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FURTHER SITE CHARACTERIZATION AND ANALYSIS

VOLUME 2D - REVISED BASELINE MODELING REPORT

HUDSON RIVER PCBs REASSESSMENT RI/FS

JANUARY 2000

For

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

Volume 2D - Book 2 of 4
Fate and Transport Models

TAMS Consultants, Inc.
Limno-Tech, Inc.
Menzie-Cura & Associates, Inc.
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Table 3-1
Comparison of Manning's 'n' from Previous Studies.

Source	Main Channel 'n'	Floodplain 'n'
Zimmie, 1985	0.027	0.065
FEMA, 1982	0.028 - 0.035	0.075

Table 3-2
Modeled Hudson River Flows at the Upstream Boundary of Thompson Island Pool.

Flow Description	River Discharge, (cfs)
Peak flow during spring and fall surveys, 1991	8,000
Peak flow for GE high flow survey, April 23-24, 1992	19,000
Peak flow for TAMS Phase 2 survey, April 12, 1993	20,300
Peak flow for spring 1994 (Bopp, 1994)	28,000
Peak flow in 1983	35,000
5-year high flow	30,126
25-year high flow	39,883
100-year high flow	47,330

Source: USGS Gaging Records; Butcher, 2000

Table 3-3
Comparison of Model Results with Rating Curve Data

Flow (cfs)	Downstream Boundary Condition feet (NGVD)	Model Predicted Upstream Elevations feet (NGVD)	Rating Curve Gauge 119 (Upstream) Elevations feet (NGVD)
10,000	120.6	121.5	121.2
20,000	122.2	123.8	123.6
30,000	123.8	126.1	126.1

Table 3-4
Effect of Manning's 'n' on Model Results for 100-Year Flow Event

	Main Channel Manning's 'n'	Floodplain Manning's 'n'	River Elevation at Roger's Island feet (NGVD)
Baseline	0.020	0.060	129.1
High 'n'	0.035	0.075	131.1
Low 'n' Main Channel	0.015	0.060	128.6
Low 'n' Floodplain	0.020	0.040	128.9
High 'n' Floodplain	0.020	0.080	129.3

Table 3-5
Effect of Turbulent Exchange Coefficients on Model Results

	Turbulent Exchange Coefficients (lb-sec/ft^2)	River Elevation Roger's Island feet (NGVD)
Baseline	100	129.1
Low Turbulent Exchange Coefficients	50	128.8
High Turbulent Exchange Coefficients	200	129.7

Table 4-1
Summary of Inputs for Depth of Scour Model at Each High Resolution Core.

Core Name	100 Year Flood Shear Stress (dynes/cm2)	Surficial Dry Bulk Density (g/cm2)
HR-19	12.7	0.369
HR-20	29.8	0.207
HR-23	19.1	0.619
HR-25	53.1	0.590
HR-26	31.7	0.276

Source: Hudson River Database Release 4.1b
Thompson Island Pool Hydrodynamic Model results

Table 4-2
Predicted Depth of Scour Range for 100 Year Flood at Each High Resolution Core Location.

	Depth of Scour (cm)			
Core Name	Median	5th Percentile	95th Percentile	Depth of PCB Peak (cm)
HR-19	0.074	0.016	0.356	20-24
HR-20	1.820	0.311	7.695	24-28
HR-23	0.158	0.030	0.819	28-32
HR-25	3.714	0.500	21.789	2.5
HR-26	1.643	0.275	8.262	12-24

Source: Hudson River Database Release 4.1b

Table 4-3
Thompson Island Pool Cohesive Sediment Expected Values of Solids Erosion and Mean Depth of Scour for 100-Year Flood, from Monte Carlo Analysis.

Erosion Type	Expected Value
Depth (cm)	0.317
Solids (kg)	1,740,000

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Table 5-1a.
HUDTOX Water Column Segment Geometry in Thompson Island Pool (2-dimensional segmentation).

	HUDTOX Segment Number	Location Description	Downstream River Mile	Length (m)	Depth (m)	Surface Area (m2)	Volume (m3)	Cross-sectional Area (m2)	Adjacent Segments		
									Below		Downstream
2-dimensional segmentation	1	West R. Island	194.11	721	1.66	111,167	184,239	256	48		3
	2	East R. Island	194.11	721	1.33	124,233	164,924	229	49		4
	3	West R. Island	193.59	845	1.66	179,319	301,100	357	50		5,6
	4	East R. Island	193.59	845	2.19	100,373	219,502	260	51		7
	5	west	193.00	942	1.55	93,705	145,320	154	53	52	8
	6	center	193.00	942	4.77	69,641	331,926	353	54	-	9
	7	east	193.00	942	1.60	51,501	82,167	87	55	-	10
	8	west	192.25	1,219	1.25	135,968	170,143	140	57	56	11
	9	center	192.25	1,219	3.68	118,933	437,877	359	58	-	12
	10	east	192.25	1,219	1.47	72,249	106,095	87	60	59	13
	11	west	191.69	896	1.63	116,614	190,137	212	62	61	14
	12	center	191.69	896	3.60	104,141	374,750	418	63	-	15
	13	east	191.69	896	0.72	88,892	65,047	73	65	64	16
	14	west	190.99	1,125	1.67	108,820	181,319	161	67	66	17
	15	center	190.99	1,125	4.82	98,464	481,381	428	69	68	18
	16	east	190.99	1,125	1.62	89,519	145,283	129	71	70	19
	17	west	190.33	1,054	1.71	77,285	132,461	126	73	72	20
	18	center	190.33	1,054	4.34	101,114	439,168	417	74	-	21
	19	east	190.33	1,054	2.00	66,975	133,699	127	76	75	22
	20	west	189.81	848	1.71	66,786	113,979	134	77	-	23
	21	center	189.81	848	4.29	78,114	335,126	395	79	78	24
	22	east	189.81	848	2.04	88,884	181,045	214	-	80	25
	23	west	189.22	941	2.07	76,079	157,460	167	82	81	26
	24	center	189.22	941	5.62	63,745	358,258	381	83	-	27
	25	east	189.22	941	2.01	60,339	121,202	129	85	84	28
	26	west TI Dam	188.50	1,160	1.92	106,532	200,215	173	86	-	29
	27	center TI Dam	188.50	1,160	3.58	146,361	517,870	446	87	-	29
	28	east TI Dam	188.50	1,160	1.48	157,473	232,375	200	89	88	29

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Table 5-1b.

HUDTOX Water Column Segment Geometry Below Thompson Island Pool (1-dimensional segmentation).

	HUDTOX Segment Number	Location Description	Downstream River Mile	Length (m)	Depth (m)	Surface Area (m^2)	Volume (m^3)	Cross-sectional Area (m^2)	Adjacent Segments		
									Below		Downstream
1-dimensional segmentation	29	Lock 6	186.20	3,757	1.95	837,947	1,634,430	435	91	90	30
	30		184.85	2,178	3.49	557,155	1,946,807	894	93	92	31
	31	Lock 5	183.41	2,317	3.86	474,625	1,832,981	791	95	94	32
	32		182.30	1,767	3.92	468,521	1,835,130	1,039	96		33
	33		181.40	1,446	3.12	229,378	715,684	495	97		34
	34		179.73	2,699	2.84	572,753	1,628,112	603	99	98	35
	35		178.08	2,647	3.76	501,225	1,882,175	711	101	100	36
	36		175.08	4,833	4.20	948,752	3,985,892	825	103	102	37
	37		170.98	6,597	4.24	1,377,869	5,844,528	886	105	104	38
	38		169.79	1,918	3.69	558,975	2,064,033	1,076	107	106	39
	39	Stillwater Dam	168.19	2,566	2.99	408,394	1,222,268	476	109	108	40
	40		166.67	2,454	1.93	952,848	1,835,070	748	111	110	41
	41	Lock 3 Dam	165.99	1,087	4.18	417,298	1,743,711	1,605	113	112	42
	42		164.31	2,715	3.18	623,849	1,982,413	730	115	114	43
	43	Lock 2 Dam	163.49	1,309	2.47	563,621	1,390,352	1,062	117	116	44
	44		160.87	4,214	2.89	1,090,832	3,148,431	747	119	118	45
	45	Lock 1 Dam	159.39	2,384	4.15	682,251	2,831,358	1,188	121	120	46
	46		156.41	4,795	4.56	1,280,753	5,841,577	1,218	122		47
	47	Federal Dam	153.89	4,056	5.77	1,282,972	7,405,588	1,826	123		0

Table 5-2a.
HUDTOX Sediment Segment Geometry in Thompson Island Pool for Surficial Sediment Segments (2-dimensional segmentation).

Layer thickness = 2 cm

	HUDTOX Segment Number	Sediment Type	Surface Area (m^2)	Volume (m^3)	HUDTOX Sediment Layer	Adjacent Segments	
						Above	Below
2-dimensional segmentation	48	N	86,468	1,729	1	1	124
	49	N	64,616	1,292	1	2	125
	50	N	104,029	2,081	1	3	126
	51	N	66,458	1,329	1	4	127
	52	C	9,251	185	1	5	128
	53	N	25,142	503	1	5	129
	54	N	69,532	1,391	1	6	130
	55	N	34,250	685	1	7	131
	56	C	67,706	1,354	1	8	132
	57	N	22,071	441	1	8	133
	58	N	102,034	2,041	1	9	134
	59	C	5,886	118	1	10	135
	60	N	32,421	648	1	10	136
	61	C	16,475	329	1	11	137
	62	N	33,064	661	1	11	138
	63	N	103,509	2,070	1	12	139
	64	C	28,928	579	1	13	140
	65	N	19,719	394	1	13	141
	66	C	34,407	688	1	14	142
	67	N	23,202	464	1	14	143
	68	C	17,791	356	1	15	144
	69	N	71,668	1,433	1	15	145
	70	C	36,064	721	1	16	146
	71	N	24,256	485	1	16	147
	72	C	22,973	459	1	17	148
	73	N	22,891	458	1	17	149
	74	N	84,520	1,690	1	18	150
	75	C	8,939	179	1	19	151
	76	N	13,685	274	1	19	152
	77	N	31,066	621	1	20	153
	78	C	12,148	243	1	21	154
	79	N	53,177	1,064	1	21	155
	80	C	58,927	1,179	1	22	156
	81	C	22,523	450	1	23	157
	82	N	23,873	477	1	23	158
	83	N	50,643	1,013	1	24	159
	84	C	19,342	387	1	25	160
	85	N	4,315	86	1	25	161
	86	N	64,343	1,287	1	26	162
	87	N	138,185	2,764	1	27	163
	88	C	63,742	1,275	1	28	164
	89	N	31,981	640	1	28	165

Table 5-2b.
HUDTOX Sediment Segment Geometry Downstream of Thompson Island Pool for Surficial Sediment Segments (1-dimensional segmentation).

Layer thickness = 2 cm

	HUDTOX Segment Number	Sediment Type	Surface Area (m^2)	Volume (m^3)	HUDTOX Sediment Layer	Adjacent Segments	
						Above	Below
1-dimensional segmentation	90	C	79,269	1,585	1	29	166
	91	N	449,376	8,988	1	29	167
	92	C	189,009	3,780	1	30	168
	93	N	160,637	3,213	1	30	169
	94	C	268,967	5,379	1	31	170
	95	N	145,117	2,902	1	31	171
	96	N	468,567	9,371	1	32	172
	97	N	229,401	4,588	1	33	173
	98	C	68,901	1,378	1	34	174
	99	N	503,907	10,078	1	34	175
	100	C	97,432	1,949	1	35	176
	101	N	403,842	8,077	1	35	177
	102	C	89,073	1,781	1	36	178
	103	N	859,771	17,195	1	36	179
	104	C	346,399	6,928	1	37	180
	105	N	1,031,605	20,632	1	37	181
	106	C	295,637	5,913	1	38	182
	107	N	263,392	5,268	1	38	183
	108	C	34,953	699	1	39	184
	109	N	373,481	7,470	1	39	185
	110	C	213,454	4,269	1	40	186
	111	N	739,487	14,790	1	40	187
	112	C	171,255	3,425	1	41	188
	113	N	246,085	4,922	1	41	189
	114	C	18,739	375	1	42	190
	115	N	605,171	12,103	1	42	191
	116	C	51,928	1,039	1	43	192
	117	N	511,748	10,235	1	43	193
	118	C	3,092	62	1	44	194
	119	N	1,087,846	21,757	1	44	195
	120	C	64,524	1,290	1	45	196
	121	N	617,793	12,356	1	45	197
	122	N	1,280,878	25,618	1	46	198
	123	N	1,283,097	25,662	1	47	199

Table 6-1. Sediment Data Sets Used in Development and Application of the HUDTOX Model.

Year	Agency	Program description	Purpose of study	Parameters*	Use in HUDTOX
1977	NYSDEC	Sediment core and grab sampling between Fort Edward and Federal Dam	Extensive mapping and sediment sampling to asses extent of PCB pollution in the UHR	PCB Aroclors, visual texture, grain size, %sand/silt/clay	Specification of sediment Tri+ PCB initial conditions for the 1977-1997 calibration.
1984	NYSDEC	Sediment core and grab sampling	Confirm locations of PCB hotspots in TIP	PCB Aroclors, visual texture, bulk density	Specification of sediment Tri+ PCB calibration targets.
1991	General Electric	Composite sediment sampling	Provide sufficient data to calculate mean PCB concentrations over 1 to 2 mile intervals of the UHR	PCB congeners, porewater PCB congeners, TOC, DOC, bulk density, texture, grain size	Specification of Total PCB, BZ#4, BZ#52, and Tri+ initial conditions for 1991-1997 calibration. Specification of sediment Tri+ PCB calibration targets. Specification of sediment DOC levels.
1994	USEPA	High resolution core sampling	Investigation of long-term trends in PCB transport, release and degradation via the sediment record	PCB congeners, porewater PCB congeners, TOC, DOC, bulk density, texture, grain size, radionuclides	Assesment of model-computed sediment burial rates in calibration.
1994	USEPA	Low resolution sediment core sampling	Investigation of PCB levels in selected hotspots of the UHR	PCB congeners, bulk density, texture, grain size, organic carbon	Specification of sediment Tri+ and Total PCB calibration parameters and determination. Specification of sediment organic carbon levels.
1994	USEPA	Confirmatory sediment sampling	Calibration of the side scan sonar signal to sediment properties	Texture, grain size, bulk density	Specification of mean cohesive and noncohesive bulk density values.
1994	USEPA	Sediment type mapping between Fort Edward and Northumberland Dam	Side scan sonar survey of bottom sediments	Areal distribution of fine and coares sediment	Establishing cohesive and noncohesive sediment segmentation, classification of PCB samples as cohesive or noncohesive in setting initial conditions.
1997	General Electric	Sediment type mapping between Northumberland Dam and Federal Dam at 77 transects	Qualitative sediment type determinations based on visual inspection of grab samples or by probing	Qualitative sediment type determination at specific points	Establishing cohesive and noncohesive sediment segmentation.
1998	General Electric	Extensive sediment sampling in TIP and limited numer of locations between TI Dam and Federal Dam		PCB congeners, bulk density, radionuclides	HUDTOX surface sediment Tri+ concentrations for model calibration.

*The list of parameters is not comprehensive and only presents those of interest to the development and calibration of HUDTOX.

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Table 6-2. USGS Gage Information For Gages Used In Flow Estimation.

USGS gaging station	USGS Station No.	Drainage Area (mi^2)	Period of Operation
Hudson River at Fort Edward, NY	01327750	2817	1/1/77 - 9/30/97
Hudson River at Stillwater, NY	01331095	3773	1/1/77 - 9/30/97[1]
Hudson River above Lock 1 near Waterford, NY	01335754	4611	3/1/77 - 9/30/97[1]
Glowegee Creek at West Milton, NY	01330000	26	10/1/90 - 9/30/97
Kayaderosseras Creek near West Milton, NY	01330500	90	1/1/77 - 9/30/96
Hoosic River near Eagle Bridge, NY	01334500	510	1/1/77 - 9/30/97
Mohawk River at Cohoes, NY	01357500	3450	1/1/77 - 9/30/97
Mohawk River Diversion at Crescent Dam, NY	01357499	N/A	1/1/77 - 9/30/97

Source: USGS

[1] Due to construction, many of the flows recorded after 6/30/92 were rated as "poor" by the USGS. "Poor" means that "about 95 percent of the daily discharges have less than "fair" accuracy. "Fair" means that about 95 percent of the daily discharges are within 15 percent.

Table 6-3. Drainage Areas and Reference Tributaries Used to Estimate Daily Tributary Flows.

Tributary	Drainage Area (mi^2)	Gaged Reference Tributary
Snook Kill	75	DAR to Kayaderosseras Creek for the period 1/1/77 – 9/30/96. DAR to Glowegee Creek for the period 9/30/96 – 9/30/97. (Note: Kayaderosseras Creek flow data are unavailable after 6/30/96 so Glowegee Creek was used.)
Moses Kill	55	
Thompson Island Pool direct runoff	31	
Batten Kill	431	
Fish Creek	245	
Flatey Brook	8	DAR to Hoosic River at Eagle Bridge, NY
Schuylerville-Stillwater direct runoff	80	
Hoosic River	720	
Anthony Kill	63	
Deep Kill	16	
Stillwater-Waterford direct runoff	39	
Mohawk River[1]	3,450	USGS gage at Cohoes + Diversion at Crescent Dam

Source: USGS 1982; This report.

[1]The Mohawk River stations are near the Mohawk-Hudson confluence so no drainage area adjustment was required.

Table 6-4. Mean Seasonal USGS Flows For Select Flow Gauges in the Study Area for the Period 3/1/77 to 6/30/92.

Season	Fort Edward	Stillwater	Waterford	Glowegee Creek	Kay. Creek @ West Milton	Hoosic River @ Eagle Bridge
Winter	5274.1	6582.5	8283.7	36.1	133.6	1042.9
Spring	7773.6	10052.9	12866.1	56.0	254.3	1770.4
Summer	3267.2	4000.1	4579.9	16.5	80.2	545.1
Fall	4489.8	5582.4	6579.0	31.5	106.1	743.5

Source: Hudson River Database Release 4.1b

Table 6-5. Seasonal Tributary Flow Adjustment Factors applied to Tributaries between Fort Edward and Stillwater, and between Stillwater and Waterford.

Season	Fort Edward Yield (cfs/mi²)	Fort Edward - Stillwater			Stillwater - Waterford		
		$\Delta\ \bar{Q}_{FE\text{-}Still}$ (cfs)	α_{FS}	Incremental Yield (cfs/mi²)	$\Delta\ \bar{Q}_{Still\text{-}Watfd}$ (cfs)	α_{SW}	Incremental Yield (cfs/mi²)
Winter	1.872	1175	0.88	0.311	658	0.98	0.143
Spring	2.760	2025	0.81	0.537	1043	0.92	0.226
Summer	1.160	653	0.83	0.173	35	0.10	0.0076
Fall	1.594	986	0.94	0.261	253	0.53	0.055

Table 6-6. Hudson River Flows Yearly Averages Estimated and USGS Gage Data.

Year	Stillwater		RPD[1]
	Estimated (cfs)	USGS (cfs)	
1977	8618	8731	-1%
1978	6415	6235	3%
1979	7612	7749	-2%
1980	4515	4327	4%
1981	5724	5626	2%
1982	6203	6107	2%
1983	7677	7486	3%
1984	7450	7360	1%
1985	5170	5140	1%
1986	7542	7291	3%
1987	6548	6296	4%
1988	5000	5030	-1%
1989	6330	6568	-4%
1990	9111	9303	-2%
1991	5500	5926	-7%
1992	6084	6374	-5%
1993	6252	6377	-2%
1994	6593	6862	-4%
1995	5093	5081	0%
1996	8694	8940	-3%
1997	7297	7469	-2%
Overall	6616	6654	-1%

[1]RPD = Relative Percent Difference

Year	Waterford		RPD
	Estimated (cfs)	USGS (cfs)	
1977	10154	10538	-4%
1978	7879	7672	3%
1979	9652	9672	0%
1980	5405	5239	3%
1981	6902	6635	4%
1982	7460	7440	0%
1983	9455	9358	1%
1984	9259	9153	1%
1985	6172	5868	5%
1986	9134	8968	2%
1987	7865	7648	3%
1988	6238	6062	3%
1989	7783	7902	-2%
1990	11141	11755	-5%
1991	6823	7503	-9%
1992	7168	7601	-6%
1993	7758	8068	-4%
1994	8130	8475	-4%
1995	6187	6255	-1%
1996	11111	11483	-3%
1997	8691	9039	-4%
Overall	8106	8196	-1%

Table 6-7. Summary of Available Solids Data for Mainstem Stations; Number of Samples and Source of Suspended Solids Sample Data by Station.

Year	Ft. Edward			TID		Stillwater			Waterford		
	USGS	Phase 2	GE	Phase 2	GE	USGS	Phase 2	GE	USGS	Phase 2	GE
1977	1					33			47		
1978	30					30			31		
1979	52					34			32		
1980	55					27			37		
1981	55					29			24		
1982	49					43			32		
1983	40					126			134		
1984	34					209			247		
1985	17					82			129		
1986	27					306			295		
1987	15					49			85		
1988	38					68			101		
1989	23					157			334		
1990	3					275			242		
1991	19		65			373		60	251		120
1992	21		67			390		28	390		34
1993	27	58	56	78		387	2		410	288	1
1994	30	47	31	40		386	35		405	89	
1995	68		68			303			299		
1996	27		71		4	30			66		
1997	19		155		190	19			25		

Source: Hudson River Database Release 4.1b

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Table 6-8. Summary of Available Solids Data for Tributaries; Number of Samples and Source of Suspended Solids Sample Data by Station.

Year	Batten Kill			Hoosic River			Mohawk River		Moses Kill		Snook Kill	
	USGS	Phase 2	GE	USGS	Phase 2	GE	USGS	Phase 2	Phase 2	GE	Phase 2	GE
1988	6			2								
1989				4			2					
1990				1			10					
1991			25	4		24	5					
1992			28			28	2					
1993		5	1	9	6	1	9	6				
1994		32		12	32		18	31	32		31	
1995				3			25					
1996							10					
1997										115		117

Source: Hudson River Database Release 4.1b

Table 6-9. Reference Tributaries for Unmonitored Tributaries

Reference Tributary	Unmonitored Tributaries
Moses Kill	TIP Direct Drainage Area, Flately Brook, TID-Schuylerville Direct Drainage Area, Schuylerville-Stillwater Direct Drainage Area
Batten Kill	Fish Creek
Hoosic River	Anthony Kill, Deep Kill, Stillwater- Waterford Direct Drainage Area

Table 6-10. Tributary Solids Rating Curve Equations for Data-Based Rating Curves and Adjusted Rating Curves for the Long-Term Solids Balance.

Tributary[1]	Flow cut-point (cfs)[2]	Unadjusted		Adjusted		10/1/77-9/30/97 Unadjusted Average Load MT/Year	10/1/77-9/30/97 Adjusted Average Load MT/Year
		A	B	A	B		
Snook Kill	105	0.0070	1.5618	0.0070	1.5618	4,222.4	4,222.4
Moses Kill	77	0.0437	1.2943	0.0437	1.2943	2,619.4	2,619.4
Ungaged/Direct drainage to TIP	43	0.0437	1.2943	0.0437	1.2943	197.9	197.9
Batten Kill	602	0.0110	0.9933	0.0110	1.2190	7,797.0	37,754.6
Ungaged TID - Schuylerville (Moses Kill)	42	0.0437	1.2943	0.0437	1.5910	691.2	2,716.0
Fish Creek (Batten Kill)	357	0.0010	0.9933	0.0110	1.1490	3,035.8	7,884.0
Flately Brook (Moses Kill)	12	0.0437	1.2943	0.0437	1.8500	78.2	701.1
Ungaged Schuylerville - Stillwater (Moses Kill)	117	0.0437	1.2943	0.0437	1.2190	11,411.1	7,008.0
Hoosic River	1,328	0.0015	1.2270	0.0015	1.2870	45,736.3	73,985.0
Deep Kill (Hoosic River)	24	0.0015	1.2270	0.0015	2.2360	47.1	1,643.9
Anthony Kill (Hoosic River)	94	0.0015	1.2270	0.0015	1.7880	313.3	6,473.7
Ungaged Stillwater - Waterford (Hoosic River)	58	0.0015	1.2270	0.0015	1.9250	150.6	4,008.2
Mohawk River	5,661	0.0002	1.2800	0.0002	1.2800	246,673.7	246,673.7

[1] Tributaries in parentheses are the reference tributaries.

[2] Flow cut-points are specified as the average flow.

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Table 6-11. Cumulative Mainstem Solids (SS) Loads and Yields

Station	Cumulative SS Load (MT) (1/1/77 - 9/30/97)	Cumulative SS Load (MT) (10/1/77 - 9/30/97)	Drainage Area (mi^2)	Yield (MT/mi^2*yr) (10/1/77 – 9/30/97)
Fort Edward	622,518	587,550	2,817	10.43
Stillwater	1,737,328	1,640,581	3,773	21.74
Waterford	3,574,041	3,239,717	4,611	35.13

Data Source: Hudson River Database Release 4.1b.

Table 6-12. Cumulative Solids Loads and Corresponding Yields by Reach (10/1/77 - 9/30/97)

Reach	Cumulative Solids Load (MT)		Average Annual Yield by Reach (MT/mi^2*yr)	
	Load increment between mainstem stations	Sum of tributary Solids loads	Yield increment between mainstem stations	Yield delivered by tributaries using rating curve
Fort Edward - Stillwater	1,053,031	601,061	55.1	31.4
Stillwater - Waterford	1,599,136	924,948	95.4	55.2

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Table 6-13. Solids (TSS) Trapping Efficiencies by Reach Estimated by QEA Using SEDZL and Applied to Estimate Tributary TSS Loads in HUDTOX.

<table>
<tr><th>Reach</th><th>Trap%[1] computed by SEDZL[2]</th><th>Area-weighted reach average Trap% applied to compute tributary TSS loads</th></tr>
<tr><td>Fort Edward to TI Dam</td><td>8.8</td><td>8.8</td></tr>
<tr><td>TI Dam to Lock 6</td><td>0.8</td><td rowspan="3">8.47</td></tr>
<tr><td>Lock 6 to Northumberland Dam</td><td>2.3</td></tr>
<tr><td>Northumberland Dam to Stillwater Dam</td><td>11</td></tr>
<tr><td>Stillwater Dam to Lock 3</td><td>10</td><td rowspan="3">3.66</td></tr>
<tr><td>Lock 3 to Lock 2</td><td>1.8</td></tr>
<tr><td>Lock 2 to Lock 1</td><td><0.1</td></tr>
<tr><td>Lock 1 to Federal Dam</td><td><0.1</td><td>0</td></tr>
</table>

[1] Trap% = TSS trapping efficiency, or percent of upstream and tributary solids load retained.

[2] From QEA, 1999.

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Table 6-14. Comparison of LTI and Literature-Based Annual Average Sediment Yield Estimates by Watershed.

	SCS Report - p. 34, 48, 49				SCS rpt. p. 103	Load/area Calc. Using LTI land use dist (GIS) and SCS soil loss/year by land use *DR=0.08		Summary Yields (MT/mi2-yr)		
Tributary	Tons	Square Miles	Tons/square mile-yr (no DR)	**Tons/mi2-yr (8% DR)**		w cropland adequately treated	w cropland needing treatment	**Minimum**	**Maximum**	**LTI Estimate**
Snook Kill	72,751	122	595	**47.6**		32.2	32.2	32.2	47.6	56.3
Moses Kill	69,306	69	1,003	**80.2**		47.9	47.9	47.9	80.2	47.6
Batten Kill	70,877	176	402	**32.1**		33.2	33.2	32.1	33.2	87.6
Fish Creek	109,154	256	427	**34.2**		36.5	36.5	34.2	36.5	32.2
Flately Brook	75,759	85	887	**71**		42.8	42.9	42.8	71	87.6
Hoosic River	106,021	236	448	**35.9**		39.4	39.4	35.9	39.4	102.8
Deep Kill	38,547	68	570	**45.6**		46.4	46.4	45.6	46.4	102.8
Anthony Kill	29,617	66	445	**35.6**	**33.6**	53.4	53.5	33.6	53.5	102.8
TIP Direct						53.3	53.3	53.3	53.3	6.4
TI Dam-Schuylerville Direct						45.2	45.2	45.2	45.2	87.6
Schuylerville-Stillwater Direct						44.2	44.2	44.2	44.2	87.6
Stillwater-Waterford Direct						54.8	54.8	54.8	54.8	102.8

Reference: USDA, Soil Conservation Service. 1974. Erosion and Sediment Inventory: New York.

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Table 6-15. Number of Tri+ PCB Data Available by Source and Year at Each Hudson River Mainstem Sampling Station.

Year	Fort Edward			Thompson Island Dam			Schuylerville			Stillwater			Waterford		
	GE	P2	USGS	GE	P2	USGS	GE	P2	USGS	GE	P2	USGS	GE	P2	USGS
1977			3						33			35			52
1978			35						12			31			31
1979			53						15			36			37
1980			55						14			28			42
1981			58						34			33			25
1982			49						34			44			33
1983			44						41			49			51
1984			34						29			35			39
1985			17						18			18			67
1986			28						25			25			24
1987			15						10			8			24
1988			38						20			23			21
1989			23						20			19			26
1990			26						5			15			18
1991	38		19	32			35			36		16	36		17
1992	79		21	54			22			27		24	27		25
1993	60	99	27	51	99		1	6			3	22	1	91	30
1994	37		30	35								19			30
1995	73		71	67								21			22
1996	107		26	93								21			26
1997	97		19	185			17					19			20
1998	38			50			35								
Total	529	99	691	567	99		110	6	310	63	3	541	64	91	660

Source: Hudson River Database Release 4.1b

Table 6-16. Number of Days With Available PCB Data for Monitored Tributaries (Batten Kill, Hoosic River, Mohawk River).

Year	Batten Kill							Hoosic River							Mohawk River						
	Tri+	Total	BZ# 4	BZ# 28	BZ #52	BZ#90 +101	BZ# 138	Tri+	Total	BZ# 4	BZ# 28	BZ #52	BZ#90 +101	BZ# 138	Tri+	Total	BZ# 4	BZ# 28	BZ #52	BZ#90 +101	BZ# 138
1991		18	18	18	18	18	18		17	17	17	17	17	17							
1992		26	26	26	26	26	26		25	25	25	25	25	25							
1993	5	6	6	6	6	6	6	6	8	8	8	8	8	8	6	7	7	7	7	7	7
Total	5	50	50	50	50	50	50	6	50	50	50	50	50	50	6	7	7	7	7	7	7

Table 6-17. Number of PCB Data Available for Each Congener and Total PCB by Source and Year at Each Hudson River Mainstem Sampling Station[1].

Year	Fort Edward		Thompson Island Dam		Schuylerville		Stillwater		Waterford	
	GE	Phase2	GE	Phase2	GE	Phase2	GE	Phase2	GE	Phase2
1991	30		30		30		31		31	
1992	73		51		20		26		24	
1993	60	12	51	12	1	6		2	1	13
1994	32		35							
1995	55		50							
1996	85		75							
1997	78		147		16					
1998	32		41		29					
Total	445	12	480	12	96	6	57	2	56	13

[1] The numbers in this table apply to each PCB type individually.

Source: Hudson River Database Release 4.1b

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Table 6-18. Criteria and Factors Used in Adjustment of Thompson Island Dam West Shore PCB Data Bias.

Fort Edward Condition	Criteria	Total PCBs	Tri+ PCBs
Low Flow, Low Upstream Concentration	Q < 4000 cfs C < 17 ng/L (Total) or $\leq$ 15 ng/L (Tri+)	0.64	0.69
Low Flow, High Upstream Concentration	Q < 4000 cfs C $\geq$ 17 ng/L (Total) or > 15 ng/L (Tri+)	0.80	0.88
High Flow, Low Upstream Concentration	Q $\geq$ 4000 cfs C < 17 ng/L (Total) or $\leq$ 15 ng/L (Tri+)	0.78	1.00
High Flow, High Upstream Concentration	Q $\geq$ 4000 cfs C $\geq$ 17 ng/L (Total) or > 15 ng/L (Tri+)	1.00	1.00

Table 6-19. Tri+ and Total PCB Concentration Statistics for Monitored Tributaries.

Tributary	PCB Form	Count	Average Concentration (ug/L)	Std. Dev.	Maximum Concentration (ug/L)	Minimum Concentration (ug/L)
Batten Kill	Tri+	5	0.00149	0.00276	0.00710	0.00000
	Total	50	0.00606	0.01052	0.04764	0.00000
Hoosic River	Tri+	6	0.00205	0.00120	0.00437	0.00108
	Total	50	0.01132	0.01282	0.05131	0.00000
Mohawk River	Tri+	6	0.00084	0.00054	0.00146	0.00017
	Total	7	0.01162	0.01568	0.03967	0.00115

Source: Hudson River Database Release 4.1b

Table 6-20. Comparison of Annual Tri+ PCB Load Estimates at Hudson River Mainstem Station Presented in the DEIR[1] and Calculated in this Report

Year	Fort Edward		Schuylerville		Stillwater		Waterford	
	DEIR	LTI	DEIR	LTI	DEIR	LTI	DEIR	LTI
1977	1,414	673	2,519	2,215	2,926	2,545	2,439	2,394
1978	544	351	2,747	1,821	2,138	1,680	2,260	2,047
1979	1,272	978	4,635	3,987	3,008	3,081	2,963	3,355
1980	439	430	760	772	899	851	1,007	785
1981	354	291	962	1,207	922	946	1,299	1,188
1982	374	325	528	490	635	717	818	774
1983	657	551	997	967	1,612	1,486	1,191	1,133
1984	477	617	830	478	826	678	702	501
1985	294	186	324	157	299	186	432	179
1986	423	191	320	180	358	130	366	153
1987	197	220	213	157	235	157	300	241
1988	119	65	83	59	105	73	100	73
1989	445	103	195	136	200	159	151	124
1990	398	224		363	220	336	115	404
1991	185	259		465	208	257	212	271
1992	825	604		655	411	491	317	438
1993	310	234		283	420	445	229	268
1994	90	155		240		126		128
1995		108		157		92		83
1996		59		219		154		168
1997		29		130		80		139

[1] Data Evaluation and Interpretation Report (USEPA, 1997), Table 3-23 Ratio Method

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Table 6-21. Estimated Average Annual Load at Fort Edward by PCB Type from 1991-1997.

Year	Tri+ (kg/day)	Total (kg/day)	BZ#4 (kg/day)	BZ#28 (kg/day)	BZ#52 (kg/day)	BZ#90+101 (kg/day)	BZ#138 (kg/day)
1991	0.7108	1.1784	0.0415	0.0901	0.0638	0.0189	0.0140
1992	1.6496	1.8622	0.0571	0.1169	0.0930	0.0304	0.0188
1993	0.6417	0.9880	0.0738	0.0931	0.0865	0.0238	0.0098
1994	0.4246	0.4813	0.0404	0.0483	0.0437	0.0217	0.0102
1995	0.2949	0.3462	0.0192	0.0335	0.0216	0.0116	0.0080
1996	0.1618	0.2223	0.0153	0.0164	0.0155	0.0073	0.0040
1997	0.1063	0.1258	0.0120	0.0068	0.0072	0.0043	0.0015

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Table 6-22. Cohesive/non-cohesive Sample Classification Criteria Applied to 1977 NYSDEC Data to Compute HUDTOX Sediment Tri+ Initial Conditions.

Classification	Classification Critera				
	Reach	Side Scan Sonar Region	Texture Class*	Principal Fraction**	Other
Cohesive	Fort Edward to Lock 5	Fine			
Non-cohesive	Fort Edward to Lock 5	Coarse	n.appl.		
Non-cohesive	Fort Edward to Lock 5	Fine	8,9		
Cohesive	Fort Edward to Lock 5	Coarse		<= 200	
Cohesive	downstream of Lock 5	NA		<= 200	
Non-cohesive	downstream of Lock 5	NA		>= 400	
Cohesive	downstream of Lock 5	NA		300	%clay + %silt ≥ 25
Non-cohesive	downstream of Lock 5	NA		300	%clay + %silt < 25
Cohesive	downstream of Lock 5	NA	< 4	NA	
Non-cohesive	downstream of Lock 5	NA	≥4, ≤10	NA	
Cohesive	downstream of Lock 5	NA	>10 or NA	NA	Tri+ ≥ 50 ppm
Non-cohesive	downstream of Lock 5	NA	>10 or NA	NA	Tri+ < 50 ppm
Cohesive	all	either			$f_{OC} \geq 0.10$

NA=not available, shaded dash cells indicate not applicable

*Modified from Tofflemire and Quinn, 1979

Texture No. (txtno)	Sediment type description
txtno<1	clay
1 ≤ txtno < 2	silt
2 ≤ txtno < 4	muck, muck&wood chips
4 ≤ txtno < 6	fine sand, fine sand & wood chips
6 ≤ txtno < 8	sand, sand & wood chips
8 ≤ txtno < 10	coarse sand, course sand & wood chips
txtno > 10*	considered unclassified - no matching class in Tofflemire and Quinn, 1979

** From USEPA Hudson River Database Release v4.1b

Principal fraction	Type
100	clay
200	silit
300	fine sand
400	medium sand
500	coarse sand
600	gravel

Table 6-23. Sample Count and Averaging Groups for Specifying 1977 Sediment Initial Conditions for HUDTOX from the NYSDEC Data.

HUDTOX Segment	Number of samples		Averaging Group	Count of samples in averaging group		
	Cohesive	Non-cohesive		Cohesive	Non-cohesive	Total
1	1	3	1	8	25	33
2		2				
3	5	2				
4		4				
5	2	3				
6		10				
7		1				
8	12	8	2	29	62	91
9	4	16				
10	1	5				
11	5	8				
12	1	16				
13	6	9				
14	6	3	3	15	18	33
15	1	9				
16	8	6				
17	8	4	4	11	30	41
18	1	16				
19	2	10				
20	5	3	5	19	12	31
21	2	8				
22	12	1				
23	5	6	6	13	15	28
24	2	6				
25	6	3				
26	4	22	7	40	50	90
27	23	21				
28	13	7				
29	29	50	8	29	50	79
30	42	22	9	42	22	64
31	56	15	10	56	15	71
32	2	1	11	22	14	36
33	5	1				
34	15	12				
35	8	5	12	56	26	82
36	25	9				
37	23	12				
38	19	5	13	27	8	45
39	8	3				
40	17	9	14	29	20	49
41	12	11				
42	4	2	15	12	8	20
43	8	6				
44	3	5	16	11	10	21
45	8	5				
46	53	6	17	55	8	63
47	2	2				

Table 6-24. Averaging Groups for Specifying Sediment Initial Conditions from the 1991 GE Composite Sampling Data.

HUDTOX water column segment	Number of samples		Total number of samples	Averaging Group	Count of samples		
	Cohesive	Non-cohesive			Cohesive	Non-cohesive	Total
1		5	5	1	8	70	78
2		5	5				
3		7	7				
4		10	10				
5	8	19	27				
6		5	5				
7		19	19				
8	46	5	51	2	47	36	83
9		11	11				
10	1	20	21				
11	15	9	24	3	29	30	59
12		7	7				
13	14	14	28				
14	19	9	28	4	19	9	28
15	1	10	11	5	1	10	11
16	22	13	35	6	22	13	35
17	17	12	29	7	17	12	29
18		13	13	8	0	13	13
19	10	10	20	9	10	10	20
20		23	23	10	0	23	23
21	3	5	8	11	3	5	8
22	26		26	12	26	0	26
23	18	8	26	13	27	9	36
24		1	1				
25	9		9				
26		17	17	14	18	33	51
27		13	13				
28	18	3	21				
29	10	29	39	15	10	29	39
30	7	18	25	16	7	18	25
31	16	6	22	17	16	6	22
32		7	7	18	17	31	48
33		16	16				
34	17	8	25				
35	16	11	27	19	77	58	135
36	33	16	49				
37	28	31	59				
38	9	10	19	20	18	15	33
39	9	5	14				
40		17	17	21	6	19	25
41	6	2	8				
42	8	14	22	22	15	16	31
43	7	2	9				
44	1	36	37	23	1	48	49
45		12	12				
46		43	43	24	0	71	71
47		28	28				
		Grand Total:	978		394	584	978

Table 6-25. Pool-Wide Thompson Island Pool Average Surficial Sediment Concentrations for Each PCB State Variable.

	Concentrations in mg/L bulk		
PCB Type	**Cohesive**	**Non-Cohesive**	**Area-Weighted Average**
Total	40.44	28.28	31.08
Tri+	18.01	14.51	15.31
BZ#4	9.30	5.16	6.11
BZ#28	0.74	0.95	0.90
BZ#52	1.14	0.79	0.87
BZ#90+101	0.18	0.13	0.14
BZ#138	0.11	0.07	0.08

Source: Hudson River Database Release 4.1b

Table 6-26. 3-Phase Partition Coefficients Estimated from Phase 2 Water Column Data and GE Sediment Data

Parameter	Phase 2 Water Column		GE Sediment Data	
	log k_{POC}	log k_{DOC}	log k_{POC}	log k_{DOC}
Tri+	5.845	3.96	N/A	N/A
BZ#4	5.19	5.43	4.73	3.60
BZ#28	5.84	4.16	6.49	4.36
BZ#52	5.82	4.28	5.98	4.32
BZ#101+90	6.18	4.54	5.98	4.68
BZ#138	6.43	4.86	6.31	5.12

N/A = None Available

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Table 6-27. Mass Fraction of Total PCB Represented by Tri+, BZ#1, BZ#4, and BZ#8 at Mainstem Hudson River Stations Determined from GE and USEPA Phase 2 (P2) Data.

	Total PCB		Tri+ PCB		BZ#1		BZ#4		BZ#8	
Location	**GE**	**P2**	**GE**	**P2**	**GE**	**P2**	**GE[1]**	**P2**	**GE[2]**	**P2**
Fort Edward	98.13%	89.70%	90.59%	74.76%	0.08%	4.26%	3.60%	8.28%	3.86%	2.40%
Thompson Island Dam	98.80%	93.74%	60.25%	49.79%	10.83%	16.79%	24.38%	24.86%	3.33%	2.29%
Schuylerville	98.69%	94.97%	66.86%	62.95%	8.55%	11.45%	20.02%	18.61%	3.25%	1.96%
Stillwater	98.64%	95.94%	81.65%	72.61%	4.32%	12.04%	9.53%	9.27%	3.14%	2.02%
Waterford	98.41%	94.07%	82.25%	71.56%	2.87%	5.20%	10.04%	15.60%	3.25%	1.70%

[1] GE reports BZ#4 and BZ#10 together as one result.

[2] GE reports BZ#8 and BZ#5 together as one result.

Source: Hudson River Database Release 4.1b

Table 6-28. Estimated Partition Coefficients (K_{POC}, K_{DOC}) for Total PCB by Source and Agency at Mainstem Hudson River Stations.

LTI ID	Log K_{POC} (L/Kg)		Log K_{DOC} (L/Kg)		Number of GE Data	Number of P2 Data
	GE	P2	GE	P2		
Fort Edward	6.23	5.20	4.46	3.61	348	12
Thompson Island Dam	5.25	4.16	4.13	3.06	475	12
Schuylerville	5.46	4.60	4.20	3.30	94	6
Stillwater	5.90	5.19	4.34	3.70	55	3
Waterford	5.98	4.84	4.39	3.38	53	13

Table 6-29. Estimated Partition Coefficients (K_{POC}, K_{DOC}) for Total PCB at Mainstem Hudson River Stations and Averaged Over Study Reach.

LTI ID	Average Log K_{POC}[1] (L/kg)	Average Log K_{DOC}[1] (L/kg)	Distance Used in Weighting (m)
Fort Edward	6.19	4.43	4,828
TI Dam	5.22	4.11	10,541
Schuylerville	5.41	4.15	16,335
Stillwater	5.87	4.30	20,036
Waterford	5.75	4.19	9,415
Final Estimate[2]	5.64	4.22	

[1] Average was determined by weighting each source's value with the number of data points presented in Table 6-28.

[2] Final estimate was determined by weighting the station specific average value with the distance associated with each station in the last column of this table.

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Table 6-30. Statistical Summary of Dissolved Organic Carbon (DOC) Water Column Data.

Location	River Mile	Count of DOC Concentrations	Average DOC Concentration (mg/L)	Maximum DOC Concentration (mg/L)	Minimum DOC Concentration (mg/L)	Std. Dev.
Above Fort Edward	199.5	13	5.75	9.69	3.97	1.77
Above Fort Edward	197.6	29	4.82	5.94	4.01	0.51
Above Fort Edward	197	6	3.58	5.00	2.00	1.28
Above Fort Edward	195.5	14	4.65	5.28	3.75	0.51
Fort Edward	194.6	25	5.03	6.30	4.15	0.62
Fort Edward	194.4	8	4.41	7.00	2.00	1.70
Thompson Island Pool	193.7	2	3.44	3.92	2.96	0.68
Thompson Island Pool	189	11	4.43	7.00	1.00	1.44
Thompson Island Dam	188.5	28	5.00	5.53	4.11	0.39
Between TI Dam and Schuylerville	182.3	6	3.60	5.34	1.93	1.56
Schuylerville	181.4	17	4.25	7.00	2.00	1.36
Schuylerville	181.3	8	5.30	6.57	4.46	0.76
Stillwater	168.3	29	4.35	8.00	0.94	1.29
Waterford	156.5	50	4.01	6.00	1.00	1.01
Below Federal Dam	151.7	3	4.34	4.63	4.16	0.26
Below Federal Dam	125	2	4.04	4.39	3.69	0.50
Below Federal Dam	110	1	3.80	3.80	3.80	
Below Federal Dam	77	2	3.55	3.83	3.26	0.40

Table 6-31. Mean DOC Concentrations by Reach in Upper Hudson River.

Reach	River Miles	DOC Concentration (mg/L)
FE-TID	194.5-188.5	4.32
TID-Schuylerville	188.5-181.4	4.28
Schuylerville-Stillwater	181.4-168.2	4.63
Stillwater-Waterford	168.2-156.5	4.01

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Table 6-32. Mean Sediment f_{OC} Values Specified from GE 1991 Composite Data for River Mile intervals in HUDTOX.

Downstream-Upstream River Mile	Mean f_{OC}	
	Fine (Assigned to Cohesive)	Coarse (Assigned to Non-cohesive)
193.5-194.5	0.037	0.013
192.5-193.5	0.017	0.008
191.5-192.5	0.022	0.011
190.5-191.5	0.022	0.013
189.5-190.5	0.023	0.008
188.5-189.5	0.027	0.008
188.5-183	0.028	0.008
183 -180	0.016	0.013
180 -175	0.016	0.01
175 -170	0.017	0.007
170 -155	0.021	0.008

Source: Hudson River Database Release 4.1b

Table 6-33.
Illustration of Typical Low and High Flow Partitioning Behavior During Cold Weather and Warm Weather Periods.

PCB state variable	Summer						Winter					
	low flow			high flow			low flow			high flow		
	f_{diss}	f_{doc}	f_p	f_{diss}	f_{doc}	f_p	f_{diss}	f_{doc}	f_p	f_{diss}	f_{doc}	f_p
Total	0.70	0.04	0.26	0.26	0.01	0.72	0.49	0.06	0.45	0.13	0.02	0.86
Tri+	0.61	0.02	0.37	0.18	0.01	0.81	0.39	0.03	0.58	0.09	0.01	0.91
BZ#4	0.51	0.43	0.07	0.35	0.30	0.34	0.30	0.61	0.10	0.18	0.38	0.44
BZ#28	0.61	0.04	0.35	0.19	0.01	0.80	0.39	0.06	0.55	0.09	0.01	0.90
BZ#52	0.61	0.03	0.36	0.19	0.01	0.81	0.39	0.04	0.57	0.09	0.01	0.90
BZ#90+101	0.41	0.05	0.54	0.09	0.01	0.90	0.23	0.06	0.72	0.04	0.01	0.95
BZ#138	0.28	0.06	0.65	0.06	0.01	0.93	0.14	0.08	0.78	0.02	0.01	0.96

Input Conditions

parameters	winter low flow	winter high flow	summer low flow	summer high flow
m_s	5	100	5	100
θ_s	1	1	1	1
foc-s	0.22	0.08	0.22	0.08
DOCs	4.01	4.01	4.01	4.01
Temp	1.13	1.13	27.8	27.8

Table 6-34. Henry's Law Constants Developed Expiremently by Brunner, et. al. (1990) for Selected Congeners.

BZ #	Brunner's HLC[1] (atm-m3/mol)
4	0.000230
5	0.000230
6	0.000250
7	0.000280
8	0.000230
9	0.000280
10	0.000230
12	0.000140
16	0.000200
18	0.000250
19	0.000230
20	0.000160
22	0.000140
24	0.000220
26	0.000200
28	0.000200
29	0.000200
31	0.000190
32	0.000200
33	0.000160
34	0.000200
36	0.000170
37	0.000100
40	0.000100
41	0.000140
42	0.000140
44	0.000140
47	0.000190
49	0.000210
51	0.000140
52	0.000200
54	0.000200
62	0.000210

BZ #	Brunner's HLC[1] (atm-m3/mol)
64	0.000140
66	0.000120
67	0.000100
69	0.000210
70	0.000100
74	0.000100
79	0.000090
85	0.000066
87	0.000074
91	0.000120
95	0.000120
97	0.000074
99	0.000078
101	0.000090
102	0.000090
119	0.000074
120	0.000056
128	0.000013
129	0.000029
130	0.000037
131	0.000039
132	0.000044
134	0.000049
135	0.000056
136	0.000088
138	0.000021
141	0.000023
143	0.000039
146	0.000025
147	0.000051
151	0.000059
153	0.000023
159	0.000020

BZ #	Brunner's HLC[1] (atm-m3/mol)
160	0.000020
163	0.000015
165	0.000029
170	0.000009
172	0.000013
173	0.000014
174	0.000014
178	0.000023
179	0.000024
180	0.000010
185	0.000016
194	0.000010
195	0.000011
196	0.000010
198	0.000014
199	0.000010
201	0.000017
202	0.000018

[1] Source: Brunner, S., et.al. "Henry's Law Constants for Polychlorinated Biphenyls: Experimental Determination and Structure-Property Relationships." Environ. Sci. Tech., Vol. 24, No. 11, 1990.

Table 6-35. Congener Distribution of Total PCB by Mass Fraction at Mainstem Hudson River Stations Using 1993 USEPA Phase 2 Data (Number of observations).

Congener Number	Fort Edward (12)	Thompson Island Dam (12)	Schuylerville (6)	Stillwater (3)	Waterford (13)	Upper Hudson Average
BZ#1	4.258%	16.793%	11.449%	12.040%	5.201%	9.240%
BZ#2	0.000%	0.000%	0.000%	0.000%	0.109%	0.031%
BZ#3	0.151%	0.138%	0.000%	0.000%	0.181%	0.126%
BZ#4	8.283%	24.865%	18.613%	9.273%	15.605%	16.090%
BZ#5	0.005%	0.007%	0.000%	0.009%	0.000%	0.004%
BZ#6	0.575%	0.603%	0.454%	0.515%	0.513%	0.545%
BZ#7	0.061%	0.026%	0.022%	0.000%	0.013%	0.029%
BZ#8	2.397%	2.292%	1.963%	2.021%	1.705%	2.093%
BZ#9	0.196%	0.222%	0.101%	0.106%	0.068%	0.148%
BZ#10	1.681%	4.261%	2.854%	1.552%	3.225%	2.935%
BZ#12	0.060%	0.086%	0.055%	0.114%	0.140%	0.092%
BZ#15	7.739%	1.019%	1.613%	1.763%	1.820%	3.125%
BZ#16	0.990%	0.573%	0.658%	0.520%	0.712%	0.729%
BZ#17	0.837%	0.613%	0.393%	0.000%	0.932%	0.693%
BZ#17NT	1.471%	1.151%	1.687%	2.421%	1.722%	1.549%
BZ#18	4.029%	3.121%	4.088%	5.016%	4.162%	3.902%
BZ#19	3.257%	4.531%	3.508%	1.863%	4.620%	3.917%
BZ#20	0.187%	0.093%	0.030%	0.000%	0.081%	0.100%
BZ#20 (as BZ#52)NT	0.514%	0.518%	0.890%	0.882%	0.652%	0.627%
BZ#22	1.886%	1.152%	1.571%	1.994%	1.197%	1.466%
BZ#23NT	0.168%	0.062%	0.172%	0.206%	0.144%	0.137%
BZ#24NT	0.106%	0.078%	0.149%	0.245%	0.123%	0.118%
BZ#25	0.380%	0.308%	0.355%	0.537%	0.524%	0.409%
BZ#26	1.363%	1.657%	1.737%	2.332%	2.140%	1.771%
BZ#27	1.002%	1.364%	1.589%	2.042%	1.264%	1.315%
BZ#27 & BZ# 24	0.763%	1.009%	0.508%	0.000%	1.005%	0.812%
BZ#28	6.012%	3.522%	5.456%	7.195%	5.390%	5.191%
BZ#29	0.075%	0.057%	0.061%	0.058%	0.096%	0.074%
BZ#31	4.289%	3.458%	4.430%	5.689%	5.096%	4.410%
BZ#32NT	3.389%	2.201%	2.636%	3.063%	2.962%	2.839%
BZ#33	0.429%	0.179%	0.100%	0.000%	0.106%	0.202%
BZ#33NT	0.259%	0.125%	0.223%	0.303%	0.211%	0.208%
BZ#34NT	0.378%	0.200%	0.164%	0.161%	0.237%	0.250%
BZ#37	3.331%	1.918%	2.847%	4.048%	2.626%	2.747%
BZ#40	0.739%	0.384%	0.401%	0.423%	0.611%	0.546%
BZ#41	1.025%	0.454%	0.495%	0.337%	0.645%	0.655%
BZ#42	0.476%	0.200%	0.138%	0.000%	0.309%	0.282%
BZ#42NT	0.294%	0.200%	0.468%	0.653%	0.454%	0.361%
BZ#44	3.340%	1.805%	2.501%	2.922%	2.548%	2.579%
BZ#45	0.351%	0.227%	0.104%	0.000%	0.321%	0.255%
BZ#45NT	0.561%	0.378%	0.596%	0.842%	0.566%	0.538%
BZ#47	1.762%	1.104%	1.234%	1.153%	1.657%	1.452%
BZ#48NT	0.900%	0.417%	0.600%	0.750%	0.706%	0.670%
BZ#49	2.650%	1.642%	1.567%	1.512%	2.517%	2.134%
BZ#51NT	0.429%	0.255%	0.320%	0.381%	0.399%	0.358%
BZ#52	3.689%	2.596%	3.287%	3.937%	3.455%	3.301%
BZ#53	1.202%	1.004%	1.115%	0.682%	1.231%	1.113%
BZ#56	2.530%	0.507%	0.565%	0.494%	0.876%	1.146%
BZ#58NT	0.083%	0.059%	0.127%	0.212%	0.125%	0.103%
BZ#59	0.160%	0.086%	0.056%	0.000%	0.116%	0.104%

Table 6-35. Congener Distribution of Total PCB by Mass Fraction at Mainstem Hudson River Stations Using 1993 USEPA Phase 2 Data (Number of observations).

Congener Number	Fort Edward (12)	Thompson Island Dam (12)	Schuylerville (6)	Stillwater (3)	Waterford (13)	Upper Hudson Average
BZ#60NT	0.996%	0.498%	0.697%	0.856%	0.976%	0.812%
BZ#63NT	0.140%	0.051%	0.032%	0.041%	0.076%	0.078%
BZ#64NT	1.845%	1.228%	1.560%	1.884%	1.976%	1.687%
BZ#66	2.445%	1.211%	1.715%	2.265%	1.876%	1.855%
BZ#67NT	0.070%	0.033%	0.089%	0.096%	0.083%	0.069%
BZ#69NT	0.008%	0.006%	0.010%	0.031%	0.013%	0.011%
BZ#70	3.086%	1.637%	2.430%	3.148%	2.585%	2.485%
BZ#72	0.000%	0.012%	0.009%	0.000%	0.016%	0.009%
BZ#74	0.669%	0.261%	0.180%	0.000%	0.418%	0.384%
BZ#74NT	1.481%	0.810%	1.392%	2.112%	1.428%	1.321%
BZ#75	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#77	0.378%	0.129%	0.114%	0.161%	0.306%	0.244%
BZ#82	0.186%	0.102%	0.168%	0.183%	0.194%	0.164%
BZ#83	0.074%	0.050%	0.082%	0.091%	0.075%	0.070%
BZ#84	0.331%	0.203%	0.324%	0.215%	0.315%	0.284%
BZ#85	0.268%	0.140%	0.216%	0.219%	0.252%	0.220%
BZ#87	0.519%	0.274%	0.449%	0.450%	0.558%	0.452%
BZ#91	0.171%	0.133%	0.181%	0.136%	0.254%	0.183%
BZ#92	0.174%	0.097%	0.237%	0.073%	0.250%	0.177%
BZ#95	0.643%	0.494%	1.092%	1.444%	0.676%	0.724%
BZ#96NT	0.014%	0.015%	0.016%	0.029%	0.015%	0.016%
BZ#97	0.411%	0.177%	0.295%	0.348%	0.336%	0.309%
BZ#99	0.522%	0.247%	0.438%	0.419%	0.538%	0.437%
BZ#101 with BZ# 90	0.831%	0.563%	0.845%	0.928%	1.060%	0.834%
BZ#105	0.234%	0.141%	0.258%	0.293%	0.319%	0.241%
BZ#105 & BZ# 168	0.055%	0.038%	0.000%	0.000%	0.045%	0.037%
BZ#107	0.059%	0.031%	0.038%	0.034%	0.073%	0.051%
BZ#110	0.459%	0.193%	0.156%	0.000%	0.362%	0.292%
BZ#110NT	1.123%	0.719%	1.212%	1.662%	1.485%	1.167%
BZ#114NT	0.000%	0.001%	0.002%	0.000%	0.004%	0.002%
BZ#115	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#118	0.673%	0.304%	0.523%	0.472%	0.624%	0.530%
BZ#119	0.021%	0.009%	0.011%	0.012%	0.021%	0.016%
BZ#122	0.011%	0.002%	0.004%	0.000%	0.003%	0.005%
BZ#123	0.002%	0.000%	0.000%	0.000%	0.001%	0.001%
BZ#126	0.005%	0.000%	0.000%	0.002%	0.001%	0.002%
BZ#128	0.040%	0.025%	0.043%	0.029%	0.045%	0.037%
BZ#129	0.013%	0.003%	0.000%	0.000%	0.010%	0.007%
BZ#135	0.007%	0.010%	0.004%	0.000%	0.012%	0.009%
BZ#135 (as BZ#52)NT	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#136	0.023%	0.024%	0.040%	0.049%	0.055%	0.036%
BZ#137	0.024%	0.010%	0.028%	0.044%	0.028%	0.024%
BZ#138	0.265%	0.176%	0.414%	0.408%	0.478%	0.331%
BZ#140NT	0.004%	0.002%	0.000%	0.000%	0.001%	0.002%
BZ#141	0.020%	0.019%	0.029%	0.038%	0.028%	0.024%
BZ#143	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#143NT	0.021%	0.008%	0.018%	0.048%	0.015%	0.017%
BZ#144NT	0.005%	0.003%	0.006%	0.012%	0.008%	0.006%
BZ#146NT	0.015%	0.024%	0.005%	0.000%	0.020%	0.016%
BZ#149	0.152%	0.073%	0.103%	0.089%	0.252%	0.149%

Table 6-35. Congener Distribution of Total PCB by Mass Fraction at Mainstem Hudson River Stations Using 1993 USEPA Phase 2 Data (Number of observations).

