frame: Long-Term Post-Remediation (2011 on)
Exposure Medium: Fish
Exposure Point: Mid-Hudson River
Exposure Route: Ingestion
Chemical of Potential Concern: PCBs
Receptor Population: Angler

Remedial Alternative	PCB Conc. in Fish (mg/kg ww)	Intake (Non-Cancer) (mg/kg-day)	Reference Dose (mg/kg-day)	Hazard Quotient	Percent Risk Reduction compared to No Action	Percent Risk Reduction compared to MNA
Reasonable Maximum Exposure						
Mid-Hudson Average						
No Action Alternative Start Year 2010	0.49	2.2E-04	2.0E-05	11		
No Action Alternative Start Year 2012	0.43	2.0E-04	2.0E-05	9.8		
MNA Alternative Start Year 2010	0.33	1.5E-04	2.0E-05	7.5	33%	
MNA Alternative Start Year 2012	0.27	1.2E-04	2.0E-05	6.2	37%	
CAP-3/10/S Start Year 2010	0.24	1.1E-04	2.0E-05	5.5	51%	26%
REM-3/10/S Start Year 2010	0.23	1.1E-04	2.0E-05	5.3	52%	29%
REM-0/0/3 Start Year 2012	0.16	7.4E-05	2.0E-05	3.7	62%	40%
RM 152						
No Action Alternative Start Year 2010	0.82	3.7E-04	2.0E-05	19		
No Action Alternative Start Year 2012	0.70	3.2E-04	2.0E-05	16		
MNA Alternative Start Year 2010	0.53	2.4E-04	2.0E-05	12	35%	
MNA Alternative Start Year 2012	0.43	2.0E-04	2.0E-05	9.9	38%	
CAP-3/10/S Start Year 2010	0.38	1.7E-04	2.0E-05	8.6	54%	30%
REM-3/10/S Start Year 2010	0.36	1.6E-04	2.0E-05	8.2	56%	32%
REM-0/0/3 Start Year 2012	0.24	1.1E-04	2.0E-05	5.5	65%	44%
RM 113						
No Action Alternative Start Year 2010	0.36	1.7E-04	2.0E-05	8.3		
No Action Alternative Start Year 2012	0.32	1.5E-04	2.0E-05	7.4		
MNA Alternative Start Year 2010	0.24	1.1E-04	2.0E-05	5.5	33%	
MNA Alternative Start Year 2012	0.20	9.3E-05	2.0E-05	4.6	37%	
CAP-3/10/S Start Year 2010	0.18	8.3E-05	2.0E-05	4.1	50%	25%
REM-3/10/S Start Year 2010	0.18	8.1E-05	2.0E-05	4.0	51%	27%
REM-0/0/3 Start Year 2012	0.12	5.7E-05	2.0E-05	2.8	62%	39%
RM 90						
No Action Alternative Start Year 2010	0.29	1.3E-04	2.0E-05	6.5		
No Action Alternative Start Year 2012	0.26	1.2E-04	2.0E-05	6.0		
MNA Alternative Start Year 2010	0.21	9.4E-05	2.0E-05	4.7	28%	
MNA Alternative Start Year 2012	0.18	8.0E-05	2.0E-05	4.0	34%	
CAP-3/10/S Start Year 2010	0.17	7.6E-05	2.0E-05	3.8	42%	19%
REM-3/10/S Start Year 2010	0.16	7.4E-05	2.0E-05	3.7	43%	21%
REM-0/0/3 Start Year 2012	0.12	5.4E-05	2.0E-05	2.7	55%	32%

Table 799-4
Long-Term Fish Ingestion Cancer Risks
Reasonable Maximum Exposure and Central Tendency
Mid-Hudson River - Adult Angler

Scenario Time Frame: Long-Term Post-Remediation (2011 on)
Exposure Medium: Fish
Exposure Point: Mid-Hudson River
Exposure Route: Ingestion
Chemical of Potential Concern: PCBs
Receptor Population: Angler