Congener Number	Fort Edward (12)	Thompson Island Dam (12)	Schuylerville (6)	Stillwater (3)	Waterford (13)	Upper Hudson Average
BZ#151	0.058%	0.037%	0.044%	0.026%	0.077%	0.054%
BZ#153	0.177%	0.140%	0.231%	0.242%	0.307%	0.215%
BZ#156	0.003%	0.003%	0.005%	0.000%	0.007%	0.004%
BZ#156NT	0.018%	0.006%	0.003%	0.011%	0.024%	0.014%
BZ#157	0.014%	0.003%	0.012%	0.026%	0.002%	0.008%
BZ#158	0.010%	0.005%	0.000%	0.000%	0.010%	0.007%
BZ#165	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#167	0.003%	0.003%	0.000%	0.000%	0.002%	0.002%
BZ#169NT	0.387%	0.083%	0.160%	0.831%	0.055%	0.213%
BZ#170	0.017%	0.008%	0.016%	0.019%	0.028%	0.018%
BZ#171	0.005%	0.004%	0.003%	0.006%	0.010%	0.006%
BZ#172NT	0.002%	0.001%	0.004%	0.011%	0.006%	0.004%
BZ#174	0.001%	0.004%	0.002%	0.000%	0.002%	0.002%
BZ#174NT	0.020%	0.006%	0.014%	0.022%	0.023%	0.017%
BZ#175NT	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#176	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#177	0.020%	0.012%	0.010%	0.012%	0.027%	0.018%
BZ#178	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#178 (as BZ#52)NT	0.000%	0.000%	0.003%	0.000%	0.000%	0.000%
BZ#179	0.000%	0.002%	0.000%	0.000%	0.000%	0.001%
BZ#180	0.041%	0.010%	0.026%	0.038%	0.066%	0.038%
BZ#183	0.006%	0.003%	0.005%	0.007%	0.015%	0.008%
BZ#184NT	0.004%	0.005%	0.014%	0.000%	0.008%	0.007%
BZ#185	0.000%	0.000%	0.001%	0.002%	0.001%	0.000%
BZ#187	0.043%	0.022%	0.038%	0.022%	0.066%	0.042%
BZ#189	0.013%	0.000%	0.000%	0.000%	0.000%	0.003%
BZ#190	0.010%	0.001%	0.000%	0.000%	0.004%	0.004%
BZ#191	0.002%	0.000%	0.001%	0.002%	0.001%	0.001%
BZ#192 (as BZ#52)NT	0.009%	0.003%	0.004%	0.003%	0.009%	0.006%
BZ#193	0.000%	0.001%	0.000%	0.000%	0.001%	0.000%
BZ#194	0.011%	0.001%	0.003%	0.018%	0.009%	0.007%
BZ#195	0.001%	0.001%	0.002%	0.000%	0.002%	0.001%
BZ#196	0.010%	0.004%	0.003%	0.000%	0.009%	0.006%
BZ#197NT	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#198	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#199	0.001%	0.000%	0.000%	0.000%	0.002%	0.001%
BZ#200	0.002%	0.000%	0.003%	0.010%	0.000%	0.002%
BZ#201	0.043%	0.011%	0.016%	0.045%	0.033%	0.029%
BZ#202	0.007%	0.003%	0.007%	0.029%	0.008%	0.008%
BZ#203NT	0.018%	0.014%	0.012%	0.008%	0.024%	0.017%
BZ#205	0.000%	0.000%	0.005%	0.000%	0.000%	0.001%
BZ#206	0.000%	0.001%	0.000%	0.015%	0.007%	0.003%
BZ#207	0.001%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#208	0.002%	0.000%	0.000%	0.007%	0.005%	0.002%

Source: Hudson River Database Release 4.1b

Table 6-36. Congener Distribution of Total PCB by Mass Fraction at Mainstem Hudson River Stations Using 1991-1998 GE Data (Number of observations).

Congener Number	Fort Edward (350)	Thompson Island Dam (475)	Schuylerville (94)	Stillwater (55)	Waterford (53)	Upper Hudson Average
BZ#1	0.085%	10.830%	8.553%	4.319%	2.867%	6.200%
BZ#2	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#3	0.001%	0.029%	0.150%	0.151%	0.379%	0.055%
BZ#4 & BZ#10	3.599%	24.383%	20.025%	9.528%	10.041%	15.366%
BZ#5 & BZ#8	3.856%	3.333%	3.247%	3.140%	3.249%	3.489%
BZ#6	0.868%	0.798%	0.772%	0.844%	0.849%	0.825%
BZ#7 & BZ#9	0.421%	0.352%	0.309%	0.335%	0.363%	0.371%
BZ#11	0.000%	0.000%	0.001%	0.000%	0.000%	0.000%
BZ#12 & BZ#13	0.001%	0.009%	0.027%	0.030%	0.003%	0.009%
BZ#14	0.003%	0.014%	0.055%	0.000%	0.000%	0.012%
BZ#16 & BZ#32NT	6.530%	4.500%	4.937%	6.081%	6.234%	5.406%
BZ#17	5.385%	3.845%	4.374%	5.694%	5.659%	4.611%
BZ#18 & BZ#15	6.554%	4.033%	4.541%	5.945%	5.979%	5.141%
BZ#19	0.557%	3.074%	2.651%	2.129%	2.025%	2.073%
BZ#20 & BZ#33 & BZ#53	3.712%	2.222%	2.442%	3.007%	2.862%	2.825%
BZ#22 & BZ#51NT	4.127%	2.223%	2.474%	3.235%	3.005%	2.989%
BZ#23NT	0.000%	0.020%	0.000%	0.000%	0.000%	0.009%
BZ#24NT & BZ#27	0.541%	1.815%	1.572%	1.459%	1.493%	1.323%
BZ#25	0.683%	0.815%	0.814%	0.989%	1.025%	0.790%
BZ#26	0.847%	1.103%	1.127%	1.545%	1.707%	1.073%
BZ#28 & BZ#50	5.922%	3.135%	3.807%	5.212%	5.051%	4.357%
BZ#29	0.050%	0.059%	0.041%	0.062%	0.056%	0.055%
BZ#30	0.001%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#31	4.526%	3.230%	3.541%	4.422%	4.589%	3.834%
BZ#34NT& BZ#54	0.029%	0.069%	0.075%	0.040%	0.028%	0.052%
BZ#35NT	0.003%	0.001%	0.002%	0.000%	0.000%	0.002%
BZ#36	0.008%	0.007%	0.000%	0.007%	0.005%	0.007%
BZ#37 & BZ#42 & BZ#59	2.583%	1.555%	1.697%	1.959%	2.002%	1.963%
BZ#39NT	0.000%	0.000%	0.001%	0.001%	0.012%	0.001%
BZ#40	0.725%	0.397%	0.435%	0.612%	0.528%	0.531%
BZ#45	0.624%	0.515%	0.605%	0.673%	0.636%	0.575%
BZ#46NT	0.308%	0.224%	0.248%	0.255%	0.281%	0.260%
BZ#47	0.494%	0.416%	0.381%	0.659%	0.594%	0.461%
BZ#48NT & BZ#75	0.636%	0.385%	0.496%	0.408%	0.402%	0.483%
BZ#49	2.382%	1.708%	1.760%	2.223%	2.289%	2.000%
BZ#52 & BZ#73	5.202%	3.866%	3.934%	4.604%	4.689%	4.410%
BZ#55 & BZ#64NT & BZ#71	3.618%	2.183%	2.049%	2.812%	2.752%	2.722%
BZ#56 & BZ#60	2.704%	1.327%	1.666%	2.305%	2.458%	1.938%
BZ#58NT & BZ#63	0.129%	0.119%	0.096%	0.161%	0.156%	0.125%
BZ#62 & BZ#65	0.010%	0.005%	0.000%	0.000%	0.000%	0.006%
BZ#66 & BZ#93 & BZ#95	6.132%	3.341%	4.024%	4.703%	4.720%	4.499%
BZ#68	0.000%	0.015%	0.014%	0.000%	0.000%	0.008%
BZ#70 & BZ#76 & BZ#61	2.233%	1.120%	1.427%	1.924%	1.886%	1.610%
BZ#74 & BZ#94	1.199%	0.621%	0.720%	0.986%	0.894%	0.861%
BZ#77 & BZ#110	2.145%	1.194%	1.342%	1.515%	1.570%	1.569%
BZ#82	0.215%	0.106%	0.125%	0.191%	0.172%	0.153%
BZ#83 & BZ#109	0.130%	0.104%	0.101%	0.180%	0.250%	0.124%
BZ#85 & BZ#116	0.571%	0.304%	0.346%	0.351%	0.392%	0.406%

Table 6-36. Congener Distribution of Total PCB by Mass Fraction at Mainstem Hudson River Stations Using 1991-1998 GE Data (Number of observations).

Congener Number	Fort Edward (350)	Thompson Island Dam (475)	Schuylerville (94)	Stillwater (55)	Waterford (53)	Upper Hudson Average
BZ#87 & BZ#111 & BZ#119	0.966%	0.477%	0.544%	0.665%	0.717%	0.672%
BZ#89	0.030%	0.030%	0.045%	0.069%	0.045%	0.034%
BZ#91 & BZ#98 & BZ#55	0.355%	0.262%	0.225%	0.285%	0.282%	0.293%
BZ#96NT	0.560%	0.559%	0.508%	0.417%	0.388%	0.538%
BZ#99	0.727%	0.395%	0.429%	0.449%	0.479%	0.518%
BZ#100NT & BZ#67	0.042%	0.034%	0.032%	0.046%	0.033%	0.037%
BZ#101 & BZ#90NT	2.609%	1.328%	1.563%	1.625%	1.810%	1.827%
BZ#103 & BZ#57	0.037%	0.049%	0.020%	0.029%	0.015%	0.039%
BZ#104NT & BZ#44	4.088%	2.142%	2.530%	3.262%	3.307%	2.961%
BZ#107 &BZ#108 & BZ#147	0.021%	0.021%	0.008%	0.017%	0.029%	0.020%
BZ#122 & BZ#131 & BZ#133	0.001%	0.001%	0.001%	0.008%	0.002%	0.001%
BZ#123	0.019%	0.005%	0.007%	0.002%	0.002%	0.009%
BZ#128	0.003%	0.001%	0.005%	0.004%	0.004%	0.002%
BZ#129	0.000%	0.000%	0.001%	0.000%	0.000%	0.000%
BZ#130NT	0.003%	0.001%	0.004%	0.000%	0.000%	0.002%
BZ#132NT & BZ#105	0.335%	0.188%	0.436%	0.744%	0.782%	0.321%
BZ#134 & BZ#143 & BZ#114	0.004%	0.003%	0.006%	0.011%	0.005%	0.004%
BZ#135 & BZ#124	0.057%	0.056%	0.058%	0.121%	0.119%	0.063%
BZ#136	0.640%	0.314%	0.386%	0.488%	0.558%	0.454%
BZ#137	0.002%	0.002%	0.004%	0.011%	0.000%	0.003%
BZ#138 & BZ#163	0.400%	0.253%	0.509%	0.910%	0.879%	0.394%
BZ#139 & BZ#140	0.002%	0.000%	0.000%	0.000%	0.000%	0.001%
BZ#141	0.039%	0.017%	0.067%	0.019%	0.011%	0.029%
BZ#144NT	0.079%	0.076%	0.093%	0.184%	0.193%	0.090%
BZ#146NT & BZ#161	0.030%	0.013%	0.041%	0.058%	0.047%	0.026%
BZ#149 & BZ#118 & BZ#106	3.824%	1.942%	2.277%	2.200%	2.410%	2.652%
BZ#150 & BZ#112 & BZ#115	0.018%	0.013%	0.013%	0.018%	0.021%	0.015%
BZ#151	1.561%	0.786%	0.868%	0.810%	0.985%	1.069%
BZ#152 & BZ#86 & BZ#97	0.330%	0.177%	0.228%	0.344%	0.327%	0.251%
BZ#153	0.119%	0.056%	0.261%	0.347%	0.280%	0.123%
BZ#154	0.005%	0.001%	0.000%	0.011%	0.000%	0.003%
BZ#155 & BZ#84 & BZ#92	1.980%	1.281%	1.480%	1.639%	1.875%	1.587%
BZ#157	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#158	0.005%	0.002%	0.004%	0.011%	0.004%	0.004%
BZ#166	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#167	0.001%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#168	0.000%	0.008%	0.000%	0.000%	0.000%	0.004%
BZ#170	0.002%	0.000%	0.000%	0.000%	0.000%	0.001%
BZ#171 & BZ#156	0.007%	0.004%	0.009%	0.022%	0.004%	0.006%
BZ#172NT & BZ#192	0.001%	0.000%	0.000%	0.010%	0.000%	0.001%
BZ#173NT	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#174 & BZ#181	0.025%	0.012%	0.051%	0.072%	0.013%	0.023%
BZ#175NT	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#176	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#177	0.010%	0.006%	0.017%	0.048%	0.016%	0.011%
BZ#178	0.010%	0.003%	0.005%	0.001%	0.002%	0.005%
BZ#179	0.038%	0.024%	0.093%	0.011%	0.000%	0.033%
BZ#183	0.013%	0.005%	0.016%	0.033%	0.002%	0.010%

Table 6-36. Congener Distribution of Total PCB by Mass Fraction at Mainstem Hudson River Stations Using 1991-1998 GE Data (Number of observations).

Congener Number	Fort Edward (350)	Thompson Island Dam (475)	Schuylerville (94)	Stillwater (55)	Waterford (53)	Upper Hudson Average
BZ#185	0.000%	0.001%	0.003%	0.006%	0.004%	0.001%
BZ#187 & BZ#182	0.049%	0.021%	0.071%	0.123%	0.075%	0.044%
BZ#189	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#190	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#191	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#193	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#194	0.001%	0.001%	0.000%	0.000%	0.000%	0.001%
BZ#195	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#196 & BZ#203	0.002%	0.002%	0.000%	0.024%	0.024%	0.004%
BZ#197NT	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#198	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#199	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#200 & BZ#204	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#201	0.003%	0.002%	0.000%	0.028%	0.023%	0.004%
BZ#202	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#205	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#206	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#207	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#208	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
BZ#209	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%

Source: Hudson River Database Release 4.1b

Table 6-37. Estimated Henry's Law Constants (HLC) for Total and Tri+ PCB by Source and Agency at Mainstem Hudson River Stations.

LTI ID	Tri+ HLC (atm-m^3/mol)		Total HLC (atm-m^3/mol)		Number of GE Data	Number of Phase 2 Data
	GE	Phase 2	GE	Phase 2		
Fort Edward	1.62E-04	1.67E-04	1.71E-04	1.79E-04	348	12
Thompson Island Dam	1.75E-04	1.75E-04	1.97E-04	2.00E-04	475	12
Schuylerville	1.70E-04	1.70E-04	1.90E-04	1.88E-04	94	6
Stillwater	1.68E-04	1.66E-04	1.80E-04	1.78E-04	55	3
Waterford	1.68E-04	1.70E-04	1.80E-04	1.85E-04	53	13

Table 6-38. Estimated Henry's Law Constants (HLC) for Total PCB at Mainstem Hudson River Stations and Averaged Over Study Reach.

LTI ID	Average Tri+ PCB HLC[1] (atm-m^3/mol)	Average Total PCB HLC[1] (atm-m^3/mol)	Distance Used in Weighting (m)
Fort Edward	1.62E-04	1.71E-04	4,828
TI Dam	1.75E-04	1.97E-04	10,541
Schuylerville	1.70E-04	1.89E-04	16,335
Stillwater	1.68E-04	1.80E-04	20,036
Waterford	1.68E-04	1.81E-04	9,415
Final Estimate[2]	1.69E-04	1.85E-04	

[1] Average was determined by weighting each source's value with the number of data points presented in Table 6-37.

[2] Final estimate was determined by weighting the station specific average value with the distance associated with each station in the last column of this

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Table 6-39. Estimated Molecular Weight for Total and Tri+ PCB by Source and Agency at Mainstem Hudson River Stations.

LTI ID	Tri+ Mol. Wt. (g/mol)		Total Mol. Wt. (g/mol)		Number of GE Data	Number of Phase 2 Data
	GE	Phase 2	GE	Phase 2		
Fort Edward	288.6	281.1	282.8	264.9	348	12
Thompson Island Dam	283.9	276.5	256.4	244.2	475	12
Schuylerville	286.0	278.4	262.5	254.5	94	6
Stillwater	285.7	279.2	272.9	259.7	55	3
Waterford	286.0	279.6	274.0	262.4	53	13

Table 6-40. Estimated Molecular Weight for Total PCB at Mainstem Hudson River Stations and Averaged Over Study Reach.

LTI ID	Average Tri+ PCB Mol. Wt.[1] (g/mol)	Average Total PCB Mol. Wt.[1] (g/mol)	Distance Used in Weighting (m)
Fort Edward	288.4	282.2	4,828
TI Dam	283.8	256.1	10,541
Schuylerville	285.5	262.0	16,335
Stillwater	285.4	272.2	20,036
Waterford	284.8	271.7	9,415
Final Estimate[2]	285.3	267.4	

[1] Average was determined by weighting each source's value with the number of data points presented in Table 6-39.
[2] Final estimate was determined by weighting the station specific average value with the distance associated with each station in the last column of this

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Table 6-41. Estimated Henry's Law Constants and Molecular Weight by PCB Type.

PCB Type	Henry's Law Constant (atm-m^3/mol)	Henry's Law Constant @ 20°C (unitless)	Molecular Weight (gm/mol)
BZ#4	2.30E-04	0.009561068	223.1
BZ#28	2.00E-04	0.008313973	257.5
Total PCB	1.85E-04	0.007690425	267.4
Tri+ PCB	1.69E-04	0.007025307	285.3
BZ#52	2.00E-04	0.008313973	292.0
BZ#90+101	9.00E-05	0.003741288	326.0
BZ#138	2.10E-05	0.000872967	361.0

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Table 6-42. Coefficients Used to Estimate Depth and Velocity as a Function of Cross-Section Average Flow in HUDTOX for Calculation of Liquid-Phase (K_L) Air-Water Transfer Rates.

Segments Forming Cross-section	a^1	b^1	c^2	d^2
1, 2,	0.002064	1.0	1.483	0.0
3, 4,	0.001631	1.0	1.851	0.0
5, 6, 7	0.001683	1.0	2.604	0.0
8, 9, 10	0.001707	1.0	2.183	0.0
11, 12, 13	0.001424	1.0	2.032	0.0
14, 15, 16	0.001404	1.0	2.699	0.0
17, 18, 19	0.001495	1.0	2.874	0.0
20, 21, 22	0.001345	1.0	2.695	0.0
23, 24, 25	0.001477	1.0	3.182	0.0
26, 27, 28	0.001207	1.0	2.343	0.0
29	0.002300	1.0	1.951	0.0
30	0.001120	1.0	3.494	0.0
31	0.001260	1.0	3.862	0.0
32	0.000960	1.0	3.917	0.0
33	0.002020	1.0	3.120	0.0
34	0.001660	1.0	2.843	0.0
35	0.001410	1.0	3.755	0.0
36	0.001210	1.0	4.201	0.0
37	0.001130	1.0	4.242	0.0
38	0.000930	1.0	3.693	0.0
39	0.002100	1.0	2.993	0.0
40	0.001340	1.0	1.926	0.0
41	0.000620	1.0	4.179	0.0
42	0.001370	1.0	3.178	0.0
43	0.000940	1.0	2.467	0.0
44	0.001340	1.0	2.886	0.0
45	0.000840	1.0	4.150	0.0
46	0.000820	1.0	4.561	0.0
47	0.000550	1.0	5.772	0.0

[1] *Average cross-section velocity,* $u = a \cdot Q^b$

[2] *Average cross-section depth,* $D = c \cdot Q^d$ *(assumed constant)*

Table 6-43. Annual Average Bulk Sediment Concentrations by PCB Type.

Year	PCB Type						
	Tri+ (mg/L)	Total (mg/L)	BZ#4 (mg/L)	BZ#28 (mg/L)	BZ#52 (mg/L)	BZ#90+101 (mg/L)	BZ#138 (mg/L)
1991	18.435	32.870	5.170	0.650	0.670	0.120	0.065
1992	17.085	30.462	4.791	0.602	0.621	0.111	0.060
1993	15.834	28.231	4.440	0.558	0.575	0.103	0.056
1994	14.674	26.164	4.115	0.517	0.533	0.096	0.051
1995	13.599	24.247	3.814	0.479	0.494	0.089	0.048
1996	12.603	22.471	3.534	0.444	0.458	0.082	0.044
1997	11.680	20.825	3.276	0.412	0.424	0.076	0.041
1998	10.825	19.300	3.036	0.382	0.393	0.070	0.038

Table 6-44. Annual Average Pore Water Concentrations by PCB Type.

Year	PCB Type						
	Tri+ (mg/L)	Total (mg/L)	BZ#4 (mg/L)	BZ#28 (mg/L)	BZ#52 (mg/L)	BZ#90+101 (mg/L)	BZ#138 (mg/L)
1991	0.00198	0.00760	0.03225	0.000108	0.000091	0.000013	0.000007
1992	0.00184	0.00704	0.02989	0.000100	0.000084	0.000012	0.000007
1993	0.00170	0.00653	0.02770	0.000092	0.000078	0.000011	0.000006
1994	0.00158	0.00605	0.02567	0.000086	0.000072	0.000010	0.000006
1995	0.00146	0.00561	0.02379	0.000079	0.000067	0.000010	0.000005
1996	0.00136	0.00520	0.02205	0.000074	0.000062	0.000009	0.000005
1997	0.00126	0.00482	0.02043	0.000068	0.000057	0.000008	0.000004
1998	0.00116	0.00446	0.01893	0.000063	0.000053	0.000008	0.000004

Table 6-45. Estimated Sediment Properties in Thompson Island Pool Based on Area Weighting by Sediment Type.

Parameter	Symbol	Fort Edward - TI Dam	Units
Surface Area	A	1,826,220	m^2
% cohesive	A_c	23.28	%
% noncohesive	A_n	76.72	%
Bulk Density	ρ_b	1.254	g_{solid}/cm_{total}^3
Solids Concentration	m_s	1,254,300	mg_{solid}/L_{total}
Porosity	θ_s	0.527	L_{water}/L_{total}
Fraction Organic Carbon	$foc_{(s)}$	0.0182	gm_{carbon}/gm_{solid}
DOC Concentration	DOC_s	41.25	$mg_{carbon}/L_{bulksed}$

Table 6-46. Annual Time Series of Sediment-Water Mass Transfer Rate for Tri+ PCBs.

Date	Day of Year	k_f (cm/day)	k_f (m^2/sec)
1/1	1	10.17	4.039E-08
1/16	15	10.17	4.039E-08
1/31	31	10.17	4.039E-08
2/15	46	10.17	4.039E-08
3/1	61	10.17	4.039E-08
3/16	76	10.17	4.039E-08
3/31	92	10.17	4.039E-08
4/15	107	10.17	4.039E-08
5/1	122	10.17	4.039E-08
5/16	137	10.17	4.039E-08
5/31	153	19.39	7.702E-08
6/15	168	23.51	9.341E-08
7/1	183	21.49	8.539E-08
7/16	198	12.16	4.831E-08
7/31	214	10.99	4.368E-08
8/15	229	10.17	4.039E-08
8/31	244	10.17	4.039E-08
9/15	259	10.17	4.039E-08
9/30	275	10.17	4.039E-08
10/15	290	10.17	4.039E-08
11/1	305	10.17	4.039E-08
11/15	320	10.17	4.039E-08
12/1	336	10.17	4.039E-08
12/15	351	10.17	4.039E-08
12/31	365	10.17	4.039E-08

Table 6-47. Correlation of Particulate-mediated Sediment-Water Mass Transfer Coefficient with Suspended Solids Concentration, Fort Edward Flow, and Water Temperature.

	k_p (cm/day)	TSS (mg/L)	Q_{FE} (cfs)	H_2O Temp. (°C)
k_p (cm/day)	1			
TSS (mg/L)	0.07695	1		
Q_{FE} (cfs)	-0.05006	-0.061872	1	
Temp. (°C)	0.38006	-0.198501	-0.61591	1

Table 6-48. Annual Time Series of Pore Water and Particulate Mass Transfer Coefficients by PCB Type.

Julian Day	k_d (cm/day)	$k_{p'}$ (cm/day)[1]						
	All PCB Types	BZ#4 + BZ#10	BZ#28	BZ#52	BZ#[90+101]	BZ#138	Total	Tri+
0	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
15	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
31	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
46	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
61	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
76	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
92	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
107	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
122	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
137	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
153	1.36603	0.001740	0.001055	0.001086	0.000731	0.000549	0.001264	0.001039
168	1.65661	0.002110	0.001280	0.001317	0.000887	0.000666	0.001533	0.001260
183	1.51450	0.001929	0.001170	0.001204	0.000811	0.000609	0.001401	0.001152
198	0.85687	0.001092	0.000662	0.000681	0.000459	0.000344	0.000793	0.000652
214	0.77472	0.000987	0.000599	0.000616	0.000415	0.000311	0.000717	0.000589
229	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
244	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
259	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
275	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
290	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
305	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
320	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
336	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
351	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424
365	0.68610	0.000879	0.000436	0.000454	0.000289	0.000220	0.000550	0.000424

[1] $k_p' = k_p * d_f$ where d_f = apparent dissolved fraction in the water column

Table 7-1. HUDTOX Solids Model Calibration Parameter Values.

Parameter	Definition	Units	Value	Comments
v_S (cohesive)	Gross solids settling velocity	m/day	4.15	Determined by calibration
v_S (non-cohesive)	Gross solids settling velocity	m/day	1.5	Determined by calibration
q_{cut}	Flow threshold for non-cohesive resuspension	cfs	7,042 - 31,635	Based on TSS rating curves by reach
v_r	High flow solids resuspension velocity	mm/yr	3.6 - 16.4	See Table 7-3 for coefficients used to control resuspension and sediment armoring during events in cohesive sediments
w_{ij}	Particle mixing rate between sediment layer i and j (cohesive sediments) : TIP	m^2/day	1.0E-05 (layers 1-2; 2-3; 3-4)	Based on core depth profiles, expected biological activity, and calibration of sediment temporal trajectories.
w_{ij}	Particle mixing rate between sediment layer i and j (non-cohesive sediments) : TIP	m^2/day	1.0E-05 (layers 1-2; 2-3)	Based on core depth profiles, expected biological activity, and calibration of sediment temporal trajectories.
w_{ij}	Particle mixing rate between sediment layer i and j (cohesive sediments) : TID to Fed. Dam	m^2/day	1.0E-05 (layer1-2); 1.0E-06 (layer 2-3); 1.0E-07 (layer 3-4)	Based on core depth profiles, expected biological activity, and calibration of sediment temporal trajectories.
w_{ij}	Particle mixing rate between sediment layer i and j (non-cohesive sediments) : TID to Fed. Dam	m^2/day	1.0E-05 (layer1-2);	Based on core depth profiles, expected biological activity, and calibration of sediment temporal trajectories.
D_L	Longitudinal dispersion	m^2/sec	18.8 - 37.2; 0.0 at dam interfaces	Estimates based on USGS dye survey results (USGS, 1969)
C_S	Sediment solids bulk density (dry)	g/cm^3	0.84 (cohesive) 1.38 (non-cohesive)	Estimated using Phase 2 and NYSDEC 1984 data
□	Solid density	g/cm^3	2.65	-

Table 7-2. HUDTOX Cohesive Sediment Resuspension and Armoring Parameters.

Segment	Cohesive Sediment[1]			
	α_1	α_2	α_3	ε = 0 Flow (1,000 cfs)
Above Thompson Island Dam				
1	-17.88	0.03798047	2.946	8.08
2	-166.62	21.02054298	1.090	6.68
3	-2.08	0.17339826	2.024	3.41
4	-32.34	2.28040000	1.326	7.39
5	-5.33	0.00221500	3.294	10.63
6	-40.00	0.07454000	2.909	8.68
7	no cohesive sediment identified here			
8	-1.30	0.00334178	2.716	8.99
9	-19.43	0.01881700	3.062	9.64
10	-32.03	0.03929738	2.950	9.70
11	-0.67	0.00323573	2.480	8.60
12	-16.16	0.07562286	2.419	9.18
13	-11.02	0.27144876	1.654	9.39
14	-2.18	0.00061881	3.440	10.74
15	-3.00	0.00471263	2.833	9.76
16	-7.05	0.02144044	2.501	10.14
17	-1.83	0.00663035	2.491	9.55
18	-10.29	0.03323969	2.451	10.38
19	-12.39	0.02901571	2.524	11.02
20	-1.95	0.01184945	2.267	9.50
21	-7.84	0.01900183	2.557	10.54
22	-15.71	1.40936058	1.160	7.99
23	-7.05	0.01277475	2.618	11.15
24	-13.89	0.09770687	2.175	9.77
25	-68.42	2.16242877	1.562	9.14
26	-0.55	0.00534900	2.352	7.19
27	-1.35	0.00025495	3.620	10.68
28	-3.14	0.00227800	3.001	11.12
Downstream of Thompson Island Pool				
29 - 47	-7.84	0.02144044	2.501	10.59

[1] Cohesive sediment:

$$\varepsilon = \alpha_1 + \alpha_2 * (Q / 1000)^{\alpha_3}, \text{ units of mg/cm}^2$$

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Table 7-3. HUDTOX Fraction Organic Carbon and Dissolved Organic Carbon Parameterization by Reach.

Upper Hudson River Miles	Upper Hudson River Reach Description	HUDTOX Water Segment(s)	f_{OC} [1] Water [1a)] a	f_{OC} Water b	f_{OC} Cohesive Sediment	f_{OC} Non-cohesive Sediment	DOC (mg/L) [2] Water	DOC Cohesive Sediment	DOC Non-cohesive Sediment
194.7 - 188.5	Fort Edward - TID	1 - 28	17.5%	-0.3687	1.7 to 3.7%	0.8 to 1.3%	4.32	31.5	31.5
188.5 - 182.3	TID - Batten Kill	29 - 32	17.5%	-0.3687	2.8%	0.8%	4.28	49.4	49.4
182.3 - 181.4	Batten Kill - Fish Creek	33	17.5%	-0.3687	1.6%	1.3%	4.28	49.4	49.4
181.4 - 178.1	Fish Creek - Flately Brook	34 - 35	17.5%	-0.3687	1.6%	1.3% to 1%	4.63	49.4	49.4
178.1 - 168.2	Flately Brook - Hoosic River	36 - 39	17.5%	-0.3687	1.6 to 2.1%	0.7 to 1.0%	4.63	49.4	49.4
168.2 - 166.0	Hoosic River - Anthony Kill	40 - 41	17.5%	-0.3687	2.1%	0.8%	4.01	61.5	61.5
166.0 - 163.5	Anthony Kill - Deep Kill	42 - 43	17.5%	-0.3687	2.1%	0.8%	4.01	61.5	61.5
163.5 - 156.4	Deep Kill - Waterford	44 - 46	17.5%	-0.3687	2.1%	0.8%	4.01	61.5	61.5
156.4 - 153.9	Waterford - Federal Dam	47	17.5%	-0.3687	2.1%	0.8%	4.01	61.5	61.5

[1] Fraction organic carbon on particulates were developed for:

a) Water, based on a relationship developed from the Phase2 water column data (USEPA, 1997), where foc = a Qn b and Qn = normalized flow (see Section 6.9.2).

b) Sediment, using the Phase2 low-resolution core data and the 1991 GE composite sediment sampling data (O'Brien and Gere, 1993b).

[2] Dissolved organic carbon (DOC) concentrations were developed for:

a) Water, using data from Vaughn, 1996.

b) Sediment, based on the 1991 GE composite sediment sampling data (O'Brien and Gere, 1993b).

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Table 7-4. HUDTOX PCB Model Calibration Parameter Values.

Parameter	Definition	Units	Calibration Value: Total PCB	BZ#4	BZ#28	BZ#52	BZ#90+101	BZ#138	Tri+ PCB	Comments
MW	Molecular Weight; chemical specific	g/mole	267.4[1]	223.1	257.5	292.0	326.0	361.0	279.0[1]	Estimated based on congener distribution
H_{25}	Henry's Law Constant; chemical specific, and temperature dependent	atm m^3/mole	1.85E-04[1]	0.00023[2]	0.0002[2]	0.0002[2]	9.00E-05	2.10E-05	1.69E-04[1]	Estimated based on congener distribution or literature values
log K_{POC}	Partition coefficient for sorbate on POC, based on three-phase equilibrium partitioning model; chemical specific	log (L/kg C)	5.69[1]	5.19	5.84	5.82	6.18	6.43	5.845[1]	Congener-specific K_{POC} values are theoretical. DEIR (1997).
log K_{DOC}	Partition coefficient for sorbate on DOC, based on three-phase equilibrium partitioning model; chemical specific	log (L/kg C)	4.95[1]	5.43	4.16	4.28	4.54	4.86	3.96[1]	Congener-specific K_{DOC} values are theoretical. DEIR (1997).
k_l	Air-water liquid film mass transfer rate	m/day	O'Connor - Dobbins formulation							Chapra, 1997; Thomann and Mueller, 1987
k_g	Air-water gas exchange mass transfer rate	m/day	100 (unadjusted for chemical-specific, temperature-corrected Henry's Law Constant)							WASP5 User Guide (Ambrose et al, 1993)
q_l	Arrenhius temperature correction for air water mass transfer rate	dimensionless	1.024							Chapra, 1997; Thomann and Mueller, 1987
tsf	Temperature slope factor constant affecting partitioning; chemical specific	°K	1195.7 (representative across all PCB forms)							DEIR (USEPA, 1997)
k_f	Sediment-water mass transfer coefficient for dissolved and DOC-bound PCB.	cm/day	10 - 24 (see Section 6.13)							Developed from site specific data (see Section 6.13)
D_{deep}	Deep (>4 cm) sediment porewater diffusion coefficient for dissolved and DOC-bound PCB	m^2/sec	2.00E-10 (dissolved); 1.00E-10 (DOC-bound)							Set approximately to molecular diffusion rate

[1]Estimated based on apparent PCB congener distribution.

[2]Brunner et al. 1990

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Table 7-5. Tri+ Mass Loads (1977-1997) at Mainstem Stations for Sensitivity Analyses.

Model Run Description	Load at Thompson Island Dam (kg Tri+)	Load at Schuylerville (kg Tri+)	Load at Stillwater (kg Tri+)	Load at Waterford (kg Tri+)	Load at Federal Dam (kg Tri+)	Percent Change in Load at Federal Dam
Base HUDTOX Calibration	10,638	13,374	13,649	15,730	16,367	0
TSS : Fort Edward Solids Loads with Single Stratum Regression	10,855	13,831	14,112	16,190	16,829	3
TSS : All external Tributary solids loads 50 % higher	10,711	13,521	13,289	14,792	15,261	-7
TSS : All external Tributary solids loads 50 % lower	10,711	13,663	14,800	18,194	19,226	17
TSS : All external Tributary Loads computed using Original Rating Curve	10,643	13,494	15,203	18,815	19,483	19
Partitioning : Lower Tri+ Partition Coefficient	12,080	15,251	16,287	18,376	19,071	17
Partitioning : Higher Tri+ Partition Coefficient	8,856	11,003	10,645	12,716	13,287	-19
Sediment-water Exchange: Lower Sediment-Water Mass Transfer Coefficient	9,522	11,895	11,967	13,980	14,561	-11
Sediment-water exchange: HigherSediment-Water Mass Transfer Coefficient	11,307	14,240	14,708	16,830	17,501	7
Sediment-water exchange : Cohesive rate twice non-cohesive rate	10,756	13,620	14,011	16,066	16,690	2
Burial Rate: Higher Gross Settling Velocity into Cohesive Sediments	10,225	12,334	12,216	14,037	14,675	-10
Burial Rate: Lower Gross Settling Velocity into Cohesive Sediments	11,254	14,702	15,570	18,171	18,801	15
Sediment Mixing: Mixed Depth of 6 cm in Non-cohesive Sediments below TID	10,638	13,701	14,476	17,566	18,522	13

Table 7-5. Tri+ Mass Loads (1977-1997) at Mainstem Stations for Sensitivity Analyses.

Model Run Description	Load at Thompson Island Dam (kg Tri+)	Load at Schuylerville (kg Tri+)	Load at Stillwater (kg Tri+)	Load at Waterford (kg Tri+)	Load at Federal Dam (kg Tri+)	Percent Change in Load at Federal Dam
Initial Conditions: 1977 Sediment Initial Conditions Minus 1 Sstanard Error	9,226	11,295	11,141	12,346	12,724	-22
Initial Conditions: 1977 Sediment Initial Conditions Plus 1 Standard Error	12,051	15,454	16,156	19,113	20,009	22
Volatilization : Higher Henry's Law Constant	10,623	13,345	13,603	15,665	16,300	0
Volatilization : Lower Henry's Law Constant	10,732	13,551	13,937	16,145	16,796	3

Table 8-1. Sequencing of Annual Hydrographs to Develop 70-year Forecast Hydrograph.

Forecast Year	Annual Hydrograph	Average Annual Flow (cfs)	Forecast Year	Annual Hydrograph	Average Annual Flow (cfs)
1	1998	3,904	36	2033	4,981
2	1999	4,240	37	2034	5,985
3	2000	5,985	38	2035	5,879
4	2001	7,183	39	2036	6,265
5	2002	4,955	40	2037	6,265
6	2003	4,981	41	2038	5,049
7	2004	4,240	42	2039	7,183
8	2005	4,889	43	2040	4,981
9	2006	5,879	44	2041	5,171
10	2007	5,991	45	2042	3,904
11	2008	3,904	46	2043	7,183
12	2009	3,675	47	2044	6,762
13	2010	7,183	48	2045	6,045
14	2011	5,991	49	2046	5,985
15	2012	6,265	50	2047	5,260
16	2013	6,762	51	2048	5,260
17	2014	5,985	52	2049	4,605
18	2015	5,985	53	2050	6,045
19	2016	3,904	54	2051	6,265
20	2017	4,240	55	2052	4,981
21	2018	4,943	56	2053	4,605
22	2019	4,134	57	2054	4,605
23	2020	5,049	58	2055	6,045
24	2021	4,955	59	2056	3,904
25	2022	4,240	60	2057	4,889
26	2023	4,240	61	2058	5,147
27	2024	6,265	62	2059	4,955
28	2025	4,955	63	2060	6,265
29	2026	4,981	64	2061	7,183
30	2027	4,462	65	2062	4,955
31	2028	5,049	66	2063	4,955
32	2029	5,049	67	2064	4,605
33	2030	5,171	68	2065	5,171
34	2031	6,045	69	2066	5,049
35	2032	5,260	70	2067	4,605

Table 8-2. Surface Sediment Tri+ Initial Conditions for the No Action and 100-Year Event Simulations.

River Reach	Surface Sediment Tri+ Concentration (mg/Kg)	
	Cohesive Sediment	Non-cohesive Sediment
Thompson Island Pool	13.70	6.47
TI Dam to Schuylerville	9.91	2.03
Schuylerville to Stillwater	2.42	1.48
Stillwater to Waterford	1.98	0.96
Waterford to Federal Dam	-	0.76

Table 8-3. Effect of the 100-Year Flood Event on the Non-cohesive (N) and Cohesive (C) Sediment Bed in Upper Hudson River Reaches between Fort Edward and Federal Dam (Year 1 - 3/28 to 4/13).

Upper Hudson River Reach	Thompson Island Pool (TIP)		TI Dam to Schuylerville		Schuylerville to Stillwater		Stillwater to Waterford		Waterford to Federal Dam
Sediment Type	N	C	N	C	N	C	N	C	N
Solids Deposited (MT)	119	157	158	350	2,114	1,306	4,395	1,217	1,192
Solids Resuspended (MT)	-1,103	-1,161	-164	-5,336	-2,970	-105	-5,358	-3,715	-901
Net Change in Sediment Solids Mass (MT)	-984	-1,004	-5	-4,985	-855	1,202	-963	-2,498	291
Net Change in Sediment Bed Elevation (cm)	-0.051	-0.281	-0.001	-1.105	-0.015	0.153	-0.018	-0.569	0.008

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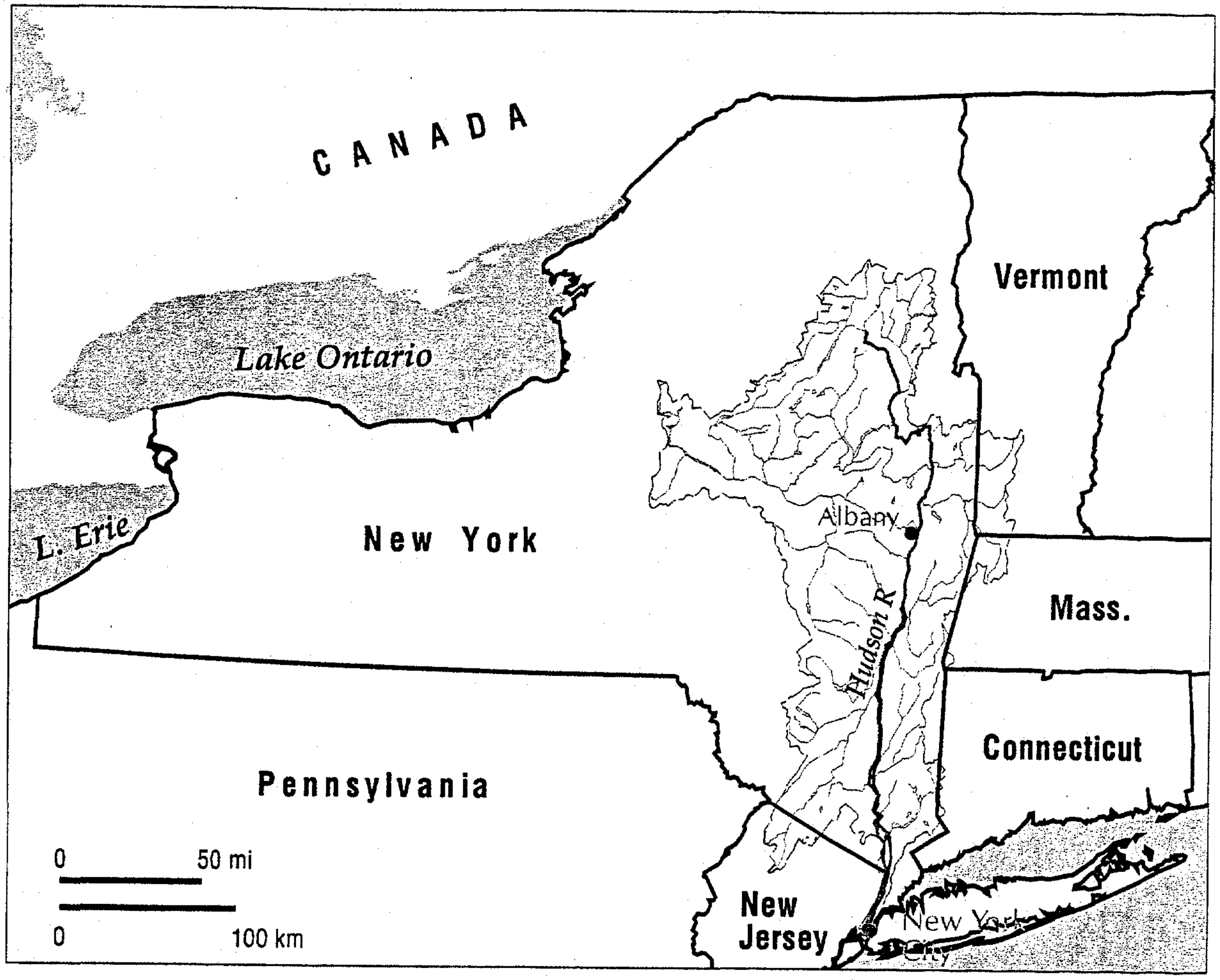


Figure 1-1. Hudson River Watershed.

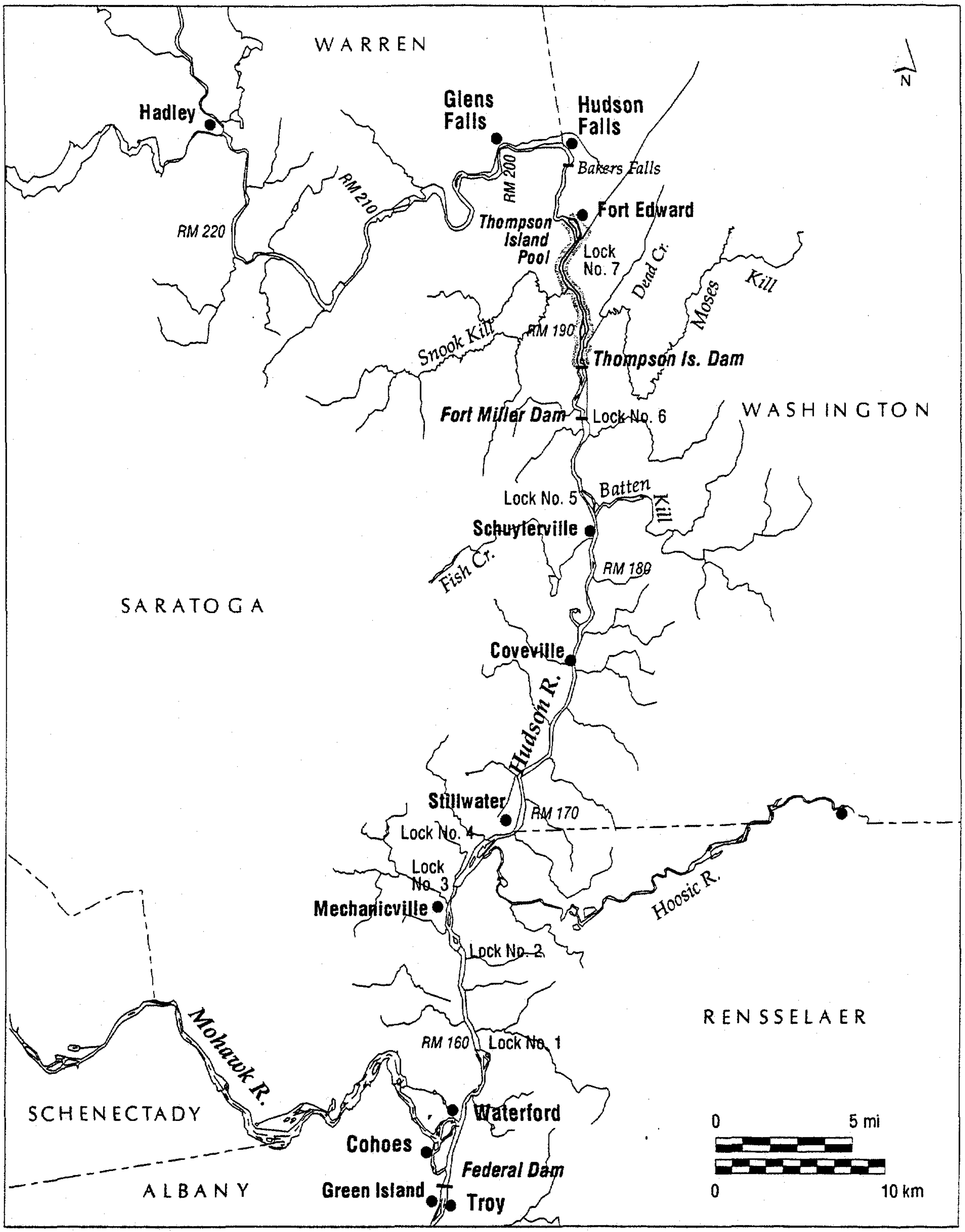


Figure 1-2. Upper Hudson River Watershed.

Limno-Tech, Inc.

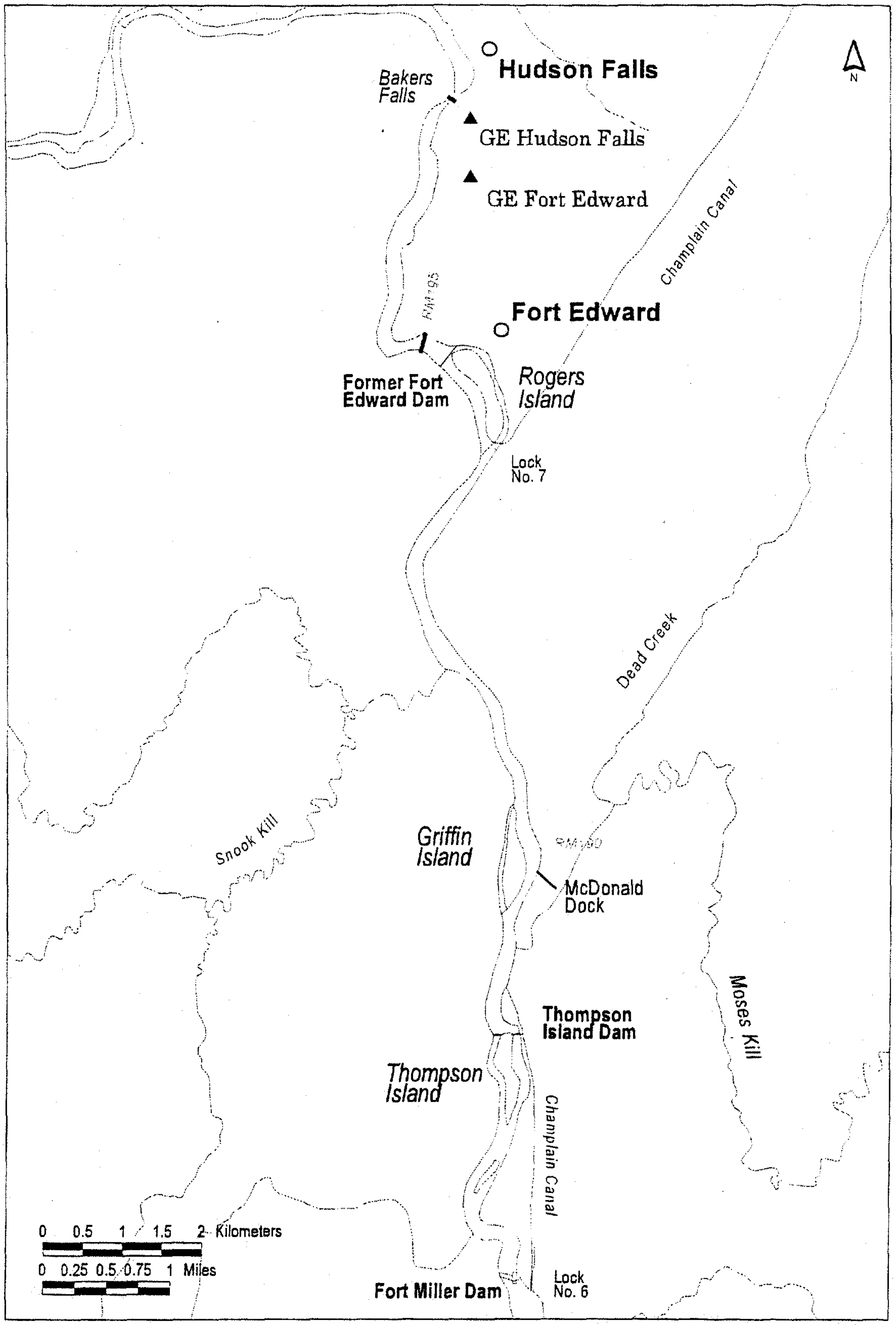
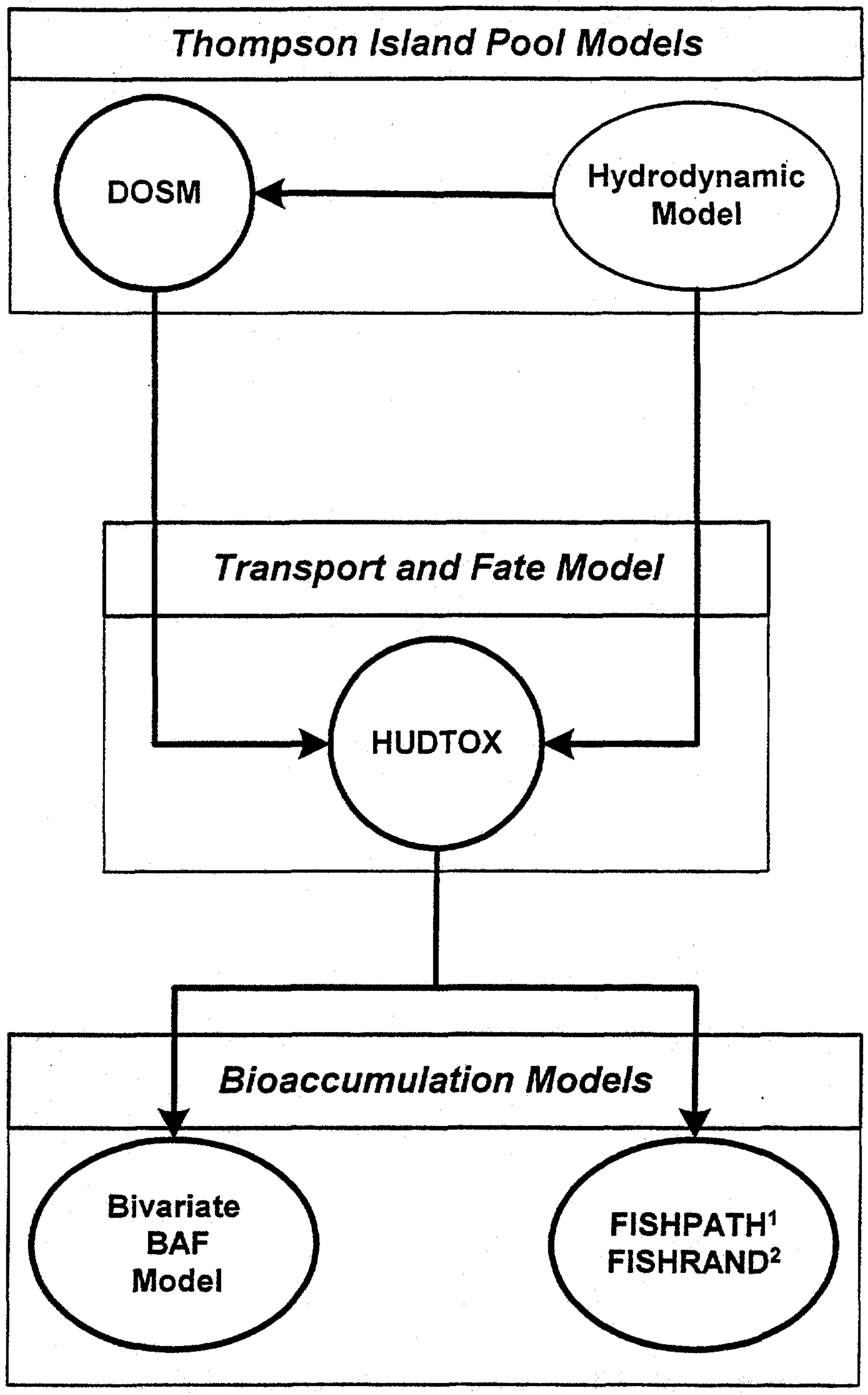


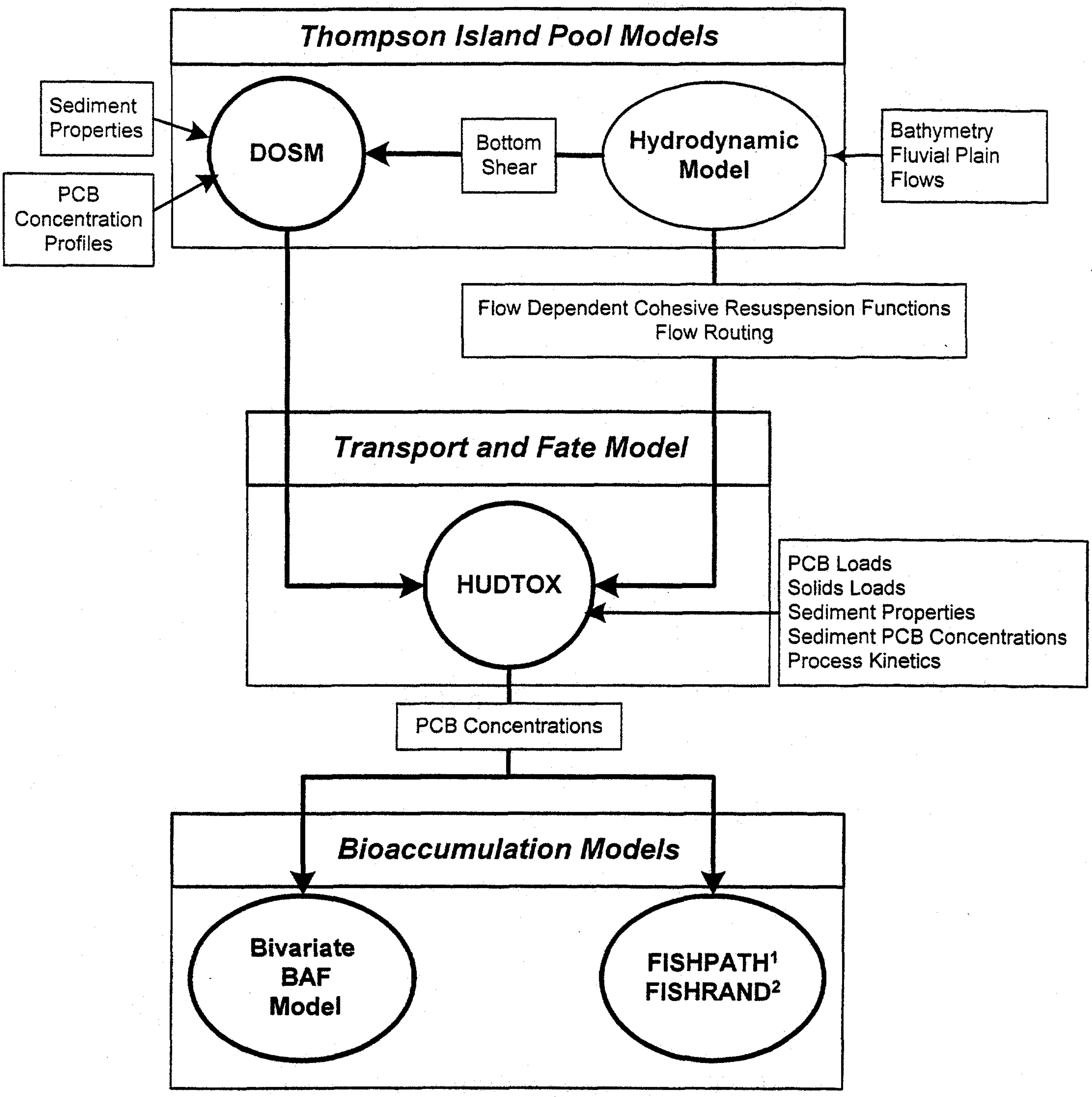
Figure 1-3. Thompson Island Pool.

Limno-Tech, Inc.



[1] Deterministic Bioaccumulation Model
[2] Probabilistic Bioaccumulation Model

Figure 2-1. Upper Hudson River Modeling Framework.