Remedial Alternative	PCB Conc. in Fish (mg/kg ww)	Intake (Cancer) (mg/kg-day)	Cancer Slope Factor (mg/kg-day)	Cancer Risk	Percent Risk Reduction compared to No Action	Percent Risk Reduction compared to MNA
Reasonable Maximum Exposure						
Mid-Hudson Average						
No Action Alternative Start Year 2010	0.31	8.2E-05	2	1.6E-04		
No Action Alternative Start Year 2012	0.30	7.9E-05	2	1.6E-04		
MNA Alternative Start Year 2010	0.16	4.1E-05	2	8.2E-05	50%	
MNA Alternative Start Year 2012	0.15	3.8E-05	2	7.6E-05	52%	
CAP-3/10/S Start Year 2010	0.12	3.2E-05	2	6.4E-05	61%	23%
REM-3/10/S Start Year 2010	0.12	3.1E-05	2	6.2E-05	62%	25%
REM-0/0/3 Start Year 2012	0.10	2.5E-05	2	5.1E-05	68%	33%
RM 152						
No Action Alternative Start Year 2010	0.52	1.4E-04	2	2.7E-04		
No Action Alternative Start Year 2012	0.50	1.3E-04	2	2.6E-04		
MNA Alternative Start Year 2010	0.25	6.6E-05	2	1.3E-04	51%	
MNA Alternative Start Year 2012	0.23	6.1E-05	2	1.2E-04	53%	
CAP-3/10/S Start Year 2010	0.19	4.9E-05	2	9.9E-05	64%	25%
REM-3/10/S Start Year 2010	0.18	4.8E-05	2	9.6E-05	65%	27%
REM-0/0/3 Start Year 2012	0.15	3.9E-05	2	7.8E-05	70%	36%
RM 113						
No Action Alternative Start Year 2010	0.23	6.1E-05	2	1.2E-04		
No Action Alternative Start Year 2012	0.23	5.9E-05	2	1.2E-04		
MNA Alternative Start Year 2010	0.12	3.1E-05	2	6.2E-05	49%	
MNA Alternative Start Year 2012	0.11	2.9E-05	2	5.8E-05	51%	
CAP-3/10/S Start Year 2010	0.09	2.4E-05	2	4.8E-05	60%	22%
REM-3/10/S Start Year 2010	0.09	2.4E-05	2	4.7E-05	61%	24%
REM-0/0/3 Start Year 2012	0.07	1.9E-05	2	3.9E-05	67%	32%
RM 90						
No Action Alternative Start Year 2010	0.19	4.9E-05	2	9.7E-05		
No Action Alternative Start Year 2012	0.18	4.7E-05	2	9.4E-05		
MNA Alternative Start Year 2010	0.10	2.7E-05	2	5.3E-05	45%	
MNA Alternative Start Year 2012	0.10	2.5E-05	2	5.0E-05	47%	
CAP-3/10/S Start Year 2010	0.08	2.2E-05	2	4.4E-05	55%	18%
REM-3/10/S Start Year 2010	0.08	2.1E-05	2	4.3E-05	56%	20%
REM-0/0/3 Start Year 2012	0.07	1.8E-05	2	3.6E-05	62%	28%

Table 799-4
Long-Term Fish Ingestion Cancer Risks
Reasonable Maximum Exposure and Central Tendency
Mid-Hudson River - Adult Angler

Scenario Time Frame: Long-Term Post-Remediation (2011 on)
Exposure Medium: Fish
Exposure Point: Mid-Hudson River
Exposure Route: Ingestion
Chemical of Potential Concern: PCBs
Receptor Population: Angler

Remedial Alternative	PCB Conc. in Fish (mg/kg ww)	Intake (Cancer) (mg/kg-day)	Cancer Slope Factor (mg/kg-day)	Cancer Risk	Percent Risk Reduction compared to No Action	Percent Risk Reduction compared to MNA
Central Tendency						
Mid-Hudson Average						
No Action Alternative Start Year 2010	0.41	3.2E-06	1	3.2E-06		
No Action Alternative Start Year 2012	0.36	2.9E-06	1	2.9E-06		
MNA Alternative Start Year 2010	0.26	2.1E-06	1	2.1E-06	36%	
MNA Alternative Start Year 2012	0.22	1.7E-06	1	1.7E-06	39%	
CAP-3/10/S Start Year 2010	0.19	1.5E-06	1	1.5E-06	53%	27%
REM-3/10/S Start Year 2010	0.19	1.5E-06	1	1.5E-06	55%	30%
REM-0/0/3 Start Year 2012	0.13	1.0E-06	1	1.0E-06	64%	41%
RM 152						
No Action Alternative Start Year 2010	0.68	5.3E-06	1	5.3E-06		
No Action Alternative Start Year 2012	0.59	4.6E-06	1	4.6E-06		
MNA Alternative Start Year 2010	0.42	3.3E-06	1	3.3E-06	37%	
MNA Alternative Start Year 2012	0.35	2.8E-06	1	2.8E-06	40%	
CAP-3/10/S Start Year 2010	0.29	2.3E-06	1	2.3E-06	57%	31%
REM-3/10/S Start Year 2010	0.28	2.2E-06	1	2.2E-06	58%	33%
REM-0/0/3 Start Year 2012	0.19	1.5E-06	1	1.5E-06	67%	45%
RM 113						
No Action Alternative Start Year 2010	0.30	2.4E-06	1	2.4E-06		
No Action Alternative Start Year 2012	0.27	2.1E-06	1	2.1E-06		
MNA Alternative Start Year 2010	0.20	1.5E-06	1	1.5E-06	36%	
MNA Alternative Start Year 2012	0.17	1.3E-06	1	1.3E-06	39%	
CAP-3/10/S Start Year 2010	0.15	1.1E-06	1	1.1E-06	52%	26%
REM-3/10/S Start Year 2010	0.14	1.1E-06	1	1.1E-06	54%	28%
REM-0/0/3 Start Year 2012	0.10	7.9E-07	1	7.9E-07	63%	40%
RM 90						
No Action Alternative Start Year 2010	0.25	2.0E-06	1	2.0E-06		
No Action Alternative Start Year 2012	0.23	1.8E-06	1	1.8E-06		
MNA Alternative Start Year 2010	0.17	1.3E-06	1	1.3E-06	32%	
MNA Alternative Start Year 2012	0.15	1.1E-06	1	1.1E-06	36%	
CAP-3/10/S Start Year 2010	0.13	1.1E-06	1	1.1E-06	46%	21%
REM-3/10/S Start Year 2010	0.13	1.0E-06	1	1.0E-06	47%	22%
REM-0/0/3 Start Year 2012	0.10	7.6E-07	1	7.6E-07	57%	33%

Table 799-5
PCB Toxicity Quotients - Ecological Receptors 2011 on (25-Year Average)
Mid to Lower Hudson River

		No Action Start Year 2010	No Action Start Year 2012	MNA Start Year 2010	MNA Start Year 2012	CAP-3/10/S Start Year 2010	REM-3/10/S Start Year 2010	REM-0/0/3 Start Year 2012
River Section 1 (RM 152)								
Mink	LOAEL	**1.4**	**1.3**	0.7	0.7	0.5	0.5	0.4
	NOAEL	**14**	**13**	**7.4**	**6.8**	**5.1**	**4.9**	**3.9**
River Otter	LOAEL	**6.6**	**6.3**	**3.6**	**3.3**	**2.5**	**2.4**	**1.9**
	NOAEL	**66**	**63**	**36**	**33**	**25**	**24**	**19**
River Section 2 (RM 113)								
Mink	LOAEL	**1.3**	**1.2**	0.7	0.7	0.5	0.5	0.4
	NOAEL	**13**	**12**	**7.3**	**6.8**	**5.2**	**5.0**	**4.1**
River Otter	LOAEL	**5.8**	**5.5**	**3.4**	**3.1**	**2.4**	**2.3**	**1.9**
	NOAEL	**58**	**55**	**34**	**31**	**24**	**23**	**19**
River Section 3 (RM 90)								
Mink	LOAEL	1.0	0.9	0.6	0.6	0.5	0.4	0.4
	NOAEL	**9.5**	**9.2**	**6.0**	**5.5**	**4.6**	**4.4**	**3.7**
River Otter	LOAEL	**4.3**	**4.1**	**2.8**	**2.5**	**2.1**	**2.0**	**1.7**
	NOAEL	**43**	**41**	**28**	**25**	**21**	**20**	**17**
River Section 4 (RM 50)								
Mink	LOAEL	0.8	0.7	0.5	0.5	0.4	0.4	0.4
	NOAEL	**7.7**	**7.4**	**5.3**	**4.9**	**4.4**	**4.2**	**3.6**
River Otter	LOAEL	**3.7**	**3.5**	**2.6**	**2.3**	**2.1**	**2.0**	**1.7**
	NOAEL	**37**	**35**	**26**	**23**	**21**	**20**	**17**