[1] Deterministic Bioaccumulation Model
[2] Probabilistic Bioaccumulation Model

Figure 2-2. Upper Hudson River Modeling Framework with Model Inputs.

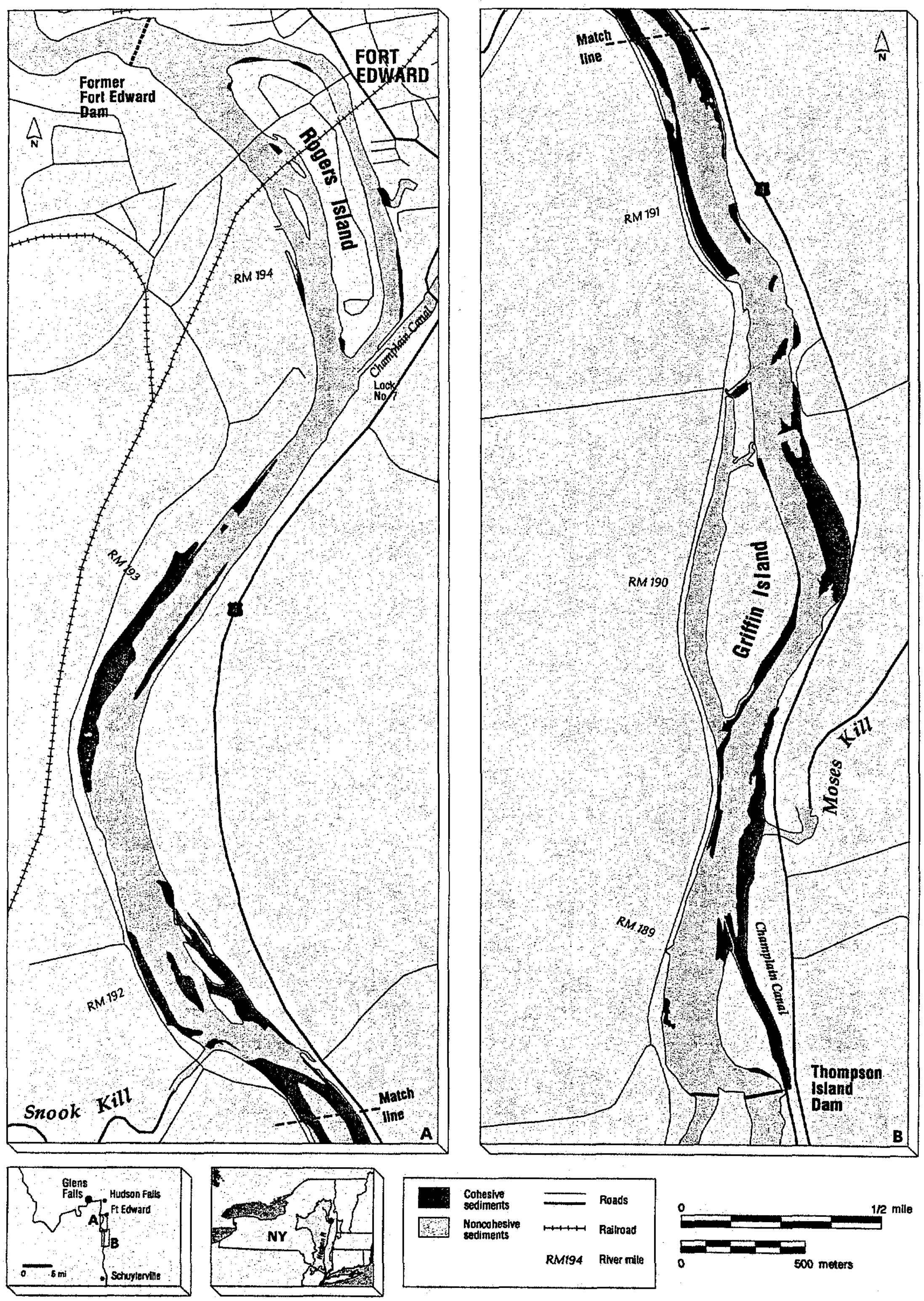


Figure 3-1. Thompson Island Pool Study Area.

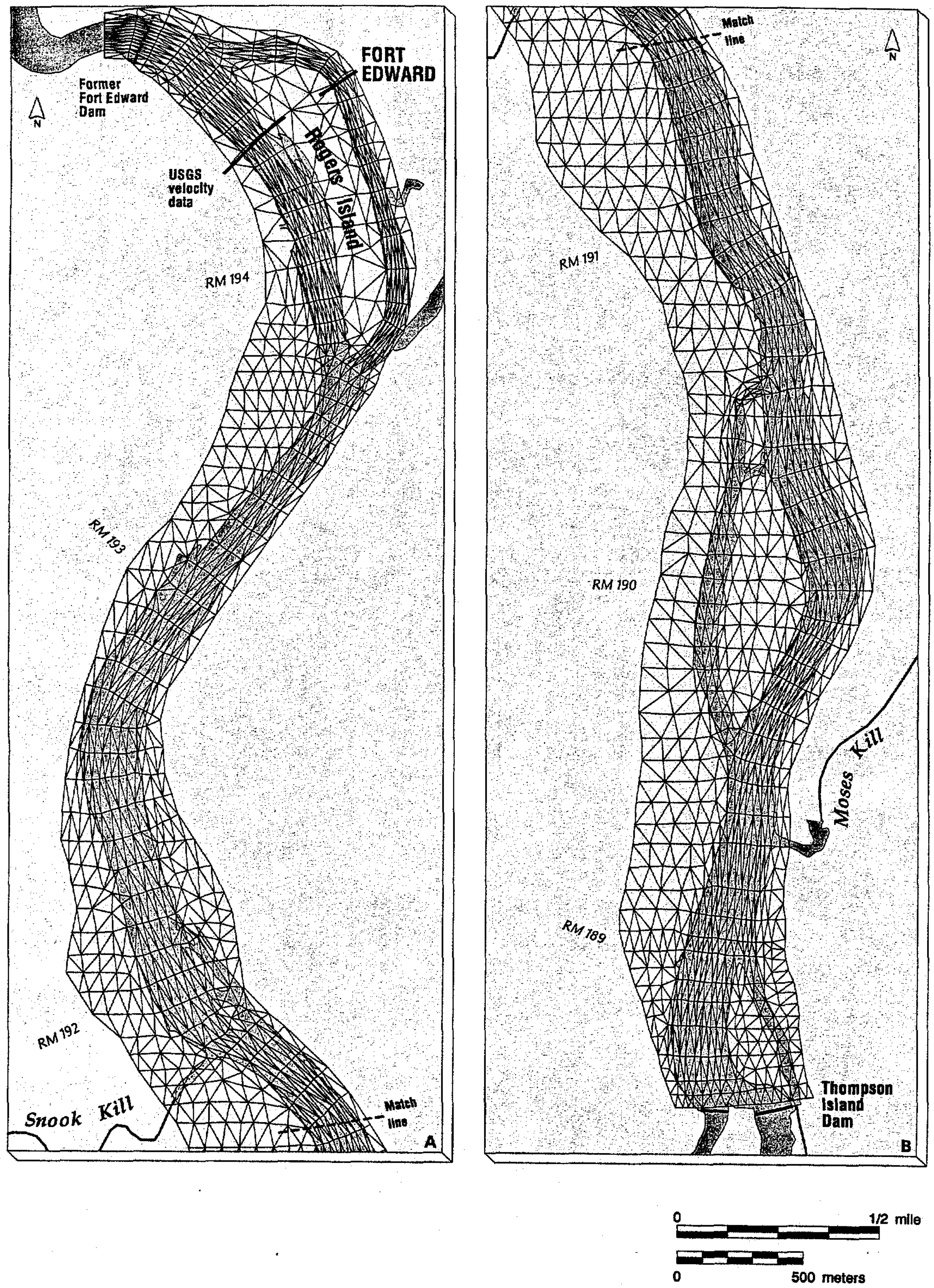


Figure 3-2. Thompson Island Pool RMA-2V Model Mesh.

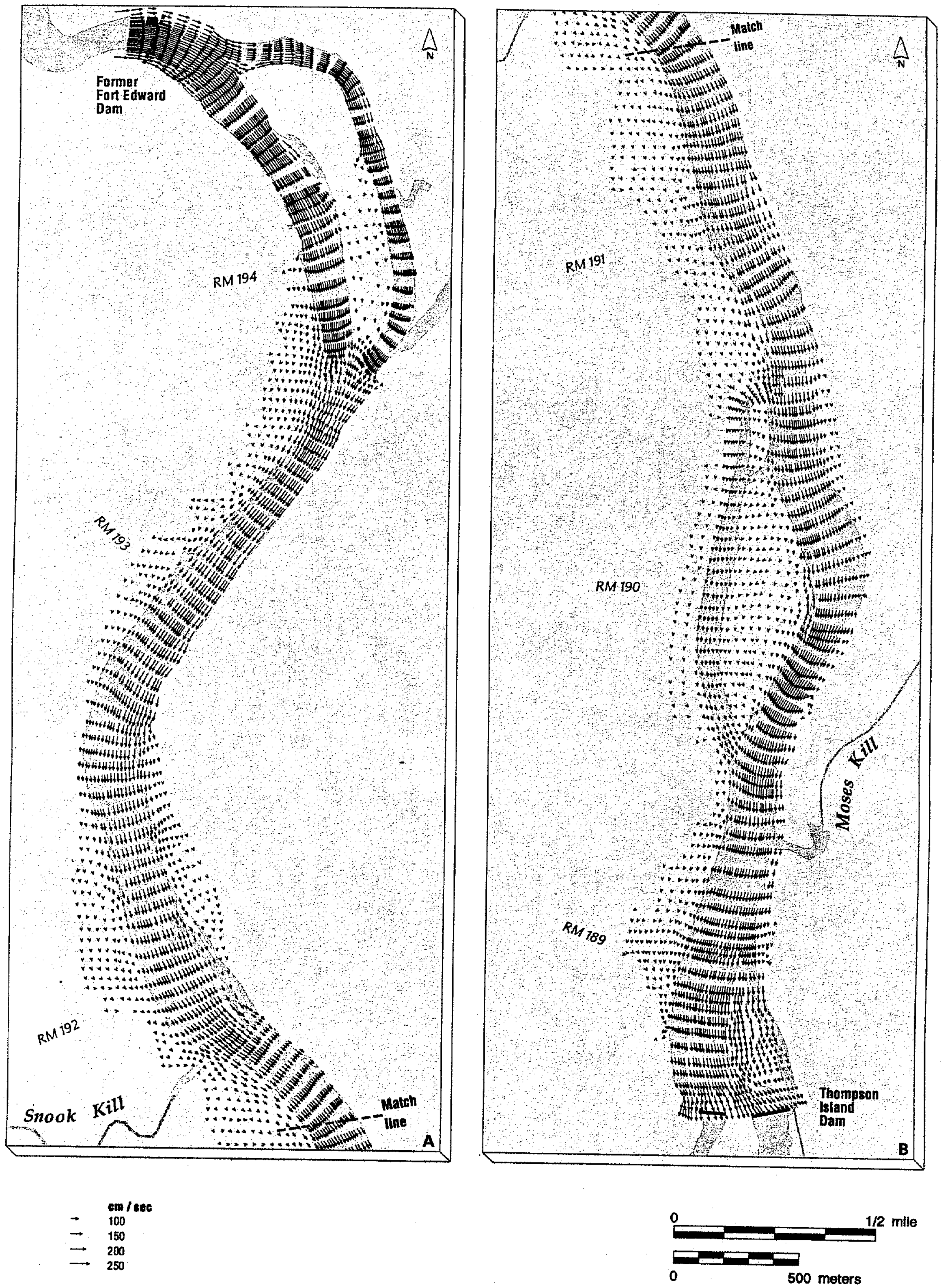


Figure 3-3. Thompson Island Pool Velocity Vectors for 100-Year Flow Event.

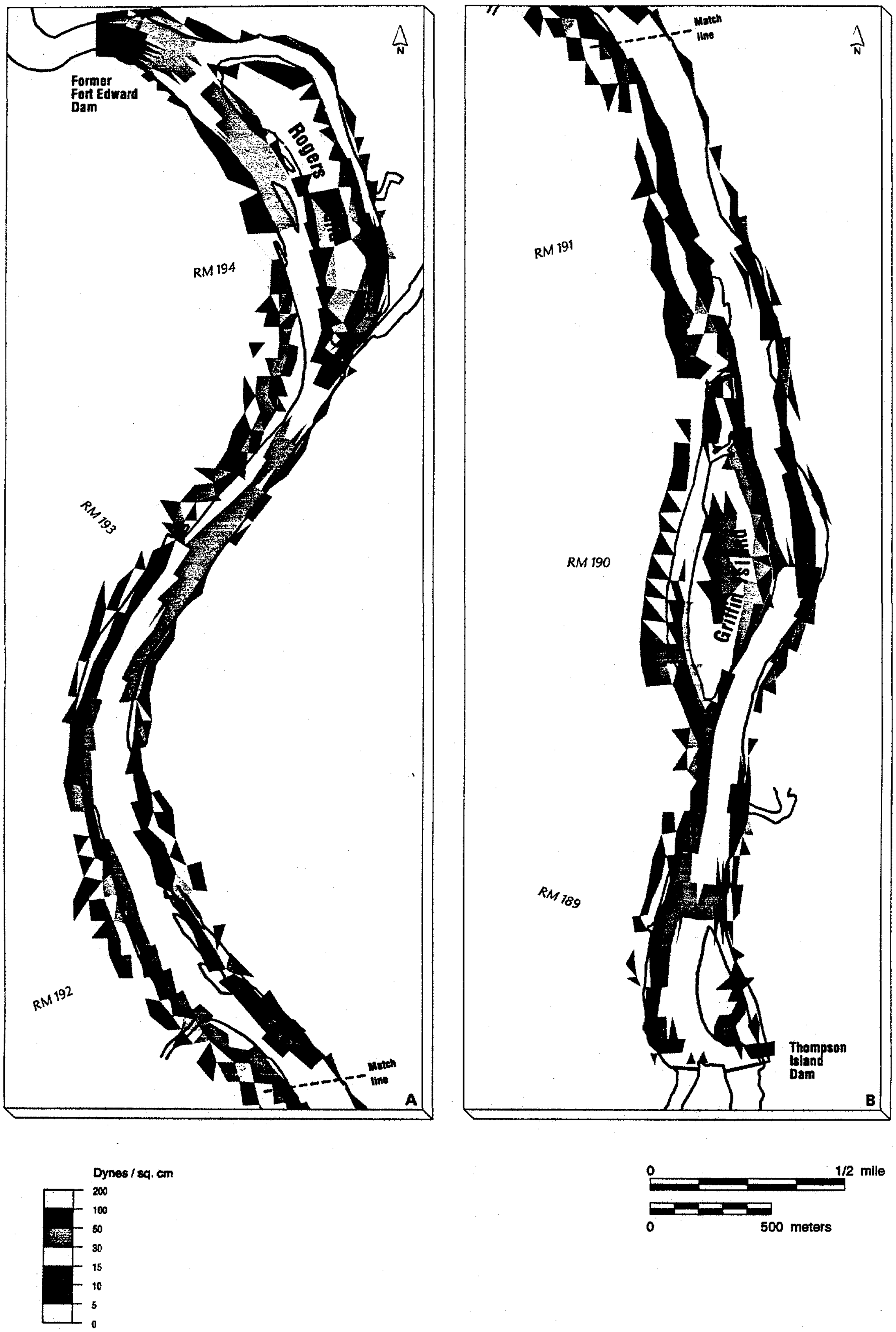


Figure 3-5. Thompson Island Pool Bottom Shear Stress for 100-Year Flow Event.

Limno-Tech, Inc.

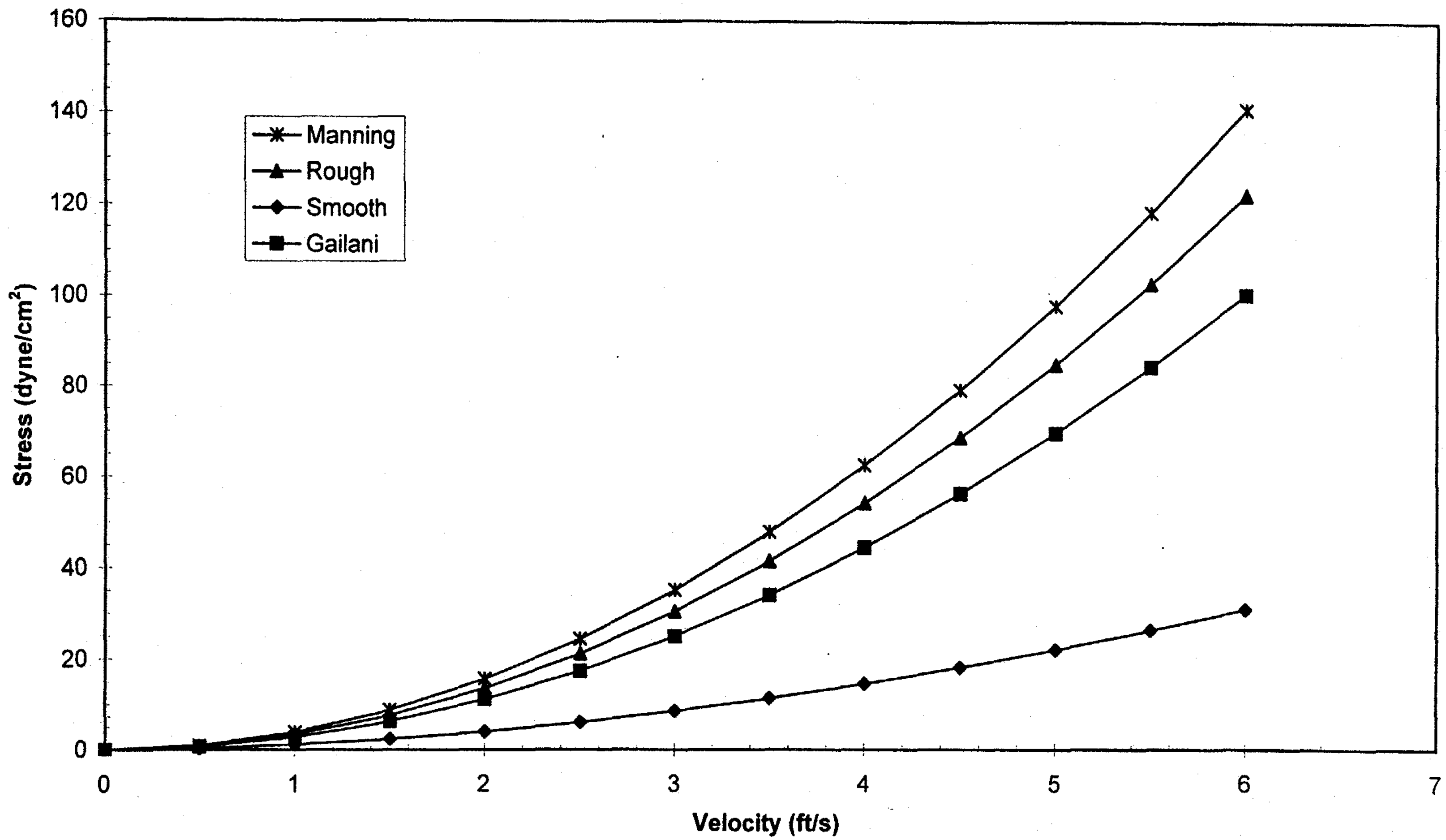


Figure 3-4. Shear Stress Computed from Vertically Averaged Velocity.

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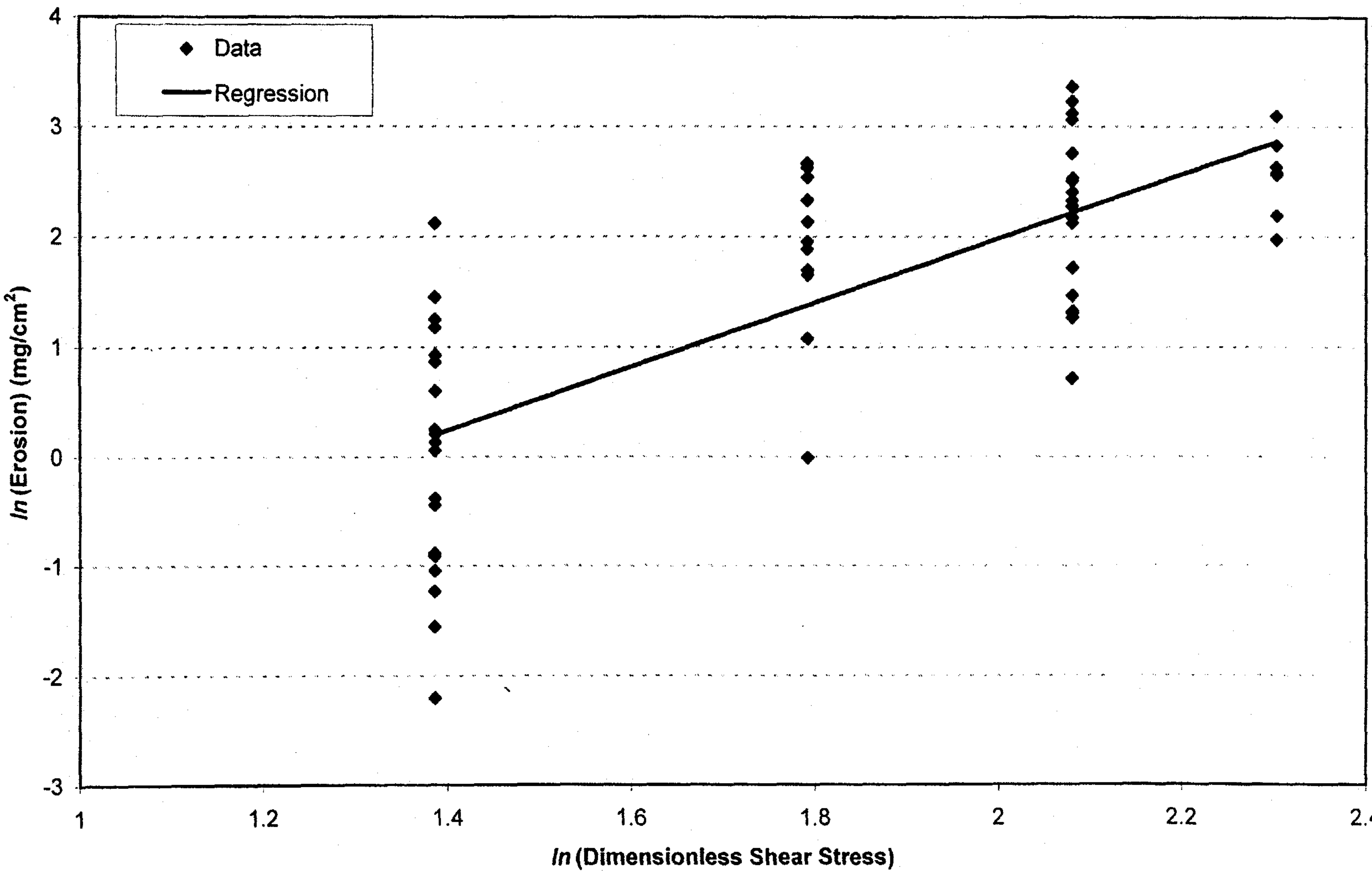

Figure 4-1. Erosion versus Shear Stress in Cohesive Sediments.

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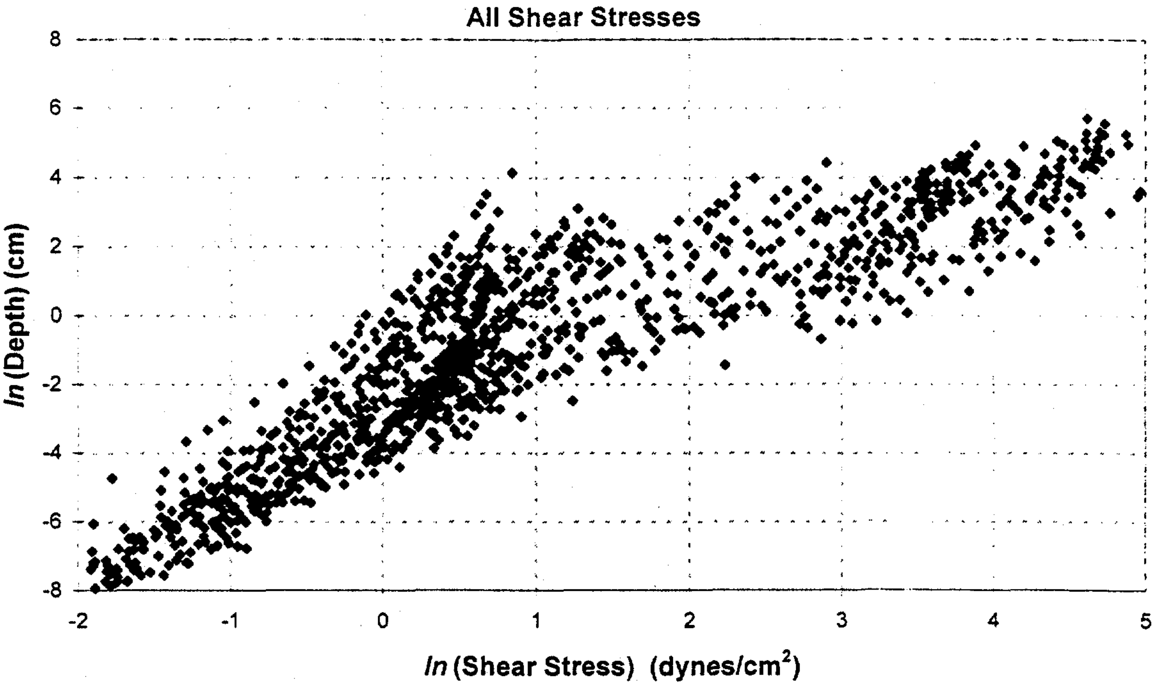


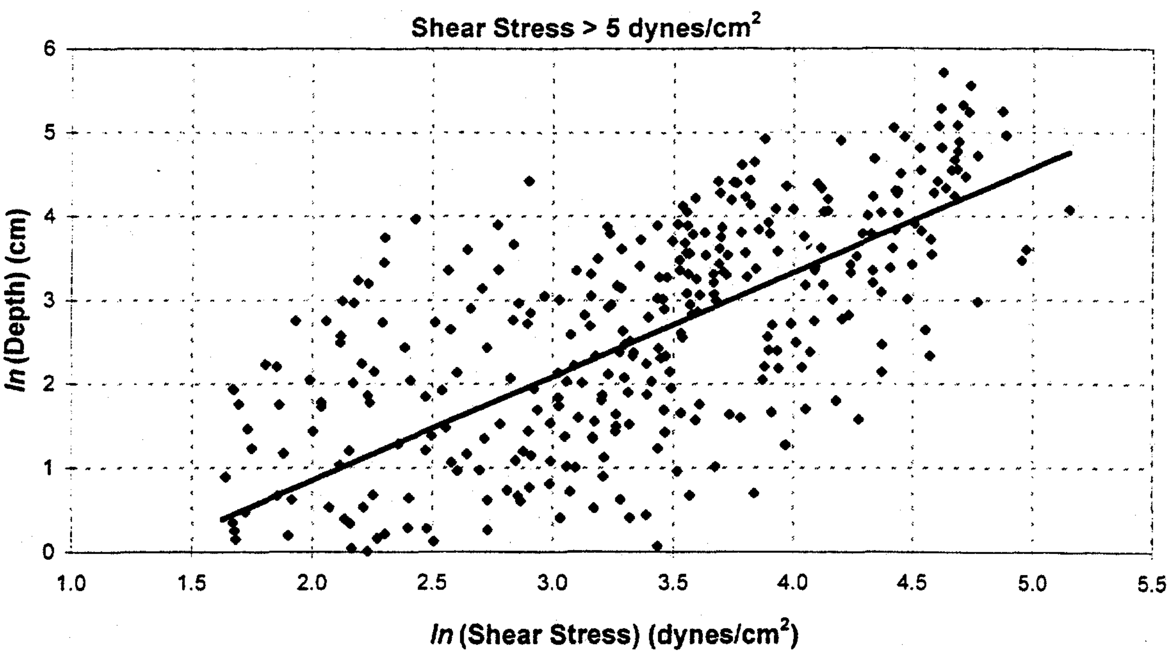


Figure 4-2. Armoring Depth versus Shear Stress.

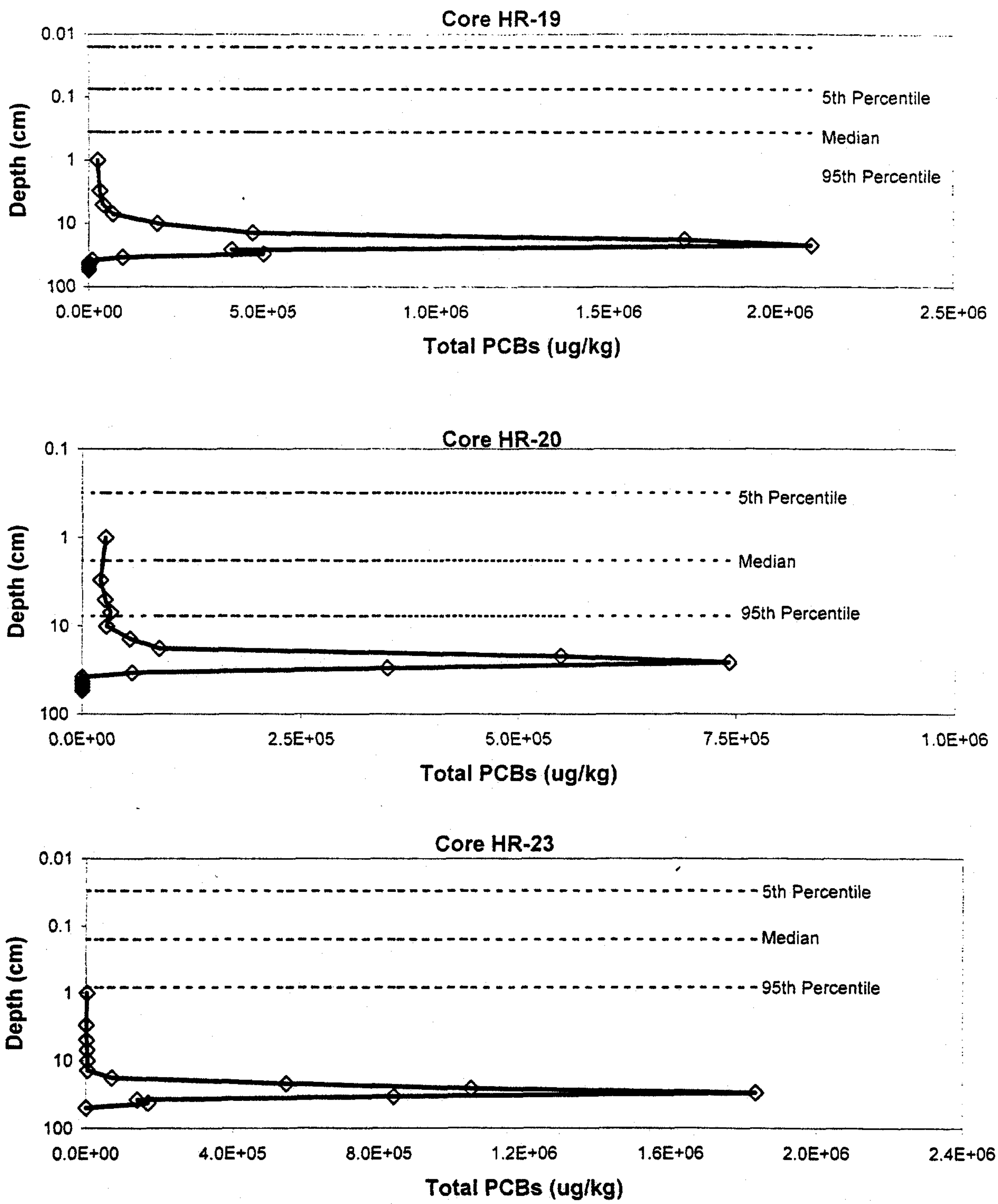
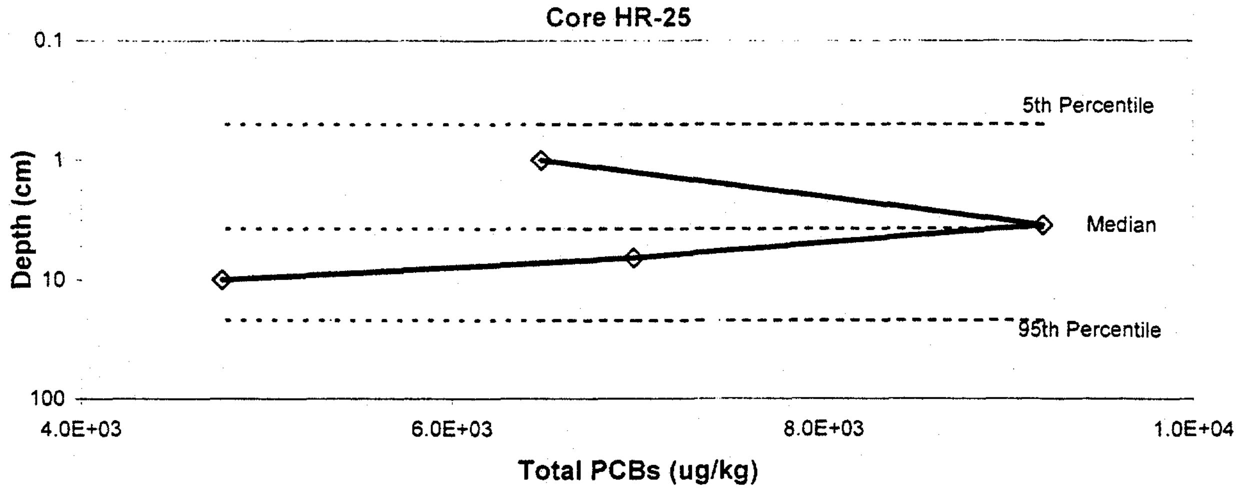


Figure 4-3a. Likelihood of PCB Scour for Selected Phase 2 High Resolution Sediment Cores.



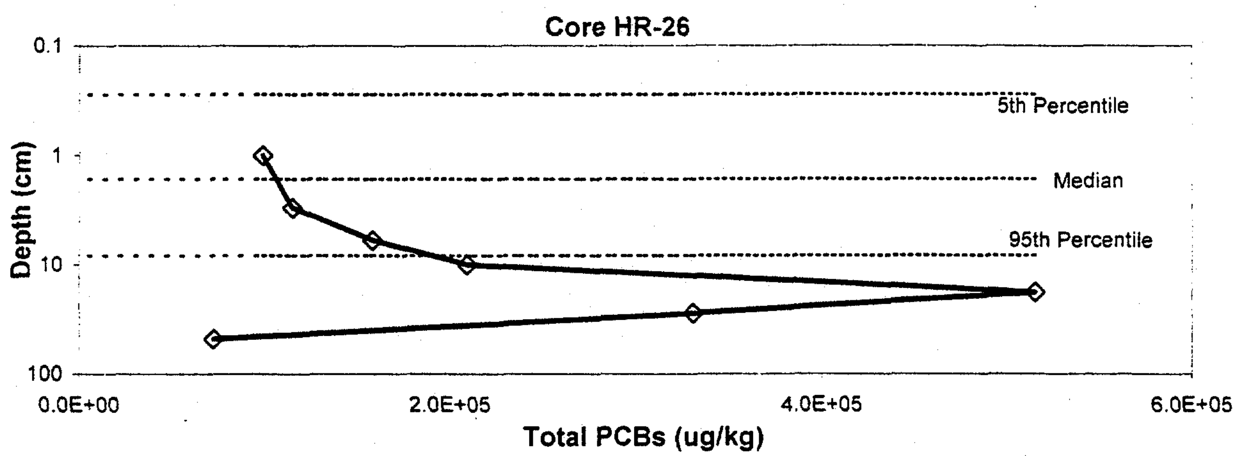


Figure 4-3b. Likelihood of PCB Scour for Selected Phase 2 High Resolution Sediment Cores.

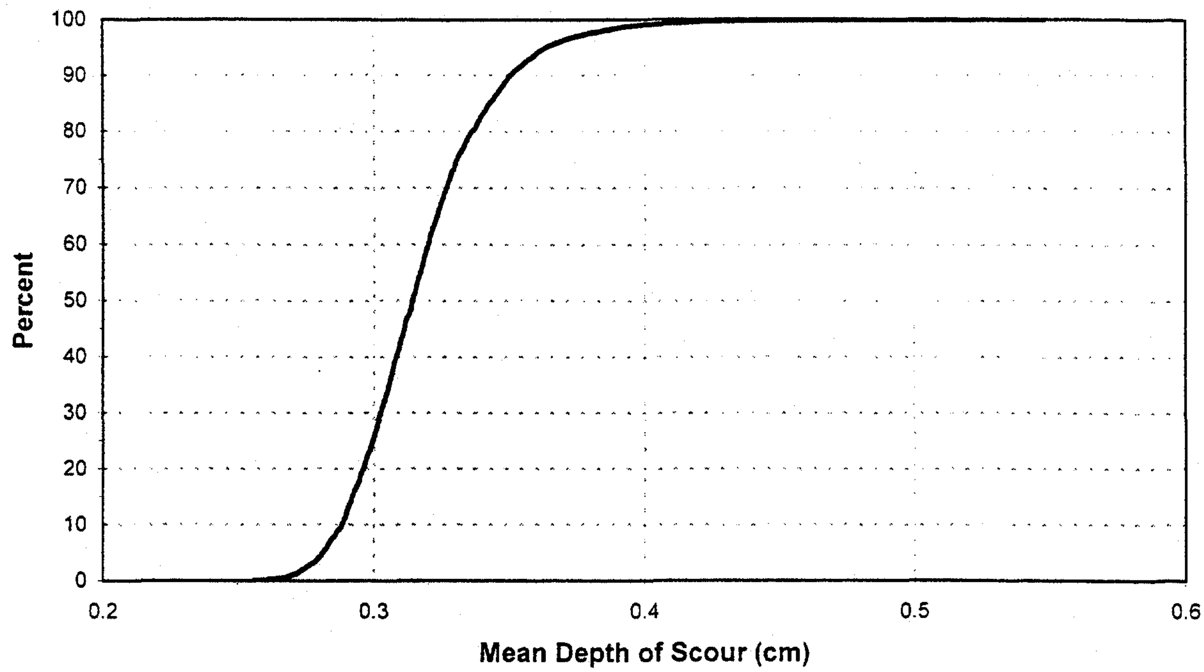


Figure 4-4. Cumulative Percent versus Mean Depth of Scour for Cohesive Sediment in Thompson Island Pool.

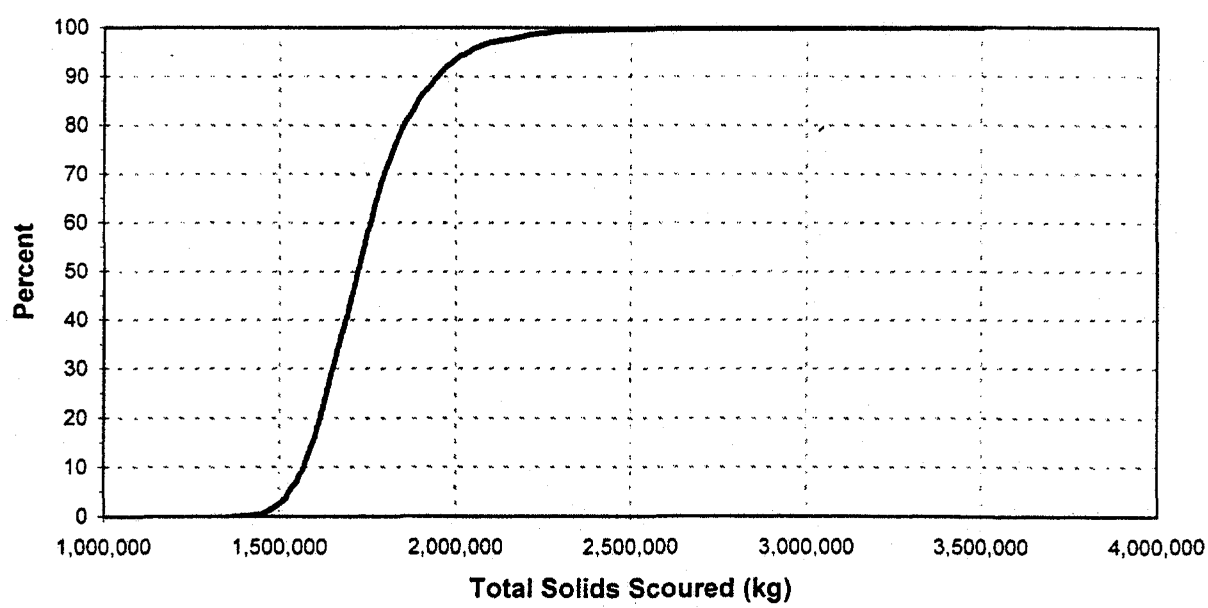
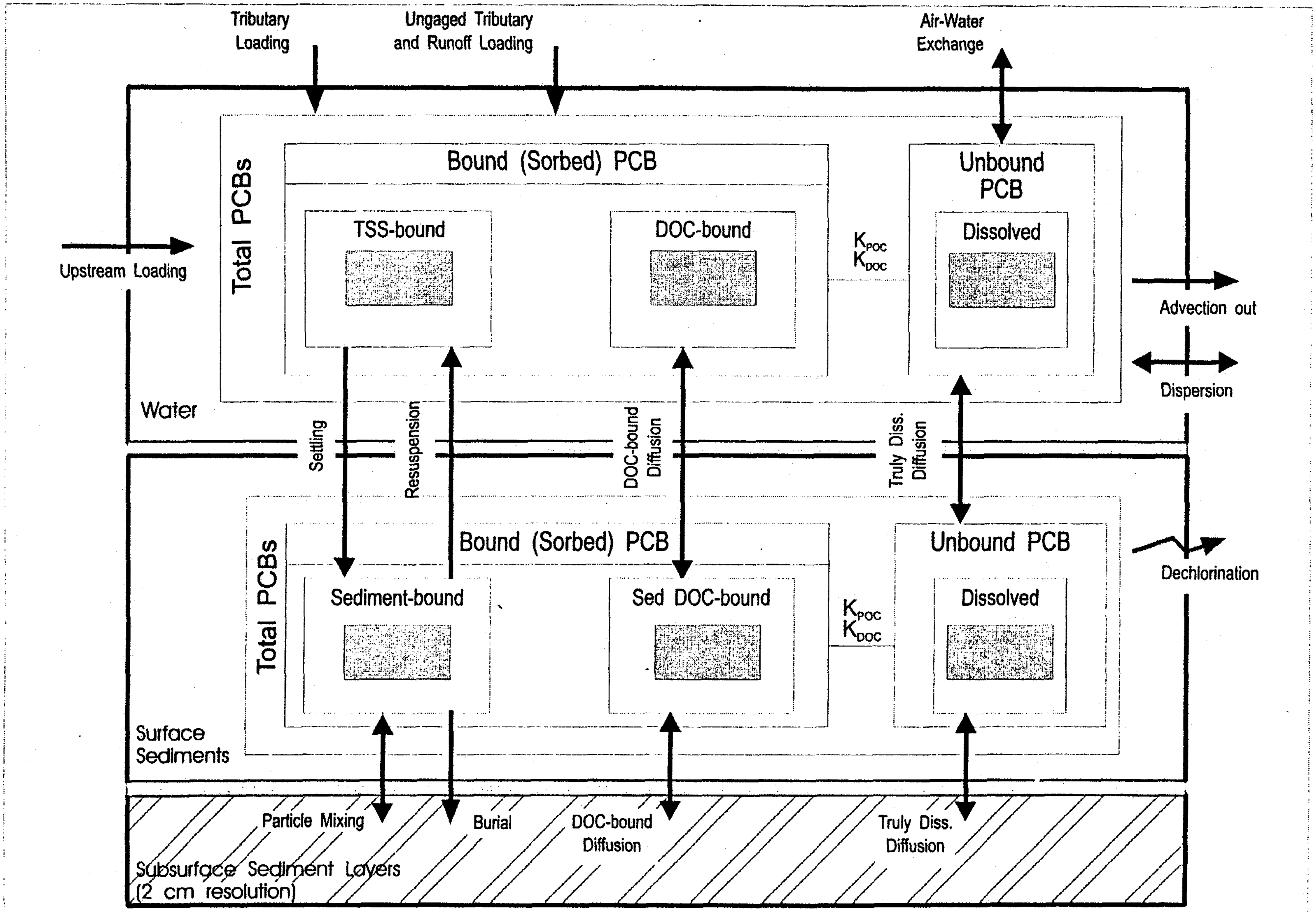


Figure 4-5. Cumulative Percent versus Total Solids Scoured from Cohesive Sediment in Thompson Island Pool.

Figure 5-1

Conceptual Framework for the HUDTOX PCB Model



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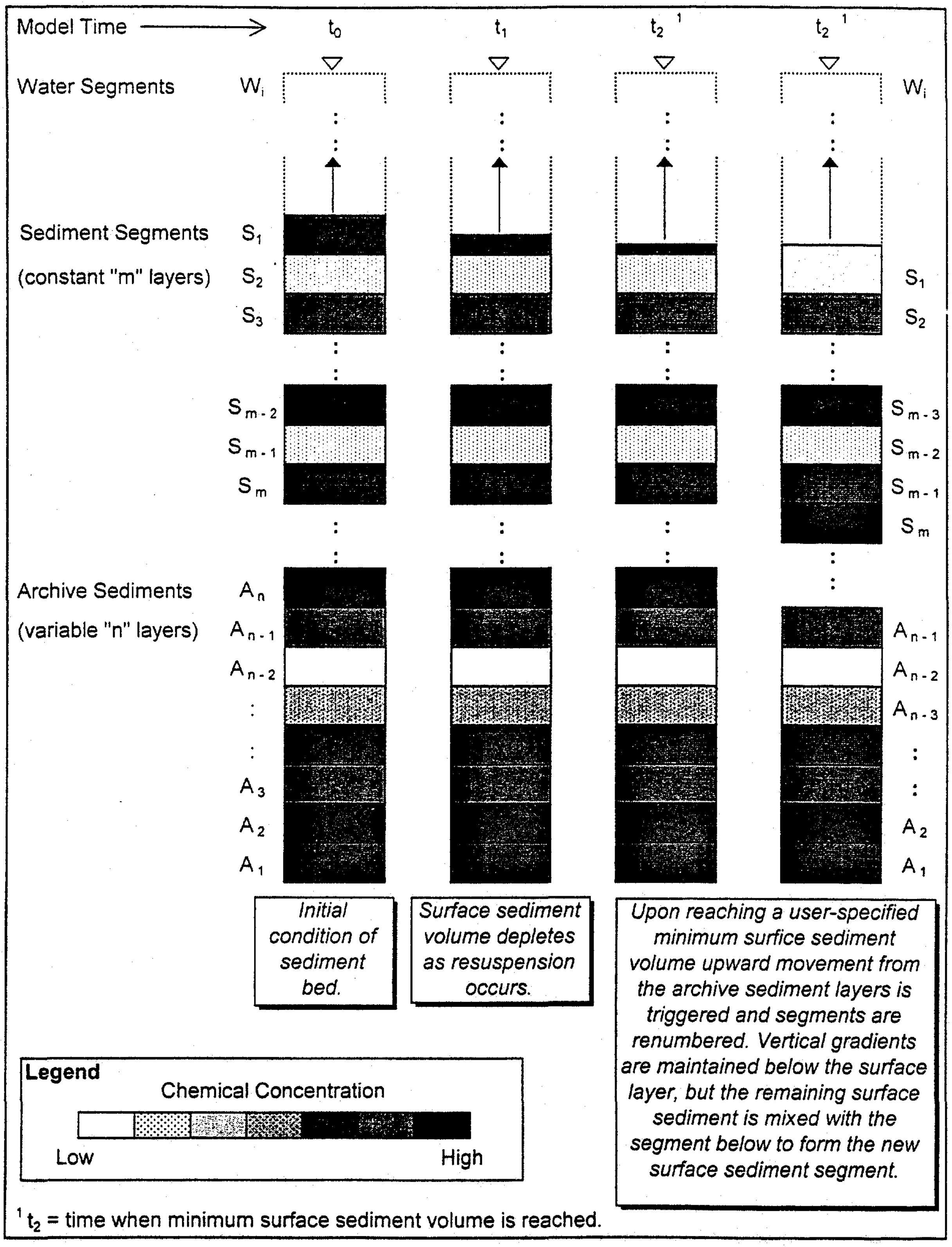

Figure 5-2. Illustration of Sediment Scour in the HUDTOX Model.

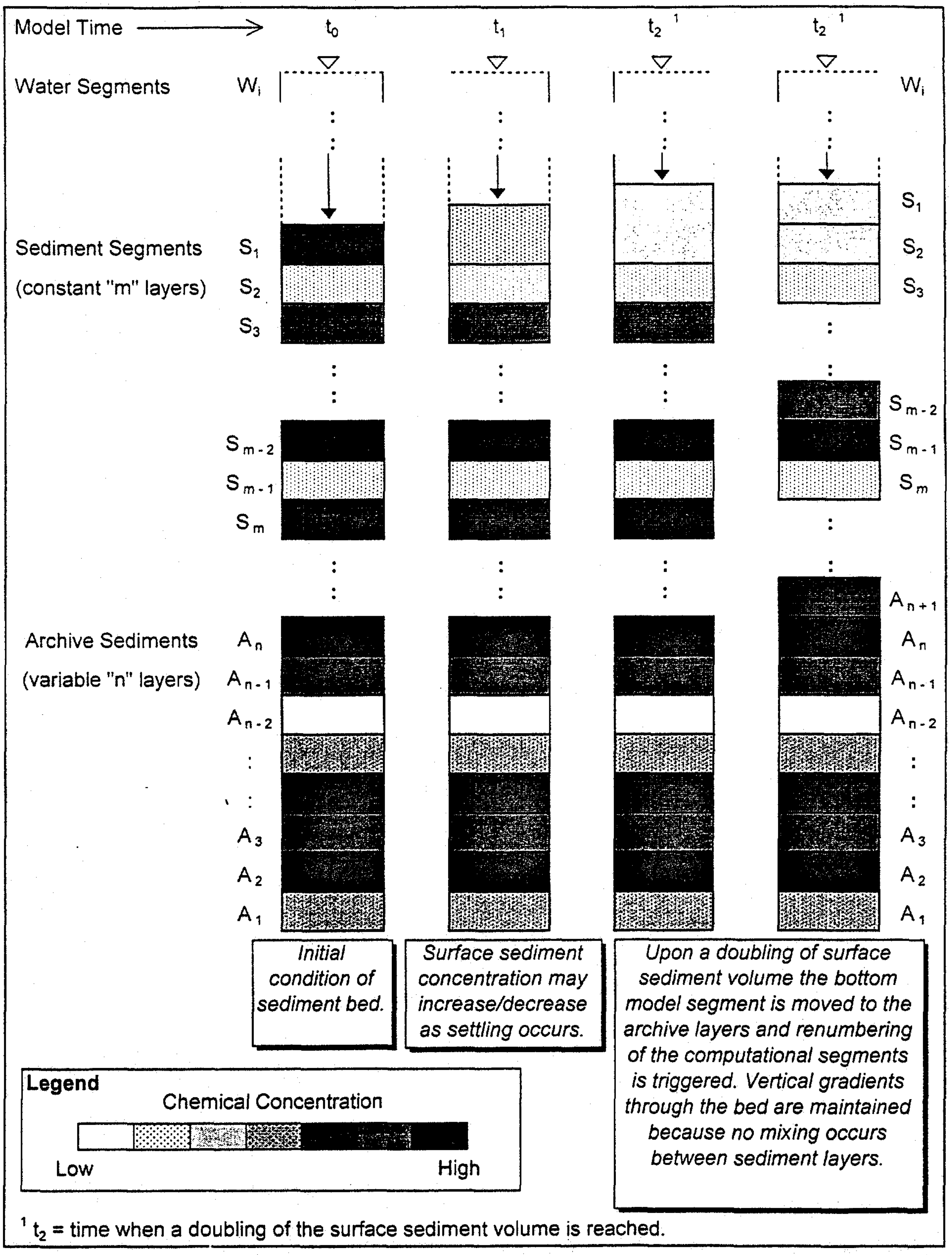

Figure 5-3. Illustration of Sediment Burial in the HUDTOX Model.

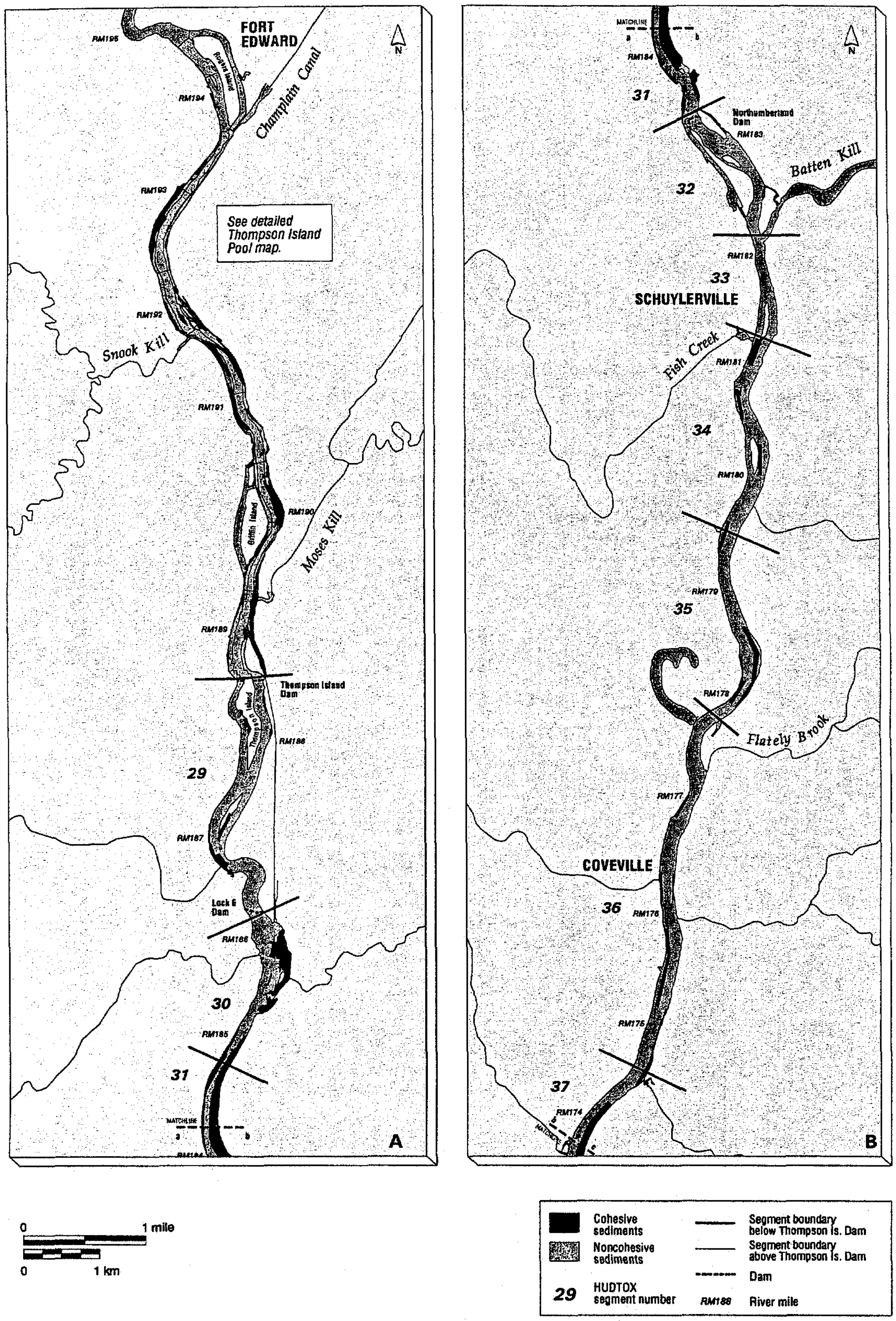

Figure 5-4 A,B. HUDTOX Model Water Column Segmentation Grid for Upper Hudson River, Parts A and B.

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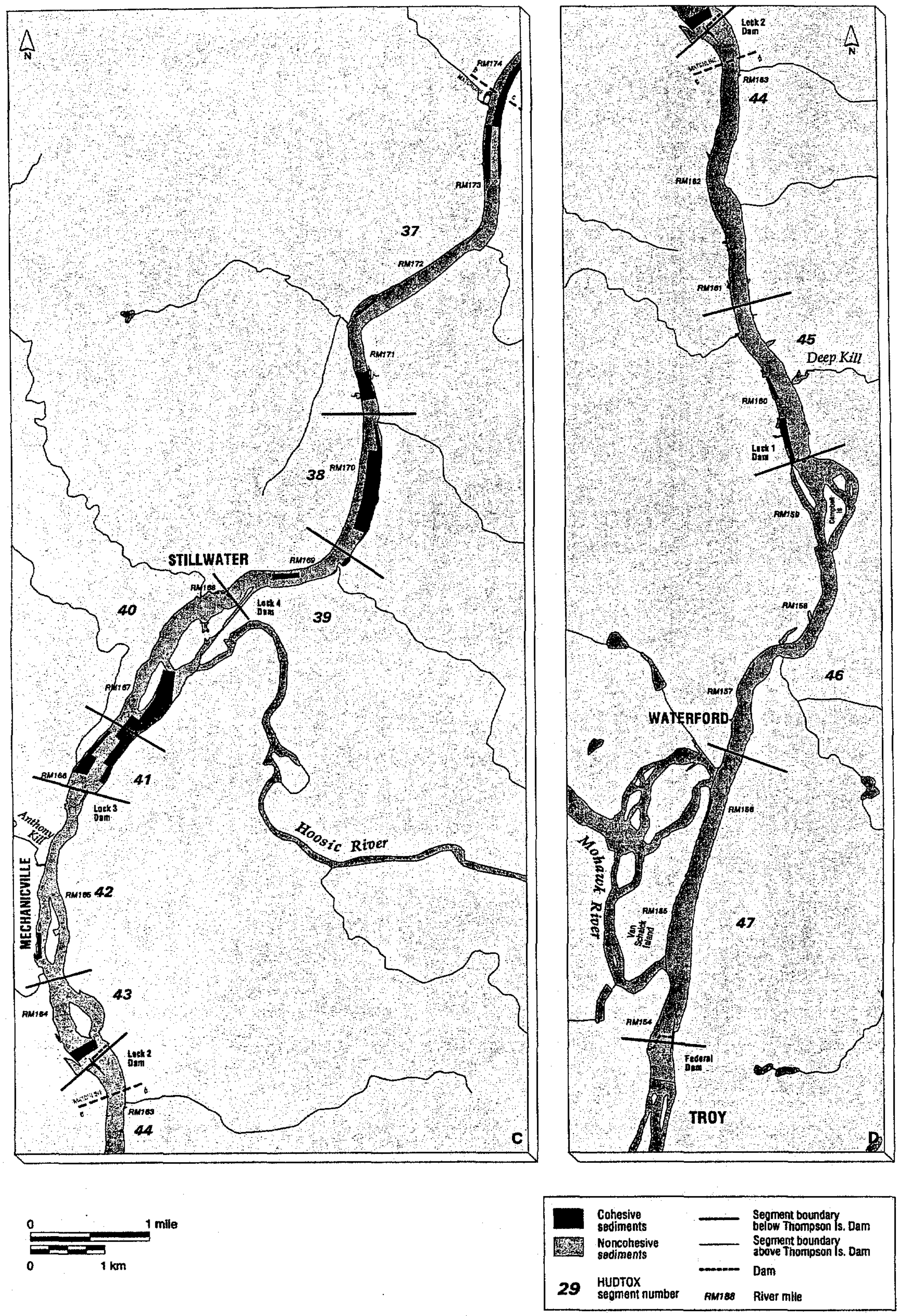

Figure 5-4 C,D. HUDTOX Model Water Column Segmentation Grid for Upper Hudson River, Parts C and D.