Notes: TQs above the target level of 1.0 are bolded.
A 25-yr time frame was used to average risks, as described in the FS. The REM-3/10/S and CAP-3/10/S time frame covered 2011-2035 and REM-0/0/3 time frame covered 2012-2036.
No Action and MNA alternatives were calculated for both time frames.

Table 799-6
PCB Risk Reduction - Ecological Receptors (25-Year Average)
Mid to Lower Hudson River

		Percent Risk Reduction CAP-3/10/S Compared to No Action SY2010	Percent Risk Reduction CAP-3/10/S Compared to MNA SY2010	Percent Risk Reduction REM-3/10/S Compared to No Action SY2010	Percent Risk Reduction REM-3/10/S Compared to MNA SY2010	Percent Risk Reduction REM-0/0/3 Compared to No Action SY2012	Percent Risk Reduction REM-0/0/3 Compared to MNA SY2012
River Section 1 (RM 152)							
Mink	LOAEL	63%	31%	63%	31%	70%	43%
	NOAEL	63%	31%	63%	31%	70%	43%
River Otter	LOAEL	62%	31%	62%	31%	70%	44%
	NOAEL	62%	31%	62%	31%	70%	44%
River Section 2 (RM 113)							
Mink	LOAEL	59%	28%	59%	28%	66%	39%
	NOAEL	59%	28%	59%	28%	66%	39%
River Otter	LOAEL	58%	28%	58%	28%	67%	40%
	NOAEL	58%	28%	58%	28%	67%	40%
River Section 3 (RM 90)							
Mink	LOAEL	52%	23%	52%	23%	60%	33%
	NOAEL	52%	23%	52%	23%	60%	33%
River Otter	LOAEL	51%	23%	51%	23%	60%	33%
	NOAEL	51%	23%	51%	23%	60%	33%
River Section 4 (RM 50)							
Mink	LOAEL	43%	18%	43%	18%	51%	26%
	NOAEL	43%	18%	43%	18%	51%	26%
River Otter	LOAEL	43%	18%	43%	18%	51%	26%
	NOAEL	43%	18%	43%	18%	51%	26%

Section 7
ALTERNATIVE-SPECIFIC RISK ESTIMATES

Table 797-1
Extended Dredging Fish Ingestion Non-Cancer Health Hazards
Reasonable Maximum Exposure and Central Tendency - Extended Dredging
Upper Hudson River Fish - Adult Angler

Scenario Time Frame: Long-Term Post-Remediation
Exposure Medium: Fish
Exposure Point: Upper Hudson River (RMs 189-154)
Exposure Route: Ingestion
Chemical of Potential Concern: PCBs
Receptor: Adult Angler