Limno-Tech, Inc.

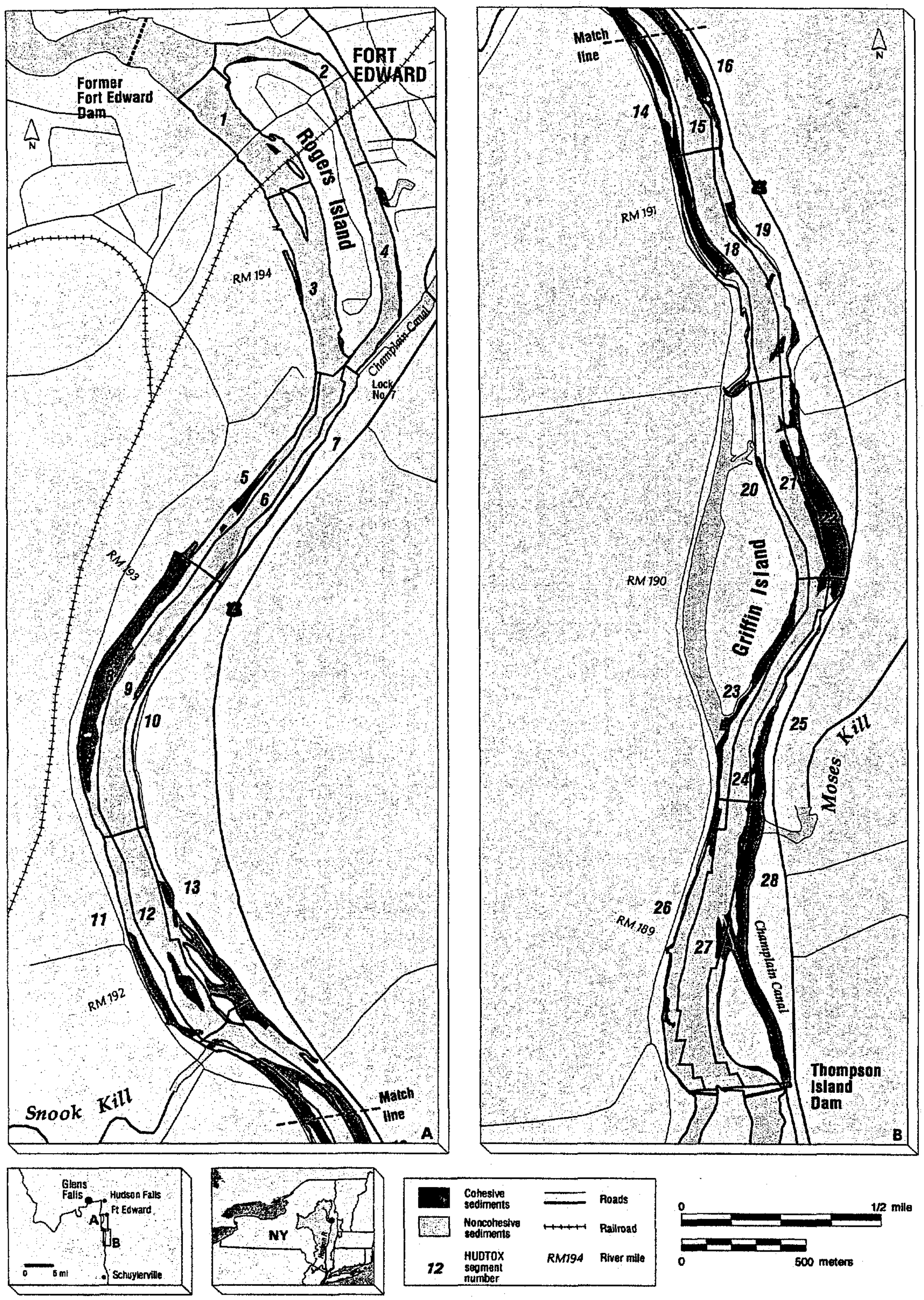

Figure 5-5. Thompson Island Pool Study Area.

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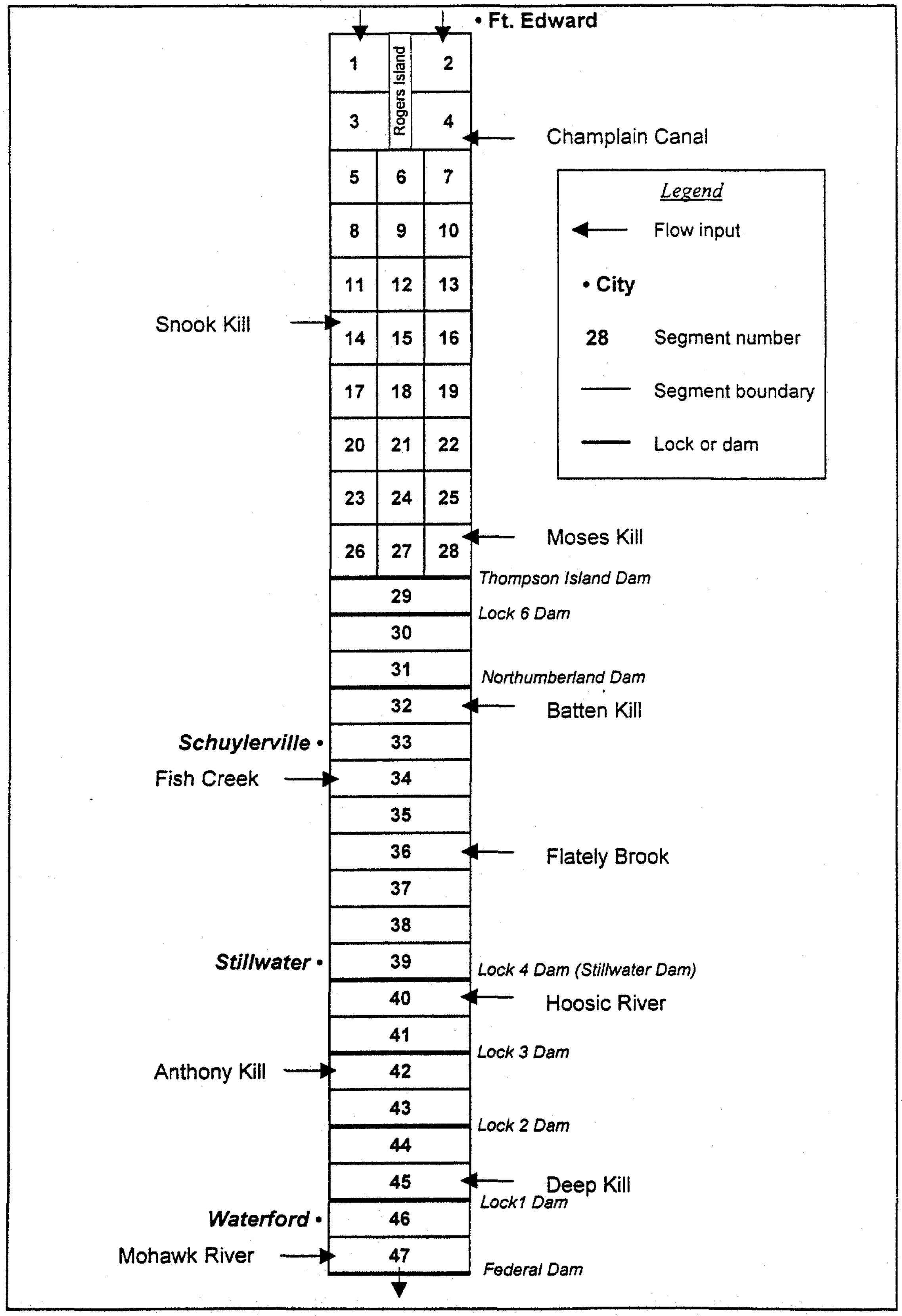

Figure 5-6. Schematic of HUDTOX Water Column Segmentation Grid.

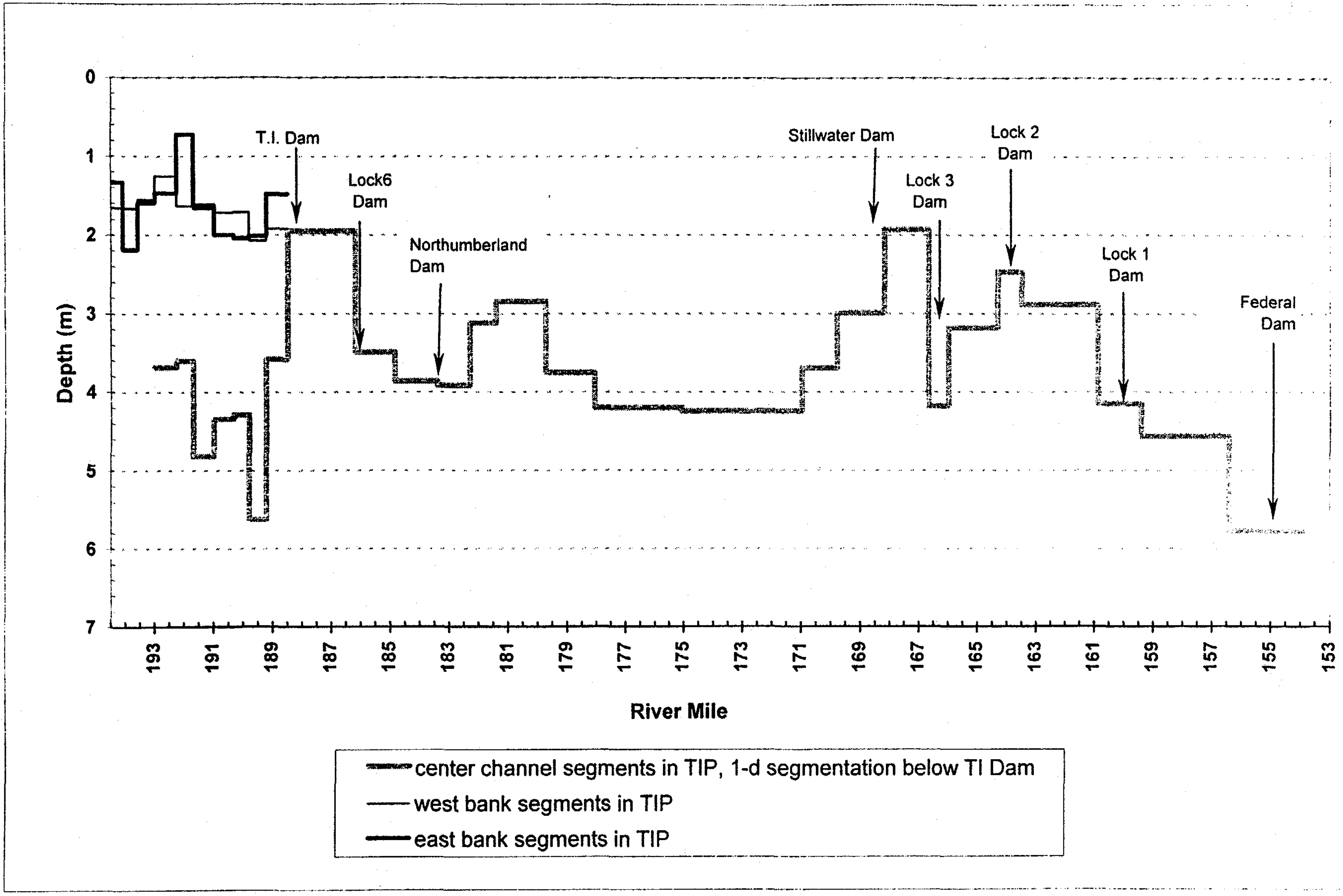

Figure 5-7. HUDTOX Water Column Segment Depths by River Mile.

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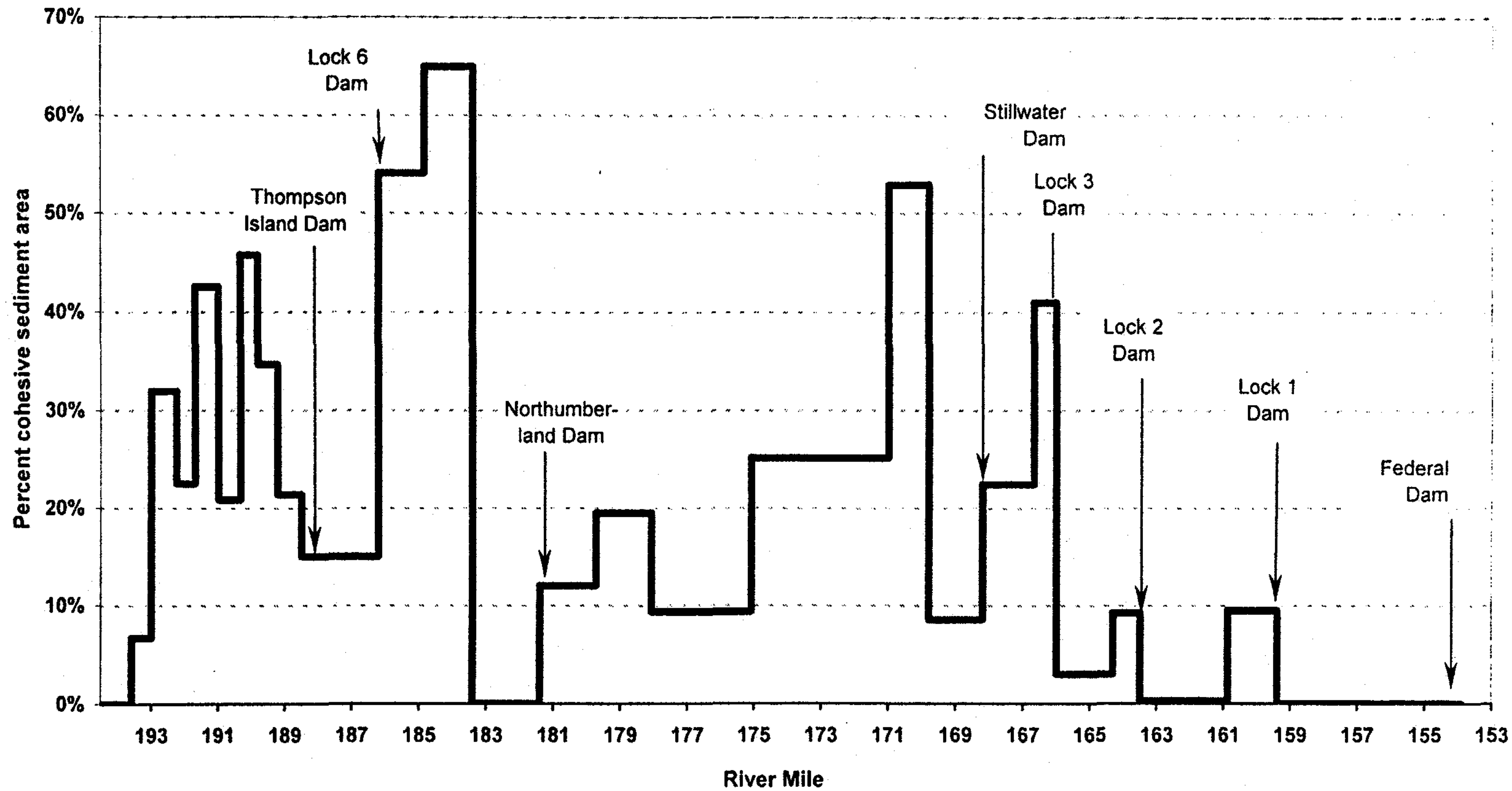

Note:
1. Percent cohesive area = (cohesive sediment area) / (cohesive sediment area + noncohesive sediment area)
2. Fort Edward to Northumberland Dam cohesive and noncohesive sediment areas were determined from USEPA Phase 2 side scan sonar study (DEIR, USEPA, 1997)
3. Northumberland Dam to Federal Dam at Troy cohesive and noncohesive sediment areas were determined from the Sediment Bed Mapping Study of the Upper Hudson River from Northumberland Dam to Troy Dam (QEA, 1998).

Figure 5-8. Percent Cohesive Area Represented in HUDTOX Sediment by River Mile.

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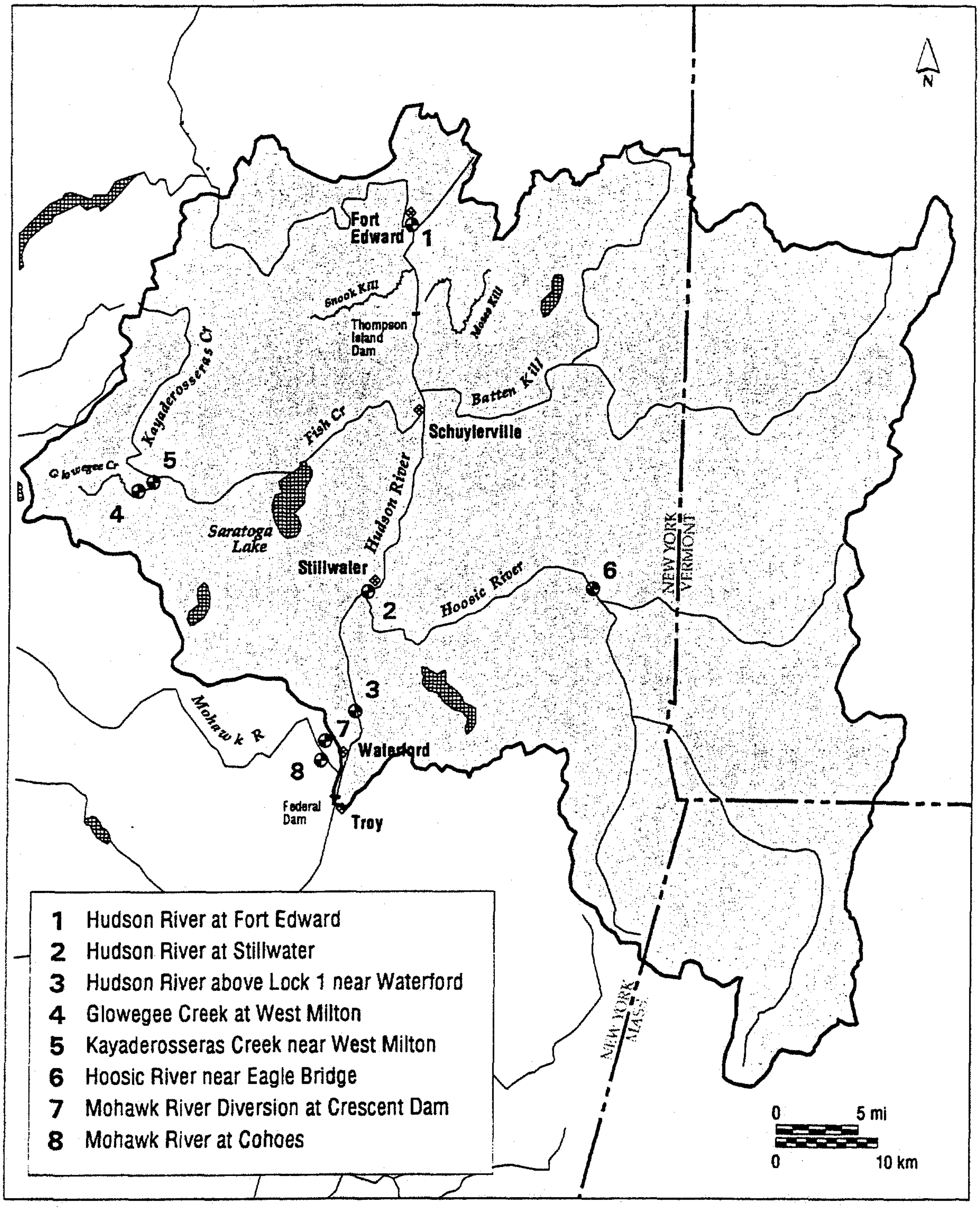

Figure 6-1. Upper Hudson River Basin USGS Flow Gage Stations Used in HUDTOX Modeling.

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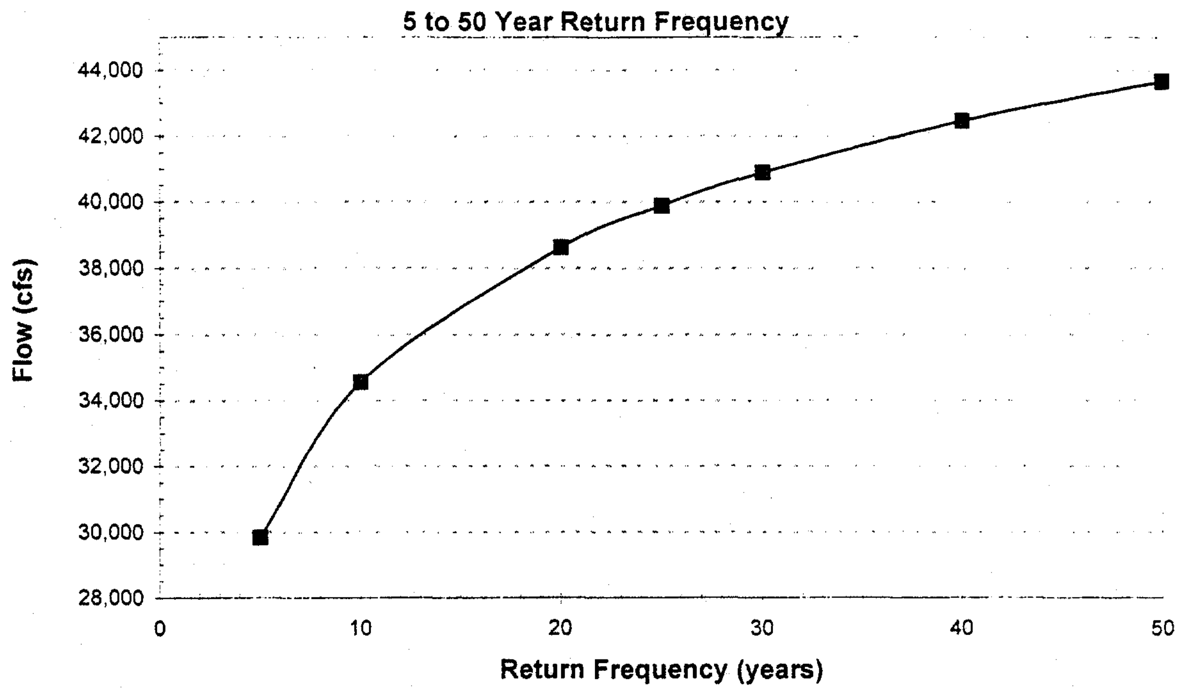

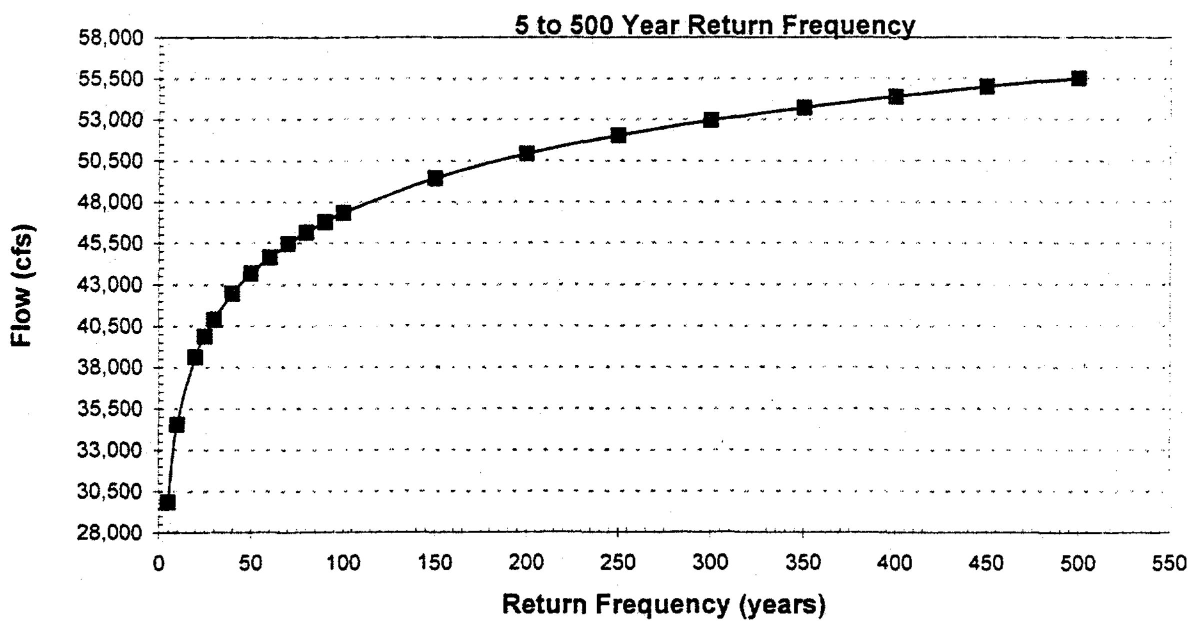

Figure 6-2. Log Pearson Flood Frequency Analysis for Fort Edward gage, Hudson River, NY Analysis

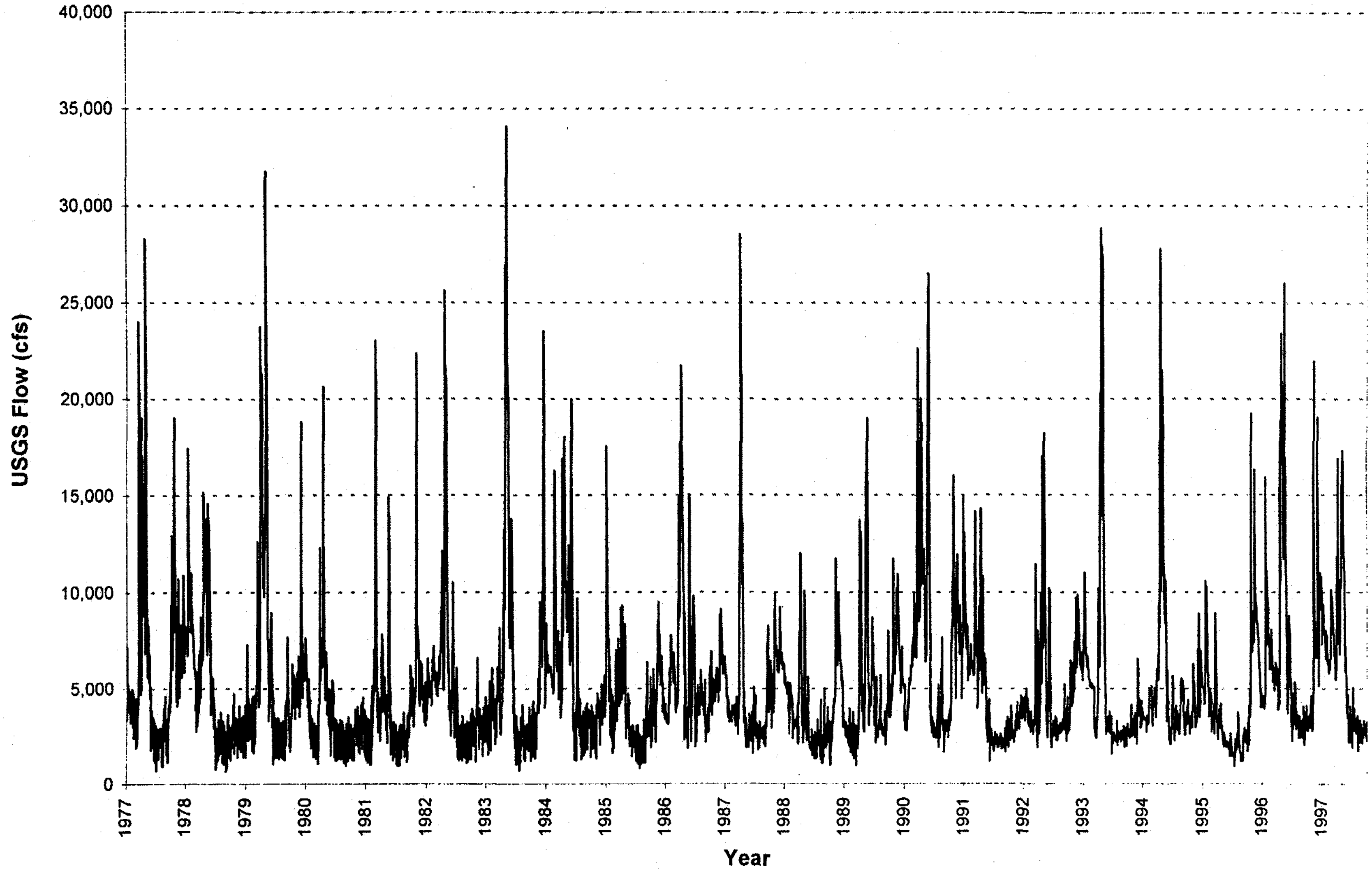

Figure 6-3. USGS Flow Time Series at Fort Edward from 1/1/77 - 9/30/97.

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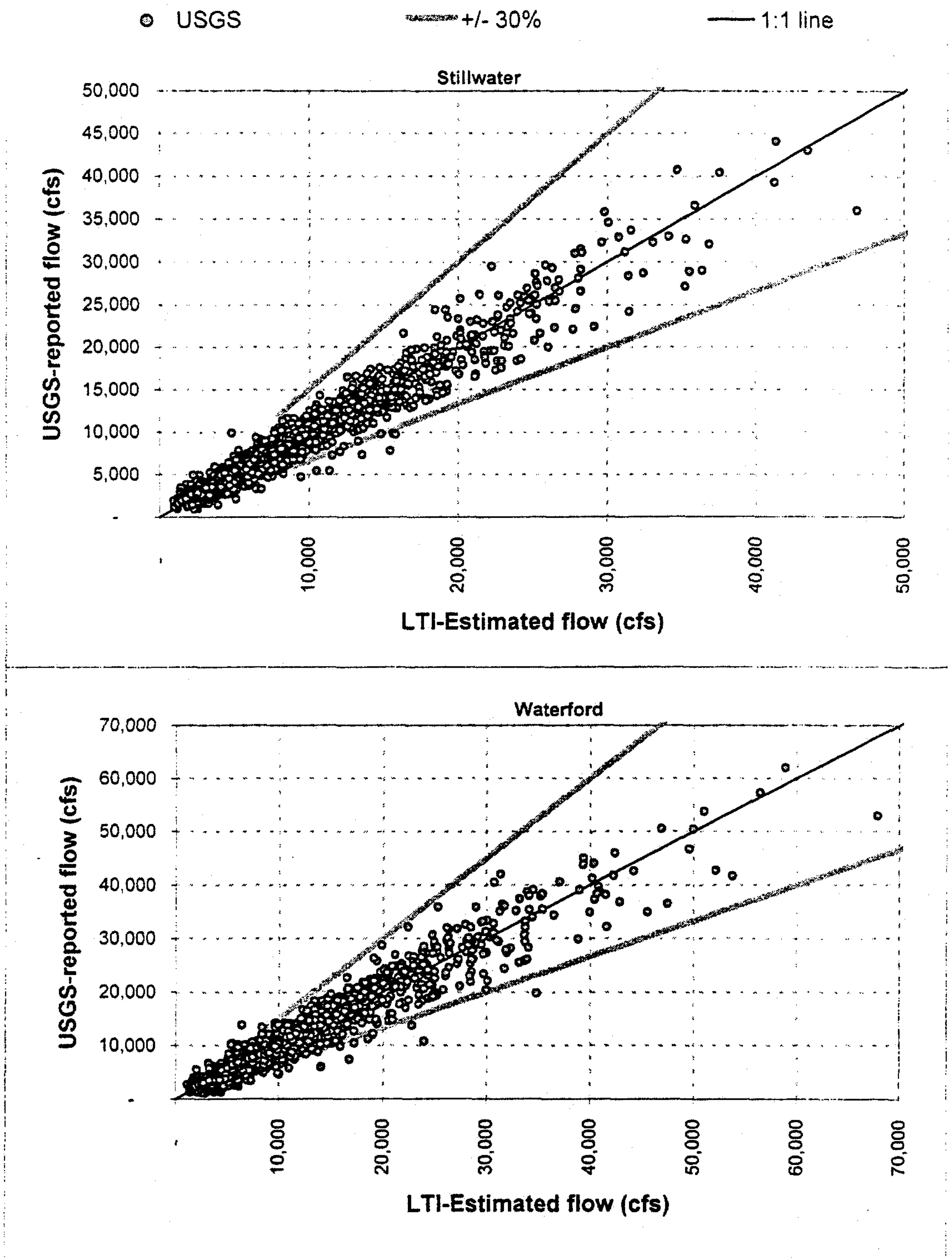

Figure 6-4. Comparison of LTI-Estimated Flow (DAR-based, seasonally & high-flow adjusted) and the USGS-Reported Flow.

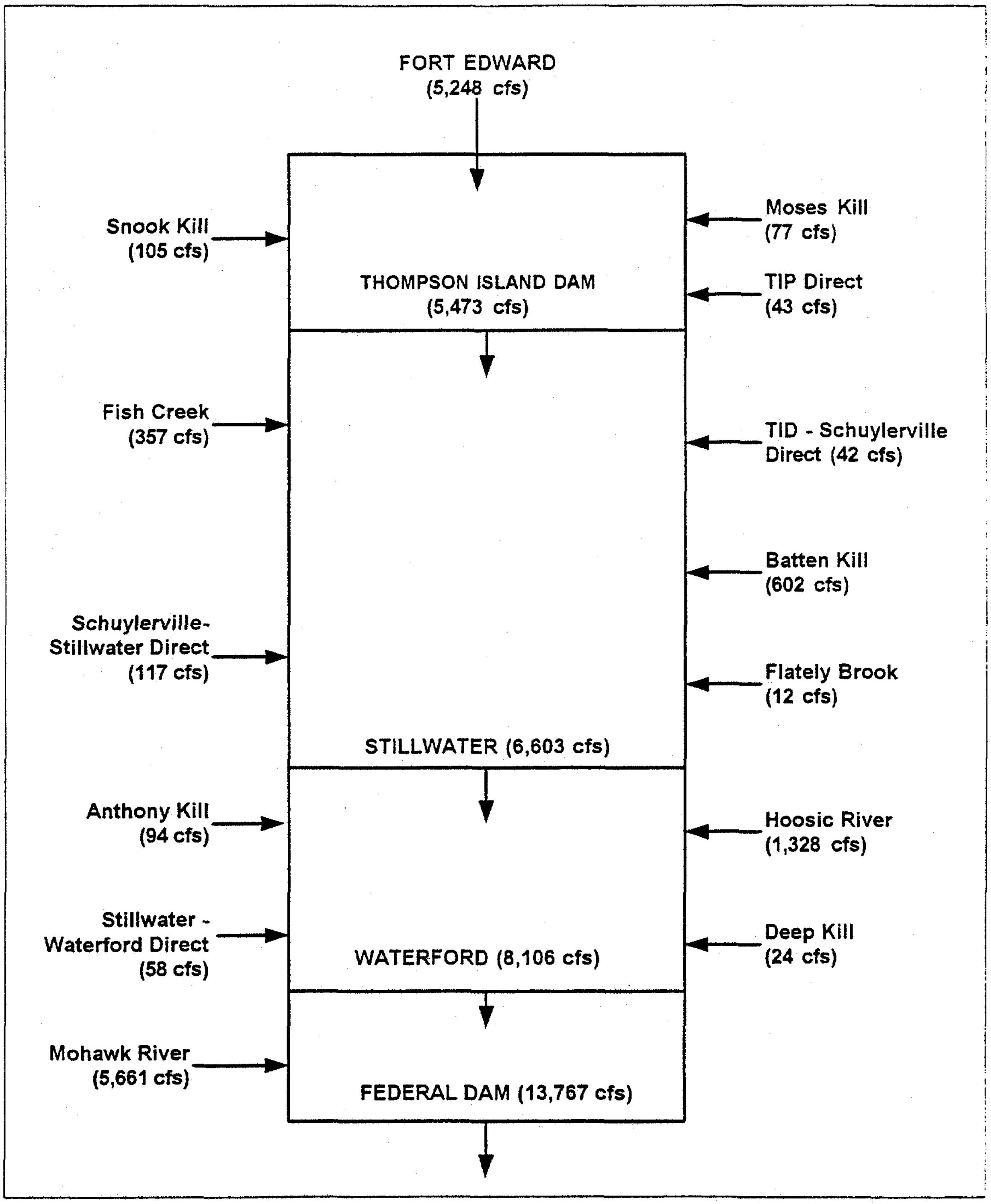

Figure 6-5. Estimated Daily Average Mainstem and Tributary Flows for the Upper Hudson River between Fort Edward and Federal Dam. (1/1/77 - 9/30/97)

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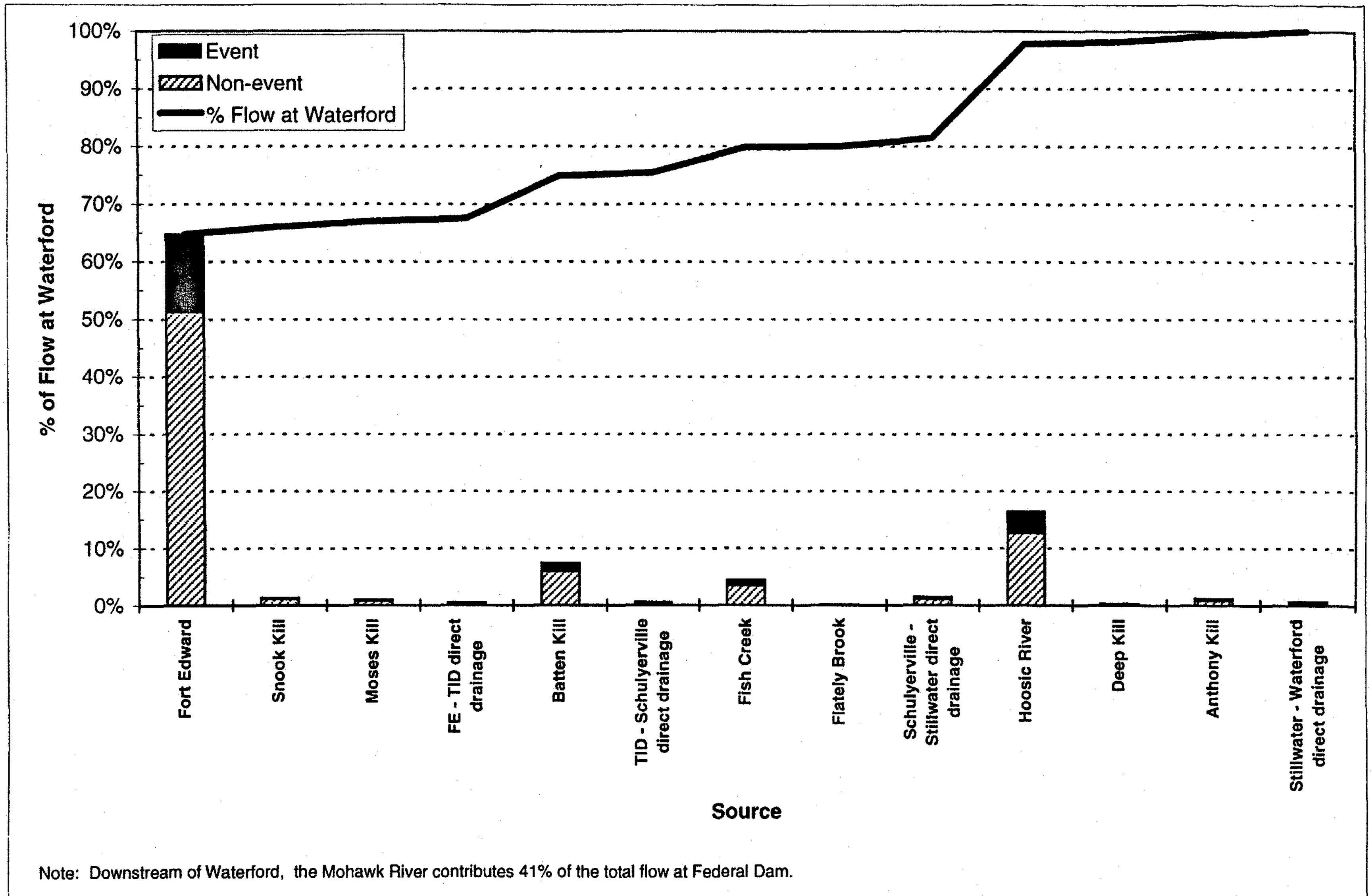

Figure 6-6. Relative Percent Flow Contribution from Fort Edward and Tributaries between Fort Edward and Waterford.

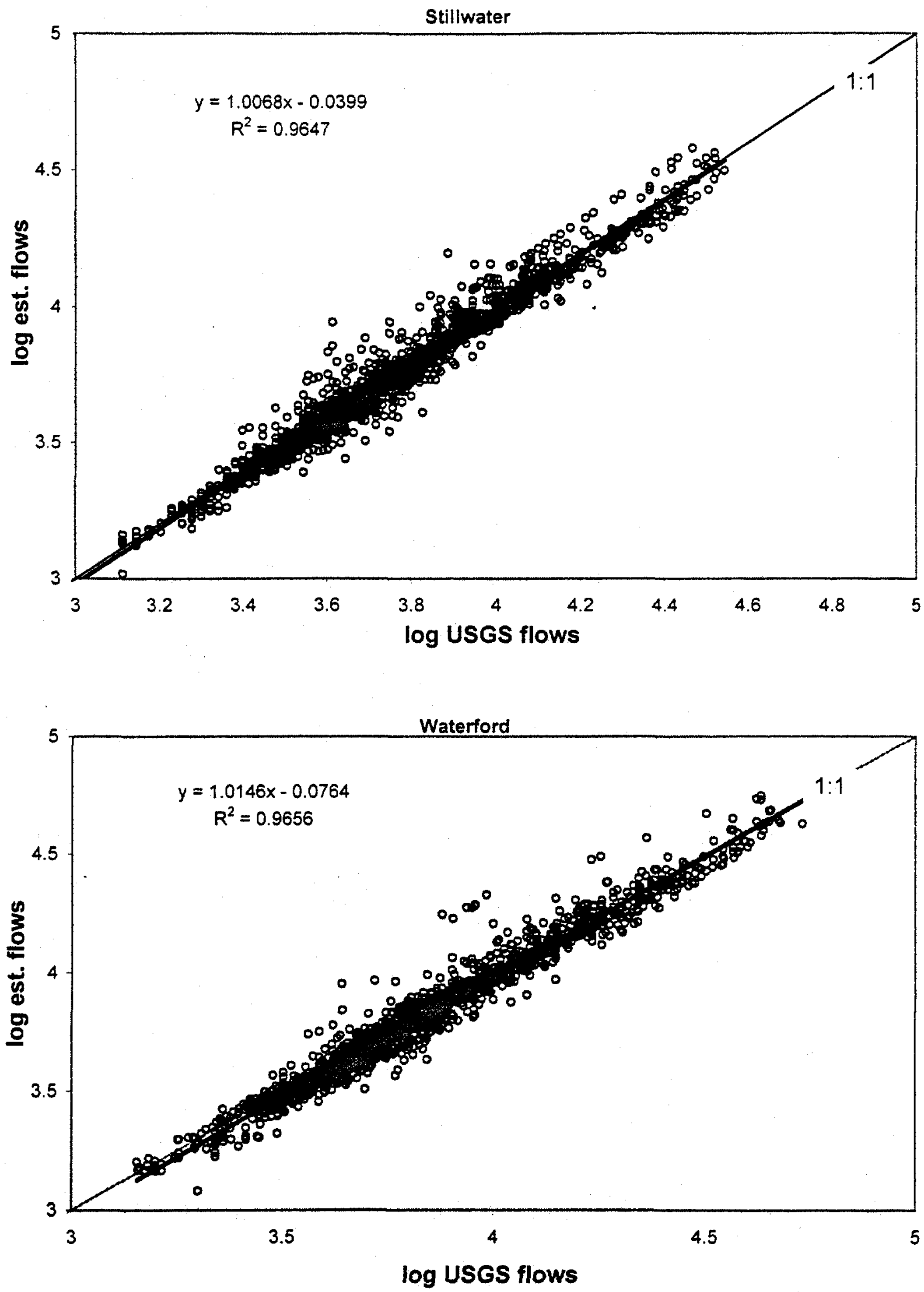

Figure 6-7. 1993 - 1997 Estimated versus USGS-Reported Daily Average Flow at Stillwater and Waterford.

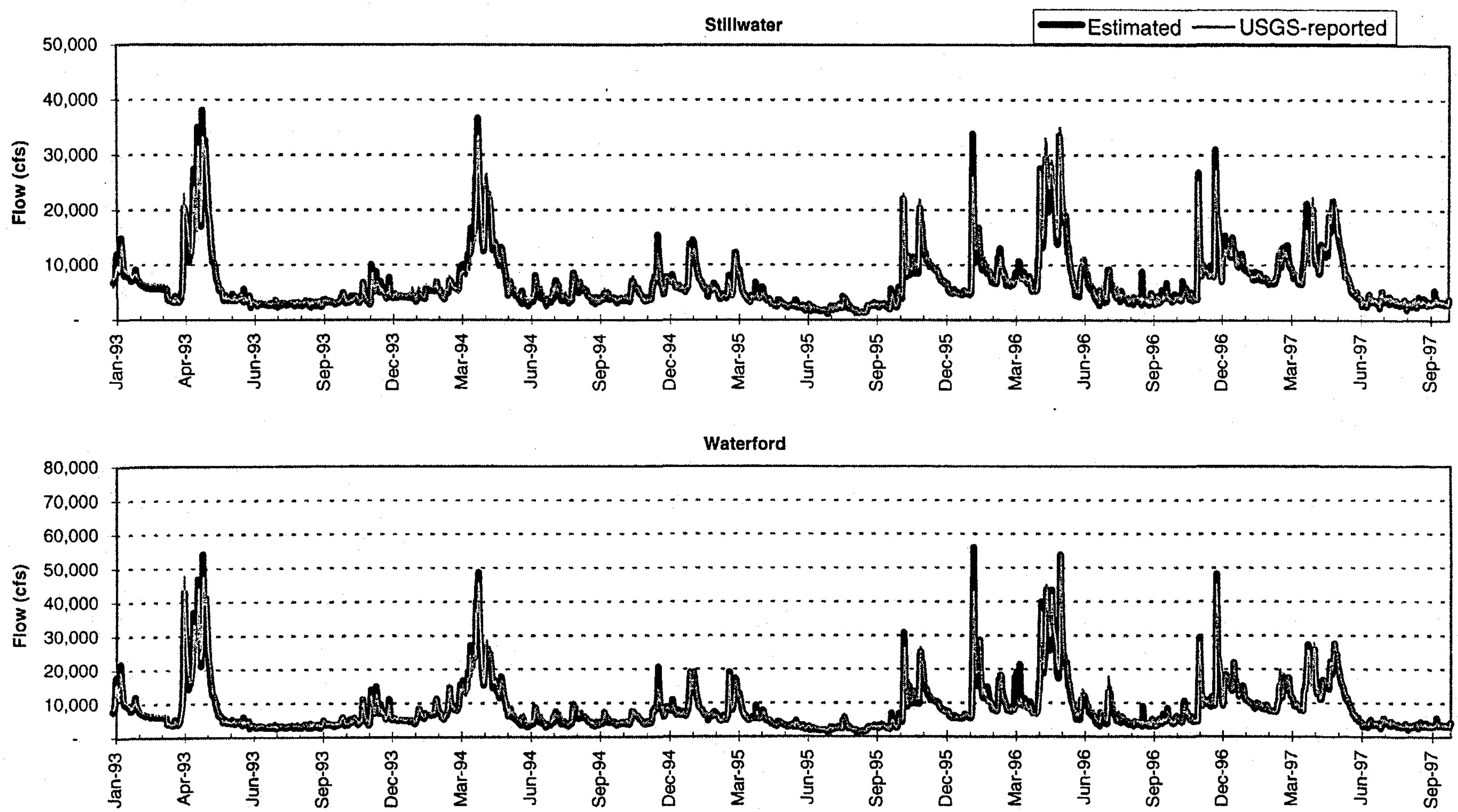

Figure 6-8. 1993 - 1997 Estimated versus USGS-Reported Daily Average Flow Time Series at Stillwater and Waterford.

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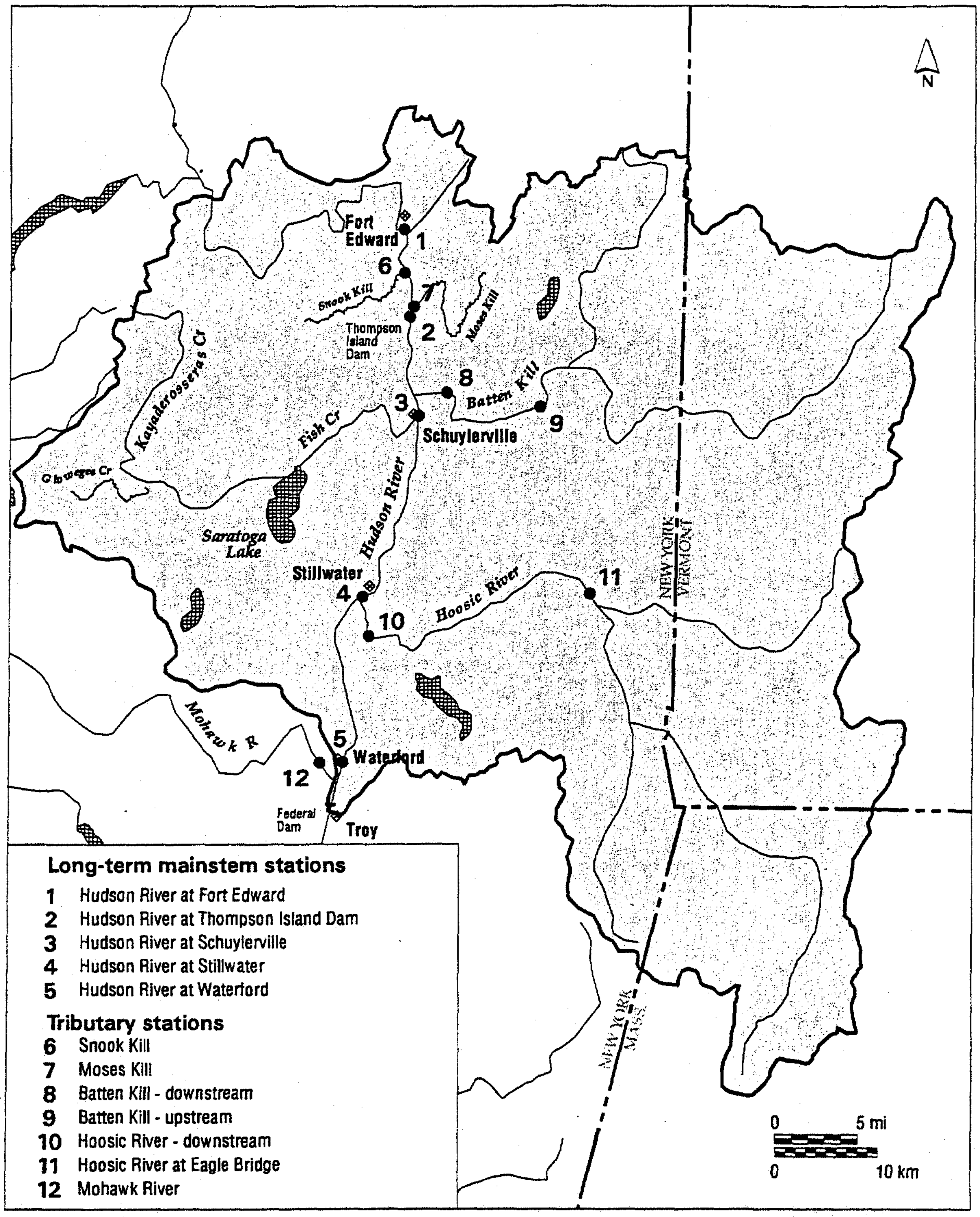

Figure 6-9. Upper Hudson River Basin Primary Mainstem and Tributary Sampling Locations for Solids Used in HUDTOX Modeling.

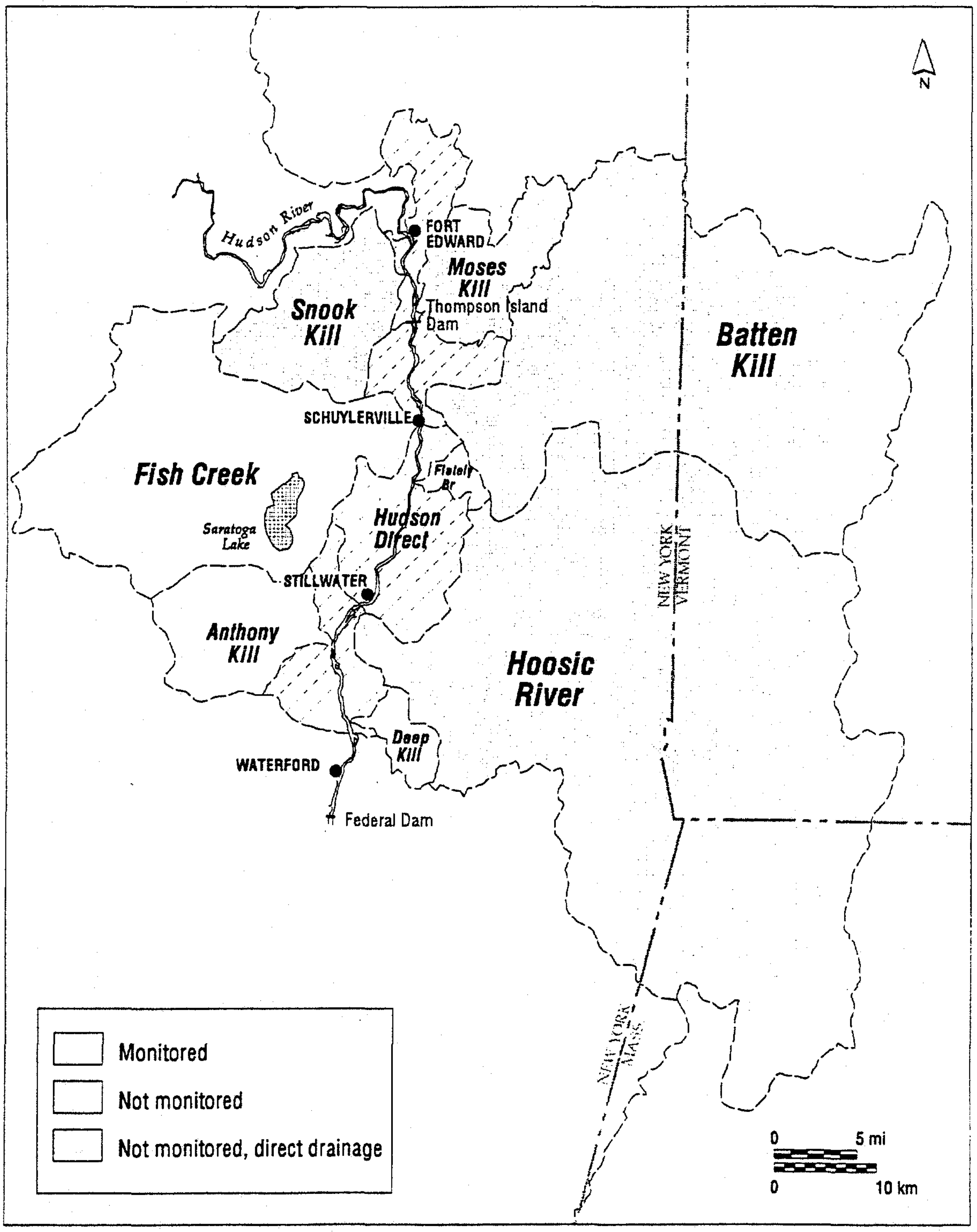

Figure 6-10. Monitored and Unmonitored Subwatersheds for Solids Between Fort Edward and Waterford.

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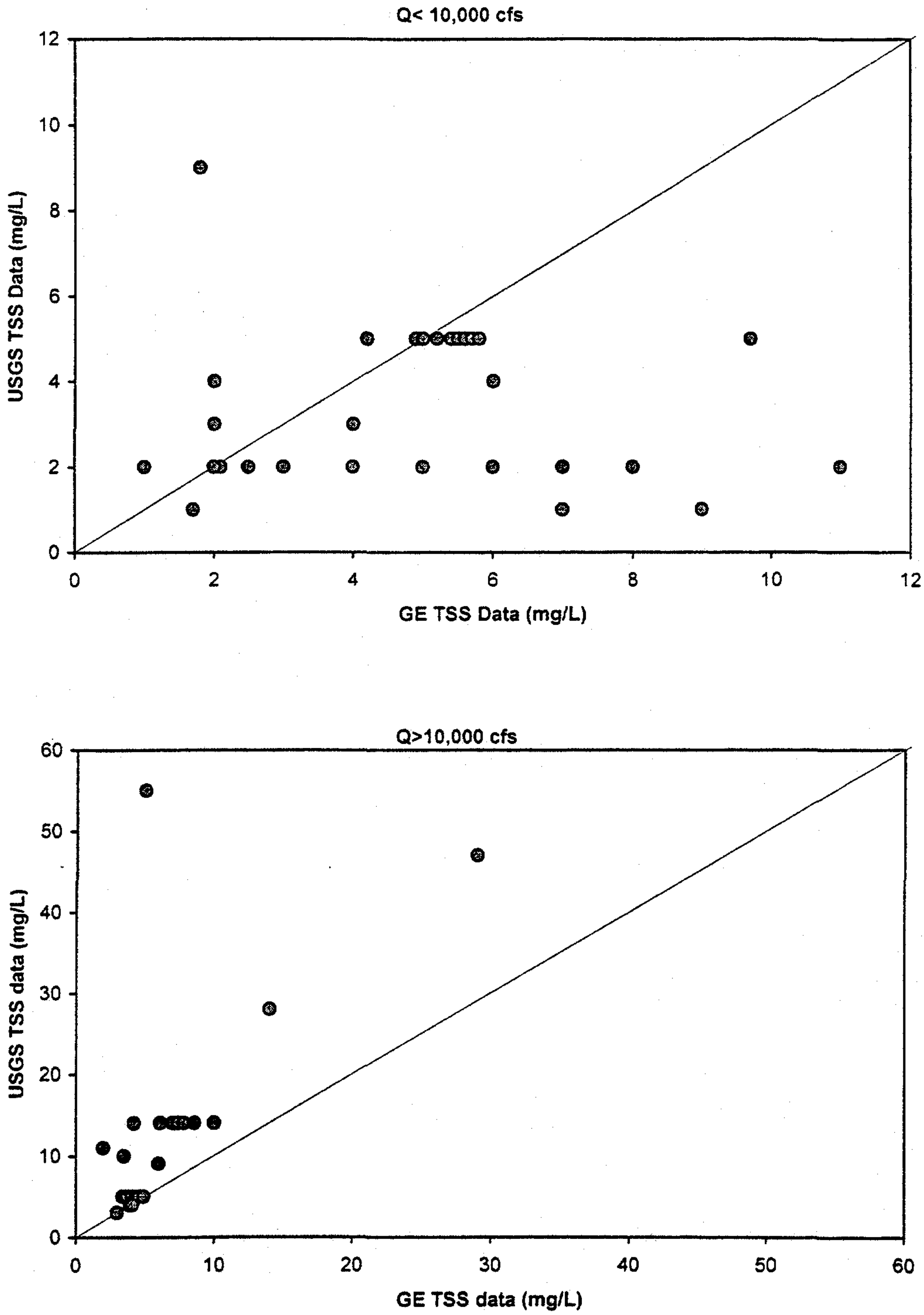


Figure 6-11. GE versus USGS TSS Data at Fort Edward for High and Low Flow Data Pairs from 4/1/91 to 9/15/97.

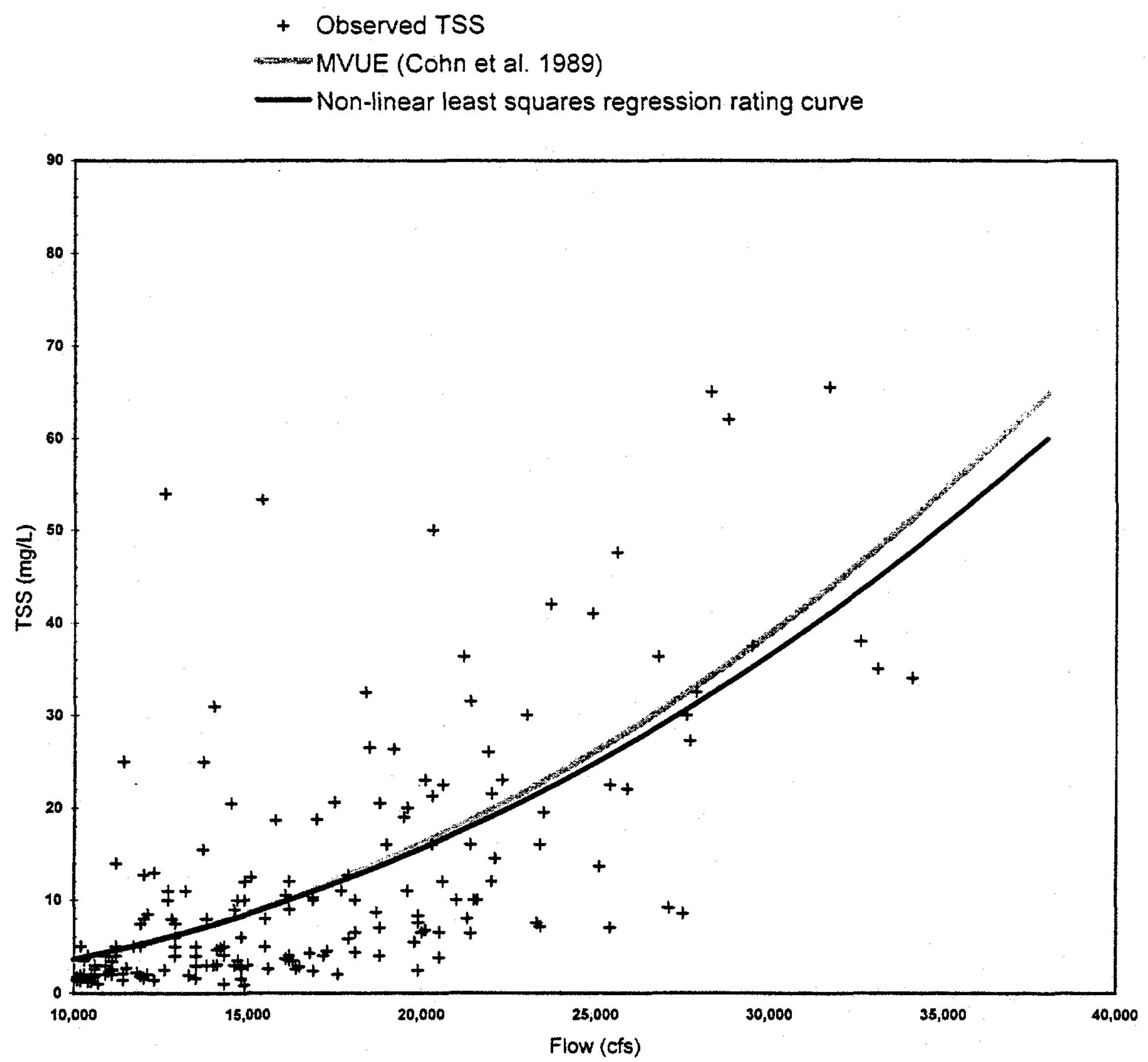


Figure 6-13. Comparison of Total Suspended Solids (TSS) High-Flow Rating Curves for Fort Edward, 1977-1997, Using MVUE (Cohn et al. 1989) and Non-linear Regression Analysis.

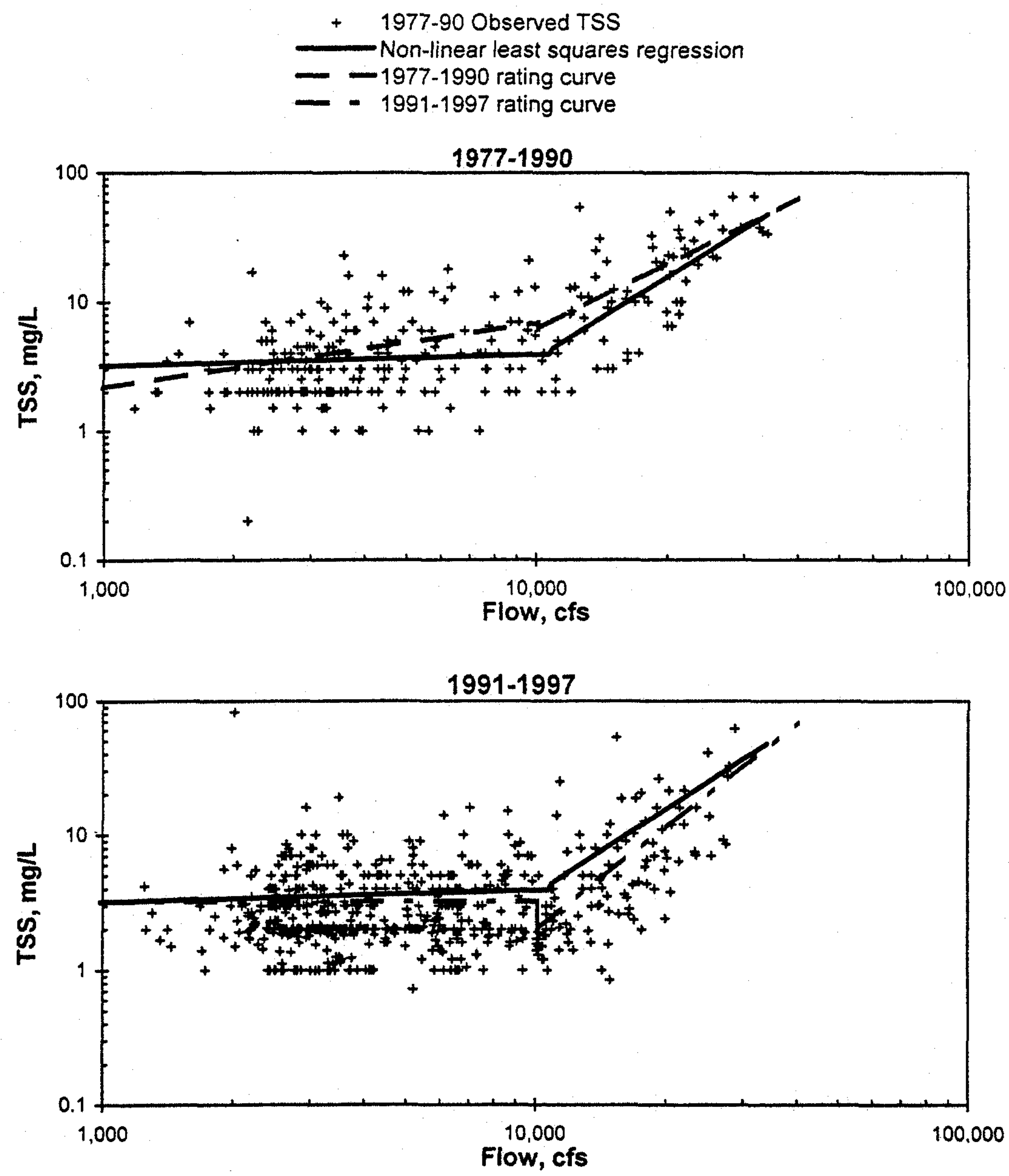


Figure 6-14. Comparison of 1977-1990 and 1991-1997 Total Suspended Solids (TSS) Rating Curves at Fort Edward versus the 1977-1997 Rating Curve.

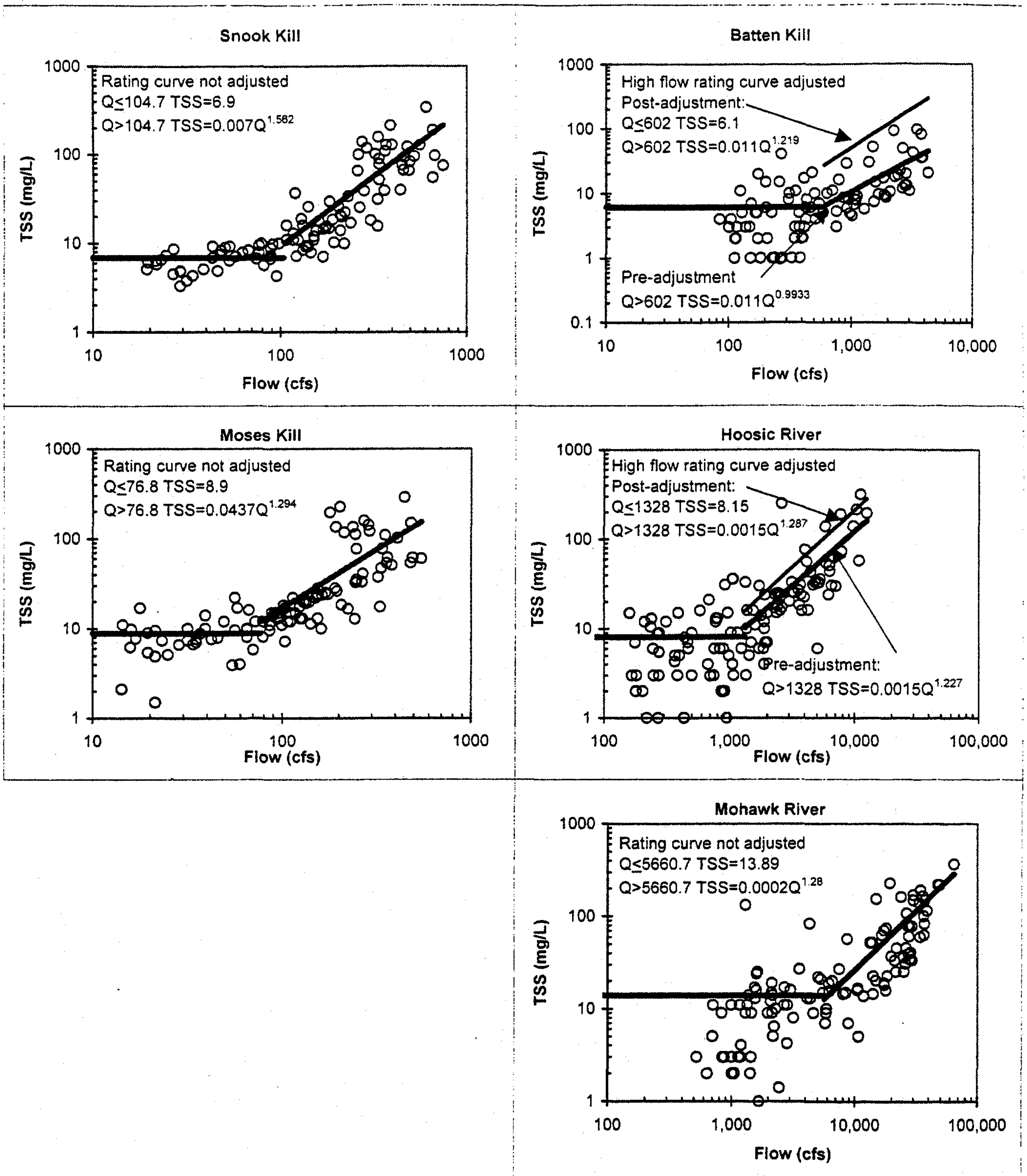
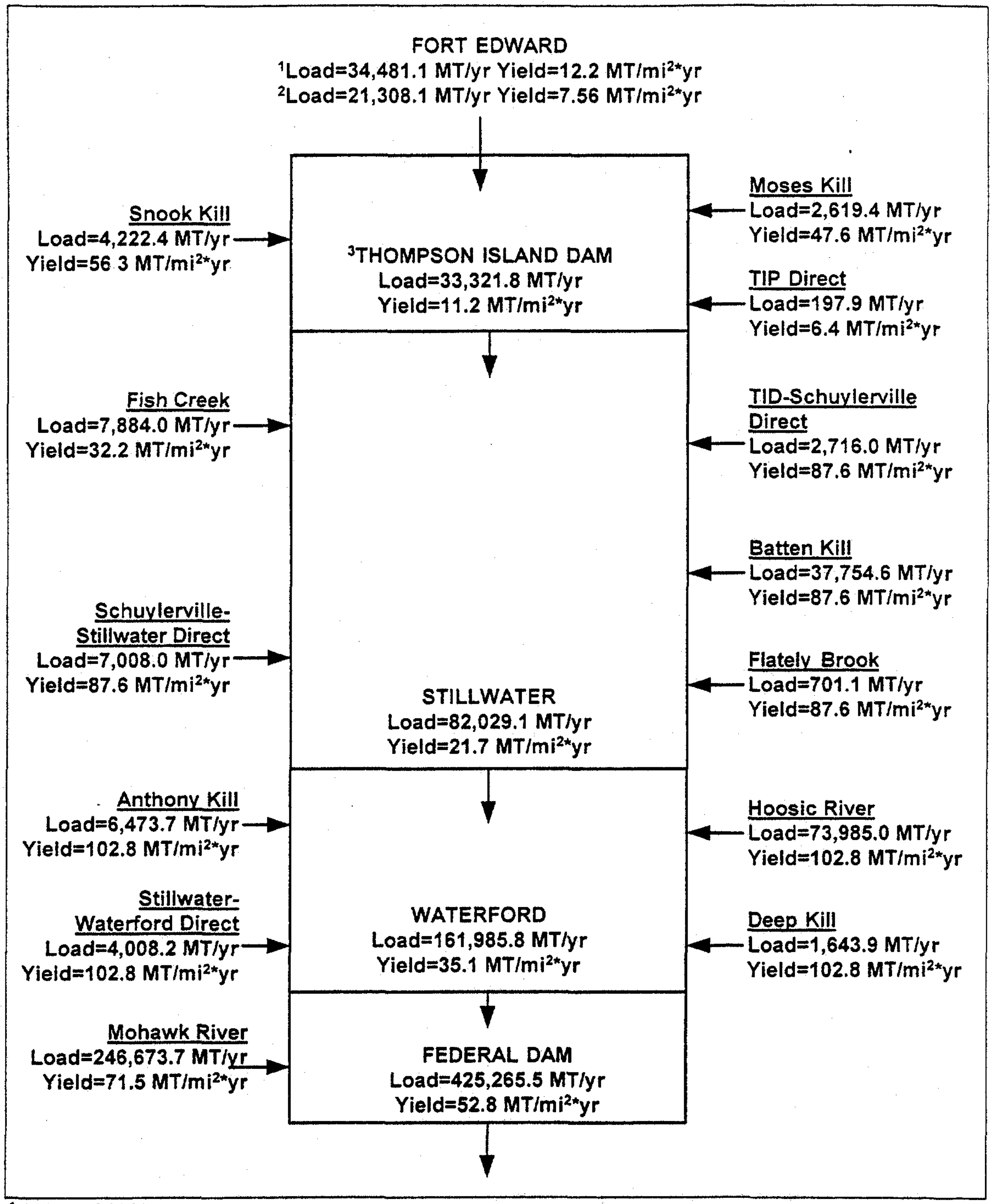


Figure 6-15. Tributary TSS Rating Curves: Based on Data and Adjusted to Achieve Solids Balance.



[1] 1/1/77 - 12/31/90
[2] 1/1/91 - 12/31/96
[3] TID loads are the sum of FE, Snook, Moses and TIP direct drainage loads, accounting for an 8.5% trapping efficiency in TIP

Figure 6-16. Mainstem and Tributary Suspended Solids Watershed Loads and Yields based on HUDTOX Suspended Solids Loading Estimates (10/1/77-9/30/97).

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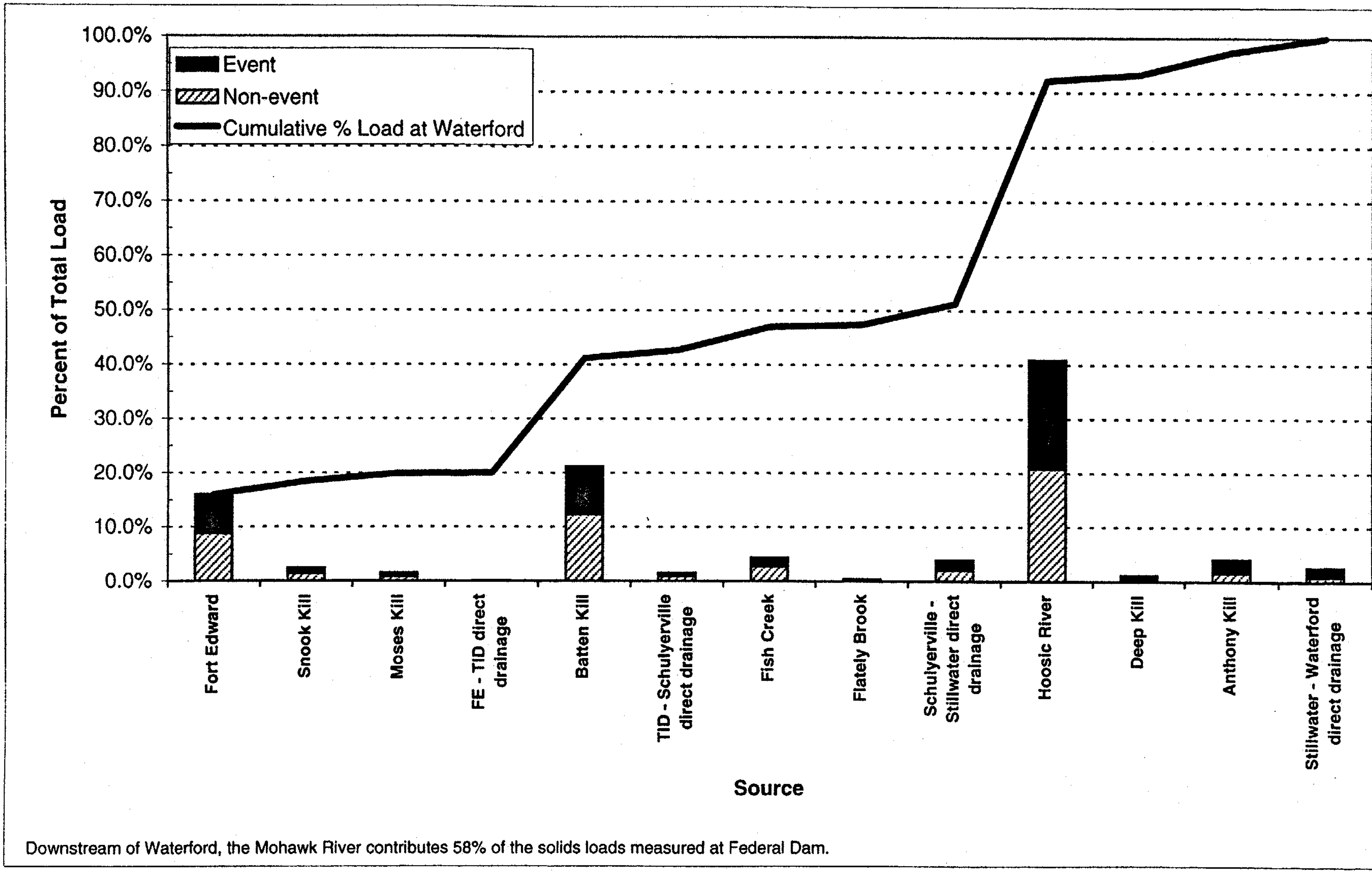

Figure 6-17. Relative Percent Solids Contribution from Fort Edward and Tributaries between Fort Edward and Waterford.

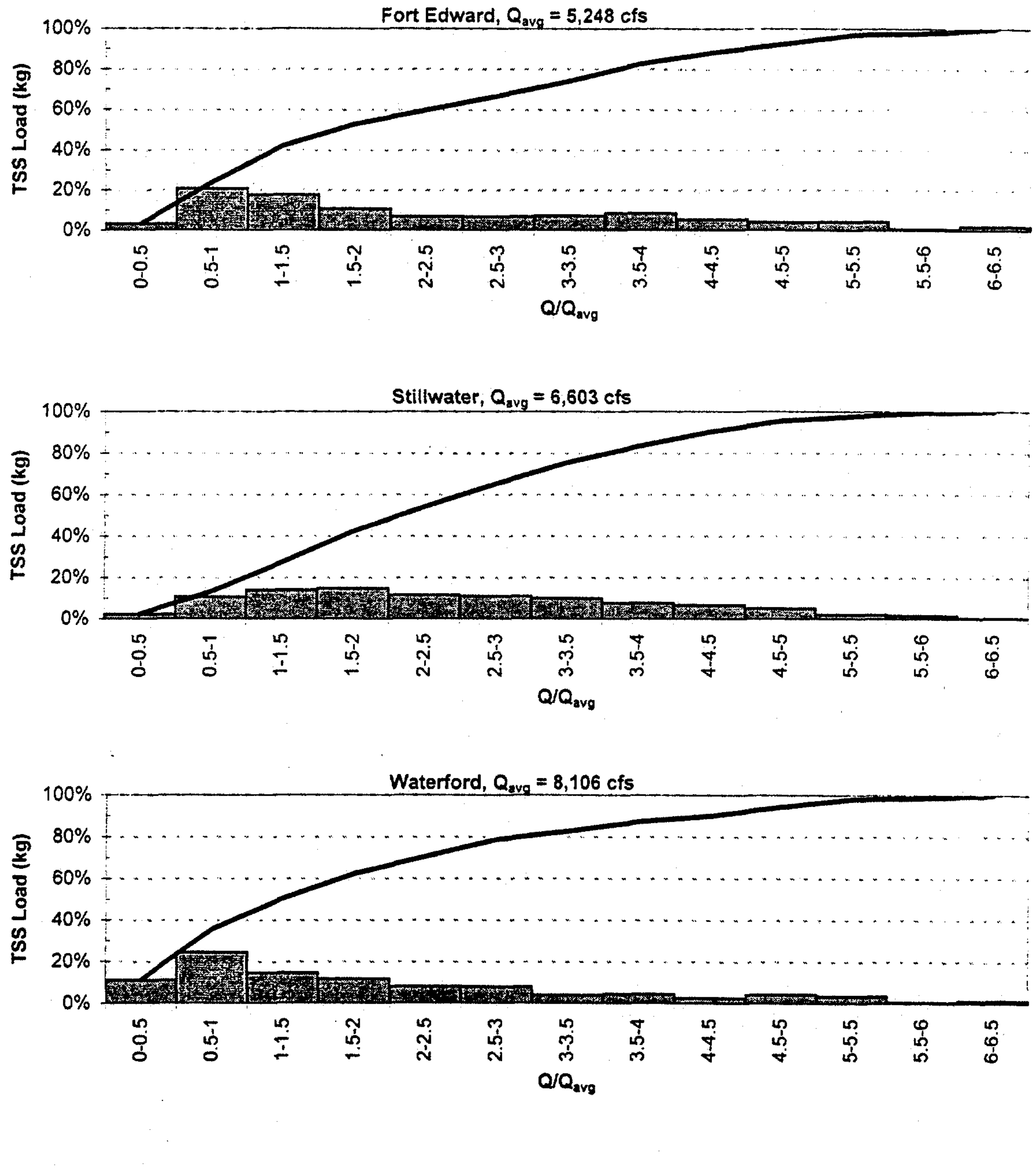

Figure 6-18. Distribution of TSS Load Over Flow Range at Fort Edward, Stillwater, and Waterford from 1977 - 1997.

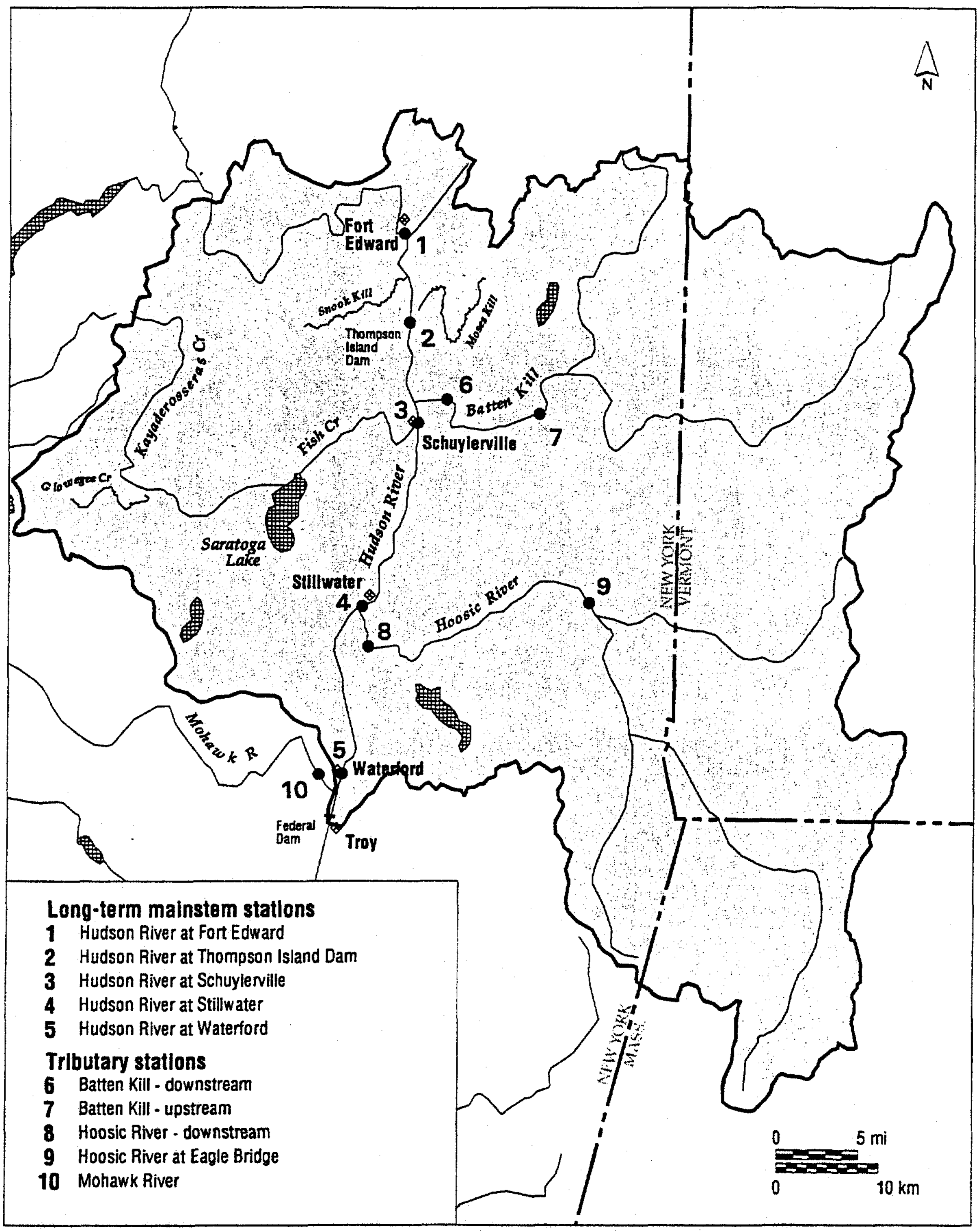

Figure 6-19. Upper Hudson River Basin Primary Mainstem and Tributary Sampling Locations for PCB Data Used in HUDTOX Modeling.

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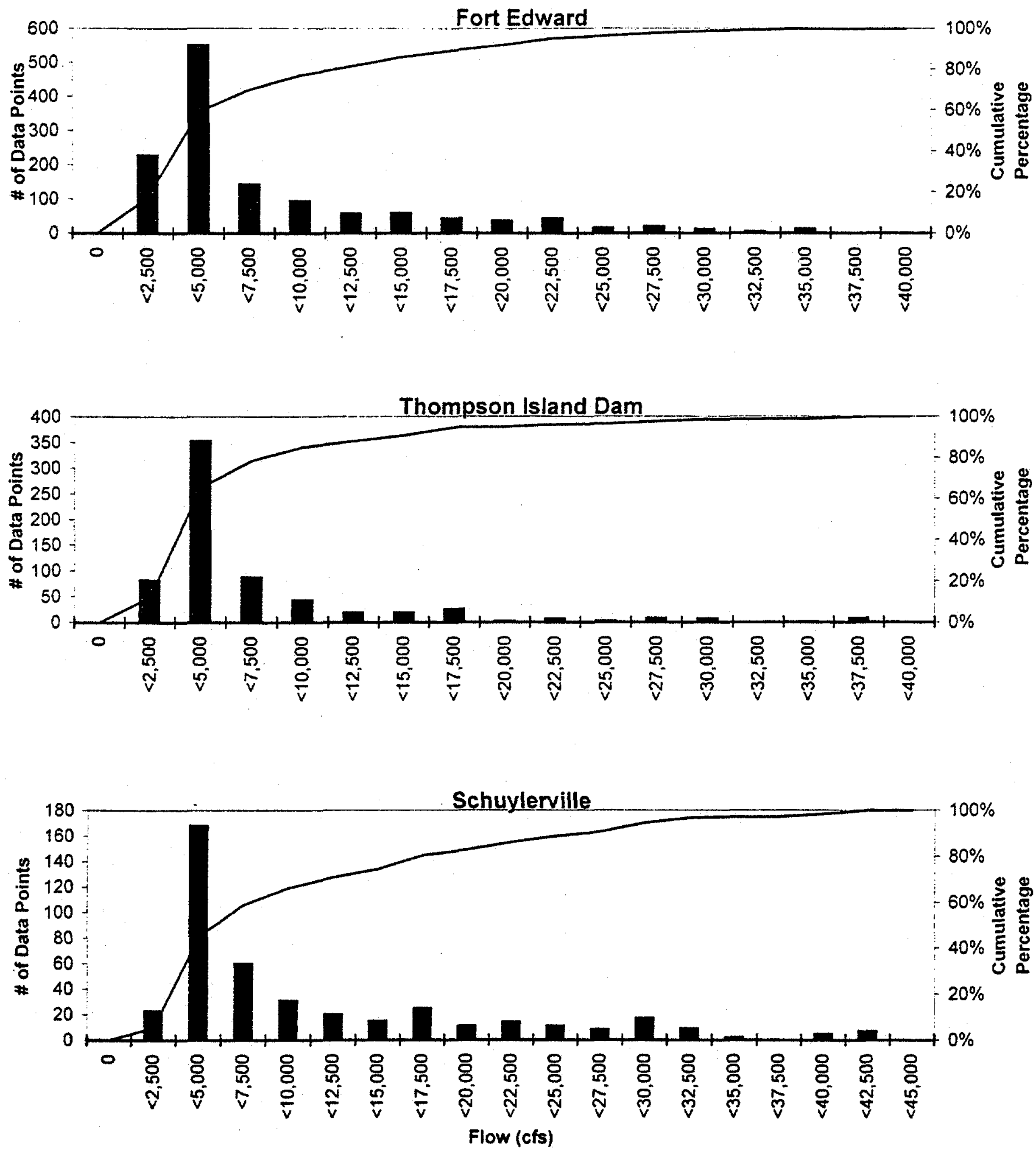

Figure 6-20a. Distribution of Available Tri+ PCBs Concentration Data by Flow Intervals for Mainstem Hudson River Sampling Stations (January 1977 - May 1998).

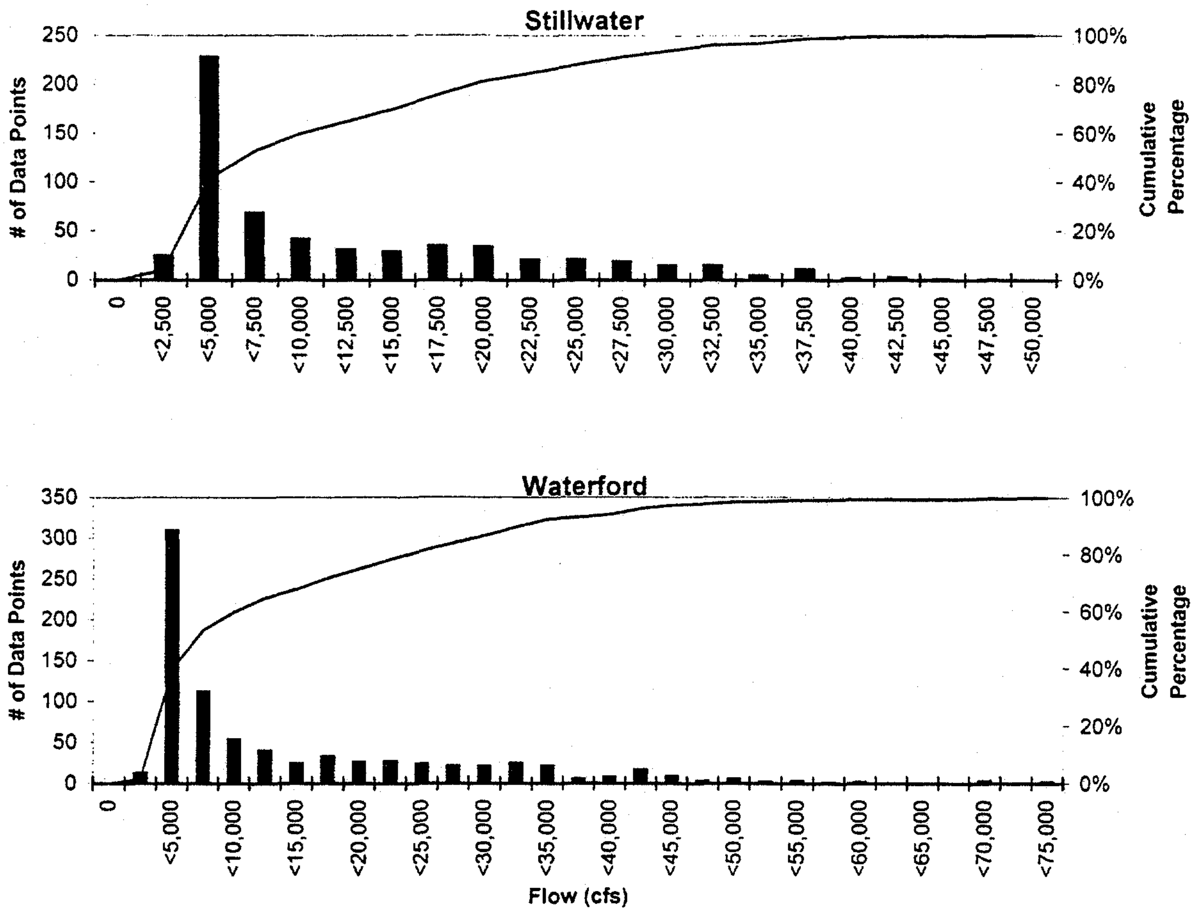

Figure 6-20b. Distribution of Available Tri+ PCBs Concentration Data by Flow Intervals for Mainstem Hudson River Sampling Stations (January 1977 - May 1998).

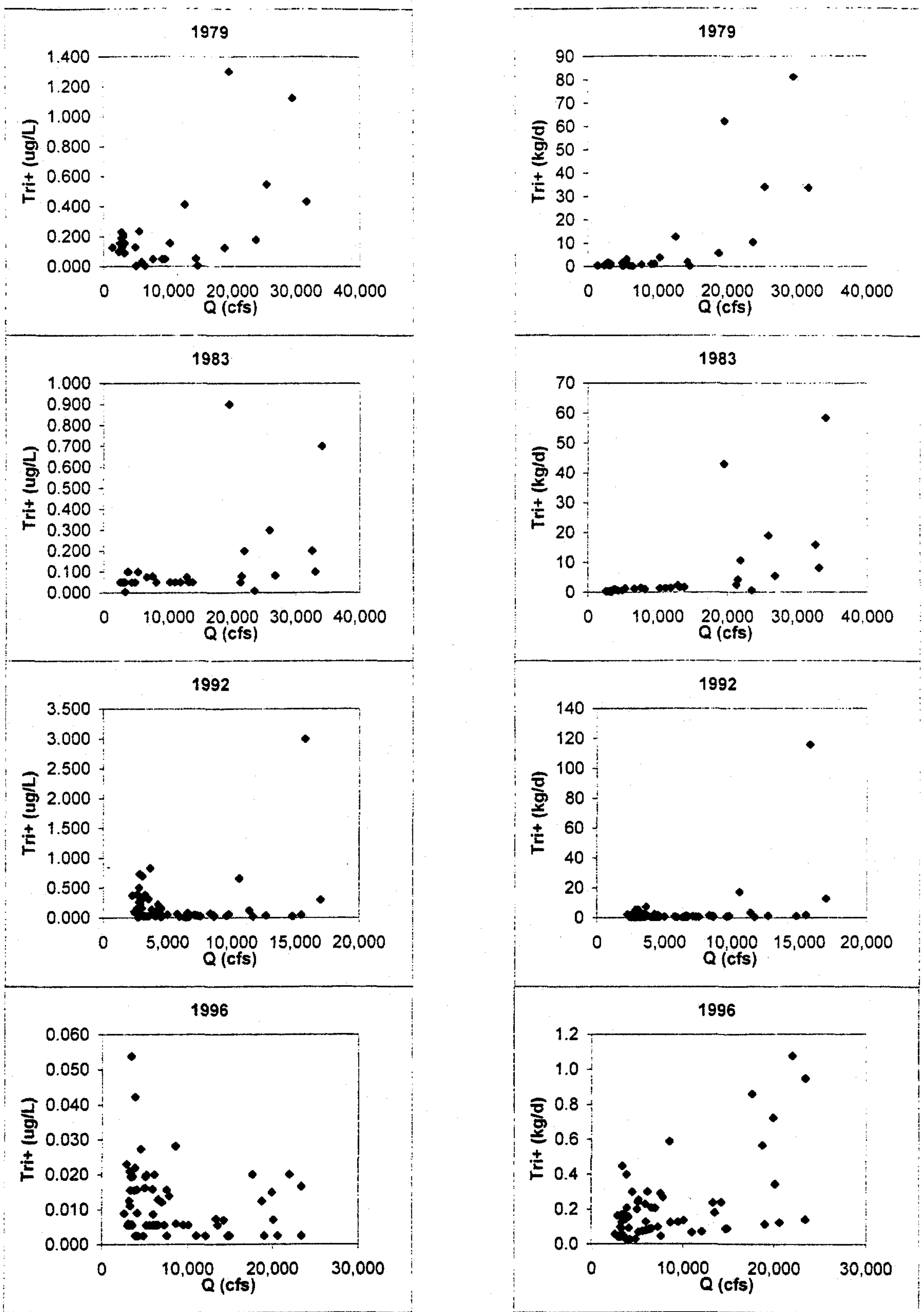

Figure 6-21. Tri+ PCB Concentrations and Load versus Flow at Fort Edward for Selected Years.

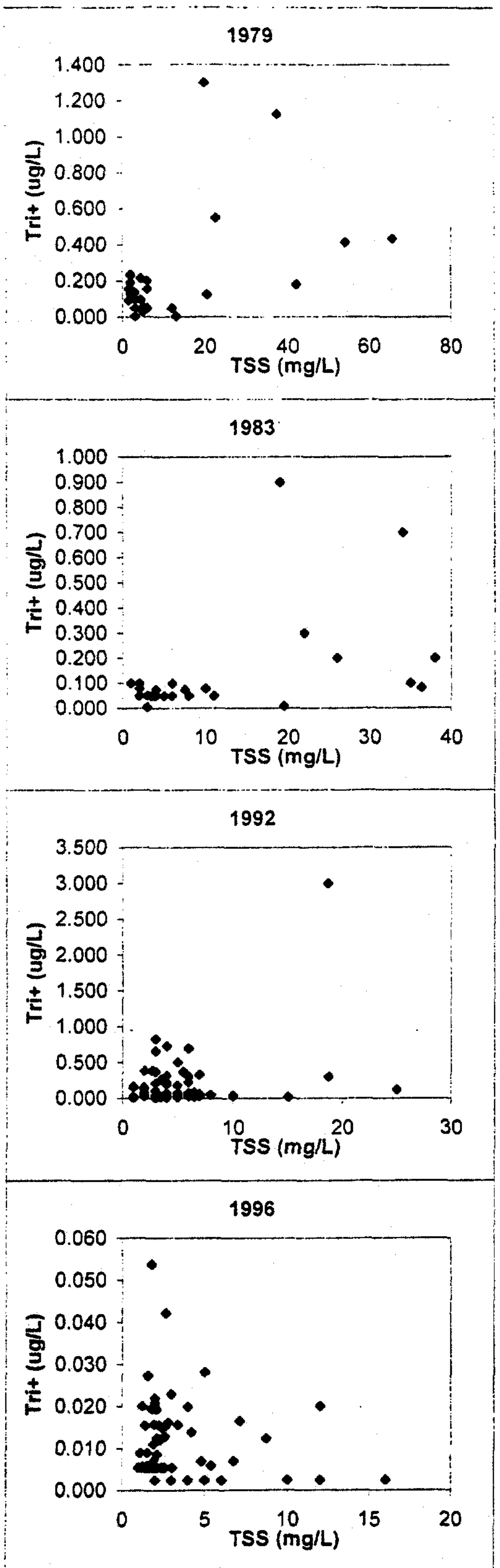

Figure 6-22. Tri+ PCB Concentrations and Loads versus Total Suspended Solids (TSS) Concentration at Fort Edward for Selected Years.

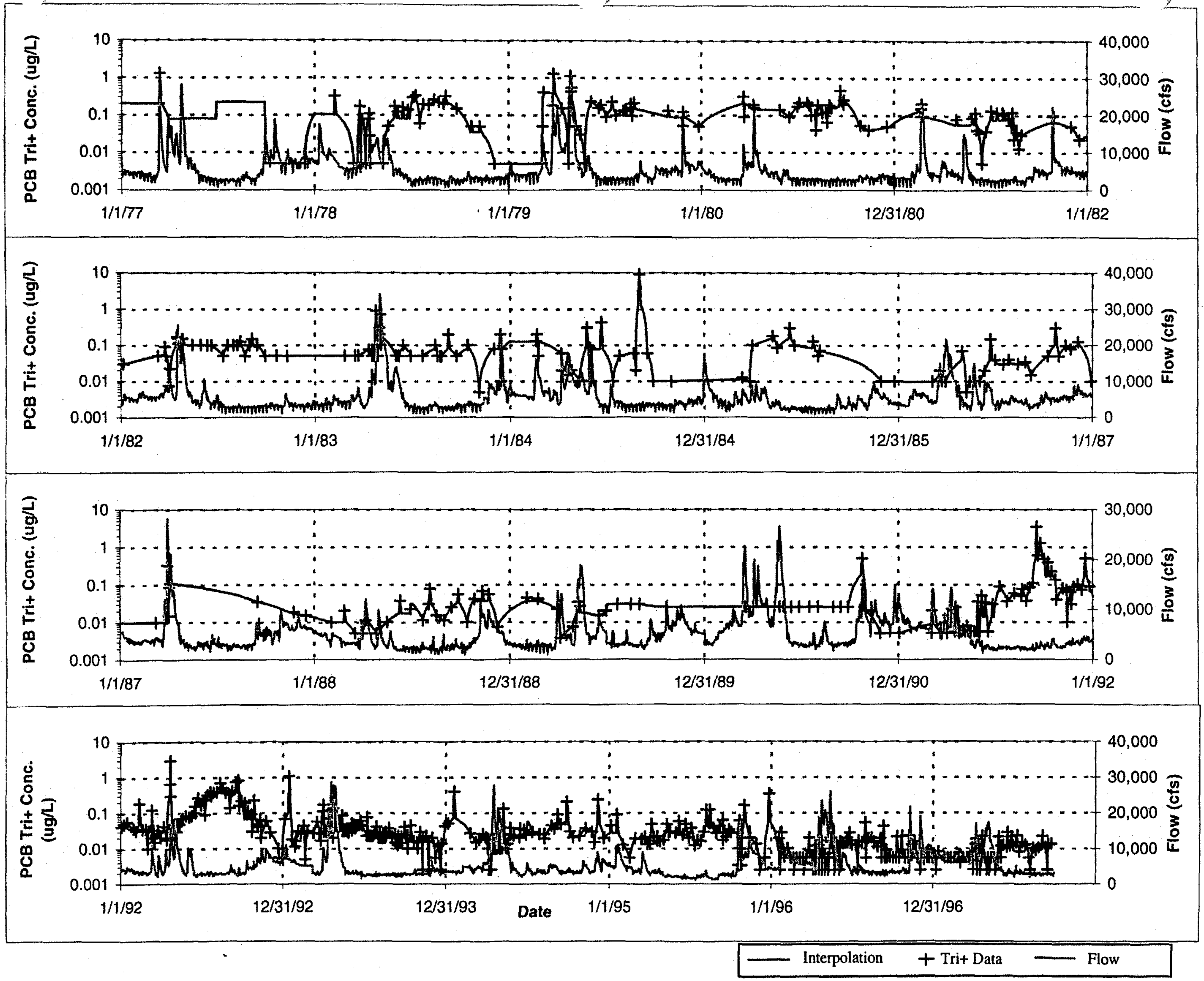

Figure 6-23. Interpolated Daily Tri+ PCB Concentration and Flow at Fort Edward, 1977-1997.

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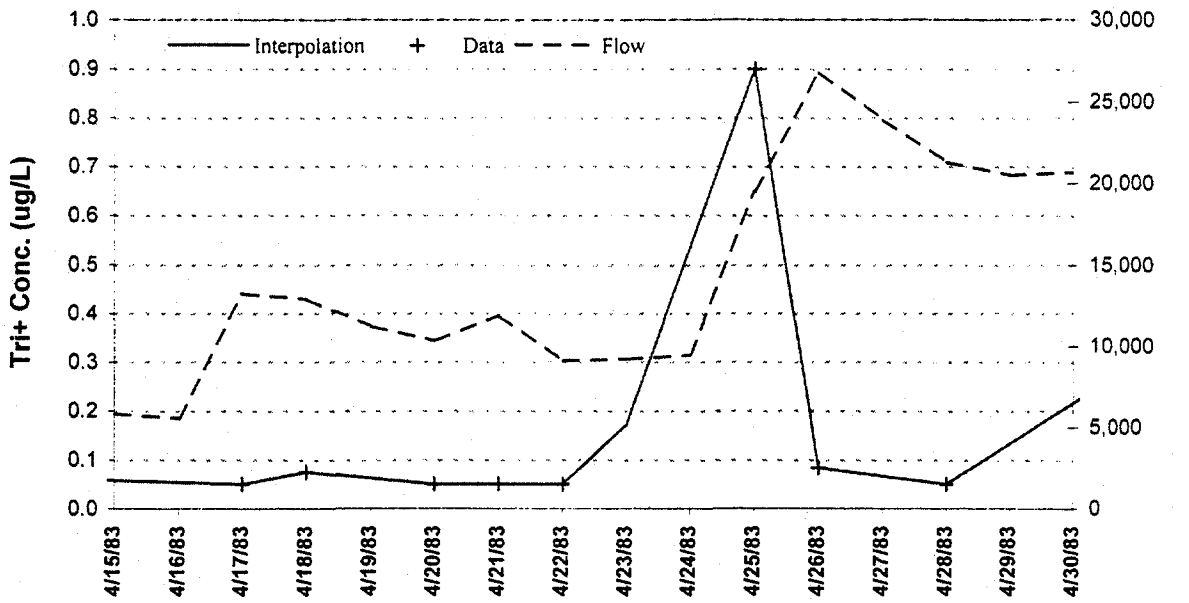

Figure 6-24. Examples of Apparent Tri+ Pulse Loading Events at Fort Edward in 1983 and 1994.

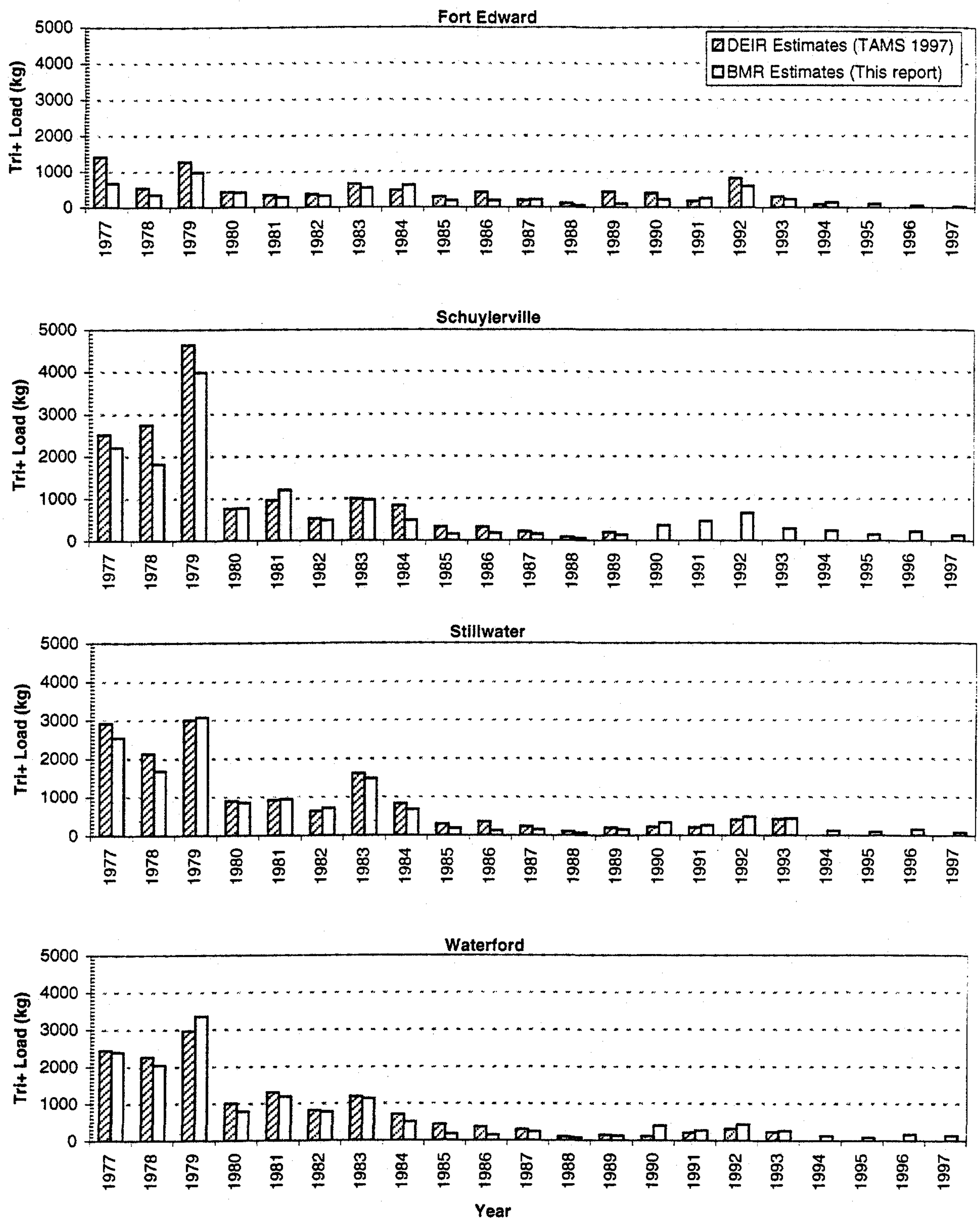

Figure 6-25. Estimated Annual Tri+ Load at Mainstem Hudson River Sampling Stations Compared to DEIR Estimates.

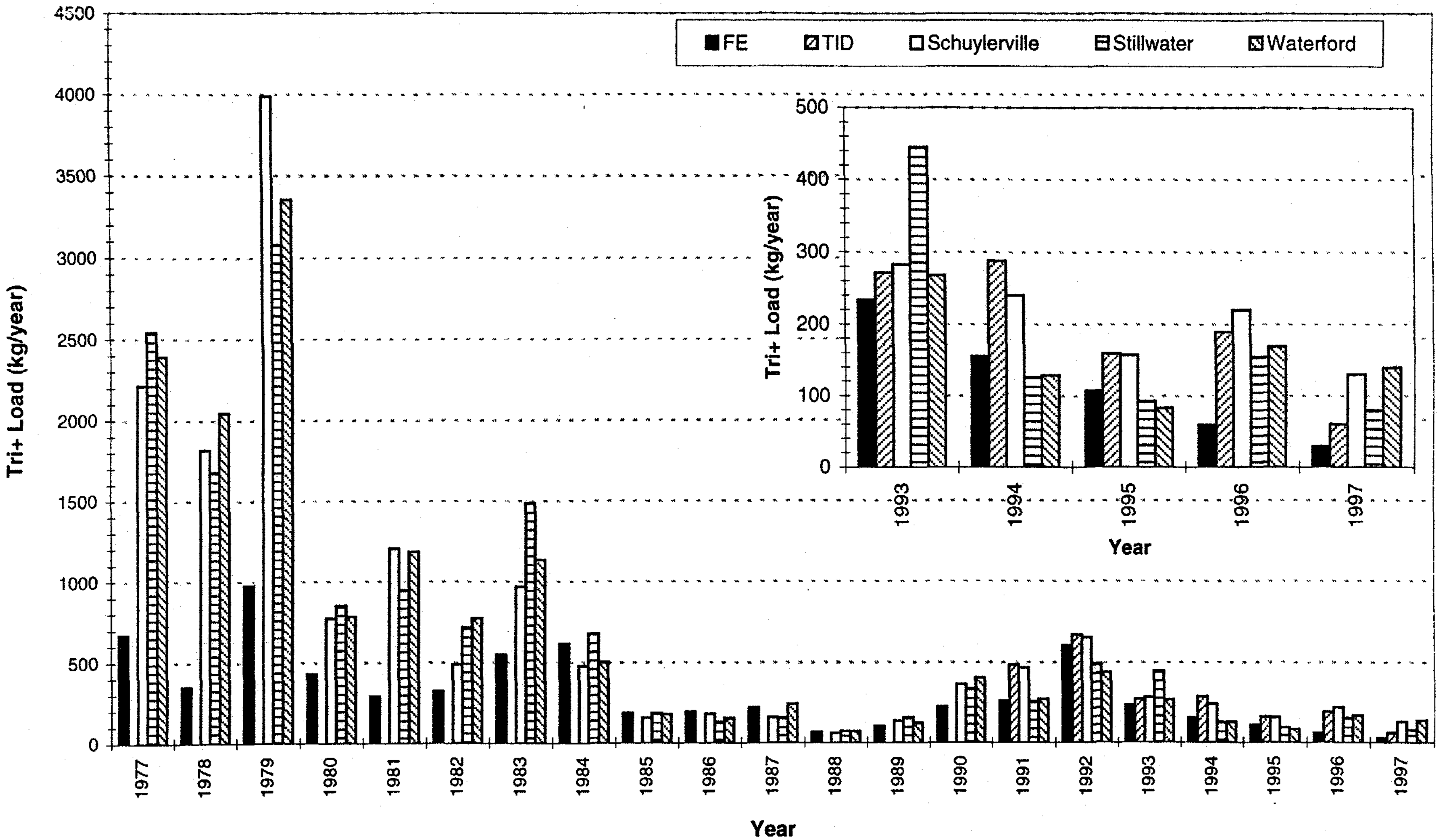

Figure 6-26. Estimated Annual Tri+ Load at Hudson River Mainstem Sampling Stations.

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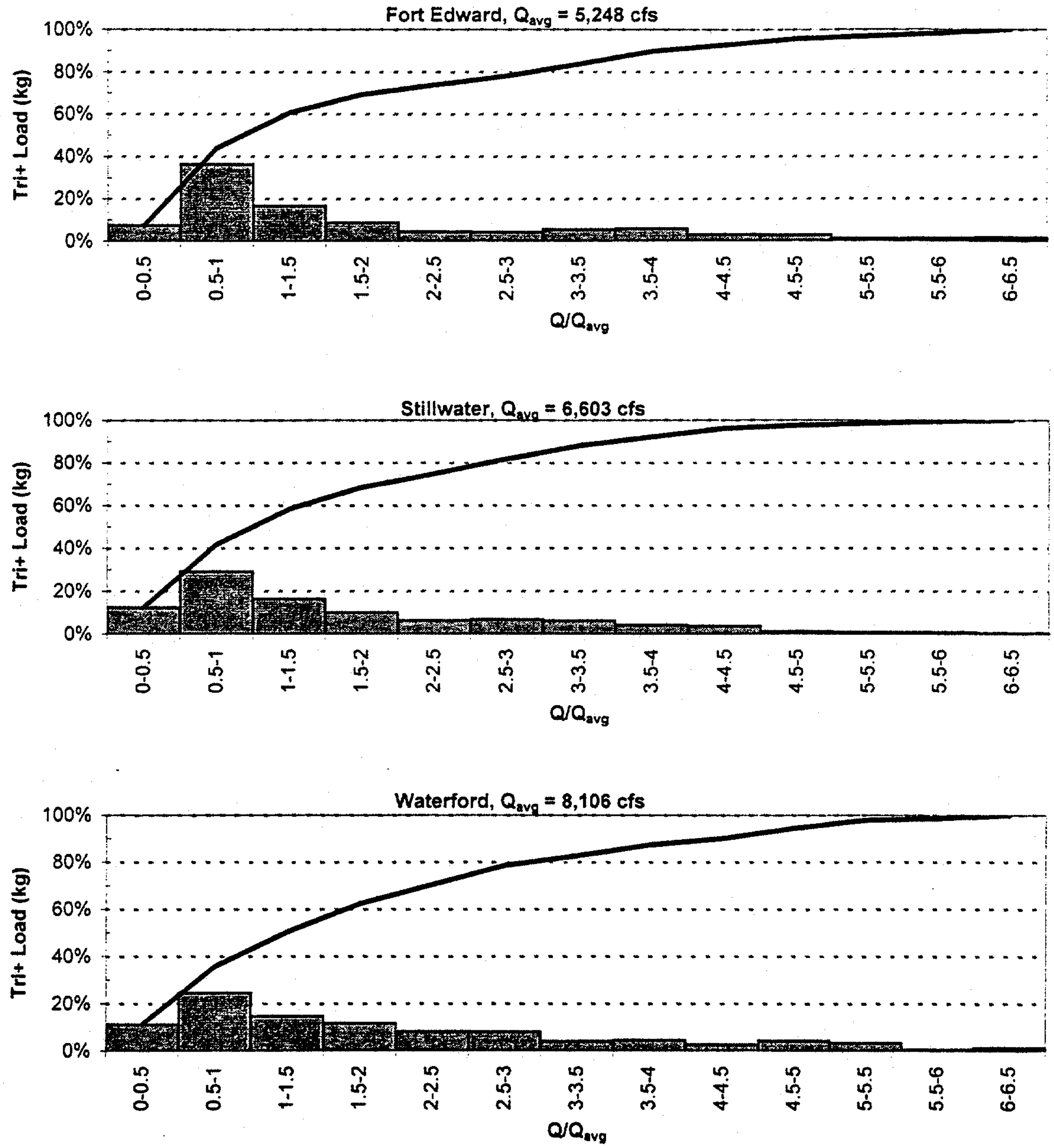

Figure 6-27. Distribution of Tri+ Load Over Flow Range at Fort Edward, Stillwater, and Waterford from 1977 - 1997.