Remedial Alternative (with starting year for evaluation)	PCB Conc. in Fish (mg/kg ww)	Intake (Non-Cancer) (mg/kg-day)	Reference Dose (mg/kg-day)	Hazard Quotient	Percent Hazard Reduction compared to No Action	Percent Hazard Reduction compared to MNA
Reasonable Maximum Exposure						
No Action (Start Year 2014)	1.9-3.2	8.8E-04-1.4E-03	2.0E-05	44-72		
MNA (Start Year 2014)	1.2-2.7	5.7E-04-1.2E-03	2.0E-05	28-62	14%-36%	
CAP-3/10/Select (Start Year 2014)	0.49	2.2E-04	2.0E-05	11	75%-84%	61%-82%
REM-3/10/Select (Start Year 2014)	0.43	2.0E-04	2.0E-05	9.8	78%-86%	65%-84%
REM-0/0/3 (Start Year 2014)	0.29	1.3E-04	2.0E-05	6.7	85%-91%	76%-89%
Central Tendency						
No Action (Start Year 2014)	1.8-3.0	8.2E-05-1.4E-04	2.0E-05	4.1-6.9		
MNA (Start Year 2014)	1.1-2.6	4.9E-05-1.2E-04	2.0E-05	2.4-5.9	15%-41%	
CAP-3/10/Select (Start Year 2014)	0.44	2.0E-05	2.0E-05	1.0	76%-86%	59%-83%
REM-3/10/Select (Start Year 2014)	0.39	1.8E-05	2.0E-05	0.89	78%-87%	63%-85%
REM-0/0/3 (Start Year 2014)	0.27	1.2E-05	2.0E-05	0.62	85%-91%	74%-89%

Notes:
The RME non-cancer exposure time frame is seven years, and the CT time frame is 12 years.
Concentrations were averaged across all three river sections.
Ranges of bounding estimate hazard quotients are presented for the No Action and MNA alternatives.

Table 797-2
Extended Dredging Fish Ingestion Cancer Risks
Reasonable Maximum Exposure and Central Tendency
Upper Hudson River Fish - Adult Angler

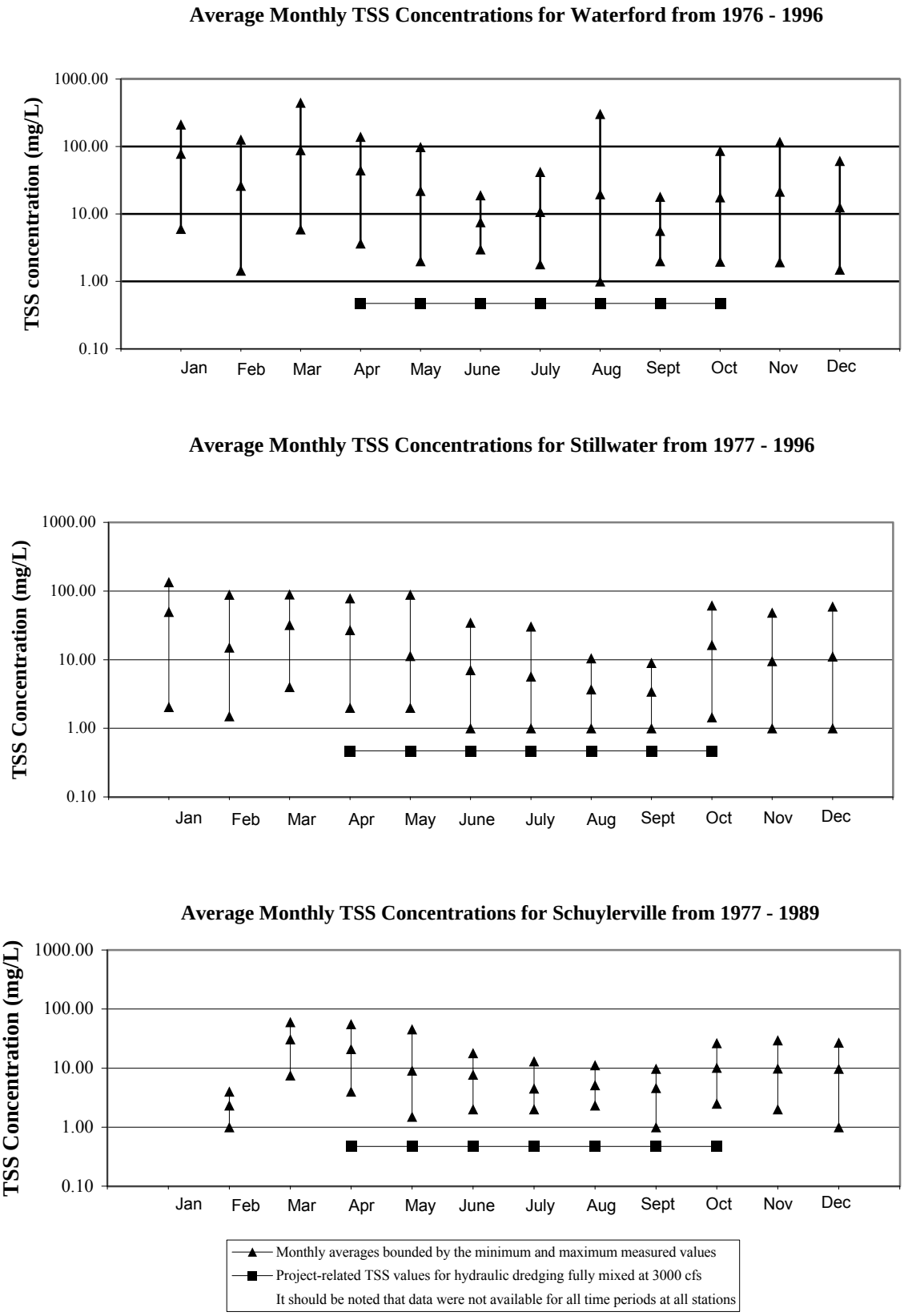
Scenario Time Frame: Long-Term Post-Remediation
Exposure Medium: Fish
Exposure Point: Upper Hudson River (RMs 189-154)
Exposure Route: Ingestion
Chemical of Potential Concern: PCBs
Receptor: Adult Angler

Remedial Alternative (with starting year for evaluation)	PCB Conc. in Fish (mg/kg ww)	Intake (Cancer) (mg/kg-day)	Cancer Slope Factor (mg/kg-day)	Cancer Risk	Percent Risk Reduction compared to No Action	Percent Risk Reduction compared to MNA
Reasonable Maximum Exposure						
No Action (Start Year 2014)	1.3-2.5	3.4E-04-6.4E-04	2	6.8E-04-1.3E-03		
MNA (Start Year 2014)	0.57-2.0	1.5E-04-5.2E-04	2	3.0E-04-1.0E-03	18%-57%	
CAP-3/10/Select (Start Year 2014)	0.28	7.3E-05	2	1.5E-04	78%-89%	50%-86%
REM-3/10/Select (Start Year 2014)	0.26	6.8E-05	2	1.4E-04	80%-89%	54%-87%
REM-0/0/3 (Start Year 2014)	0.20	5.3E-05	2	1.1E-04	84%-92%	64%-90%
Central Tendency						
No Action (2014)	1.8-3.0	1.4E-05-2.4E-05	1	1.4E-05-2.4E-05		
MNA (2014)	1.1-2.6	8.3E-06-2.0E-05	1	8.3E-06-2.0E-05	15%-41%	
CAP-3/10/Select (2014)	0.44	3.4E-06	1	3.4E-06	76%-86%	59%-83%
REM-3/10/Select (2014)	0.39	3.1E-06	1	3.1E-06	78%-87%	63%-85%
REM-0/0/3 (2014)	0.27	2.1E-06	1	2.1E-06	85%-91%	74%-89%

Notes:
The RME cancer exposure time frame is 40 years, and the CT time frame is 12 years.
Concentrations were averaged across all three river sections.
Ranges of bounding estimate hazard quotients are presented for the No Action and MNA alternatives.

Section 9
IN-RIVER IMPACTS (SHORT- AND LONG-TERM)

Figure 803-1
Average Monthly TSS Concentrations (mg/L)



Section 11
SELECTION OF THE PREFERRED REMEDY

Table 337780-1
Annual Tri+ and Total PCB Loads at the Thompson Island, Northumberland, and Federal Dams for Selected Years

Alternatives	Annual Tri+ PCB (kg)								
	Thompson Island Dam			Northumberland Dam[1]			Federal Dam[1]		
	Year 2003	Year 2011	Year 2035	Year 2003	Year 2011	Year 2035	Year 2003	Year 2011	Year 2035
No Action	104	88	60	122	105	60	131	104	62
MNA	104	44	14	123	63	15	131	72	24
6-yr REM-3/10/Select (0.13% resuspension)	104	22	11	123	27	11	131	44	20