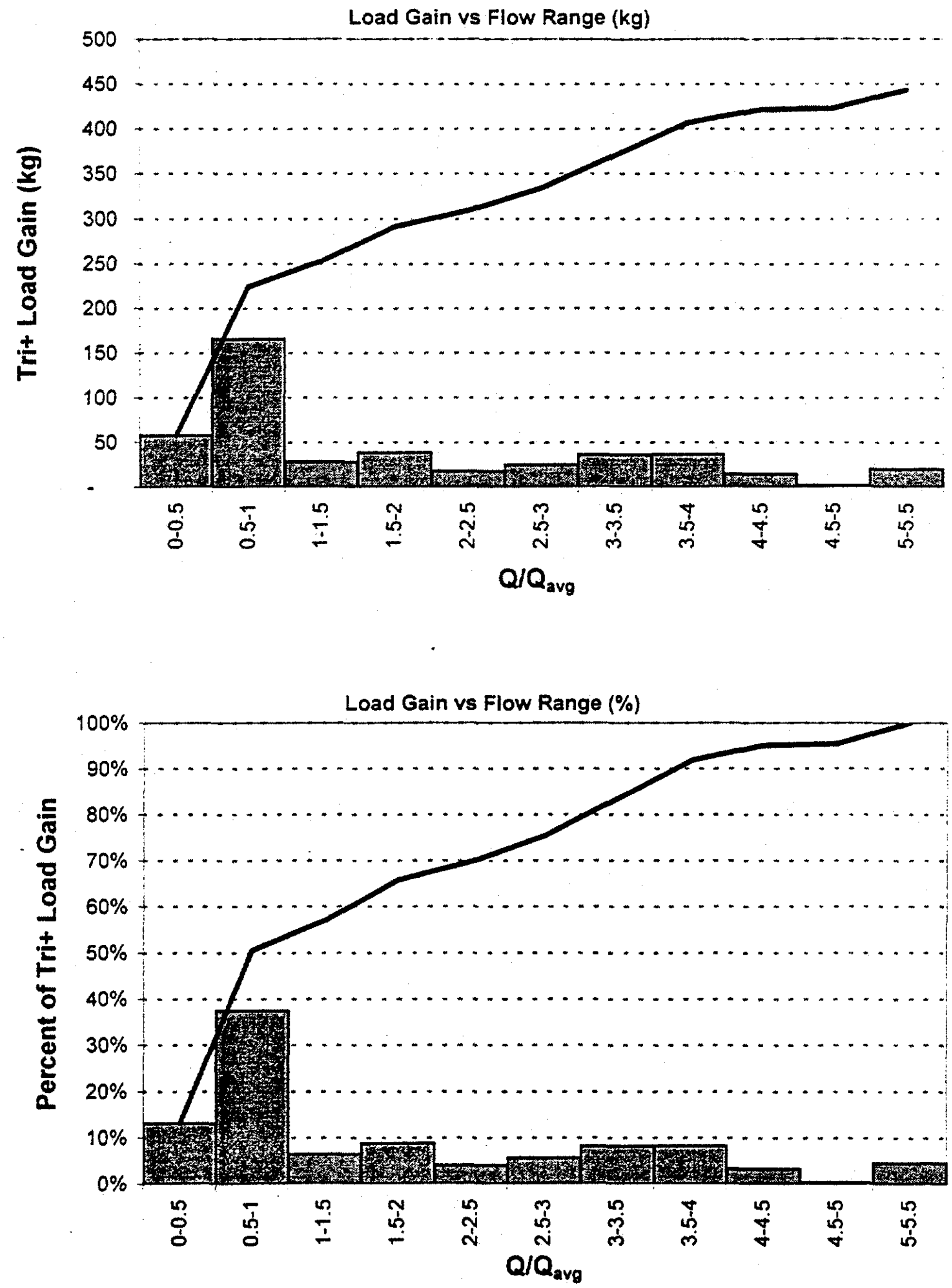

Figure 6-28. Distribution of Tri+ Load Gain Across Thompson Island Pool (TIP) Over Flow Range for 1993-1997.

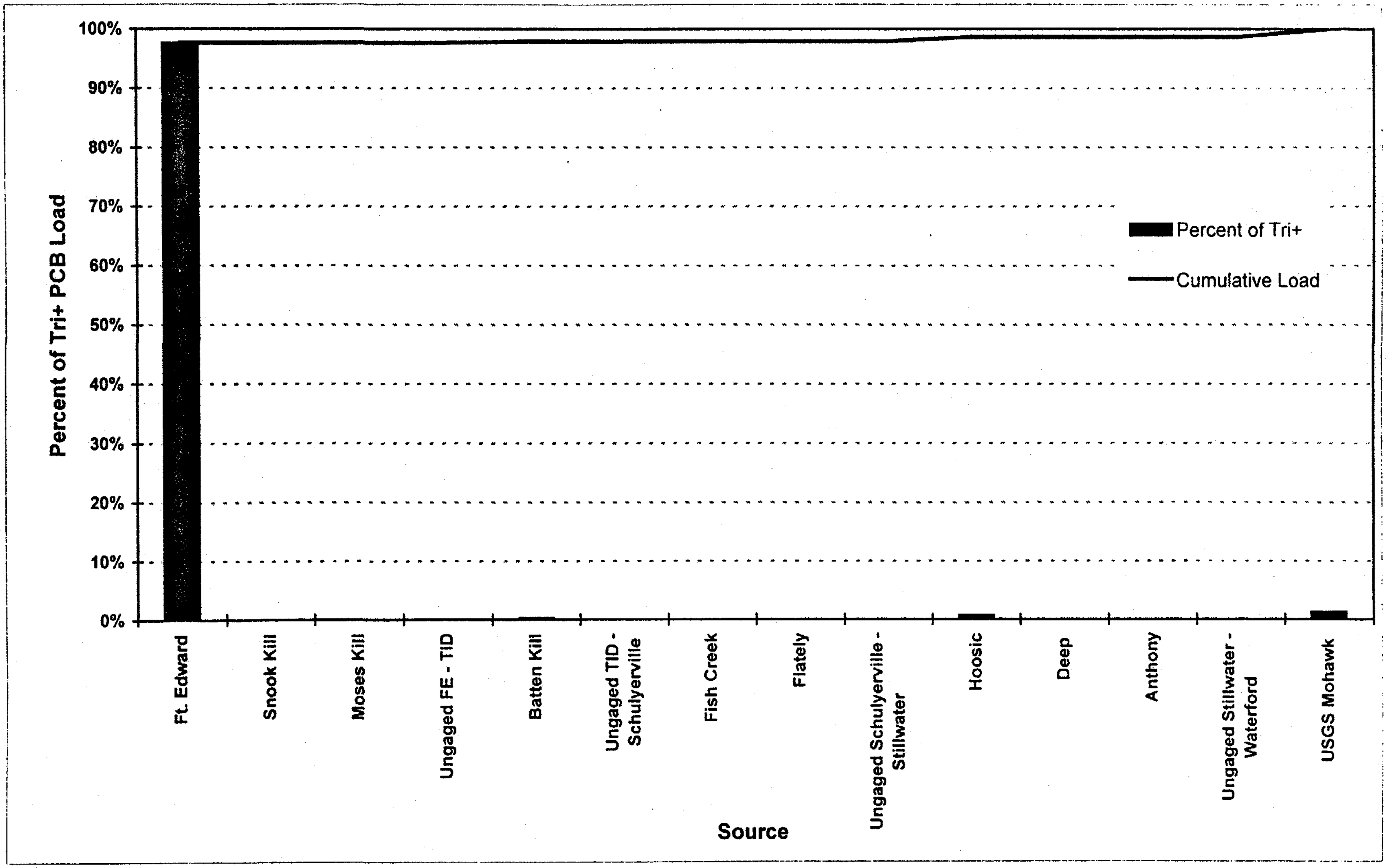

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Figure 6-29. Relative Contribution of Estimated External Tri+ PCB Loads to the Upper Hudson River by Source, 1977-1997.

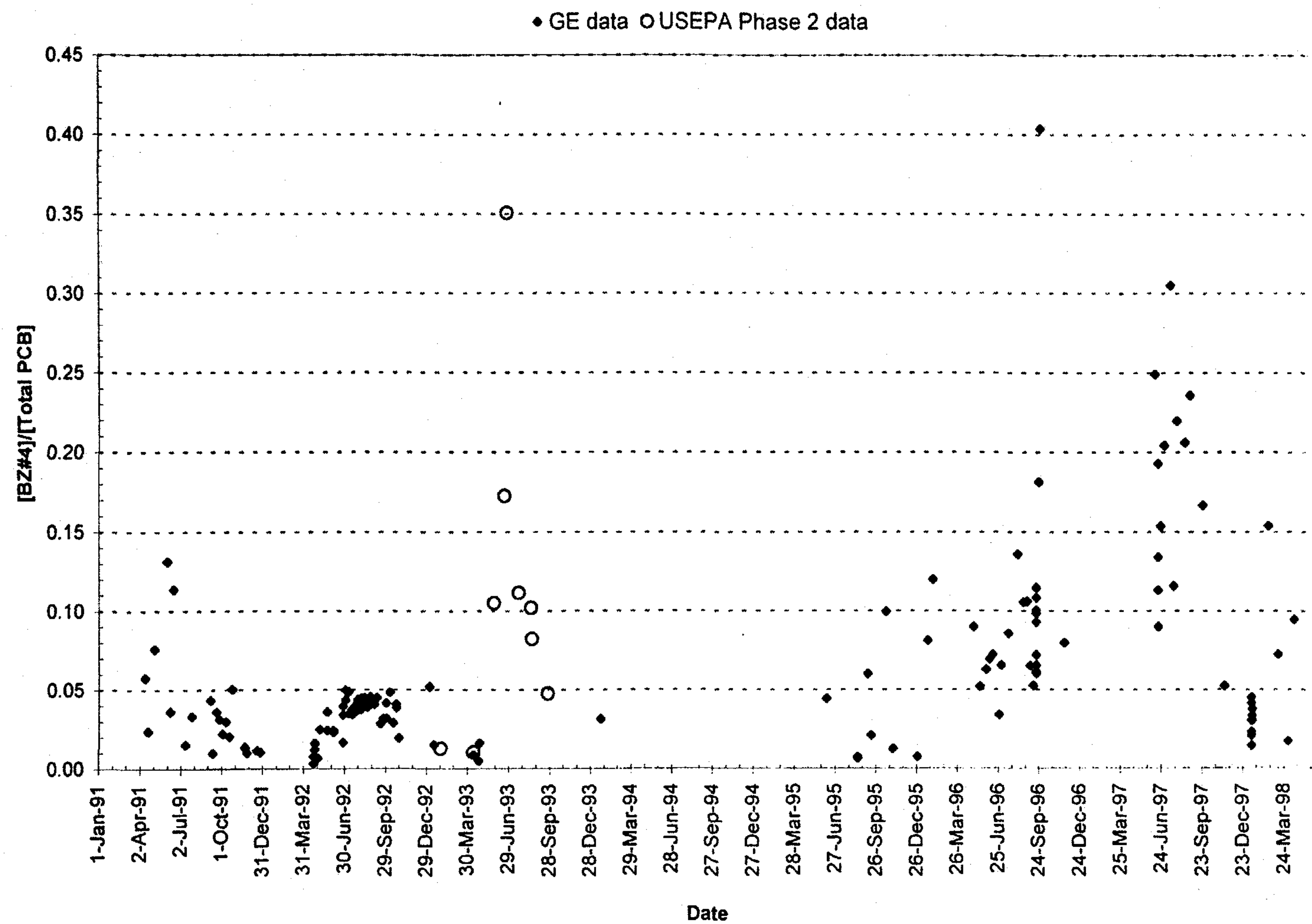


Figure 6-30. Ratio of Congener BZ#4 to Total PCBs at Fort Edward, 1991-1997, GE and USEPA Phase 2 Data.

303548

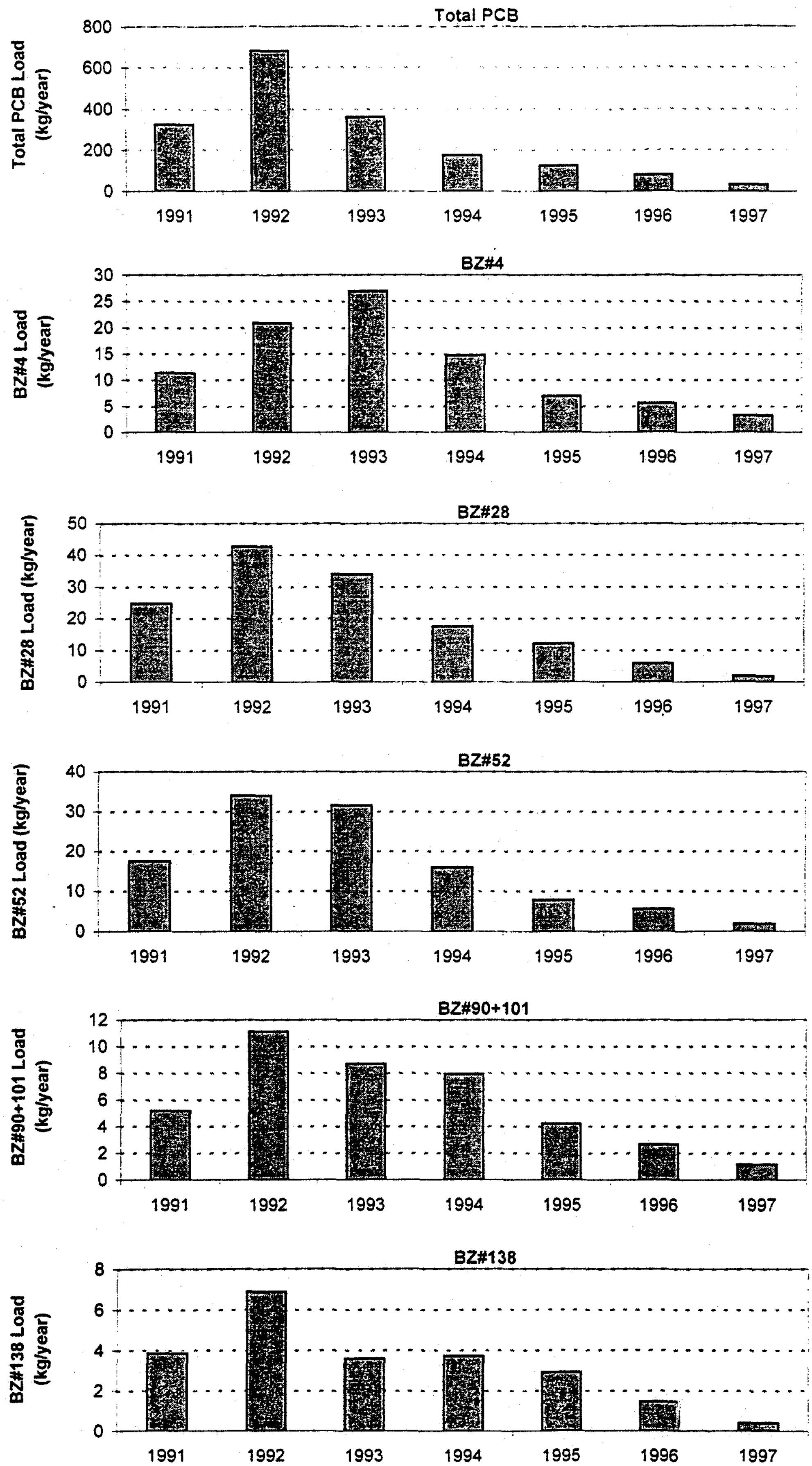


Figure 6-31. Estimated Annual Total and Congener PCB Loads at Fort Edward.

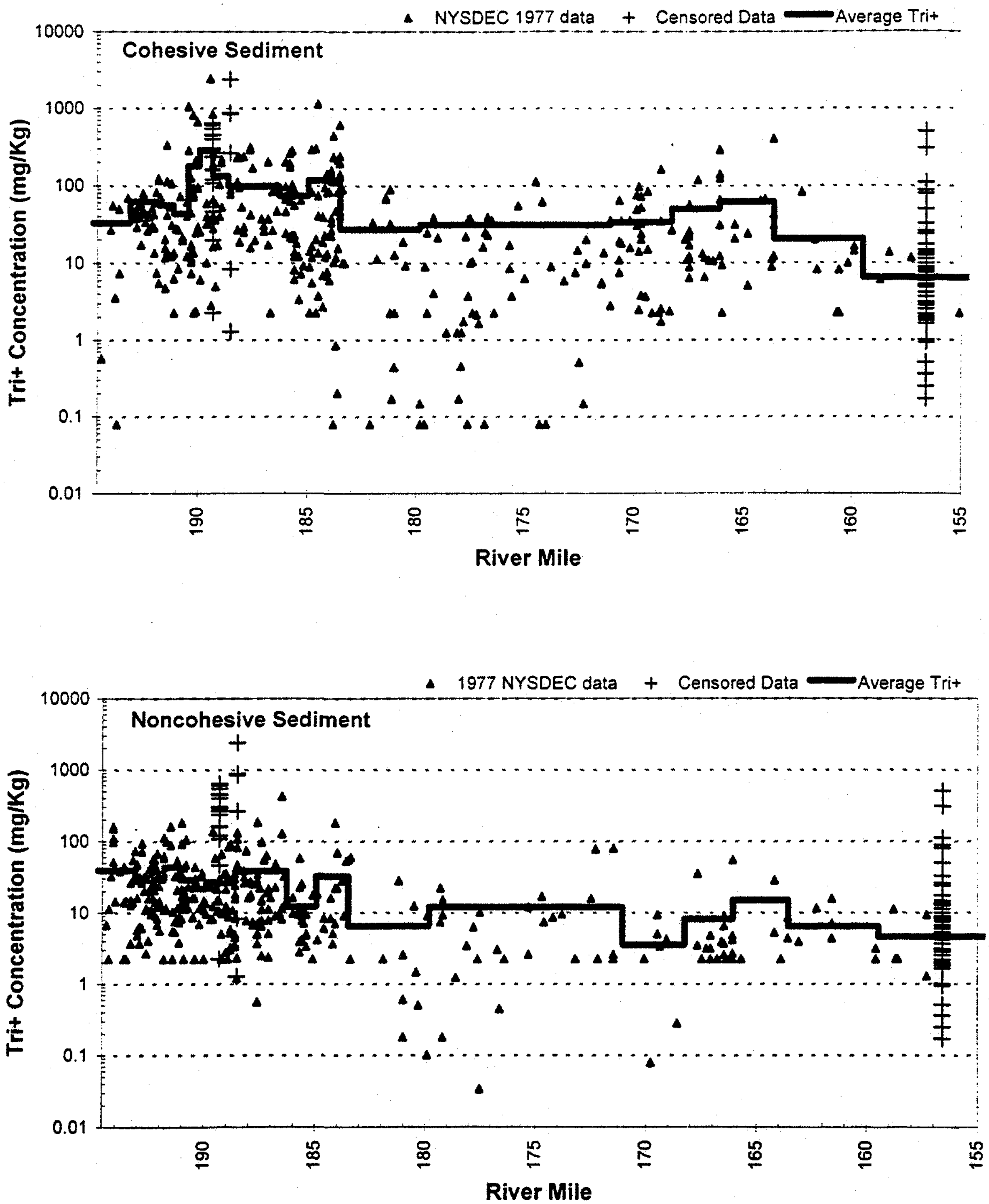


Figure 6-32. 1977 Sediment Tri+ PCB Initial Conditions Computed from the NYSDEC Data, Fort Edward to Federal Dam.

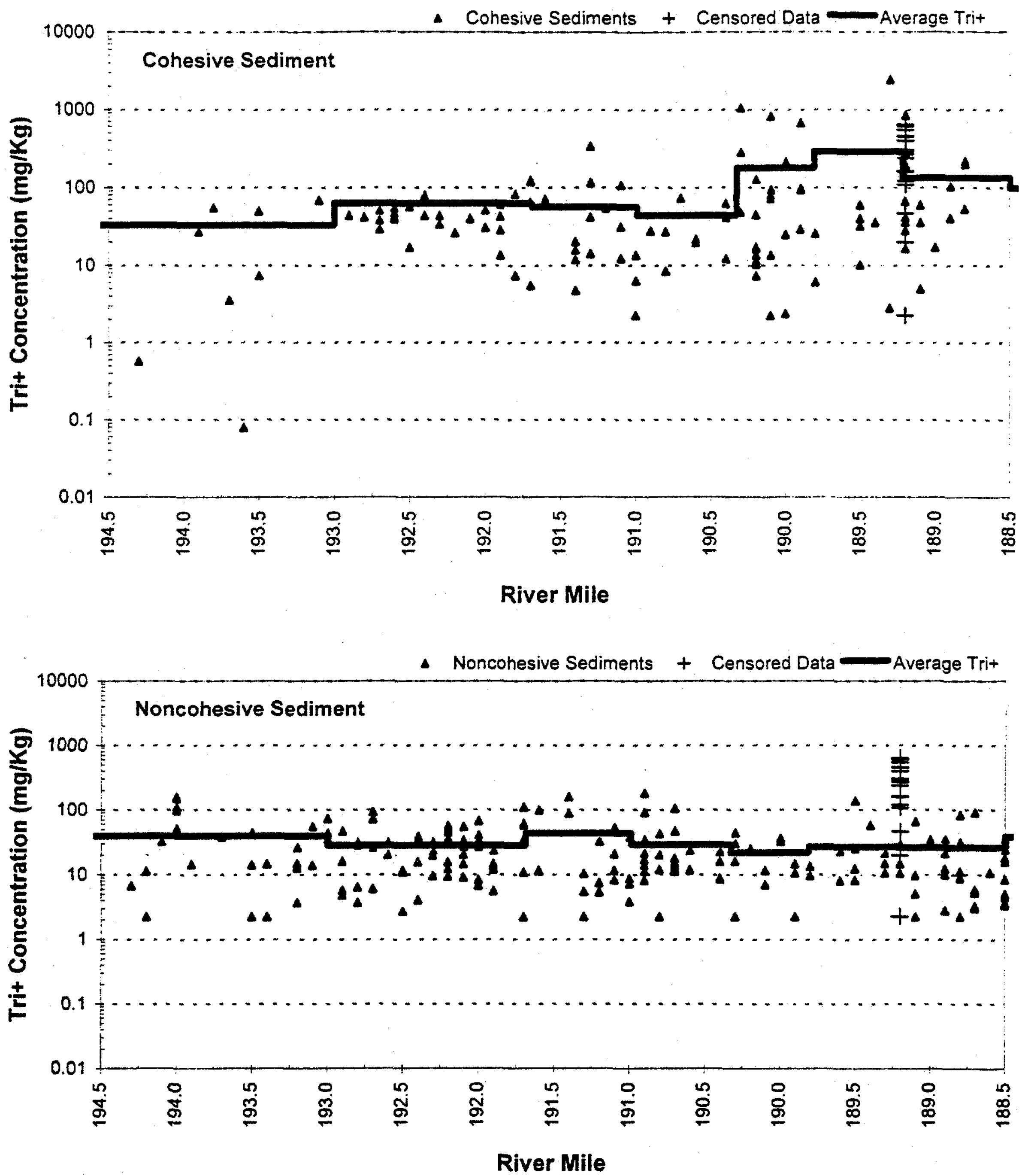
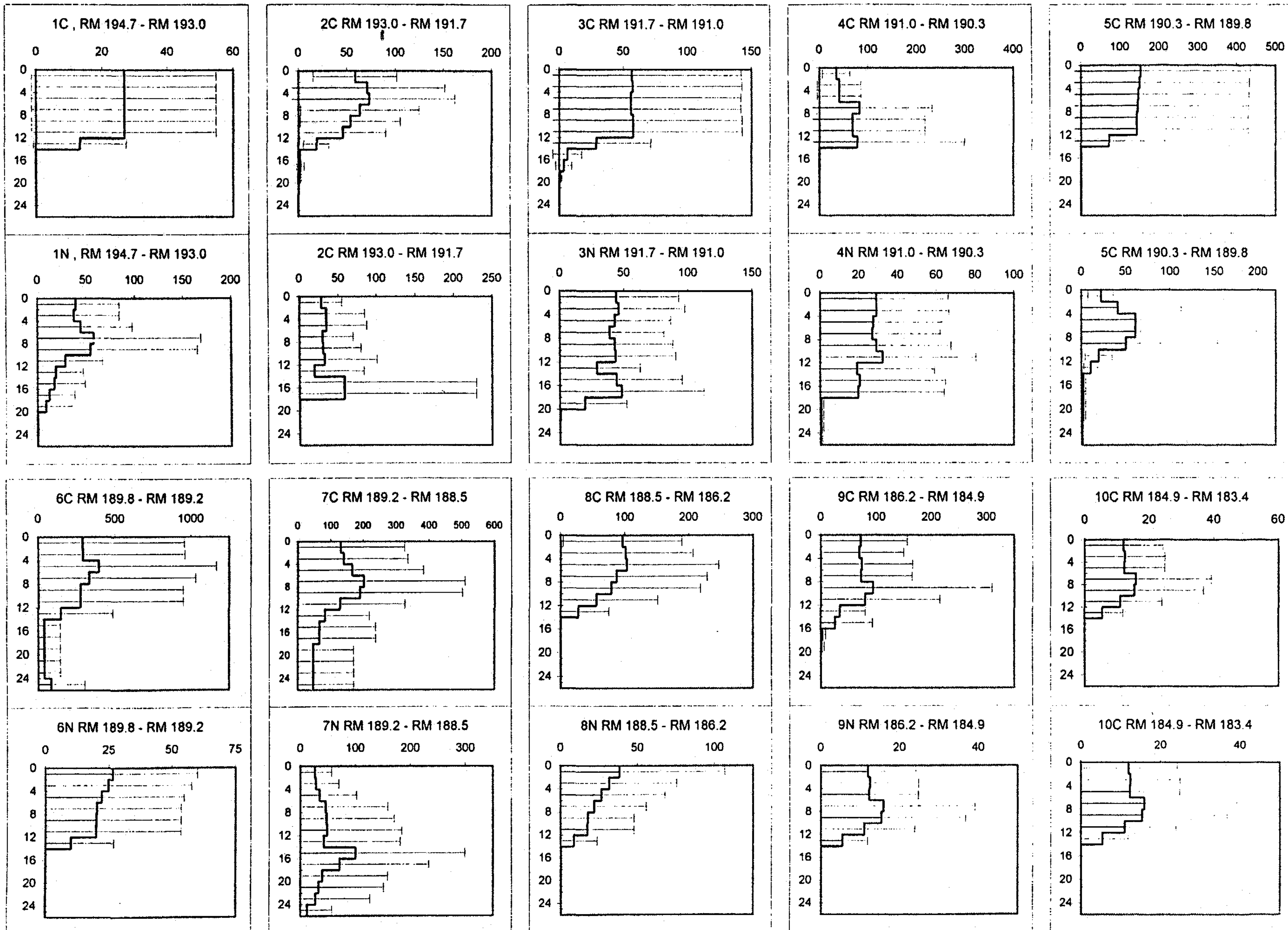


Figure 6-33. 1977 Sediment Tri+ PCB Initial Conditions Computed from the NYSDEC Data, Thompson Island Pool.



Vertical axis is depth in centimeters, horizontal axis is Tri+ concentration in mg PCB/ Kg dry weight. Group descriptions (e.g. 1C, 1N) are described in Table 6-23.
Average concentrations are plotted by layer with +/- 2 standard errors.

Figure 6-34a. 1977 Sediment Tri+ Initial Conditions Computed from 1977 NYSDEC Data: Vertical Profiles.

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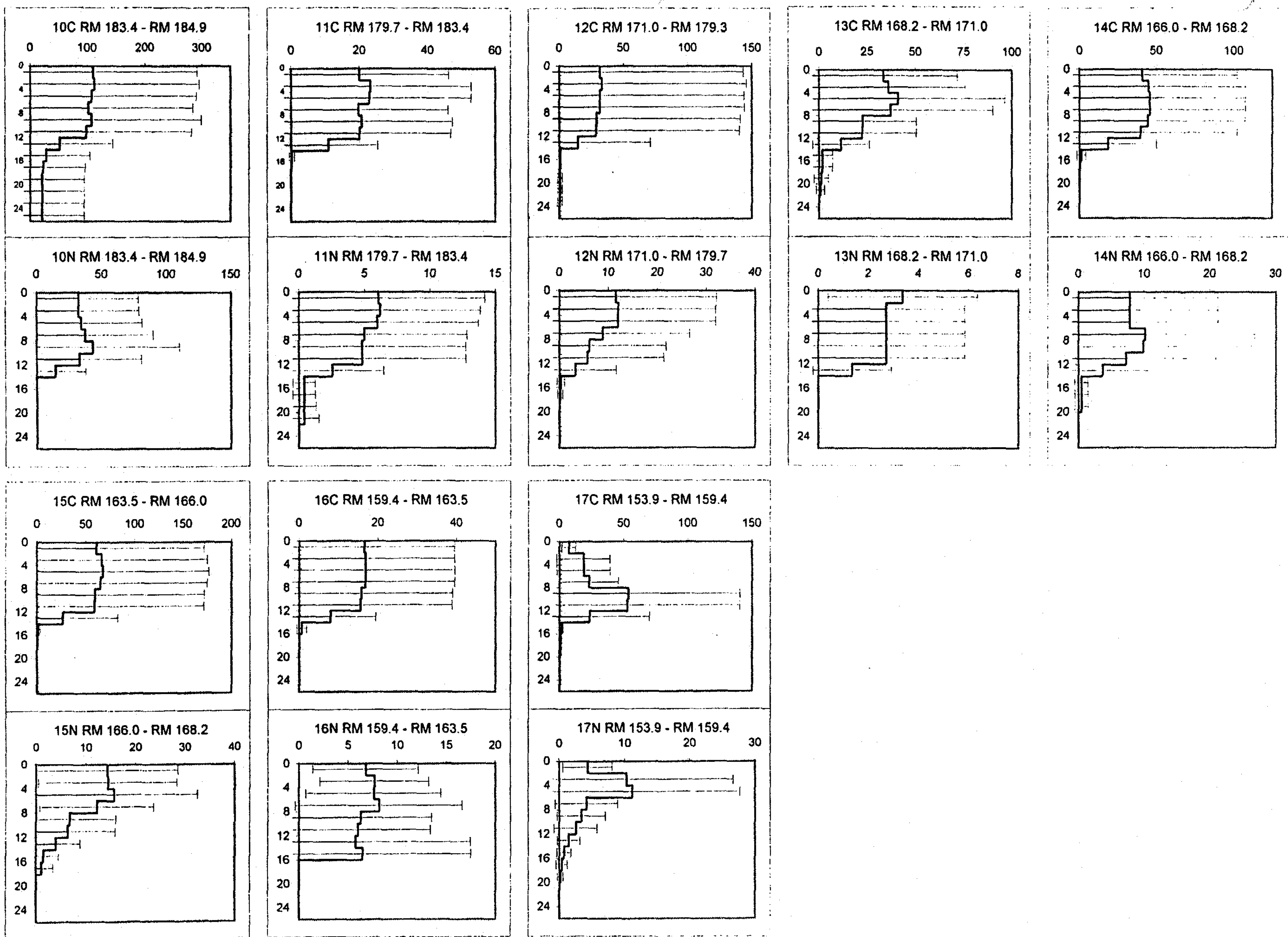

Vertical axis is depth in centimeters, horizontal axis is Tri+ concentration in mg PCB/ Kg dry weight. Group descriptions (e.g. 1C, 1N) are described in Table 6-23.
Average concentrations are plotted by layer with +/- 2 standard errors.

Figure 6-34b. 1977 Sediment Tri+ Initial Conditions Computed from 1977 NYSDEC Data: Vertical Profiles.

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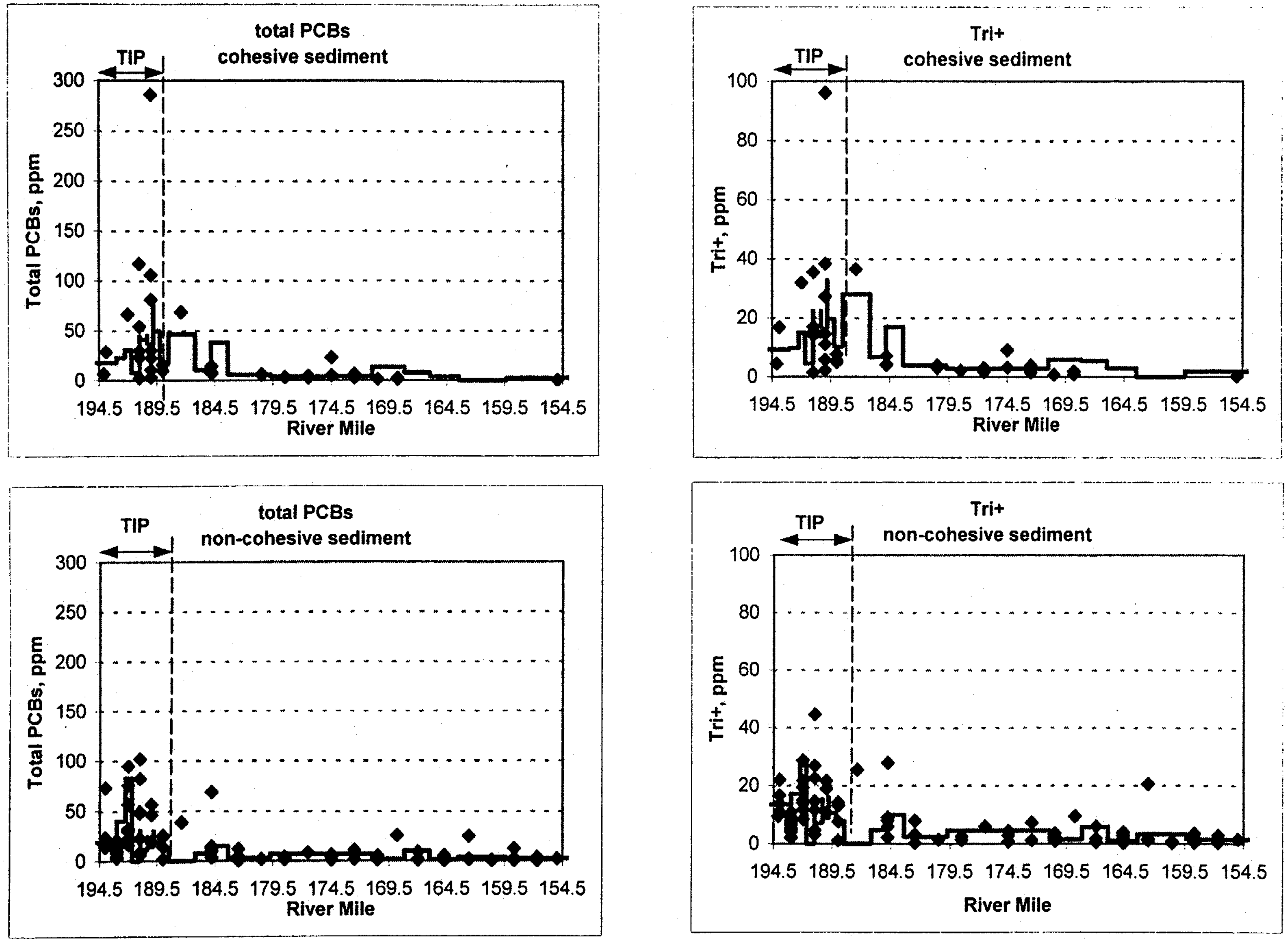

Figure 6-35. Comparison of Measures Total PCB & Tri+ PCB Data to 1991 Model Initial Conditions in the Top Layer (0-5 cm) of Cohesive and Non-cohesive Sediment

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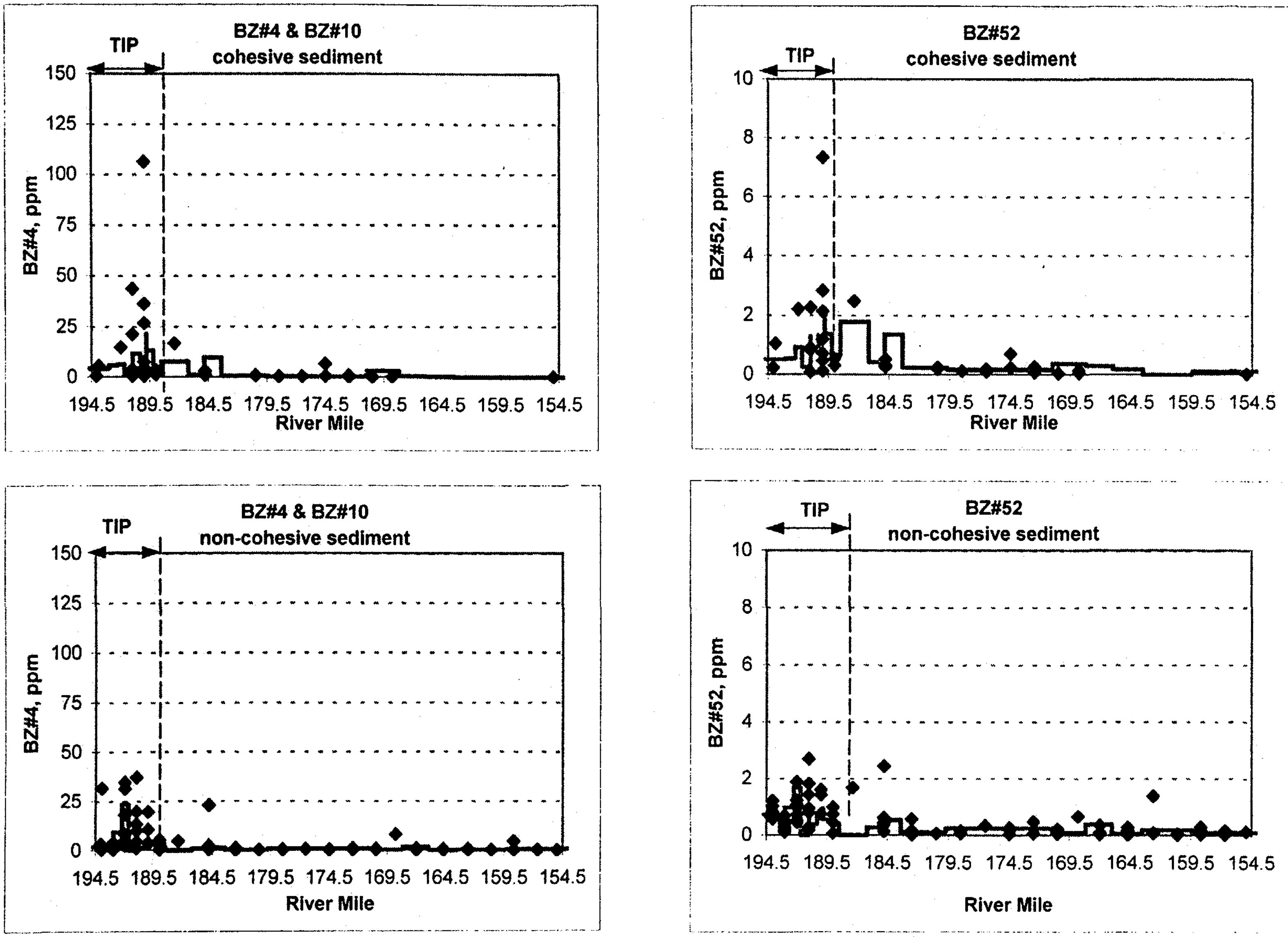


Figure 6-36. Comparison of Measured BZ#4 (& #10) & BZ#52 Data to 1991 Model Initial Conditions in the Top Layer (0 to 5 cm) of Cohesive and Non-cohesive Sediments.

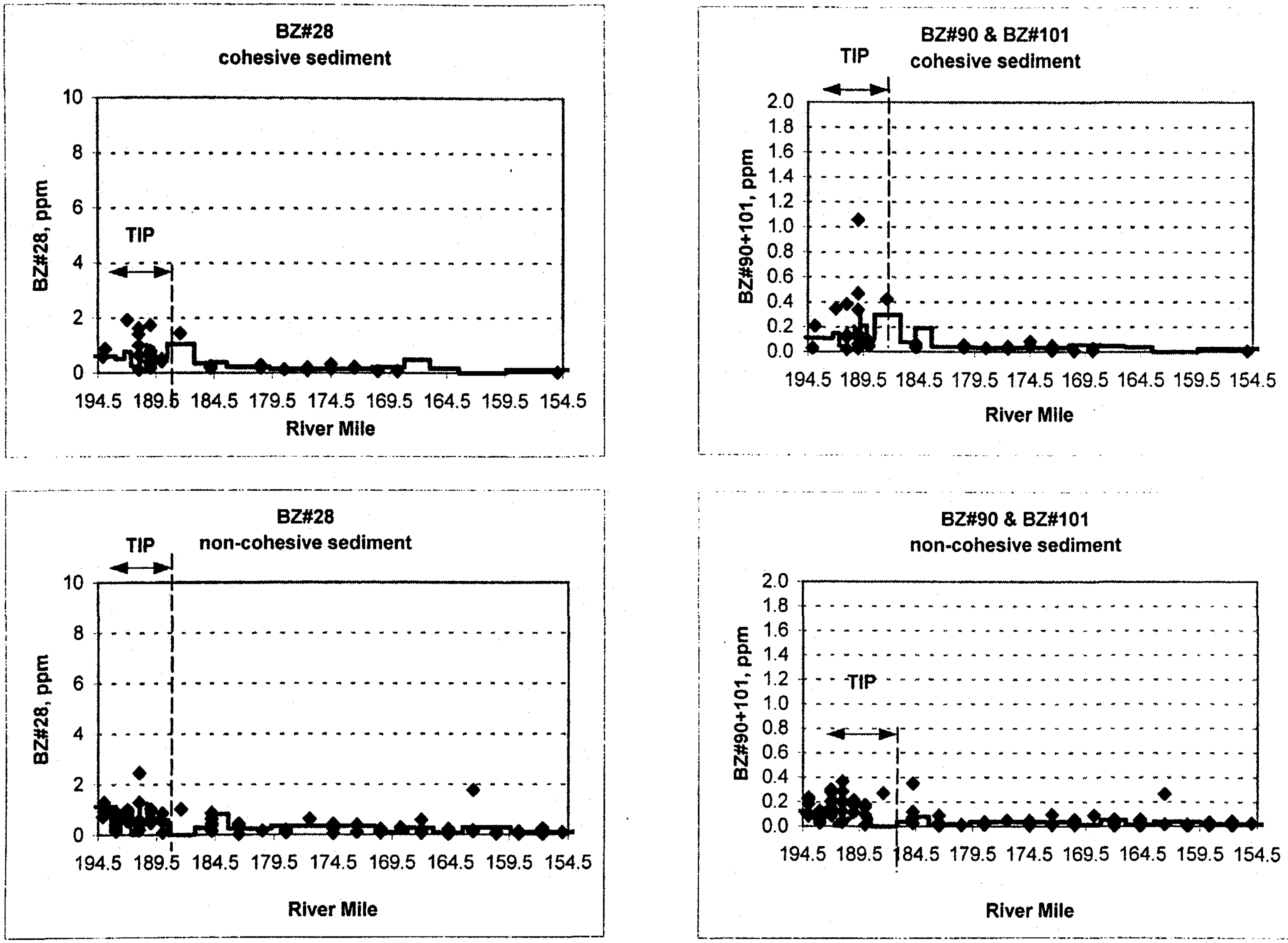
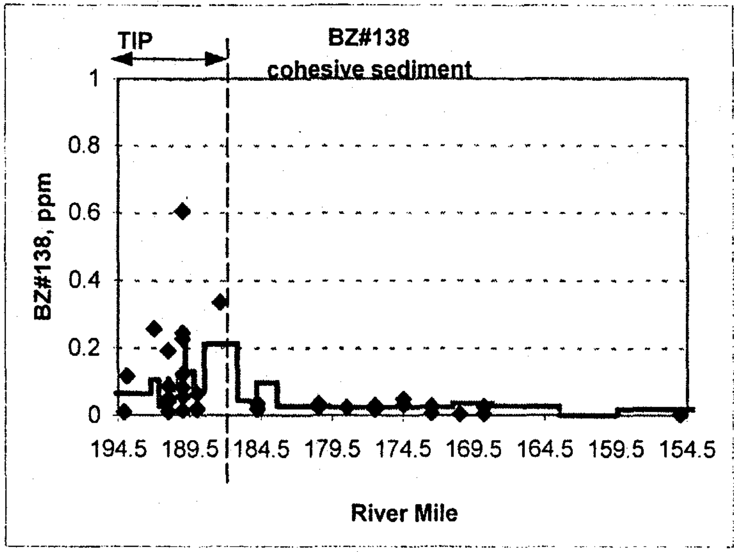


Figure 6-37. Comparison of Measured BZ#28 and BZ#90+101 Data to Model Initial Conditions in the Top Layer (0 to 5 cm) of Cohesive and Non-cohesive Sediments.



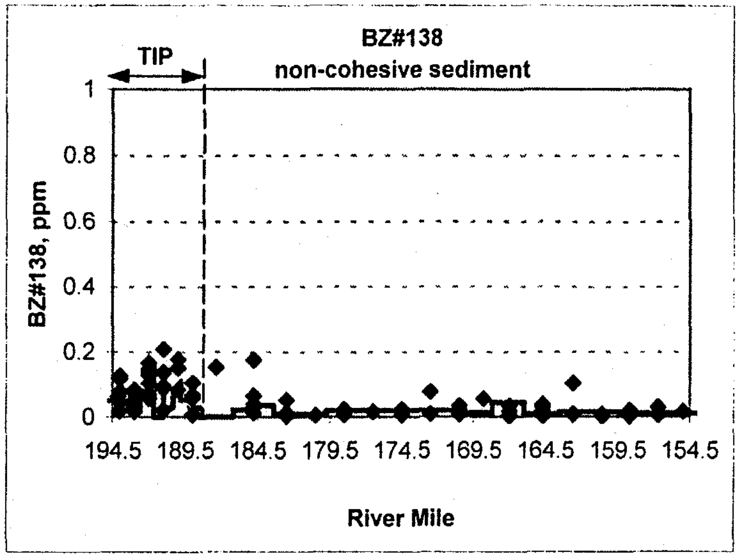


Figure 6-38. Comparison of Measured BZ#138 Data to Model Initial Conditions in the Top Layer (0 to 5 cm) of Cohesive and Non-cohesive Sediments.

303557

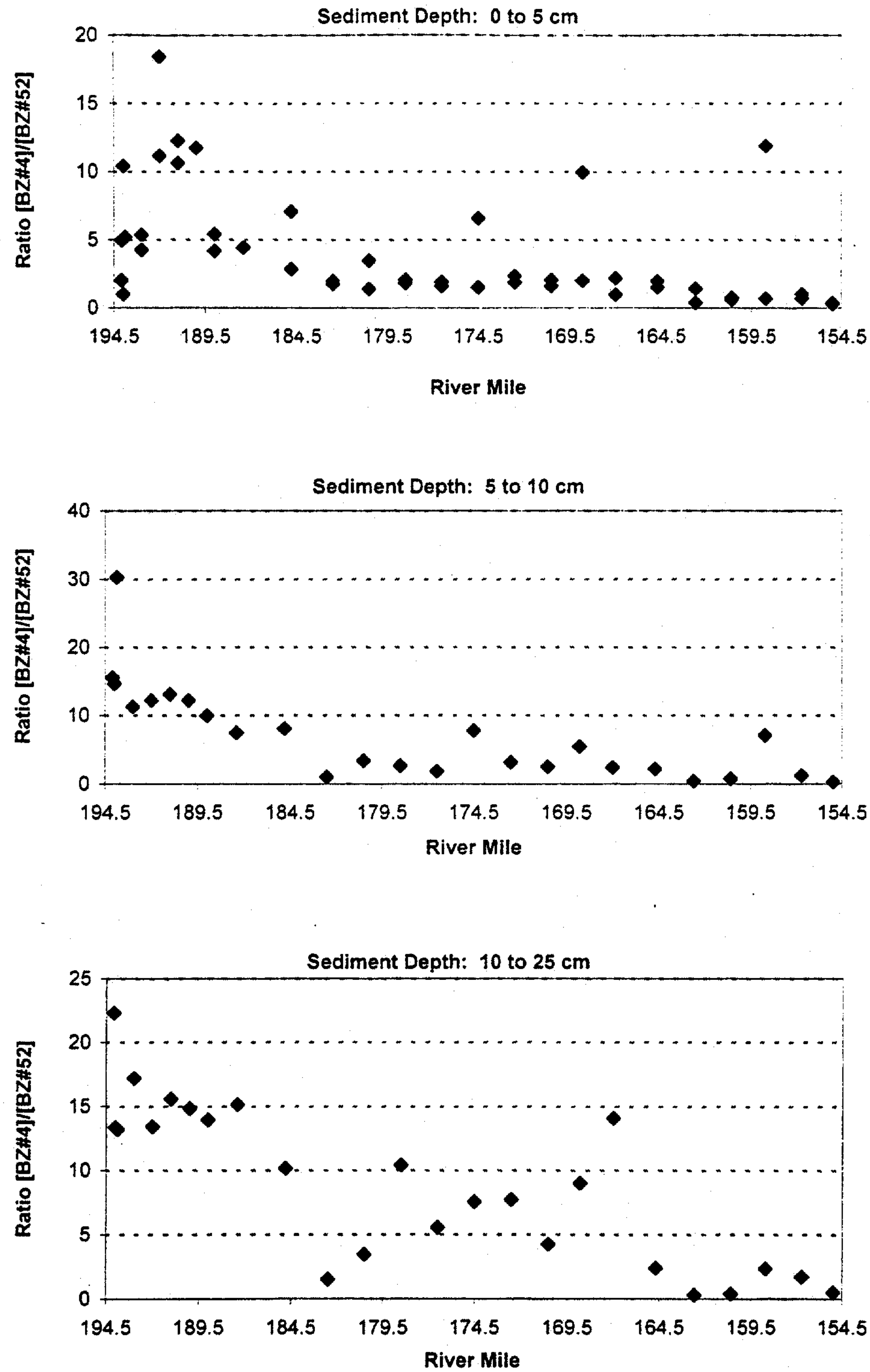


Figure 6-39. Ratio of Average BZ#4 1991 Concentrations to Average BZ#52 1991 Concentrations by Sediment Depth.

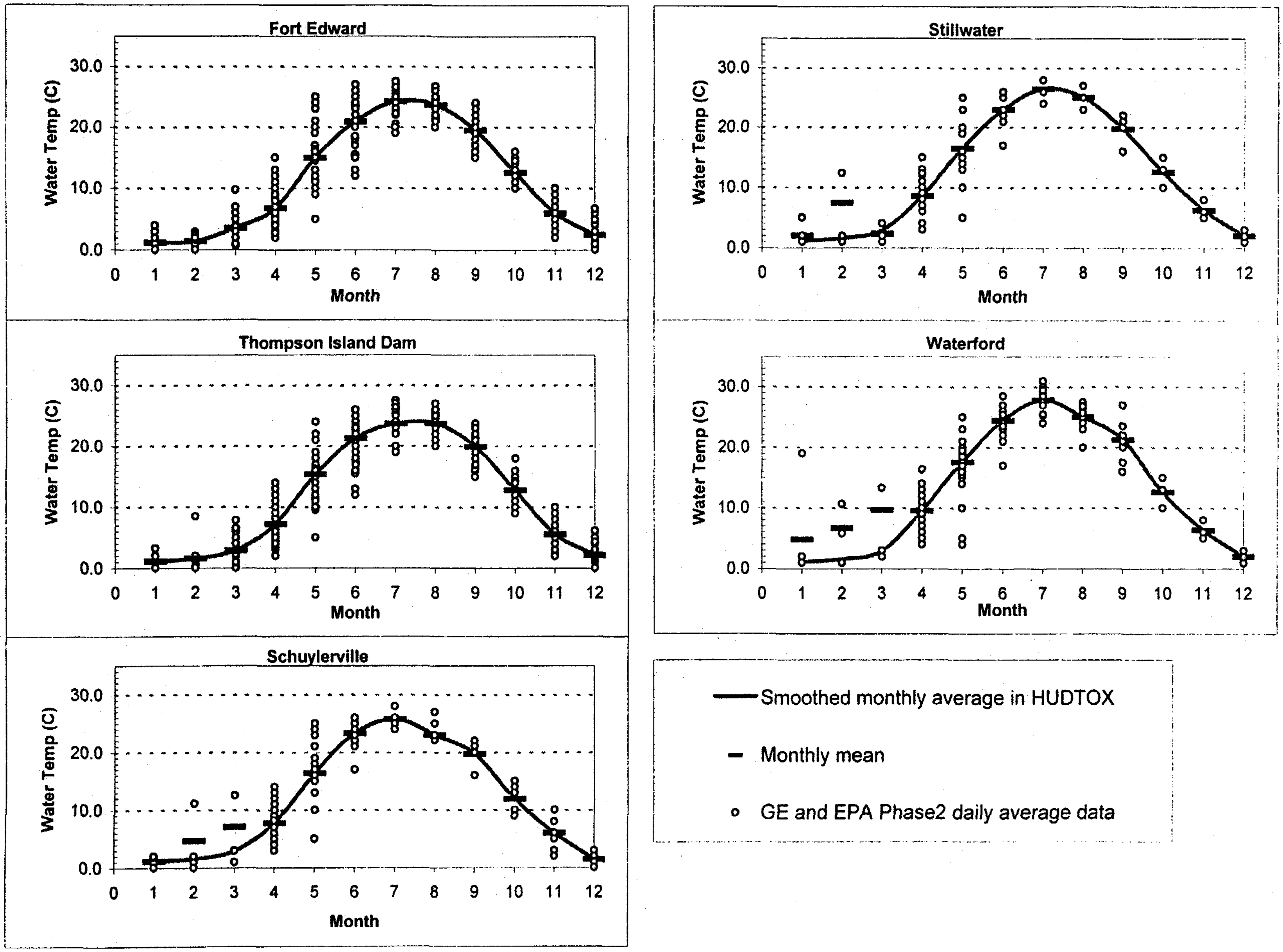


Figure 6-40. Monthly Average Water Temperature Functions Applied in HUDTOX and Observed Water Temperatures.

303559

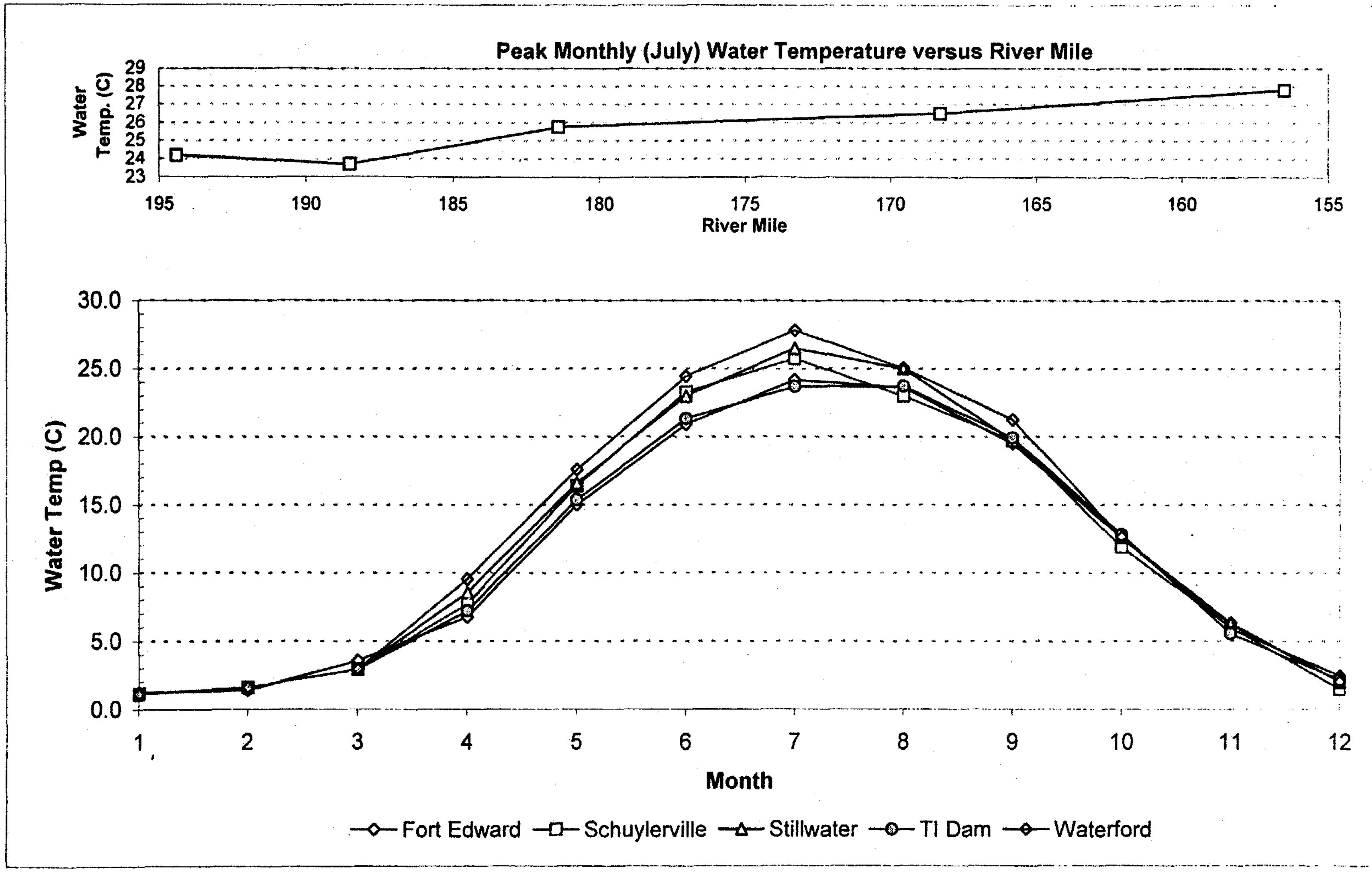


Figure 6-41. Comparison of Monthly Mean Temperatures at Mainstem Upper Hudson River Stations.