Alternatives	Annual Total PCB (kg)								
	Thompson Island Dam[2]			Northumberland Dam[1,3]			Federal Dam[1,4]		
	Year 2003	Year 2011	Year 2035	Year 2003	Year 2011	Year 2035	Year 2003	Year 2011	Year 2035
No Action	240	203	139	262	226	129	190	151	90
MNA	240	102	32	264	135	32	190	104	35
6-yr REM-3/10/Select (0.13% resuspension)	240	51	25	264	58[5]	24[5]	190	64[5]	29[5]

[1] Tri+ PCB transport is generally conservative (i.e., little apparent loss with distance downstream) while mono- and di-homologues transport is not, especially from Schuylerville to Waterford (USEPA, 2000). This is reflected in the decline in the applicable water column ratio (see White Paper – Relationship Between Tri+ and Total PCBs).
[2] Based on Tri+ to Total ratio of 2.31 (GE TID West, 97-99)
[3] Based on Tri+ to Total ratio of 2.15 (GE Schuylerville, 97-99)
[4] Based on Tri+ to Total ratio of 1.45 (USEPA Phase 2, 1993)
[5] If conservative transport is assumed for mono- and di-homologues, these values increase by about 20 to 100 kg. Note that these homologue groups were not found to be conservative (USEPA, 2000)

Table 337780-2
Cumulative Tri+ and Total PCB Loads at the Thompson Island, Northumberland, and Federal Dams (2004-2067)

Alternatives	Thompson Island Dam			Northumberland Dam			Federal Dam		
	Tri+ PCB load (kg)	Reduction relative to MNA (kg)	Reduction relative to MNA (%)	Tri+ PCB load (kg)	Reduction relative to MNA (kg)	Reduction relative to MNA (%)	Tri+ PCB load (kg)	Reduction relative to MNA (kg)	Reduction relative to MNA (%)
No Action	4100	-	-	4226	-	-	3879	-	-
MNA	1275	0	0	1505	0	0	1721	0	0
CAP-3/10/Select	911	-364	-29	1026	-479	-32	1314	-407	-24
REM-3/10/Select - 5-yr	902	-373	-29	1006	-499	-33	1296	-425	-25
REM-0/0/3	759	-516	-40	862	-643	-43	1174	-547	-32
REM-3/10/Select - 6-yr, 0.13%	925	-350	-27	1055	-450	-30	1346	-375	-22
REM-3/10/Select - 6-yr, 2.5%	1158	-117	-9	1423	-82	-5	1695	-26	-2

Alternatives	Thompson Island Dam			Northumberland Dam			Federal Dam		
	Total PCB load[1,4] (kg)	Reduction relative to MNA (kg)	Reduction relative to MNA (%)	Total PCB load[2,4] (kg)	Reduction relative to MNA (kg)	Reduction relative to MNA (%)	Total PCB load[3,4] (kg)	Reduction relative to MNA (kg)	Reduction relative to MNA (%)
No Action	9471	-	-	9086	-	-	5625	-	-
MNA	2945	0	0	3236	0	0	2495	0	0
CAP-3/10/Select	2104	-841	-29	2206	-1030	-32	1905	-590	-24
REM-3/10/Select - 5-yr	2084	-862	-29	2163	-1073	-33	1879	-616	-25
REM-0/0/3	1753	-1192	-40	1853	-1382	-43	1702	-793	-32
REM-3/10/Select - 6-yr, 0.13%	2137	-809	-27	2268	-968	-30	1952	-544	-22
REM-3/10/Select - 6-yr, 2.5%	2675	-270	-9	3059	-176	-5	2458	-38	-2

[1] Based on Tri+ to Total ratio of 2.31 (GE TID West, 97-99)
[2] Based on Tri+ to Total ratio of 2.15 (GE Schuylerville, 97-99) 3 Based on Tri+ to Total ratio of 1.45 (USEPA Phase 2, 1993)
[3] Based on Tri+ to Total ratio of 1.45 (USEPA Phase 2, 1993)
[4] Discussion on the derivation of the ratios used to obtain these loads is provided in the White Paper – Relationship Between Tri+ and Total PCBs