303560

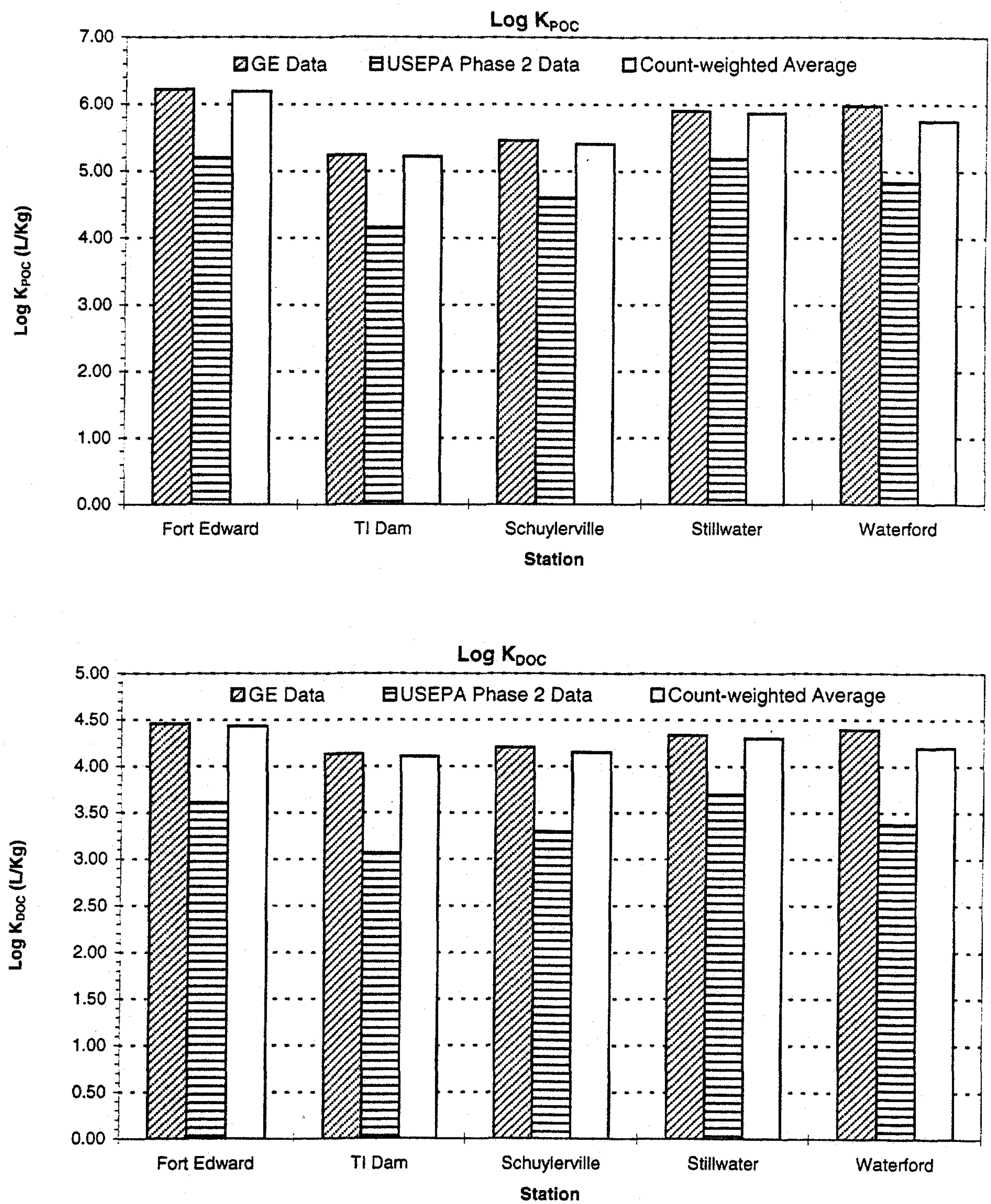


Figure 6-42. Estimated Partition Coefficients for Total PCB by Station and by Source.

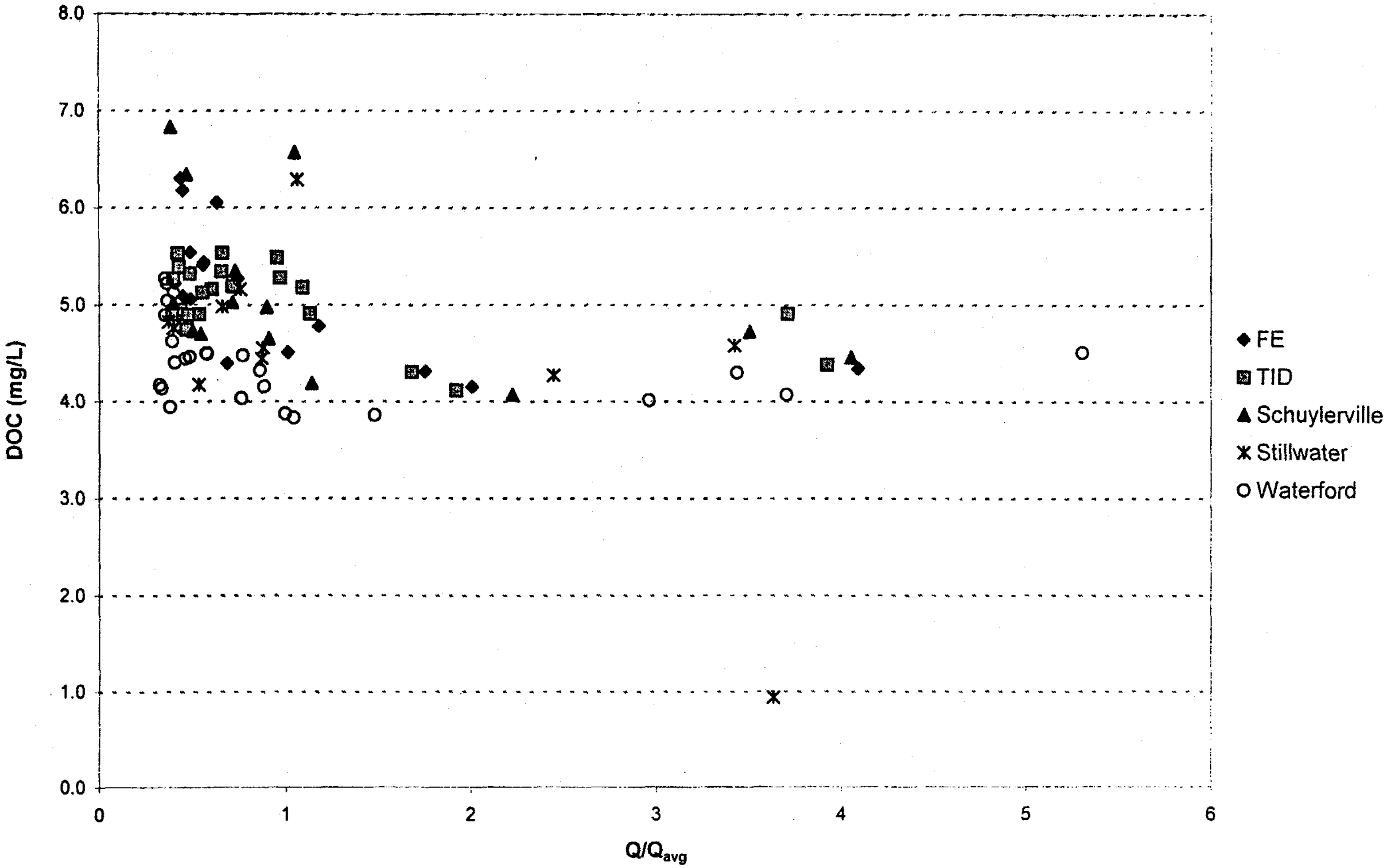


Figure 6-43. Observed Dissolved Organic Carbon (DOC) Concentrations versus Normalized Flow between Fort Edward and Federal Dam.

303562

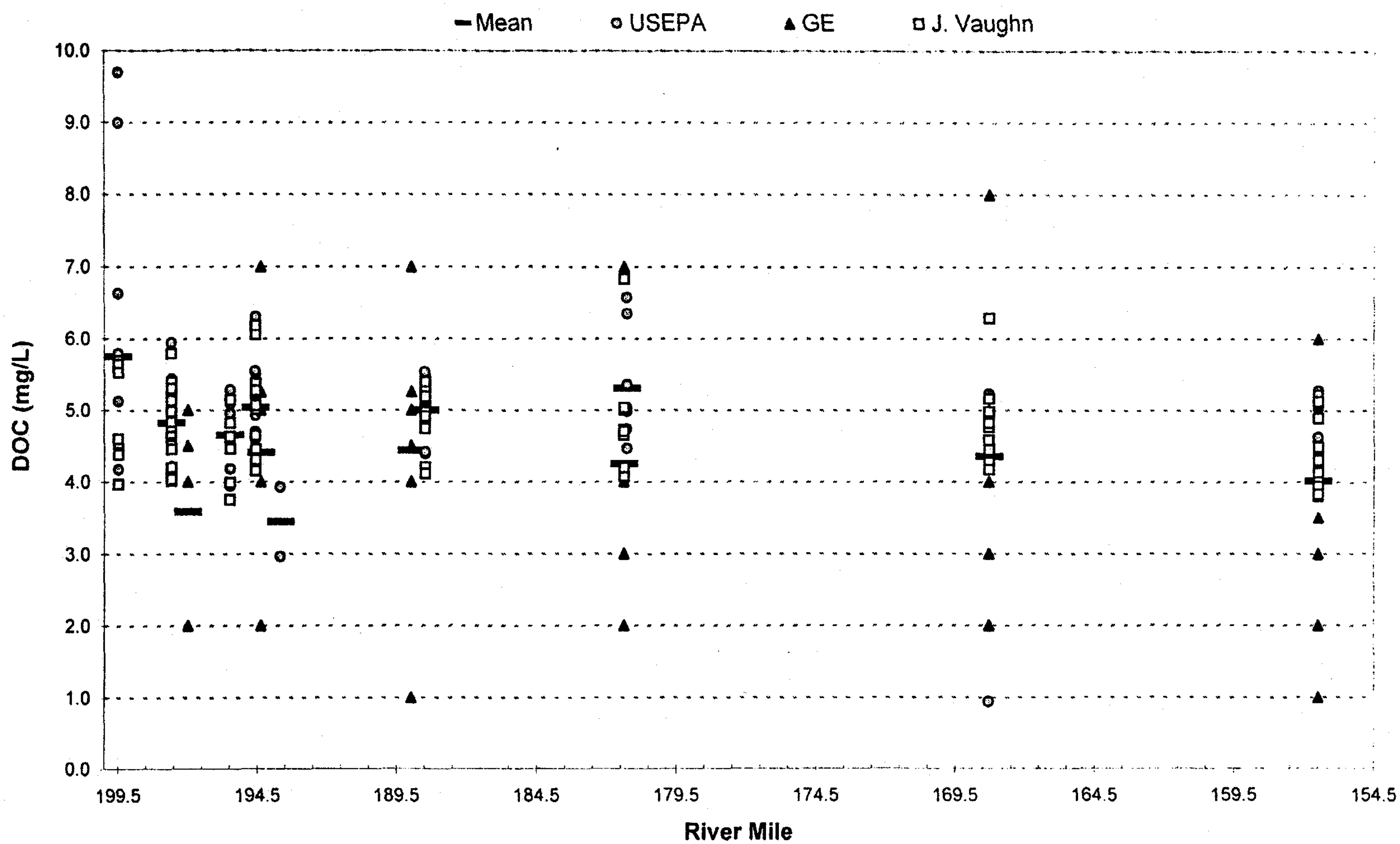


Figure 6-44. Observed Dissolved Organic Carbon (DOC) Data versus River Mile between Fort Edward and Federal Dam.

303563

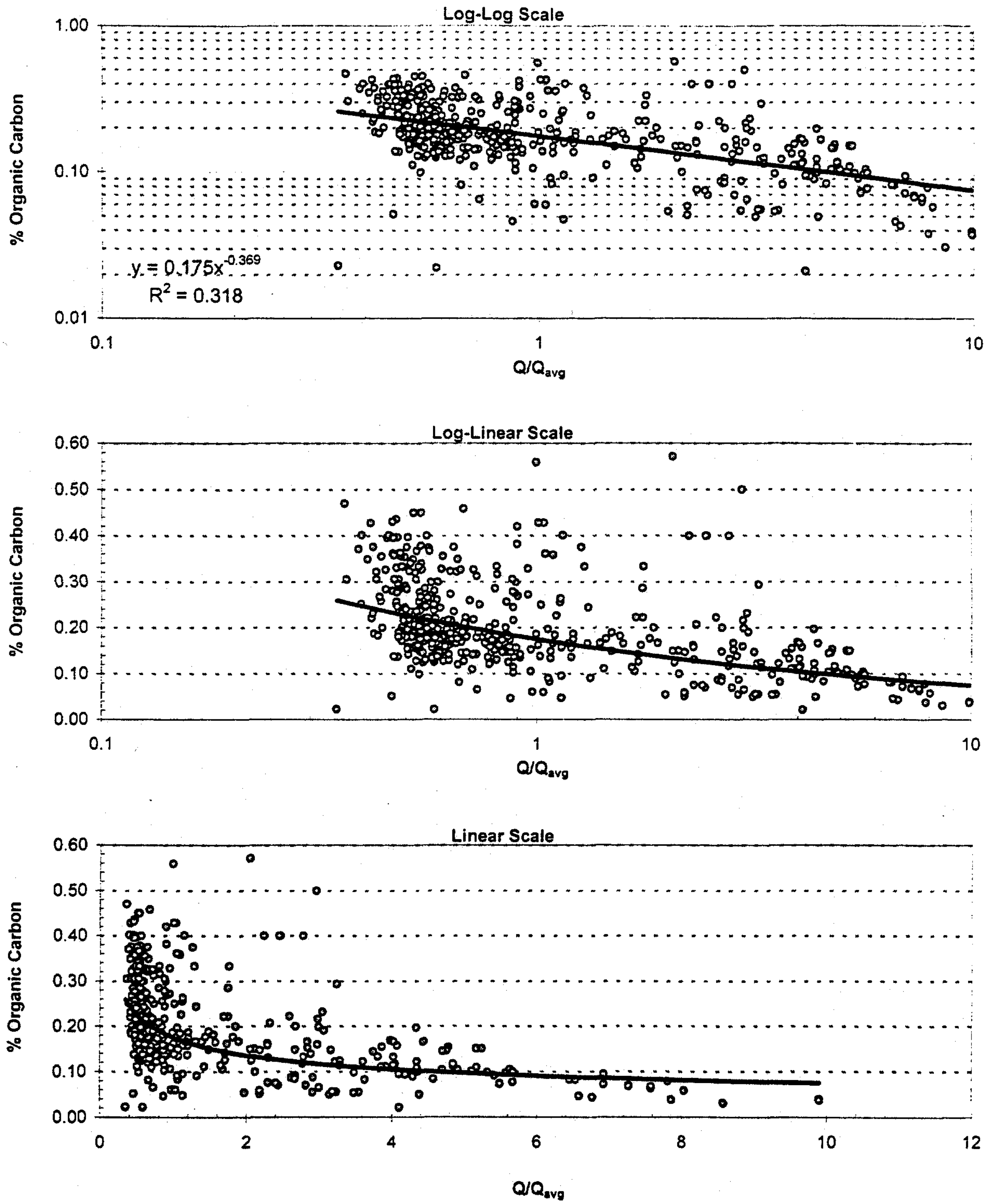


Figure 6-45. River-wide Fraction Organic Carbon (f_{OC}) Function Based on a Power Function Fit to f_{OC} Data for Mainstem Hudson River Stations.

Reach	Average	Max	Min	Stdev	Count
TIP	31.51	81	10	16.70	49
TI Dam to Stillwater	49.38	92	12	23.48	21
Stillwater to Waterford	61.53	117	21	30.56	13
All data	40.73	117	10	23.94	83

Note: 3 apparent outliers were excluded from averages. These values were 178, 212, and 169 mg/L

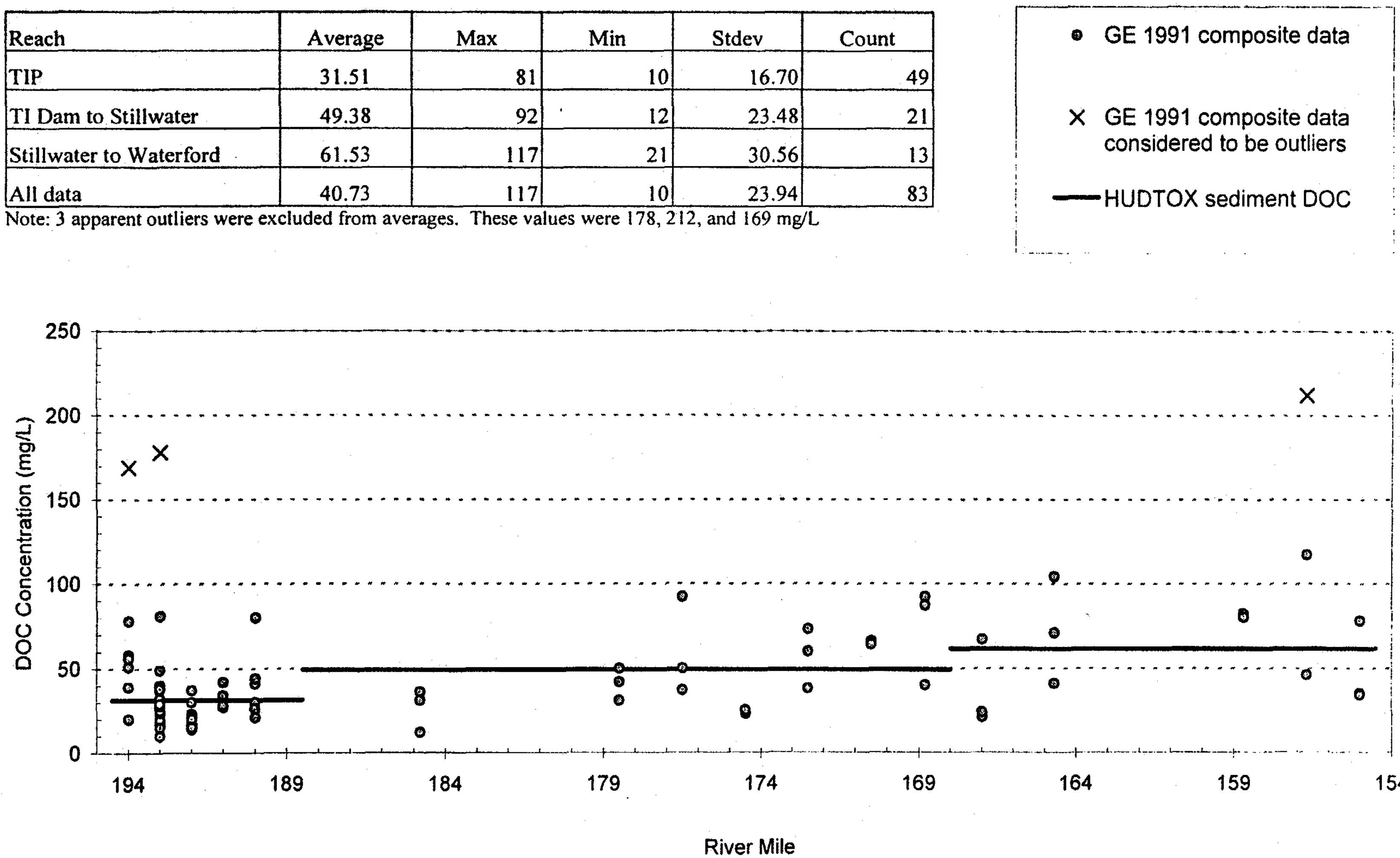


Figure 6-46. Specified Sediment Dissolved Organic Carbon (DOC) Concentrations in HUDTOX.

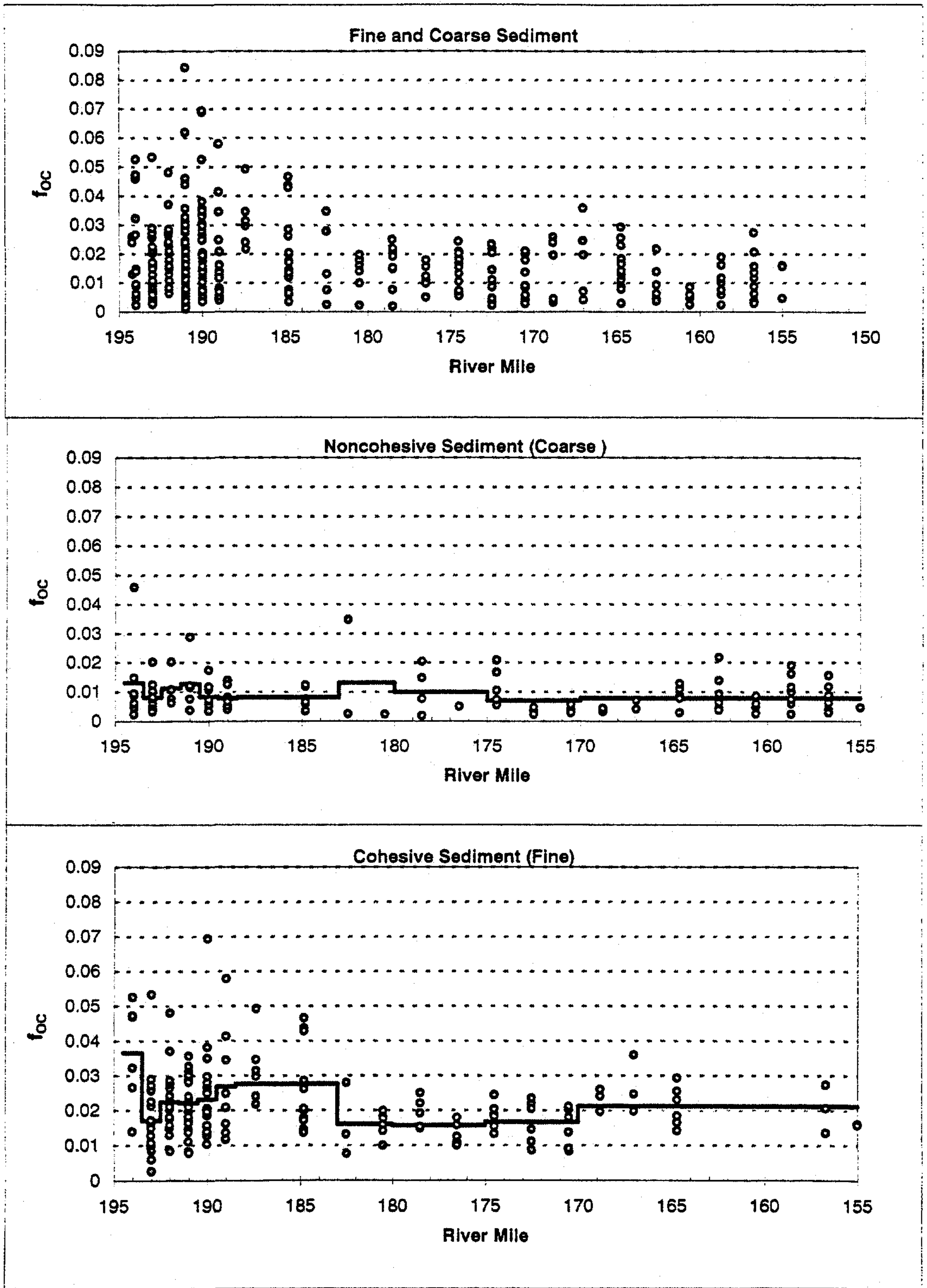


Figure 6-47. f_{OC} versus River Mile from the 1991 GE Composite Sampling and Values Specified for Cohesive and Non-cohesive Sediment in HUDTOX.

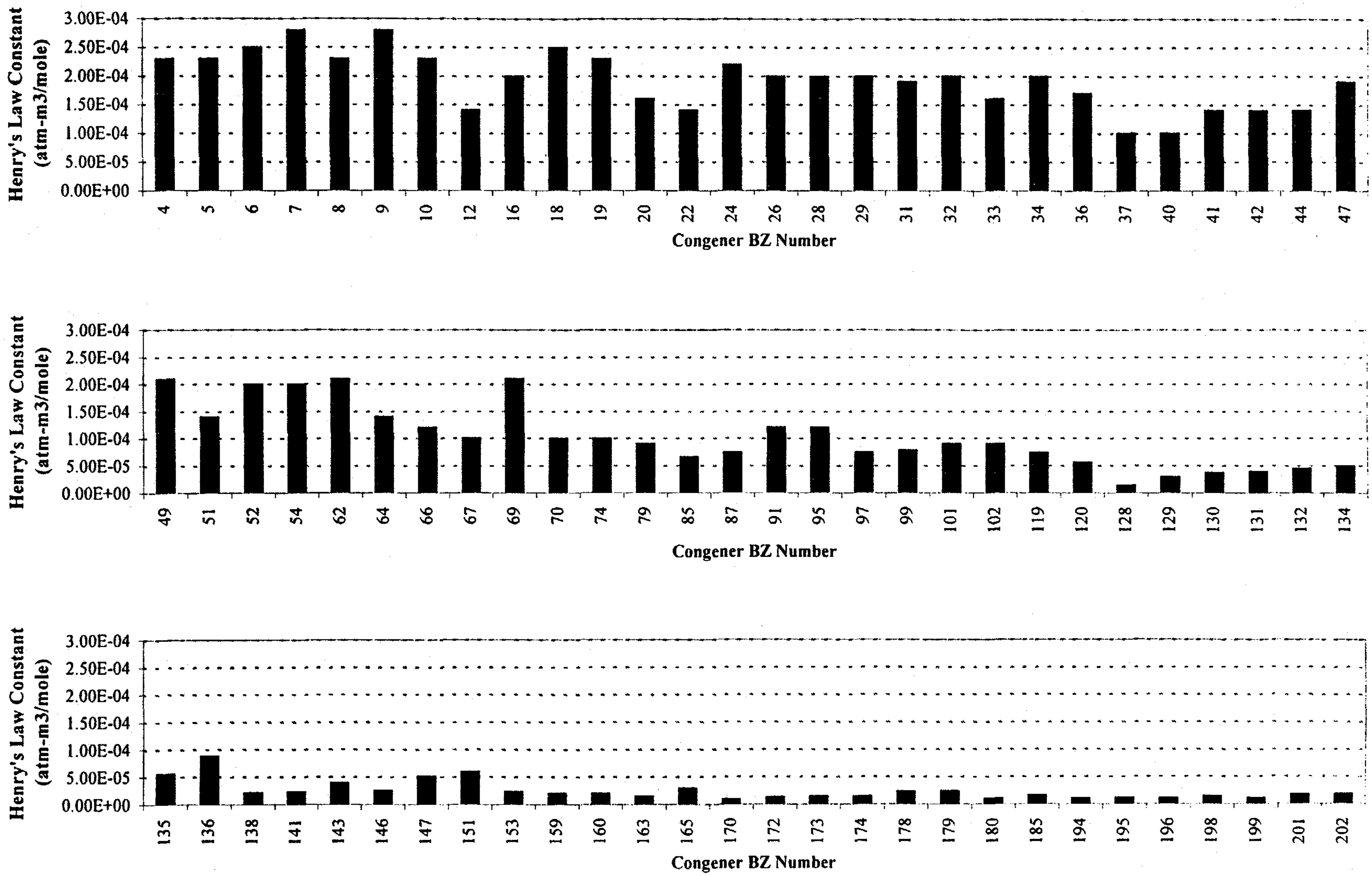


Figure 6-48. Estimated Henry's Law Constant for Selected Congeners Determined Experimentally by Brunner, et. al (1990).

303567

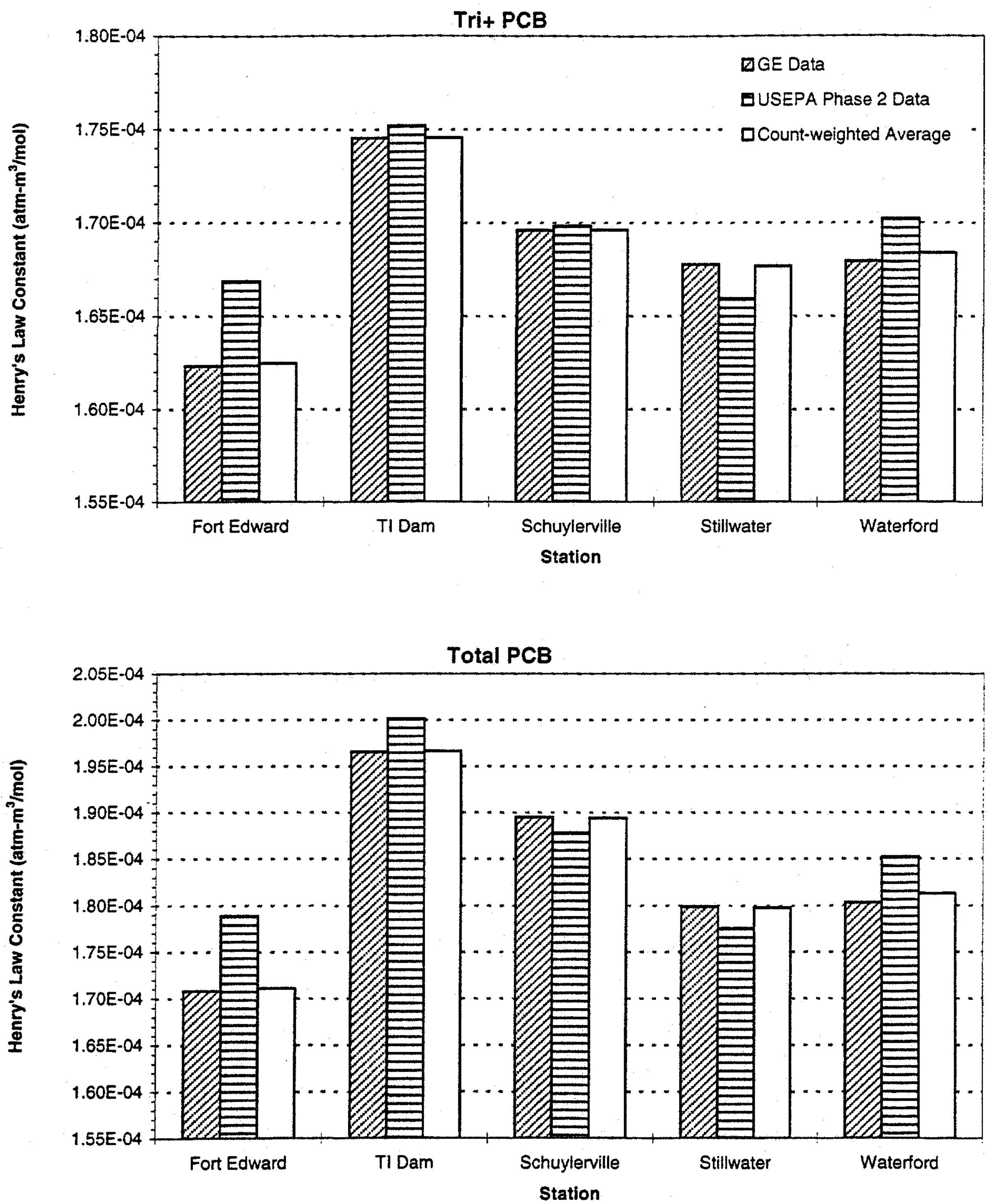
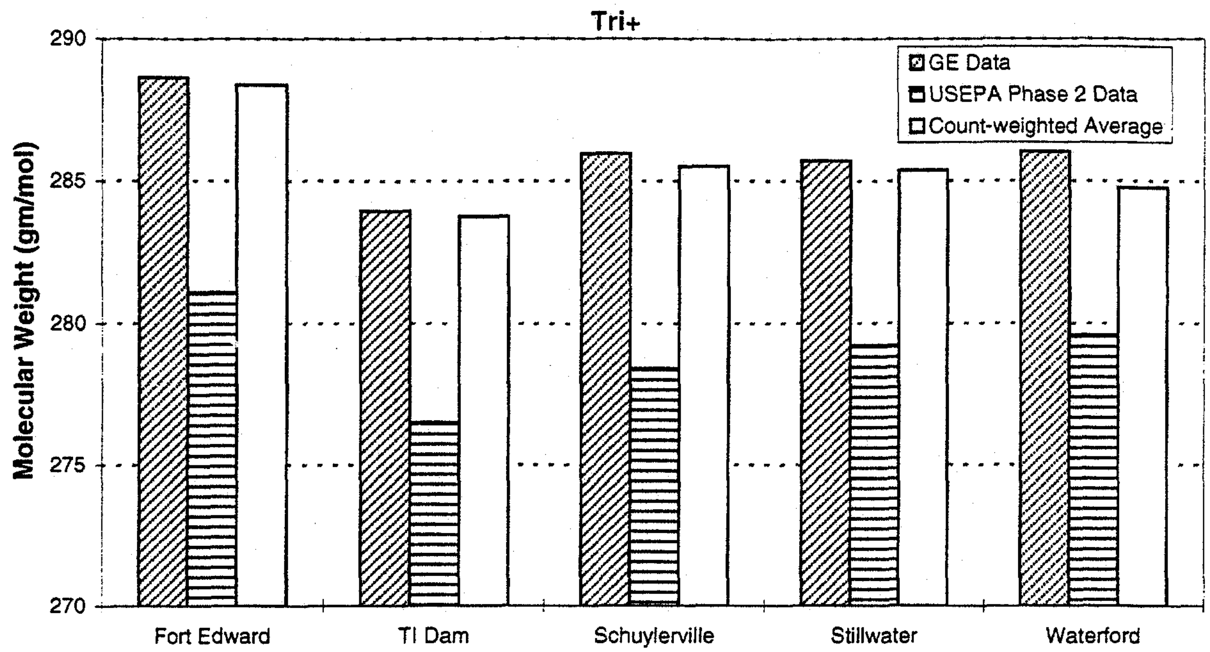


Figure 6-49. Estimated Henry's Law Constants for Tri+ and Total PCB by Station and Data Source.



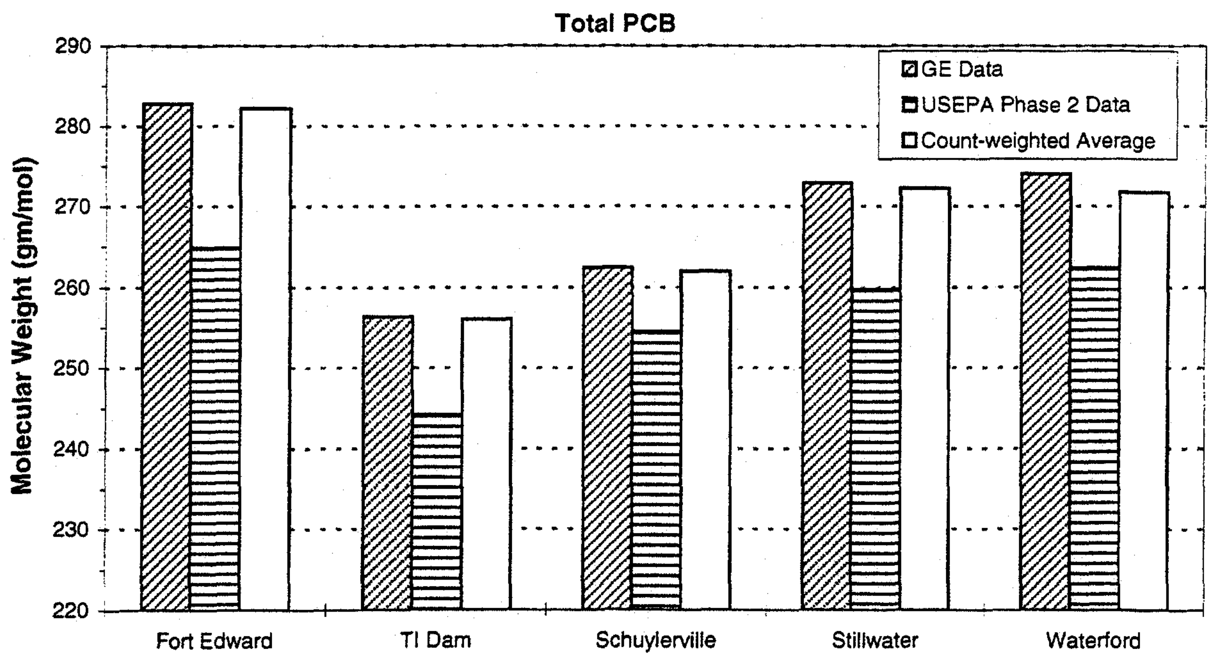
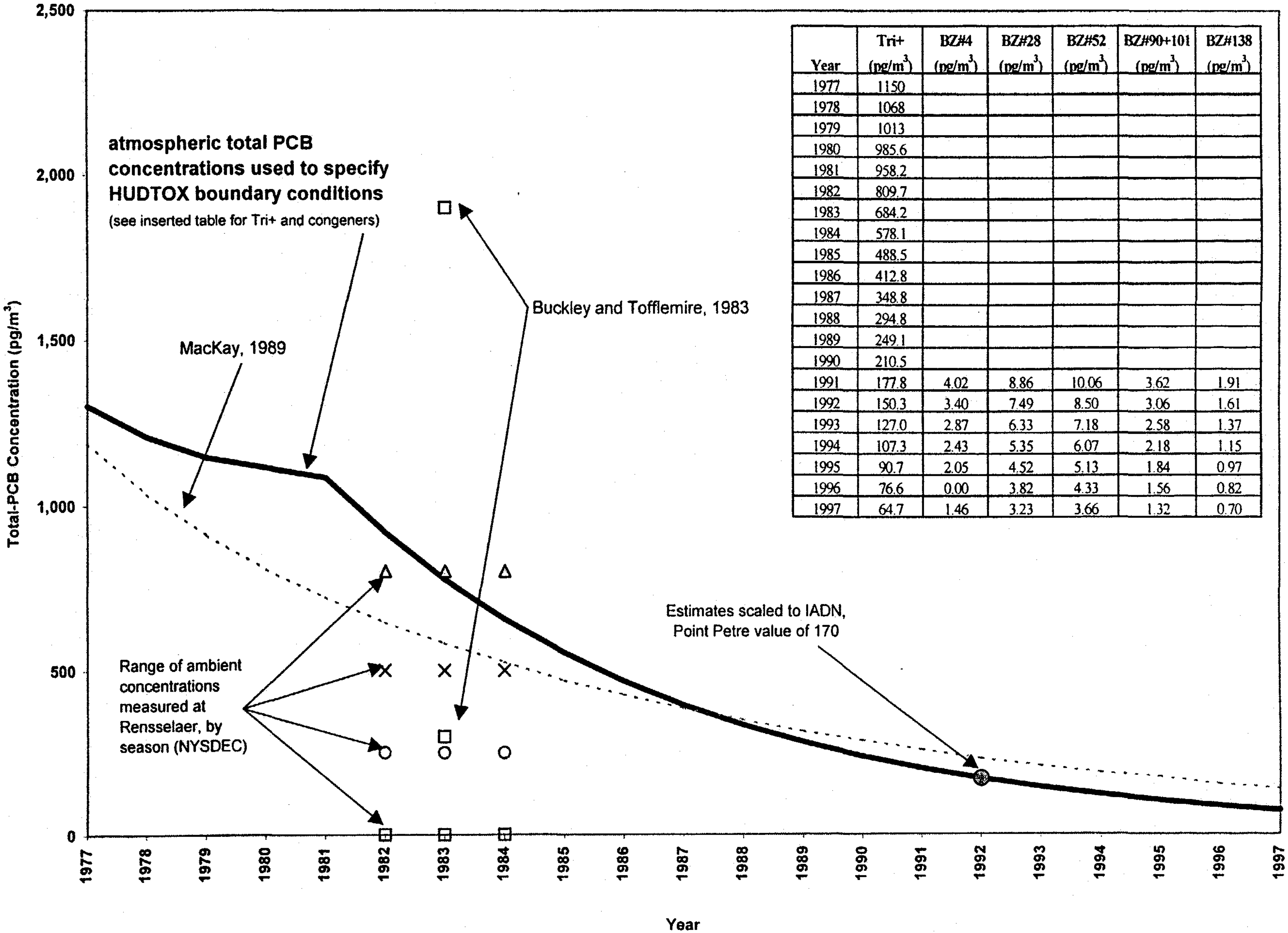
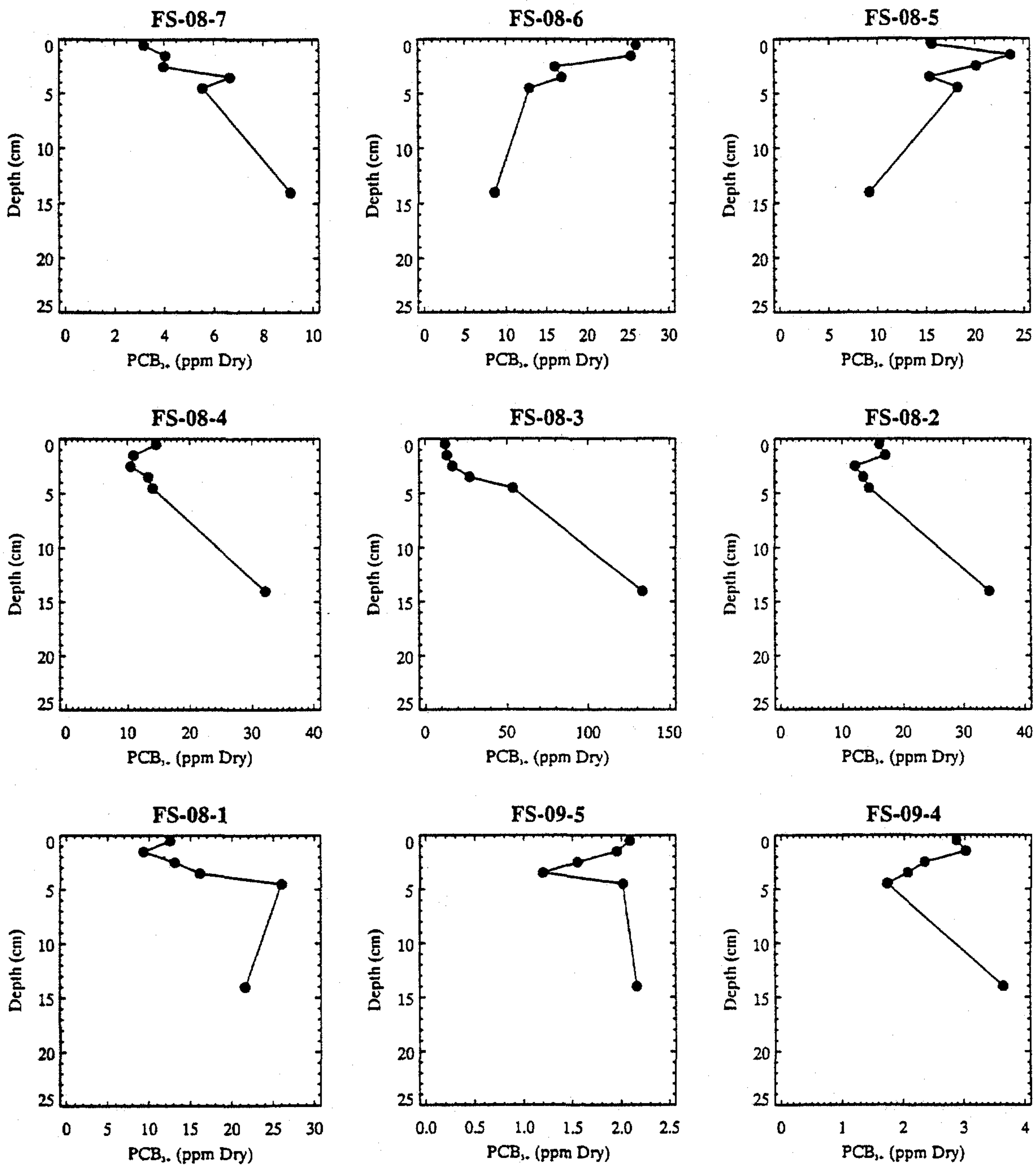


Figure 6-50. Estimated Molecular Weight for Tri+ and Total PCB by Station and Data Source.



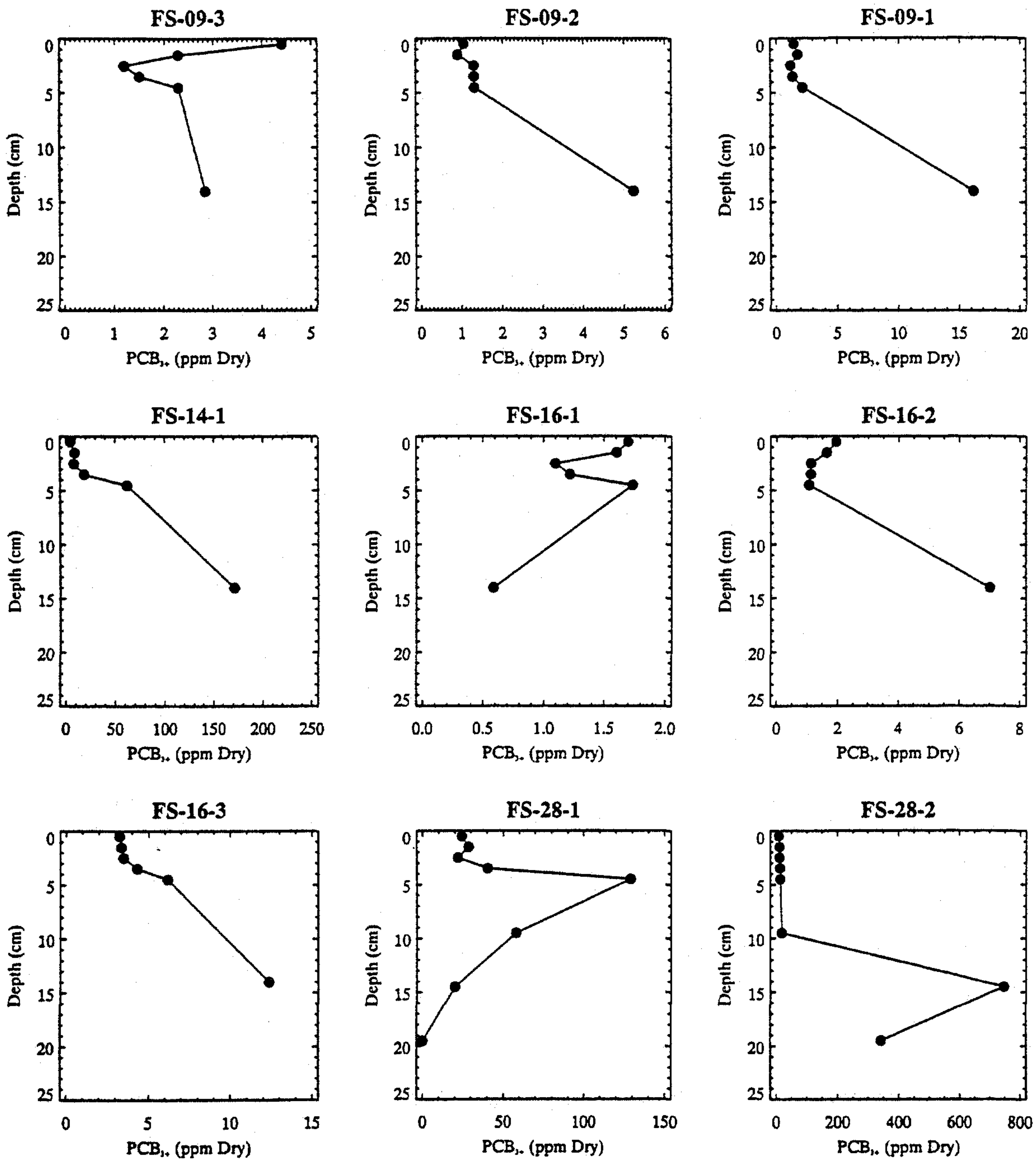
Year	Tri+ (pg/m³)	BZ#4 (pg/m³)	BZ#28 (pg/m³)	BZ#52 (pg/m³)	BZ#90+101 (pg/m³)	BZ#138 (pg/m³)
1977	1150					
1978	1068					
1979	1013					
1980	985.6					
1981	958.2					
1982	809.7					
1983	684.2					
1984	578.1					
1985	488.5					
1986	412.8					
1987	348.8					
1988	294.8					
1989	249.1					
1990	210.5					
1991	177.8	4.02	8.86	10.06	3.62	1.91
1992	150.3	3.40	7.49	8.50	3.06	1.61
1993	127.0	2.87	6.33	7.18	2.58	1.37
1994	107.3	2.43	5.35	6.07	2.18	1.15
1995	90.7	2.05	4.52	5.13	1.84	0.97
1996	76.6	0.00	3.82	4.33	1.56	0.82
1997	64.7	1.46	3.23	3.66	1.32	0.70

Figure 6-51. Specification of Historical Atmospheric Gas-Phase PCB Boundary Concentrations for the 1977-1997 HUDTOX Calibration Period.



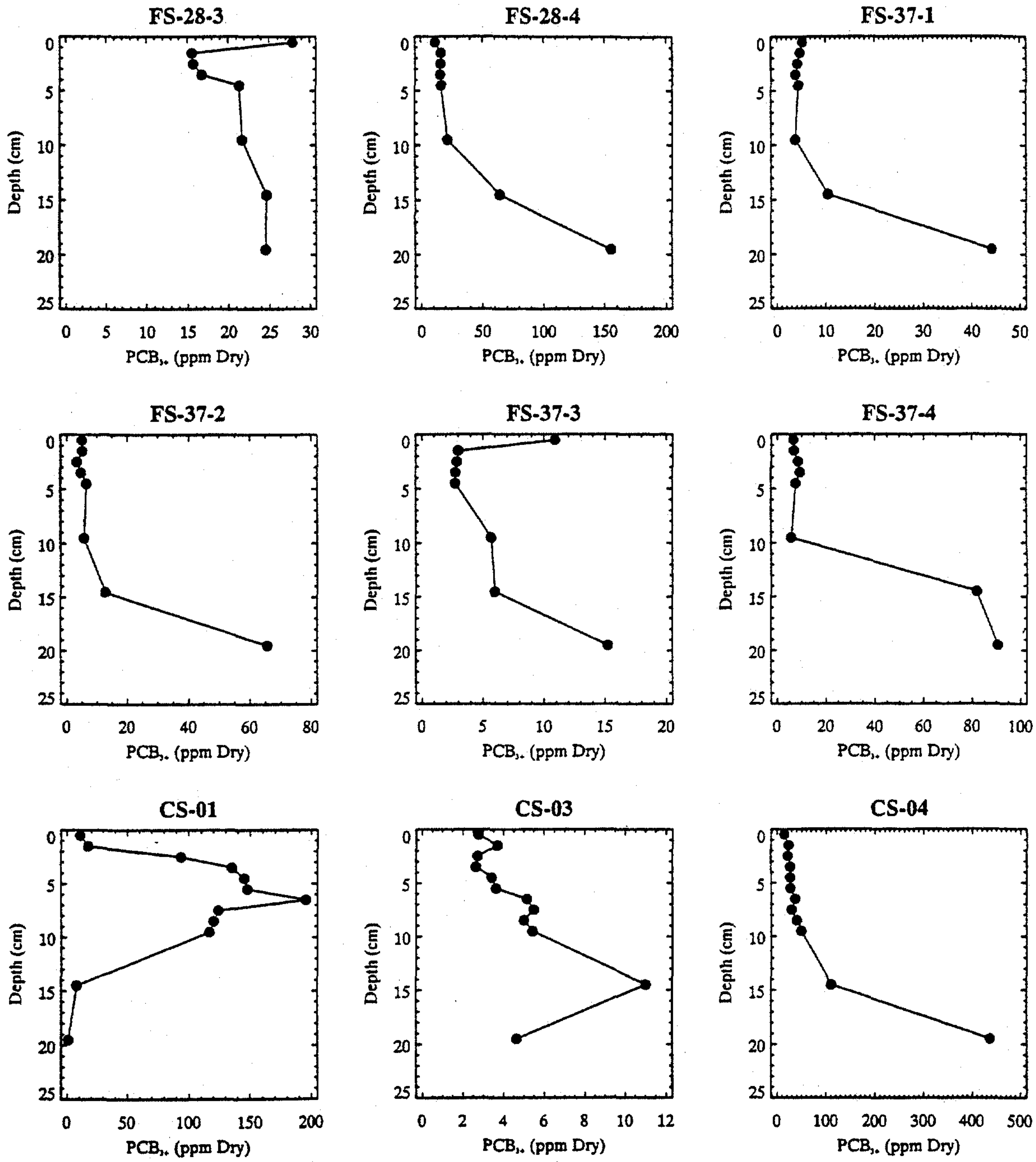
Note: Core sections shown are the top 23 cm of each core, plotted at segment midpoint.

Figure 6-52a. Vertical Profiles of PCB_{3+} within Finely Segmented Sediment Cores Collected from the Upper Hudson River (from QEA, 1999).



Note: Core sections shown are the top 23 cm of each core, plotted at segment midpoint.

Figure 6-52b. Vertical Profiles of PCB_{3+} within Finely Segmented Sediment Cores Collected from the Upper Hudson River (from QEA, 1999).



Note: Core sections shown are the top 23 cm of each core, plotted at segment midpoint.

Figure 6-52c. Vertical Profiles of PCB_{3+} within Finely Segmented Sediment Cores Collected from the Upper Hudson River (from QEA, 1999).

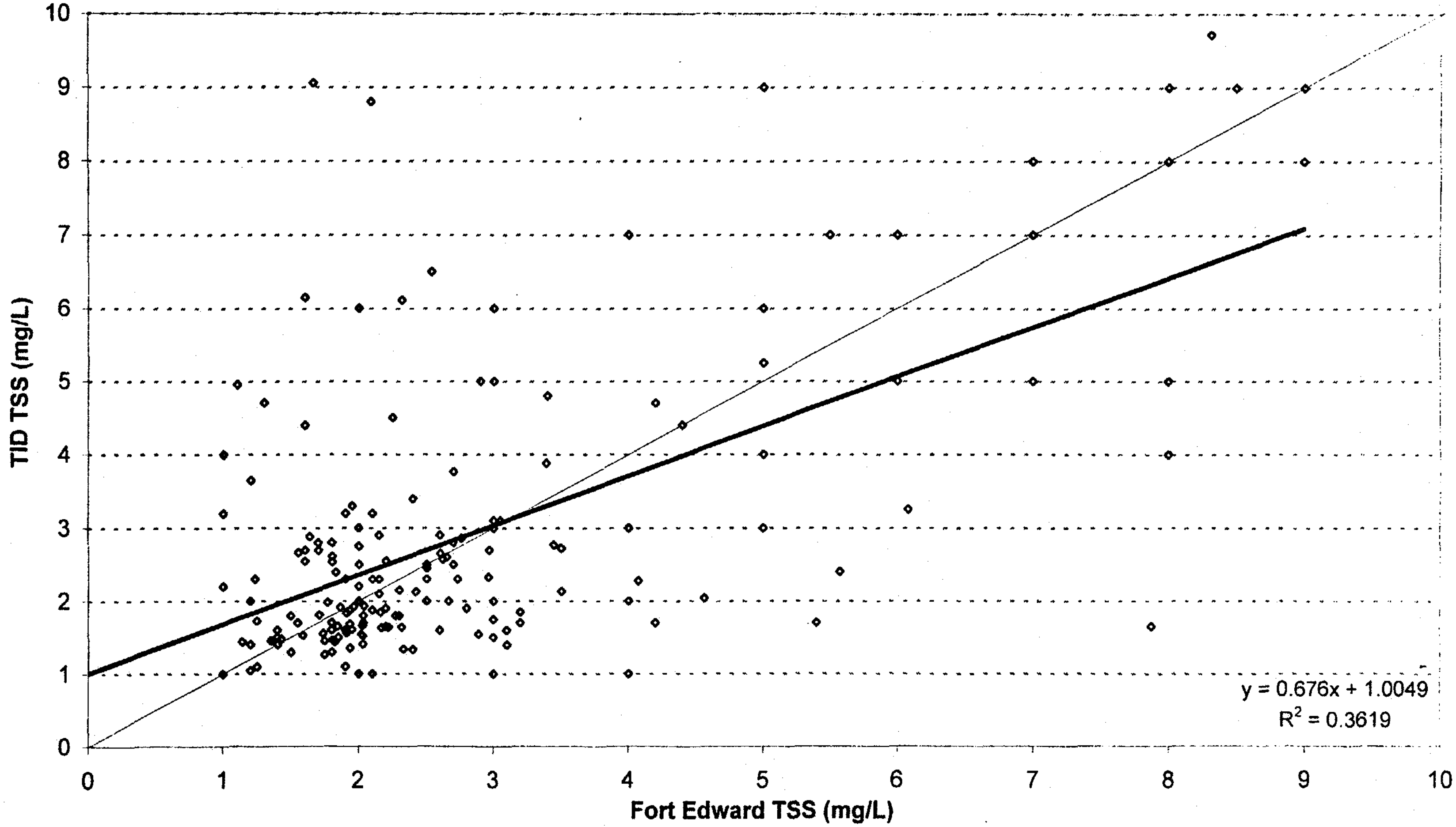


Figure 6-53. Comparison of Same-Day Suspended Solids (TSS) Concentration Data at Fort Edward and Thompson Island Dam when TSS Concentration Is Less Than 10 mg/L and Fort Edward Flow Is Less Than 10,000 cfs (1993-1997).

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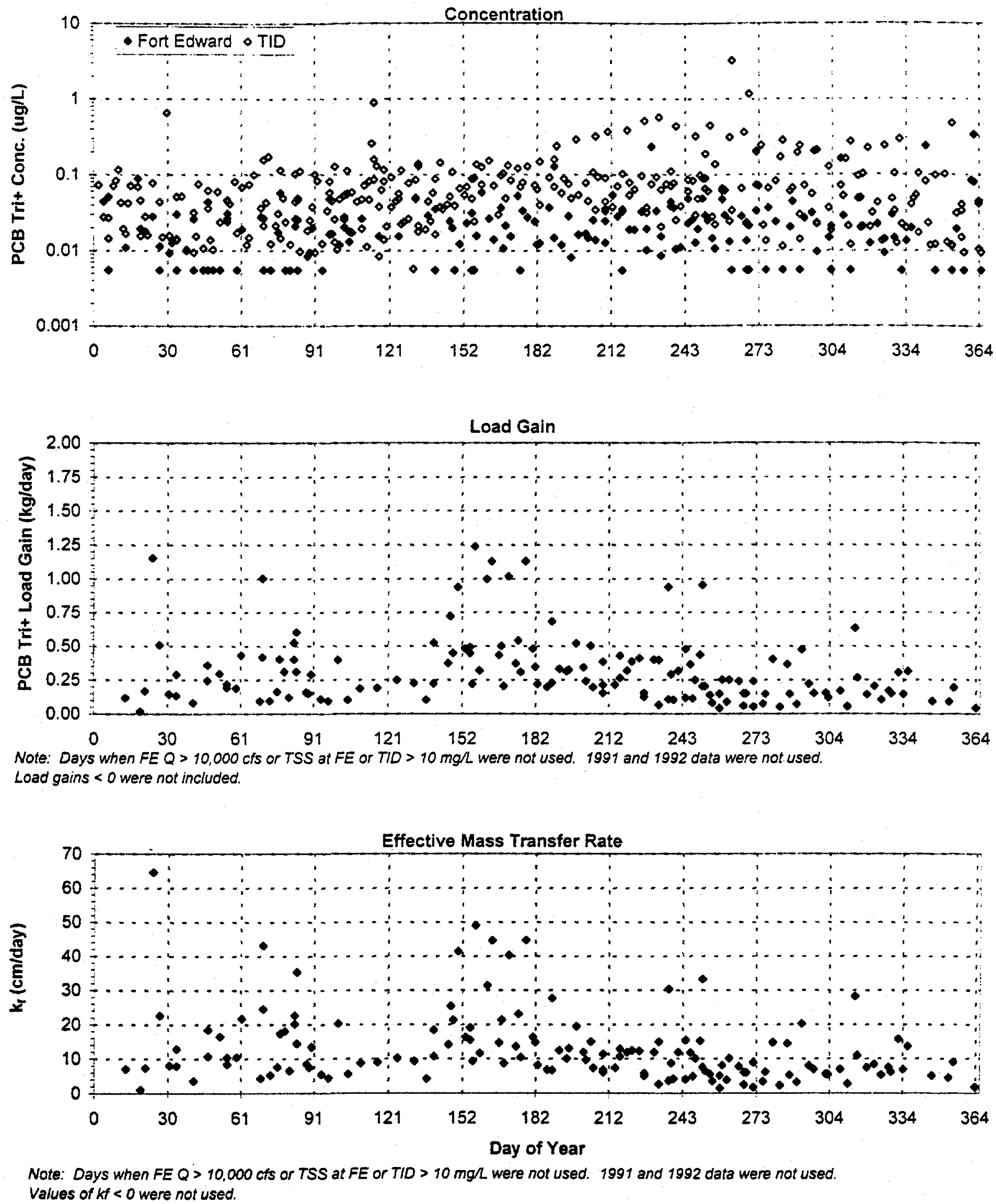
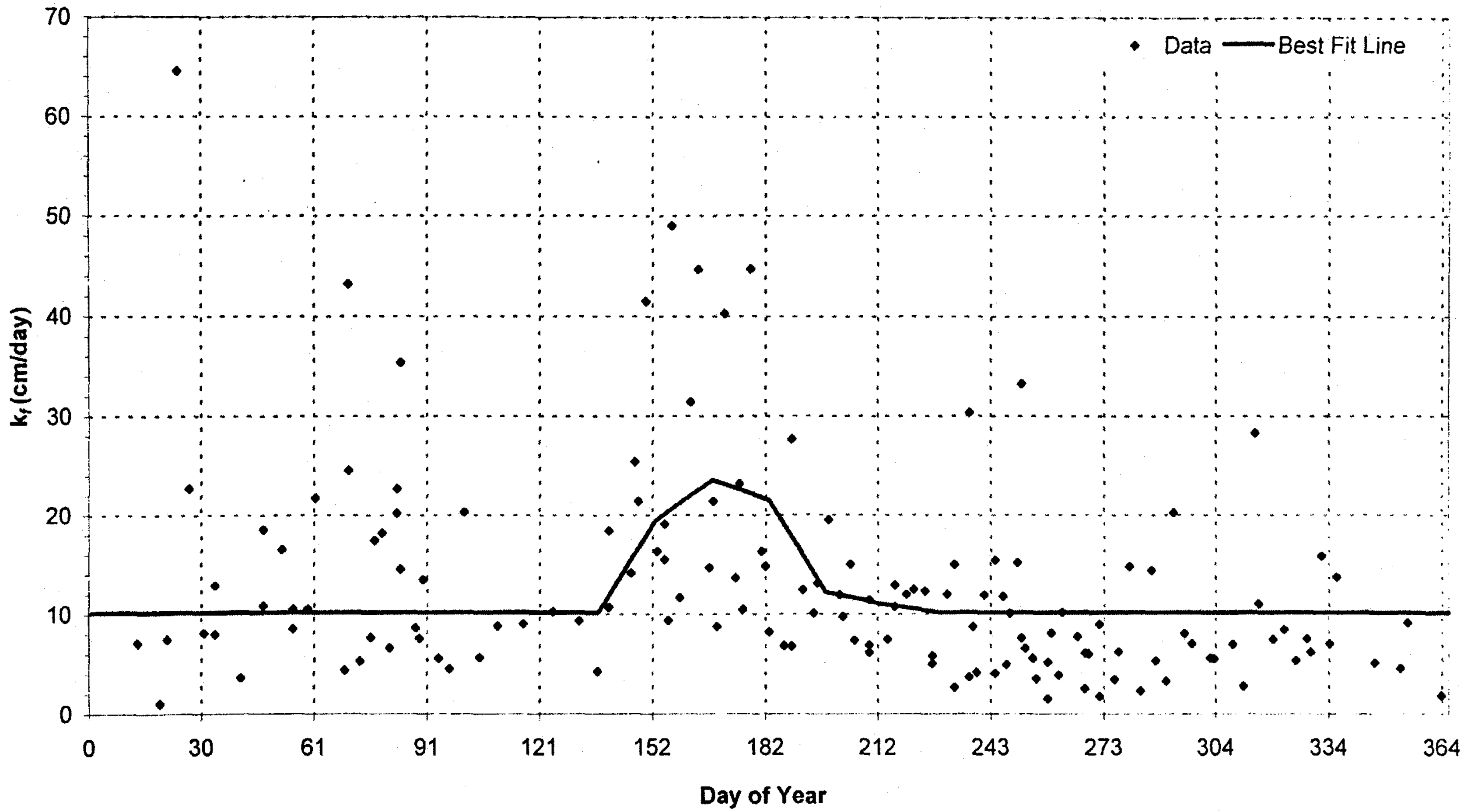


Figure 6-54. Temporal Patterns in Water Column Tri+ PCB Concentration at Fort Edward and Thompson Island Dam, Tri+ PCB Loading Increase Across Thompson Island Pool, and Calculated Effective Sediment-Water Mass Transfer Rates Across Thompson Island Pool.



Note: Days when FE Q > 10,000 cfs or TSS at FE or TID > 10 mg/L were not used. 1991 and 1992 data were not used. Values of kf < 0 were not used.

Figure 6-55. Computed Effective Mass Transfer Rate for Tri+ PCBs in Thompson Island Pool, 1993-1997.

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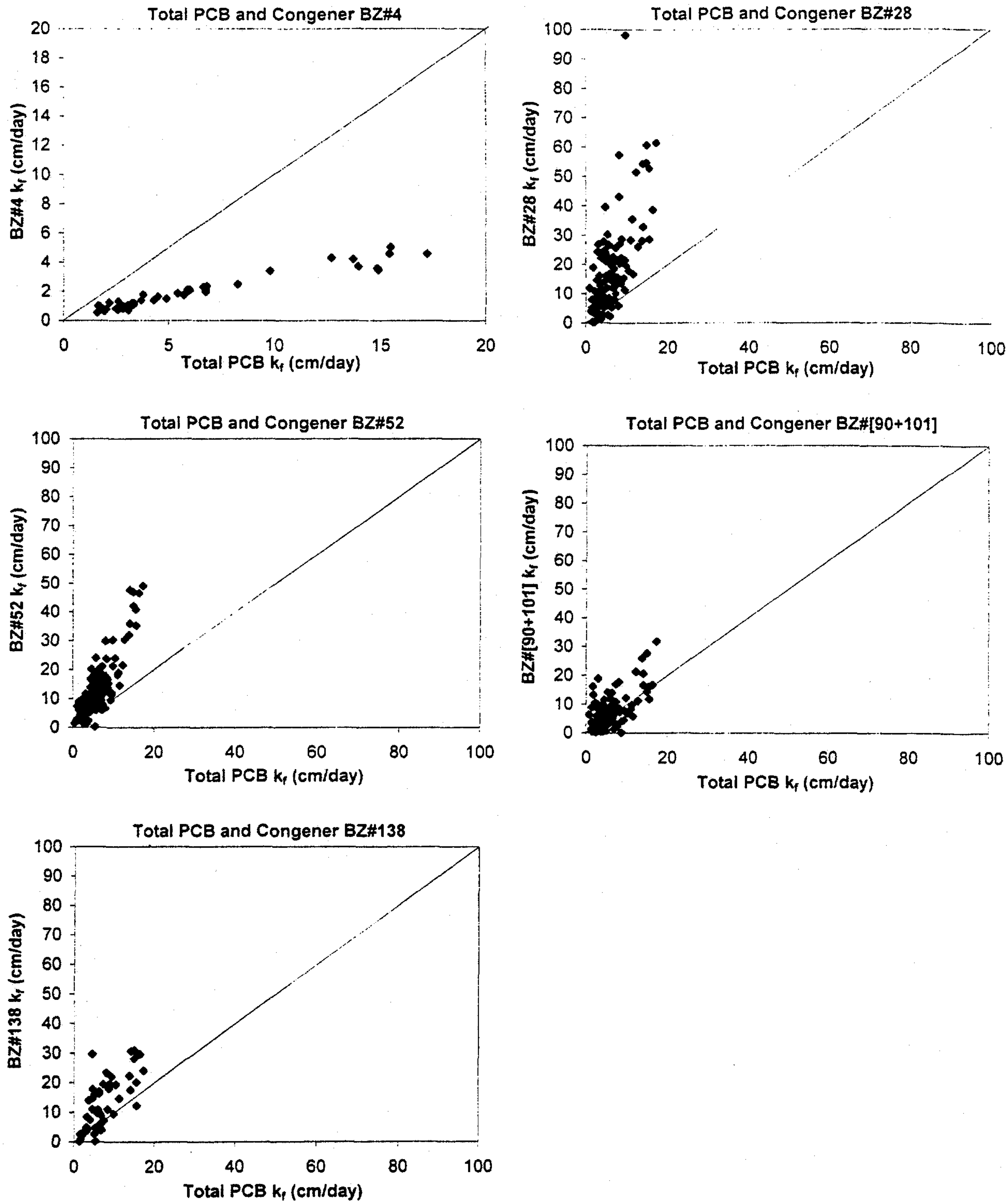
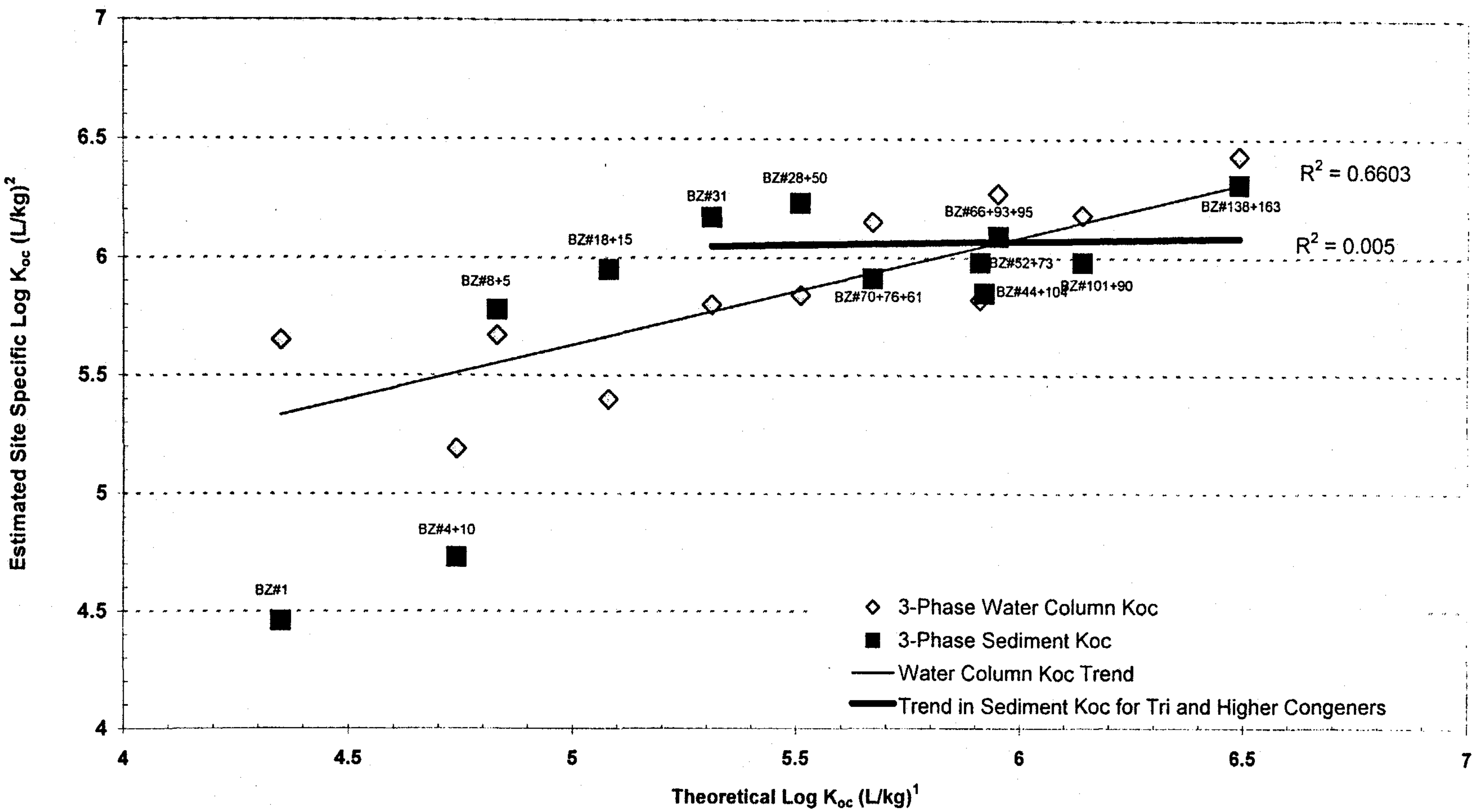


Figure 6-56. Scatter Plots of Estimated Sediment-Water Mass Transfer Rate: Congeners versus Total PCB.



[1] Source: DEIR Table 3-9 (from Burkhard (19840 as cited in Machay et al. (1992)) (USEPA, 1997)

[2] Source: DEIR Table 3-8, 3-10a (USEPA, 1997)

Figure 6-57. Comparison of Estimated Site-Specific Water Column and Sediment Koc Values for Congeners as Determined in the DEIR.

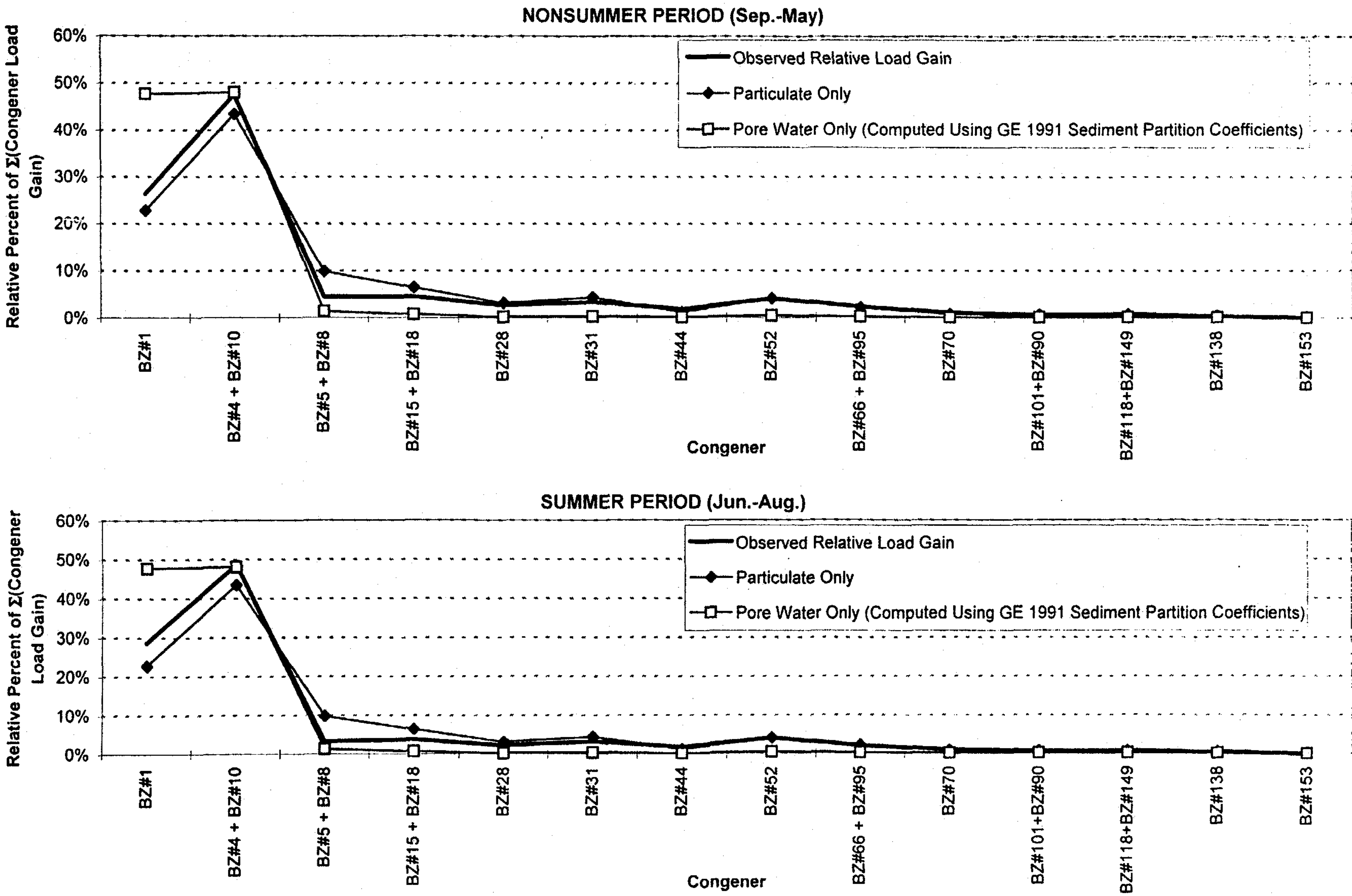


Figure 6-58. Average Observed versus Porewater and Particulate Predicted Relative Load Gain at Thompson Island Dam by Season, 1991-1997.

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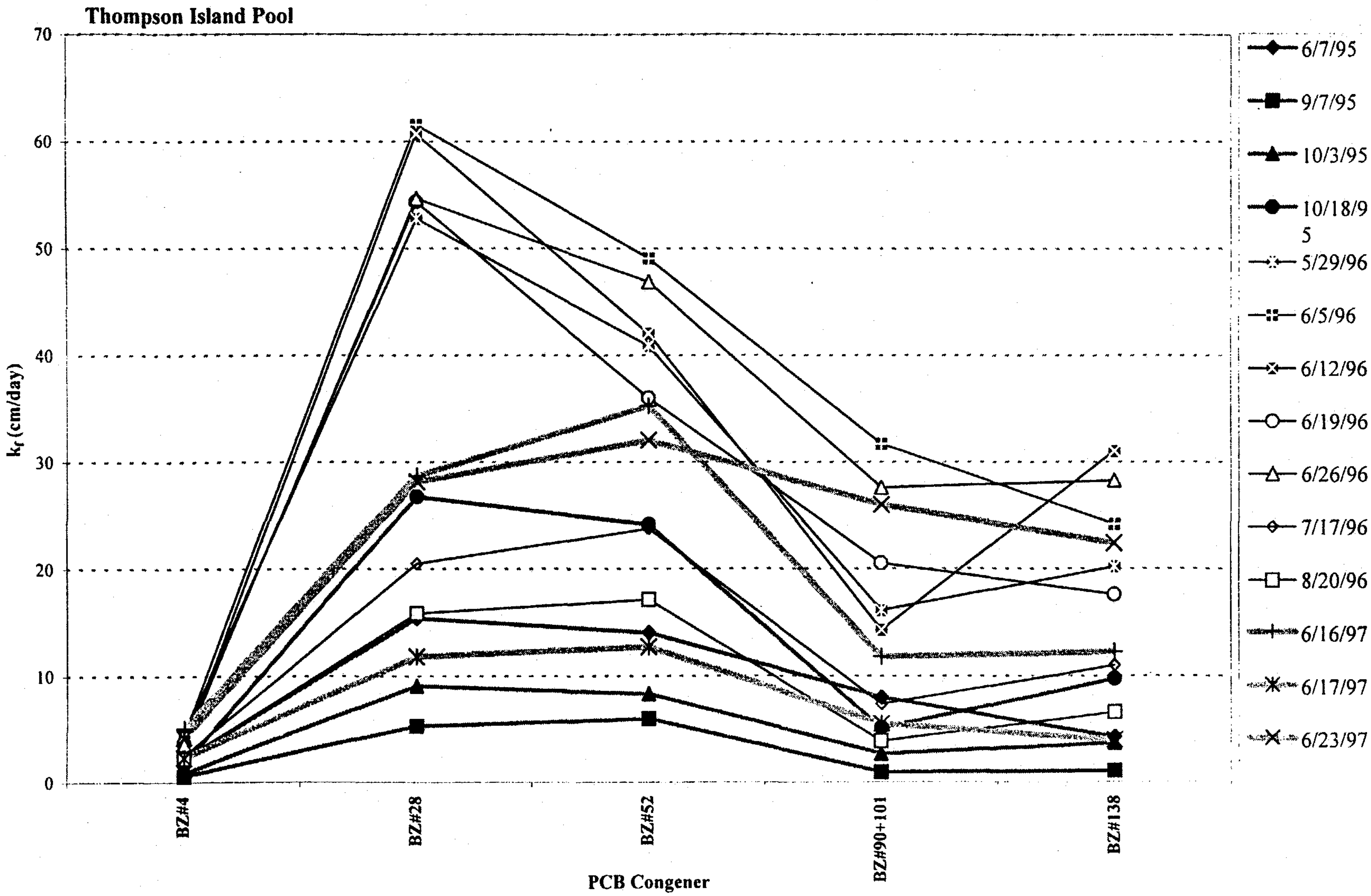

Figure 6-59. Comparison of Congener Specific Apparent Sediment-Water Mass Transfer Rates by Date.

303580

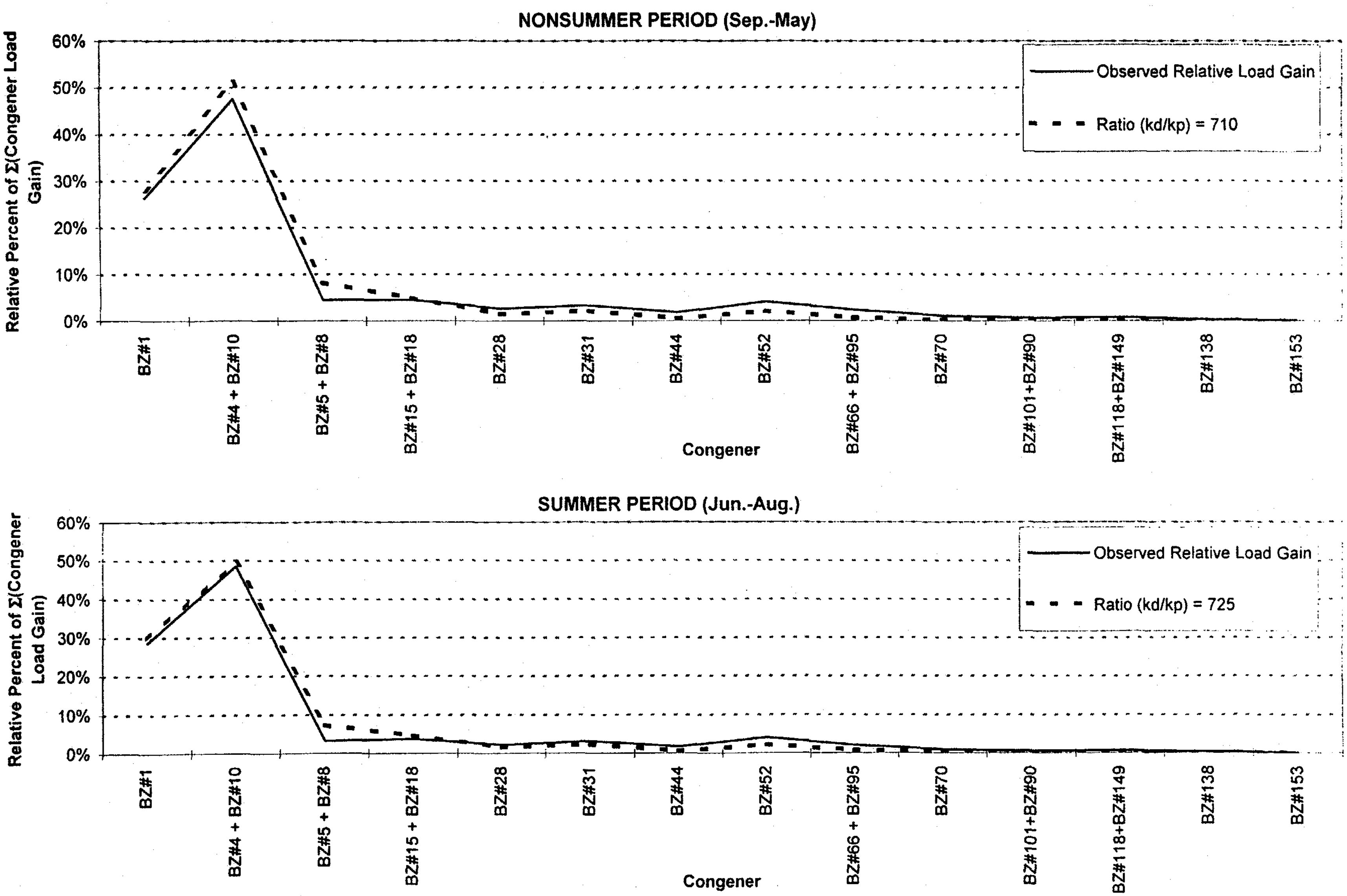

Figure 6-60. Comparison of Fit Using Ratio of Pore Water to Particulate Mass Transfer Coefficients to Average Observed Predicted Relative Load Gain at Thompson Island Dam by Season, 1991-1997.

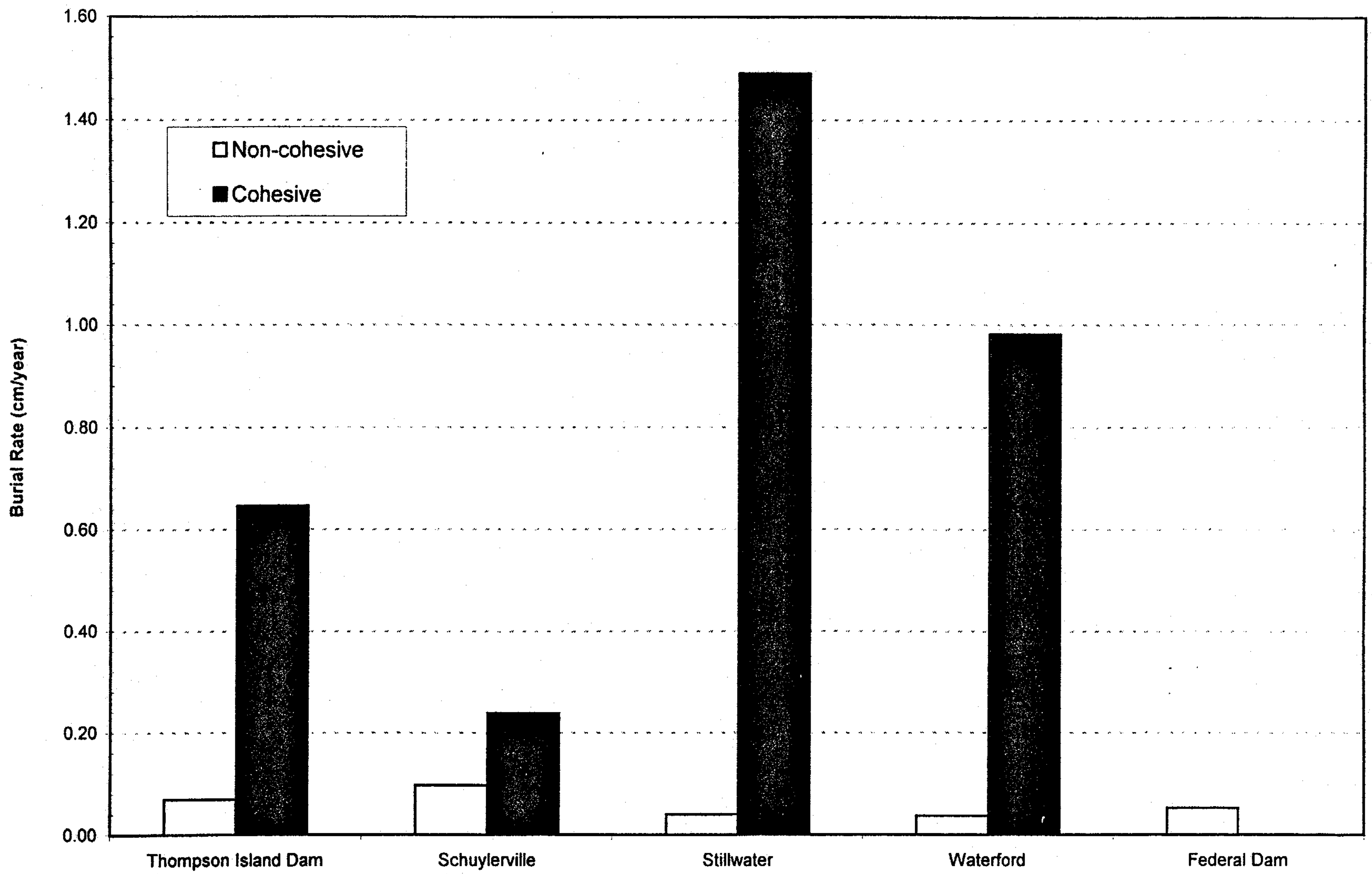

Figure 7-1. Computed Annual Average Burial Rates, 1977-1997.

303582

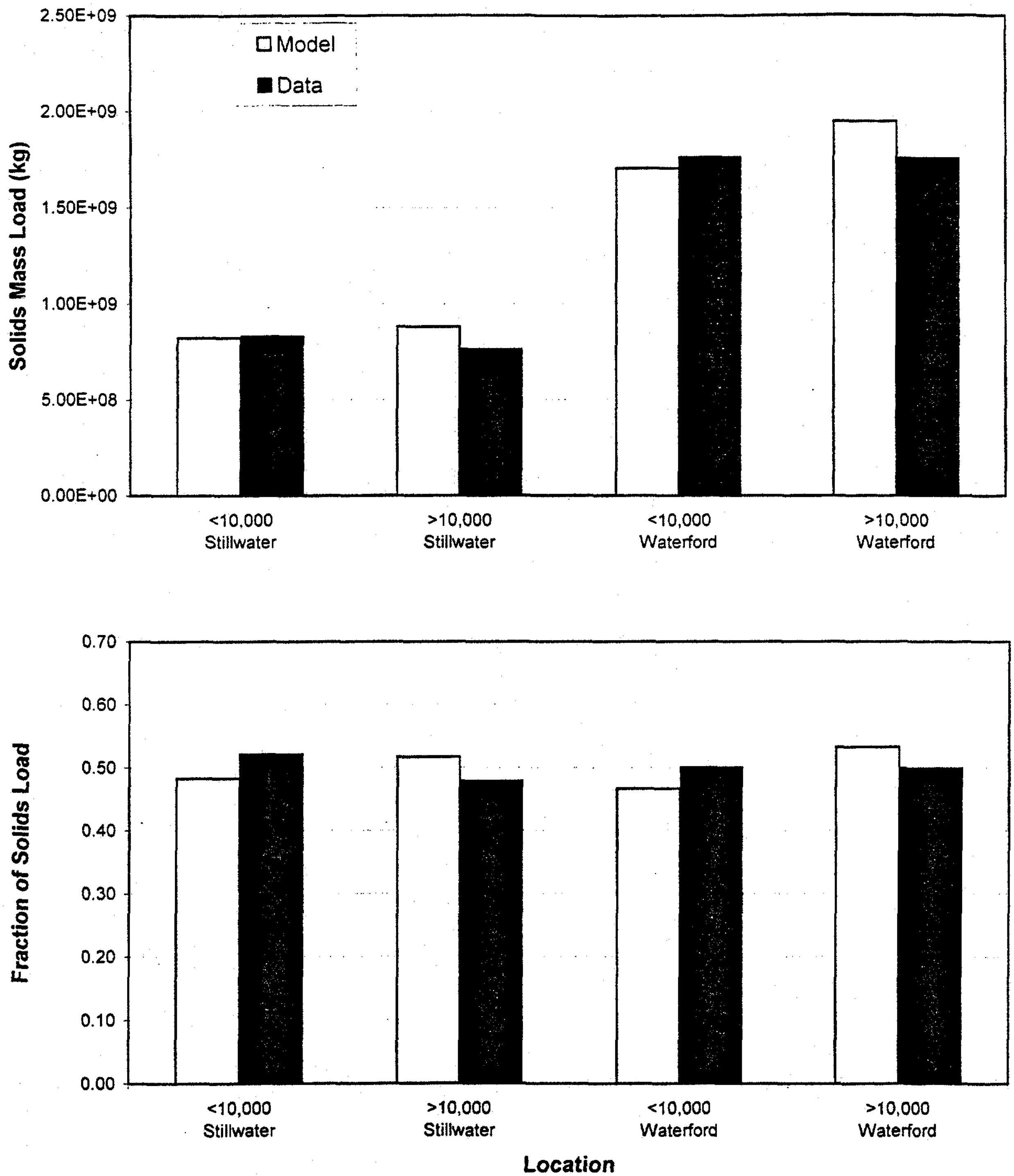

Figure 7-2. Comparison Between Model Estimated and Data Estimated In-River Solids Loadings Stratified by Fort Edward Flow at 10,000 cfs (1/1/77-9/30/97).

303584

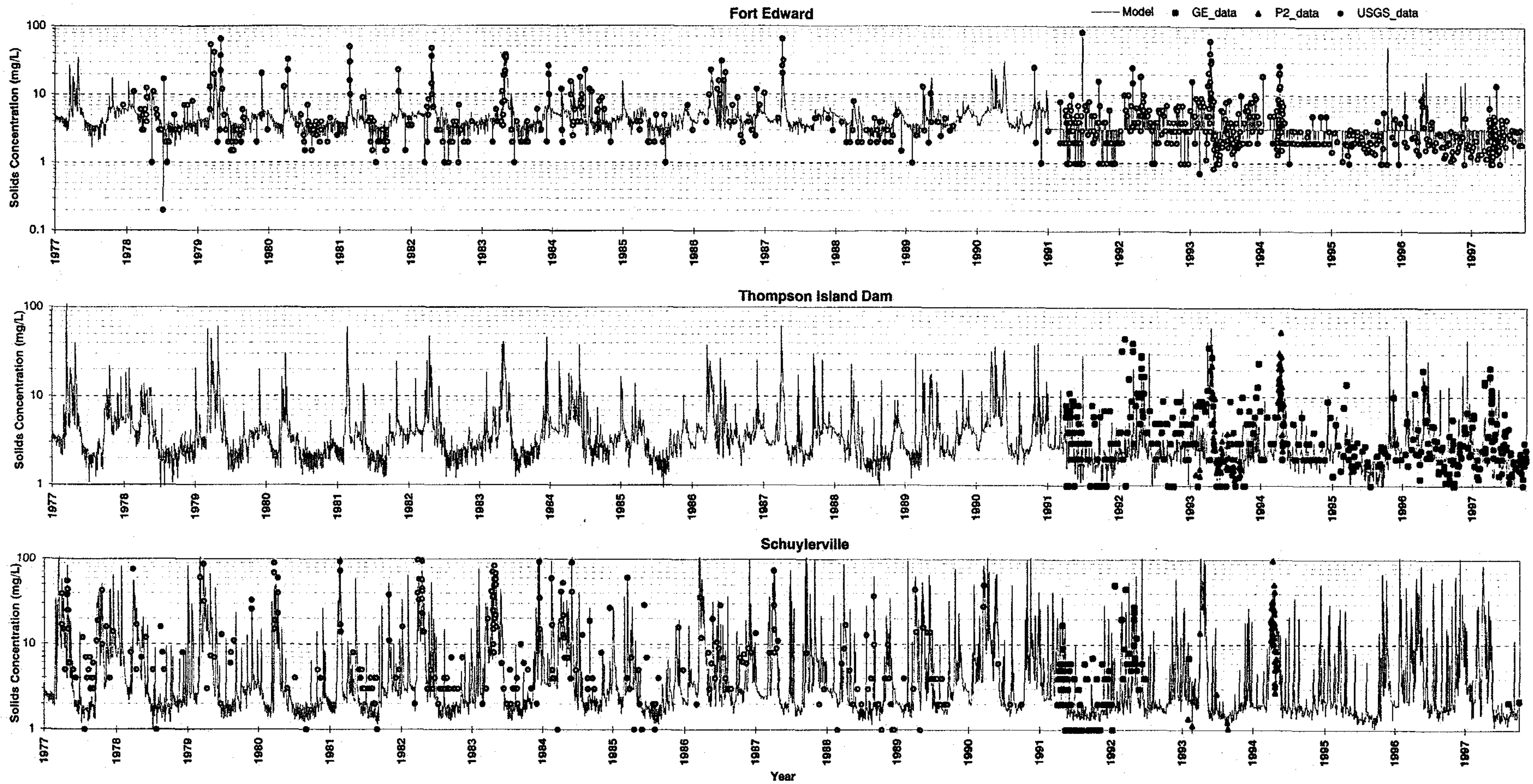

Figure 7-3a. Comparison Between Computed and Observed Solids Concentrations at Mainstem Sampling Stations.

303585

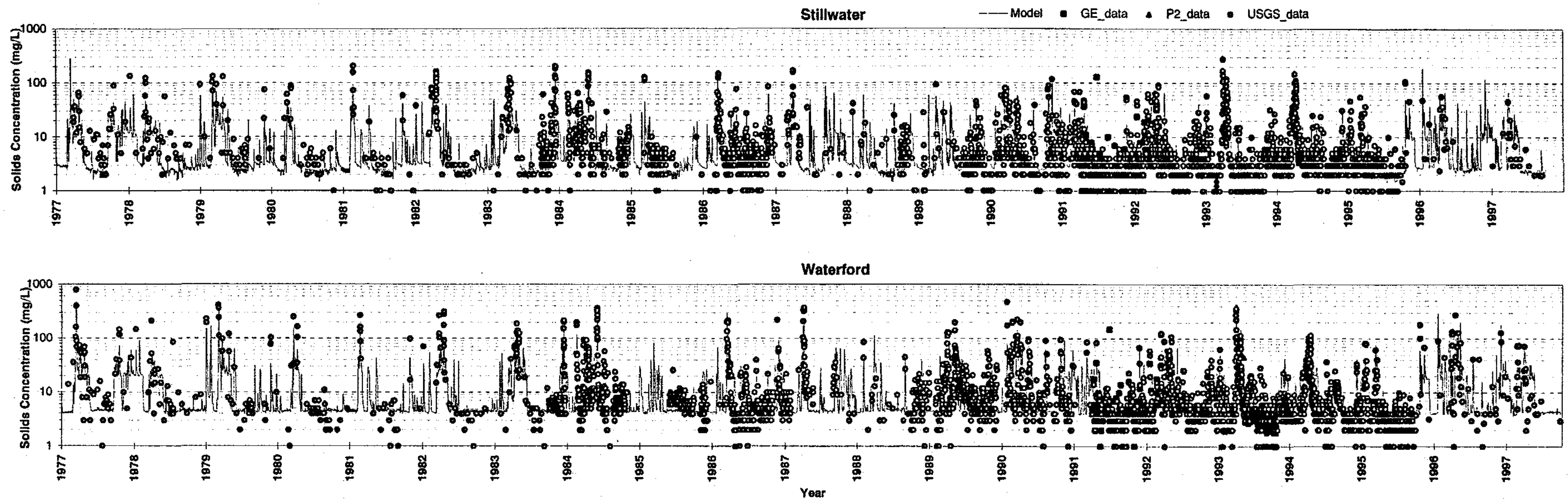

Figure 7-3b. Comparison Between Computed and Observed Solids Concentrations at Mainstem Stations.

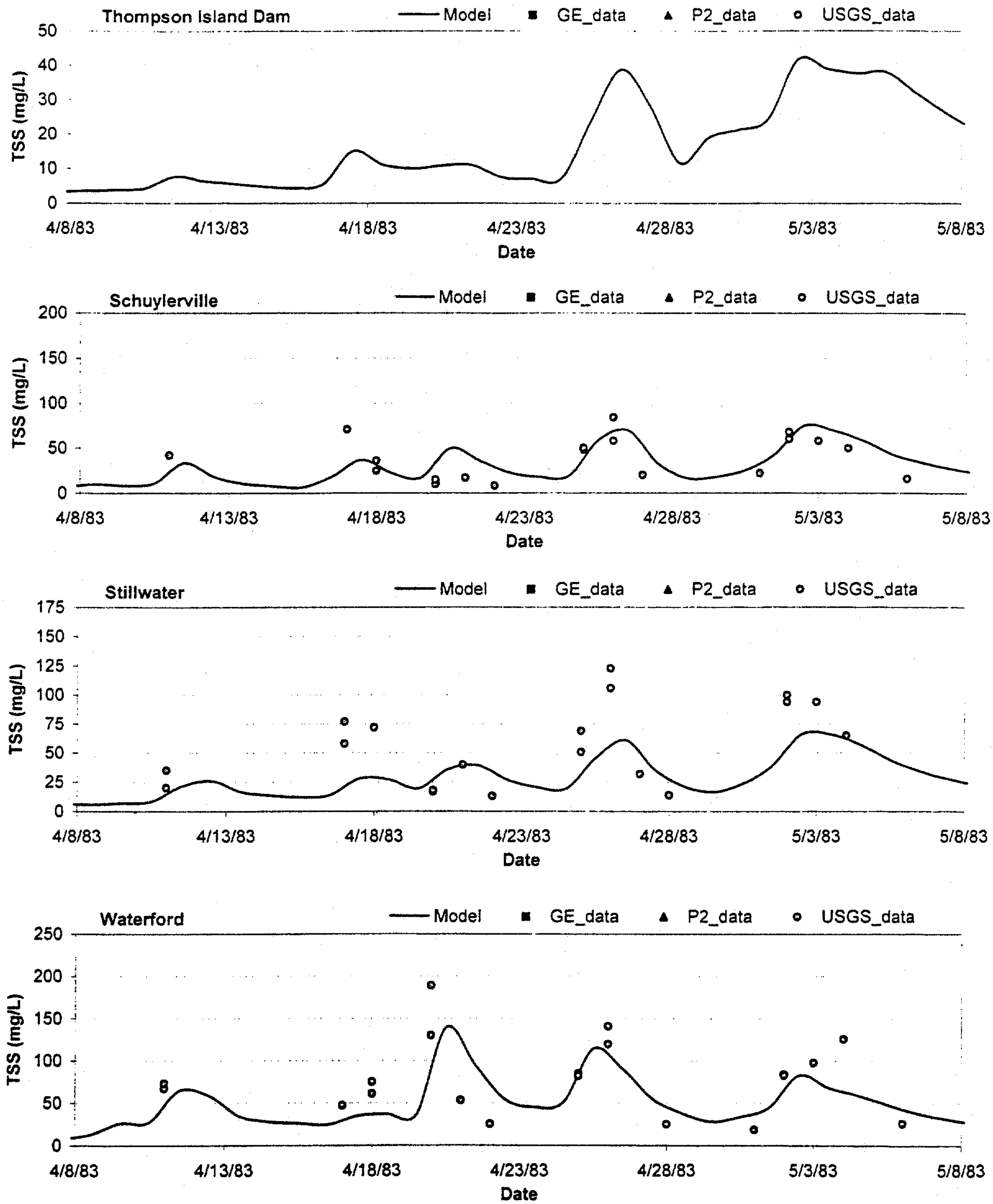

Figure 7-4. Comparison Between Computed and Observed Total Suspended Solids Concentrations (TSS) for the Spring 1983 High Flow Event.

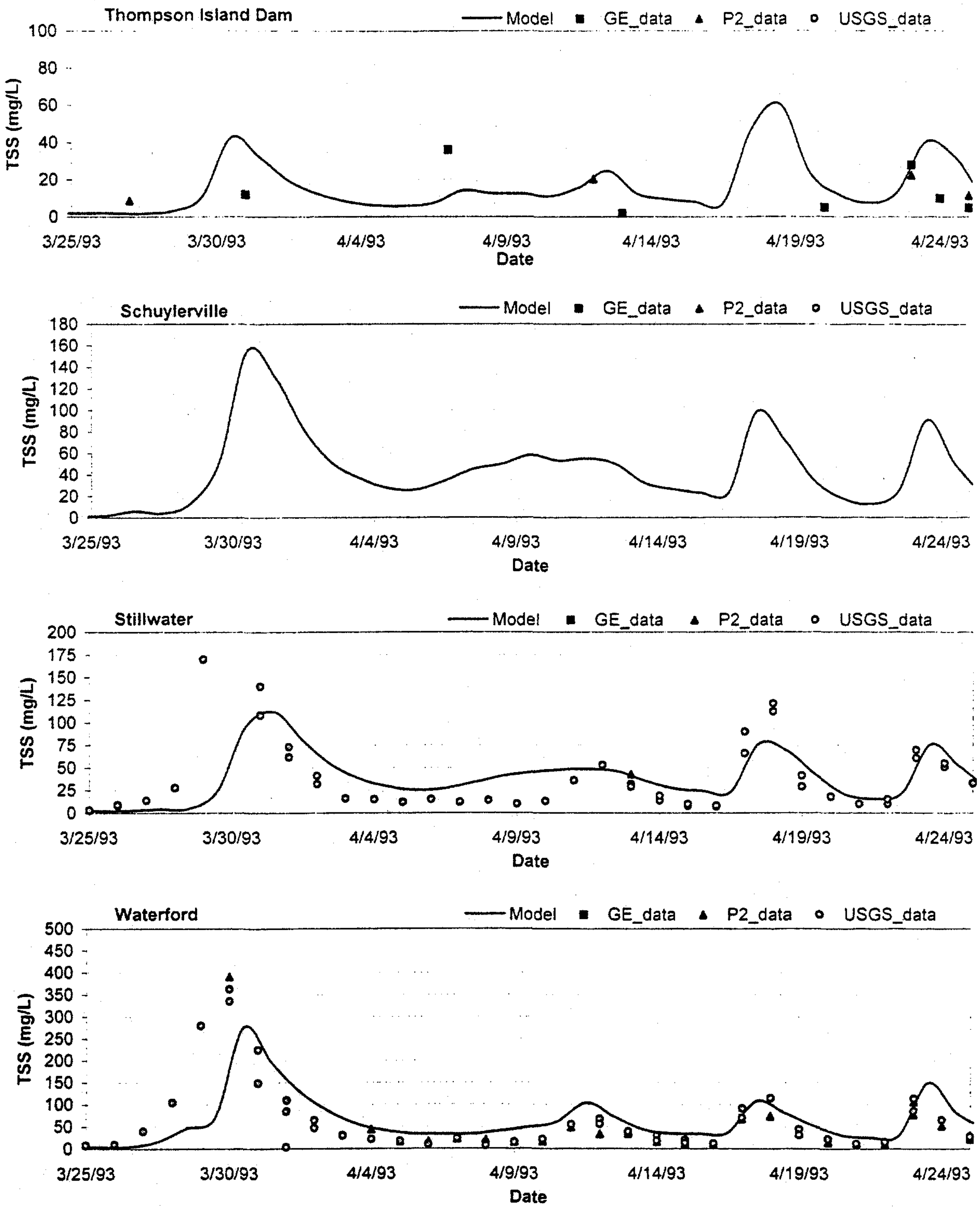

Figure 7-5. Comparison Between Computed and Observed Total Suspended Solids Concentrations (TSS) for the Spring 1993 High Flow Event.

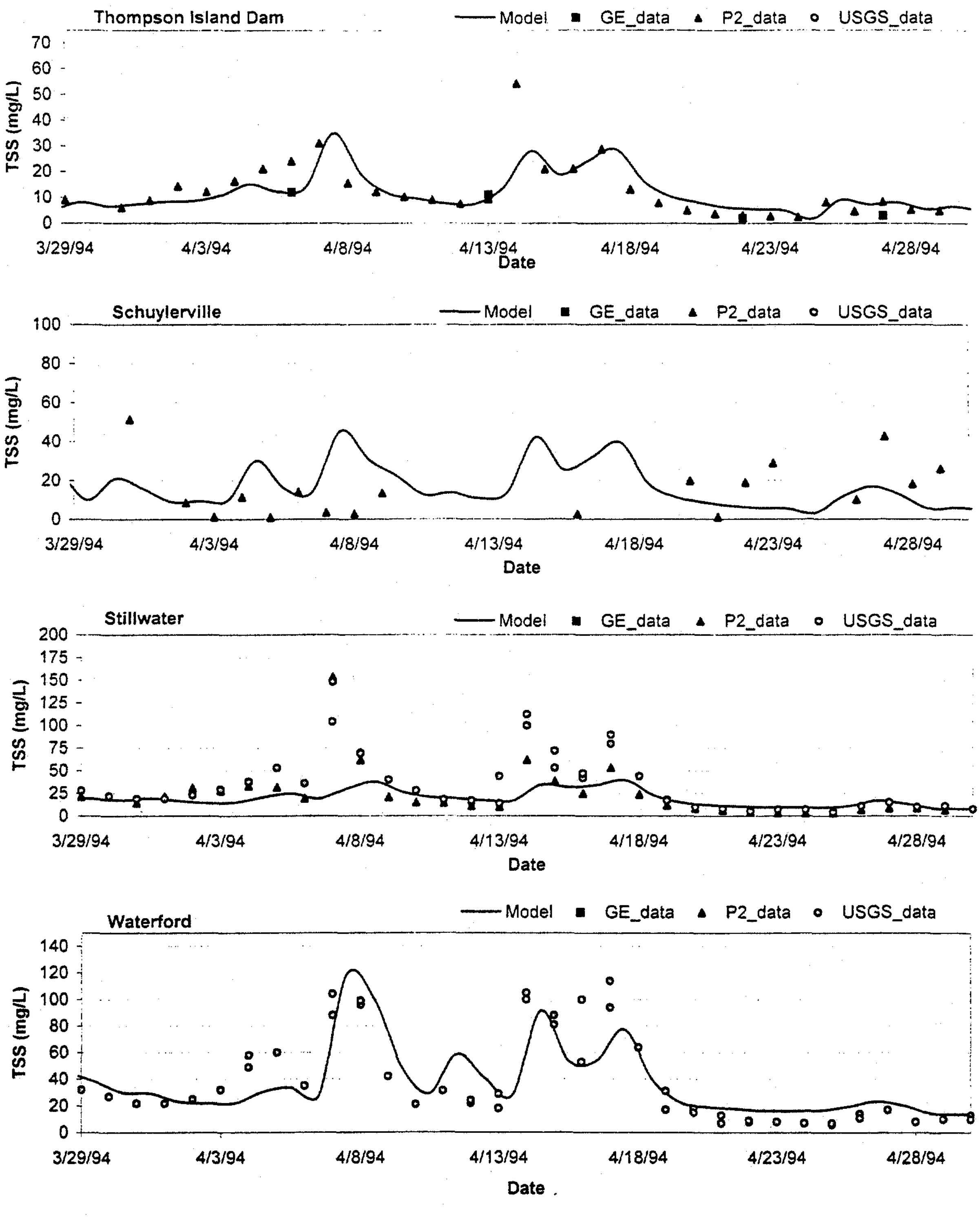

Figure 7-6. Comparison Between Computed and Observed Total Suspended Solids Concentrations (TSS) for the Spring 1994 High Flow Event.

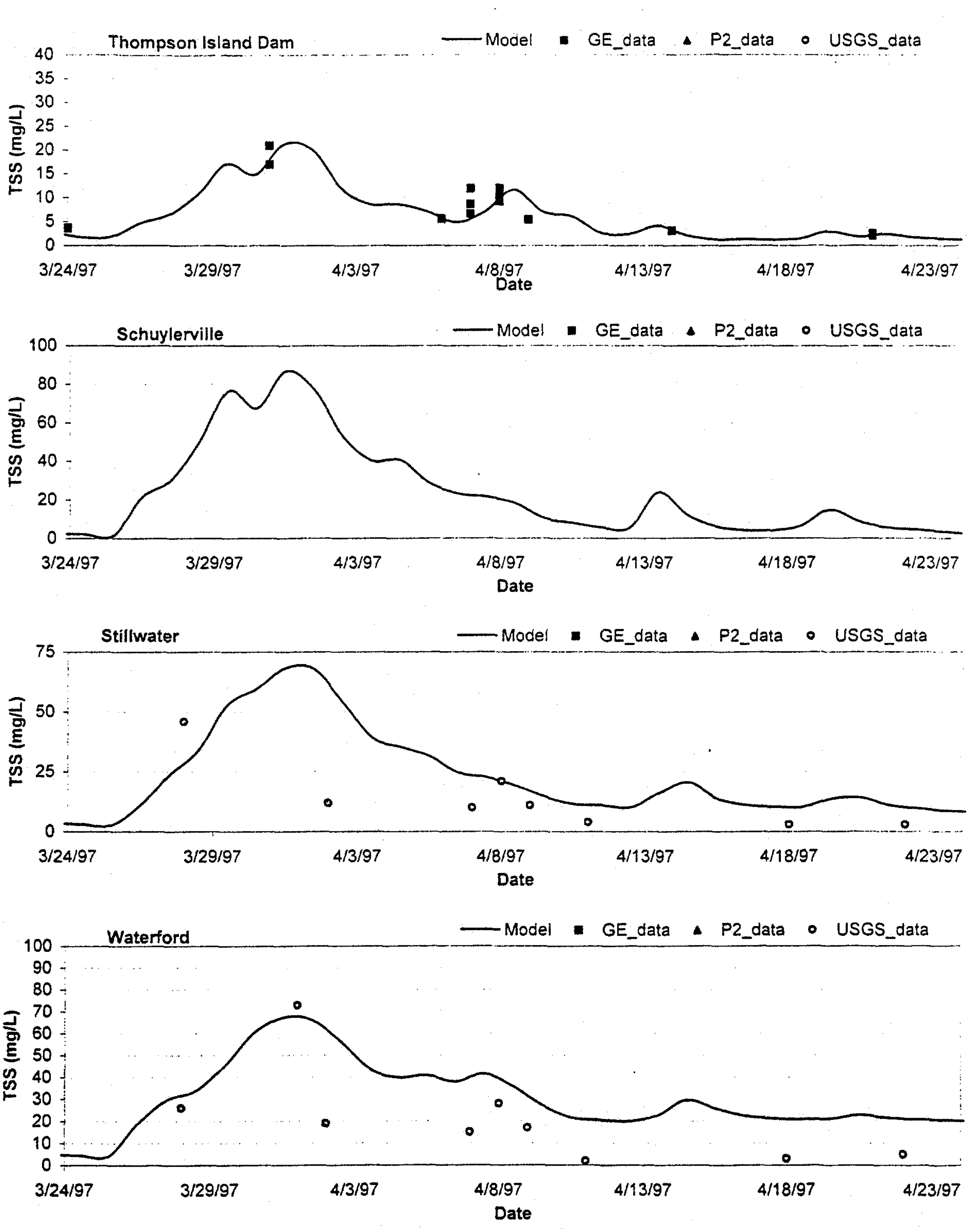

Figure 7-7. Comparison Between Computed and Observed Total Suspended Solids Concentrations (TSS) for the Spring 1997 High Flow Event.

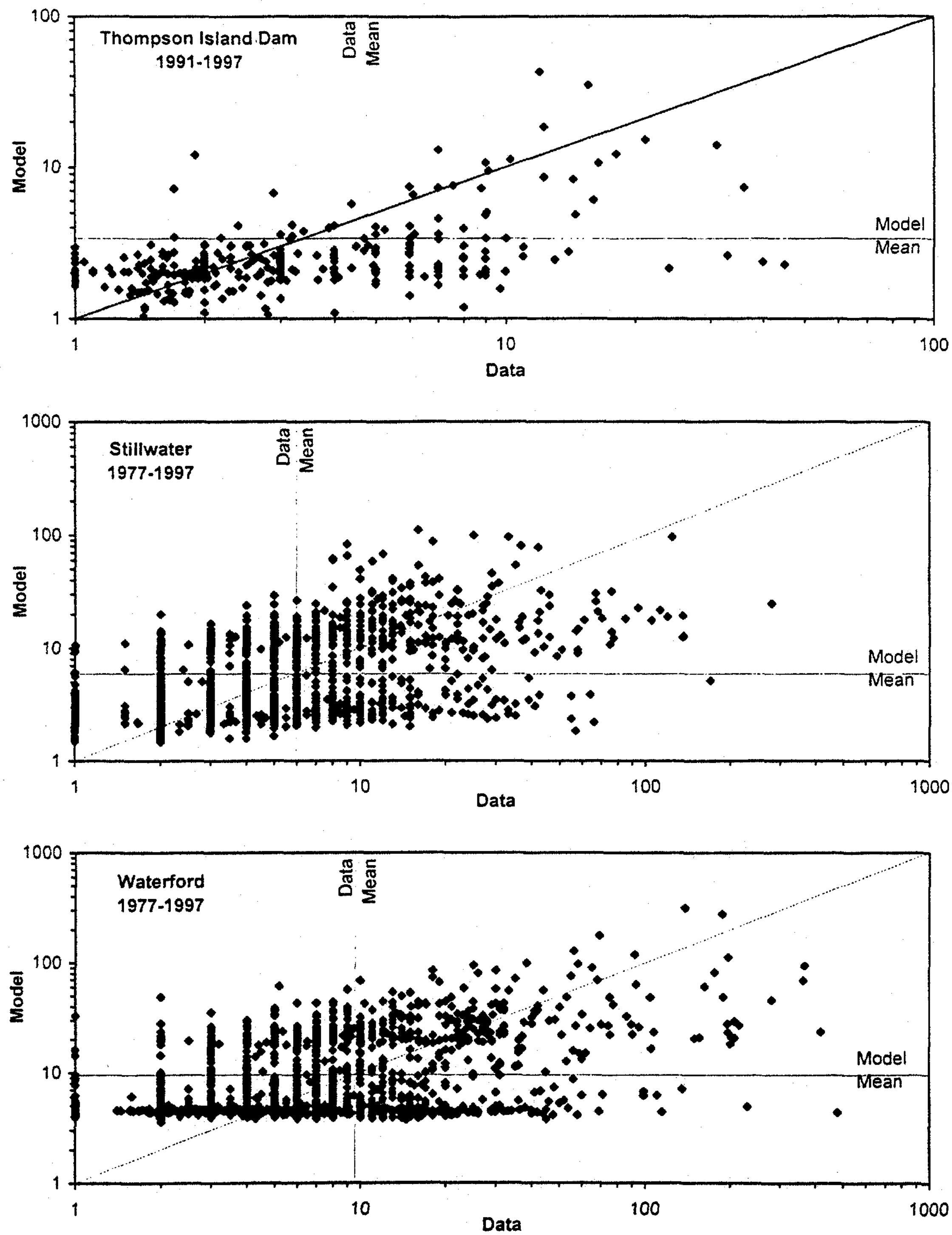

Figure 7-8. Comparison Between Computed and Observed Suspended Solids Concentrations for Fort Edward Flows Less Than 10,000 cfs.

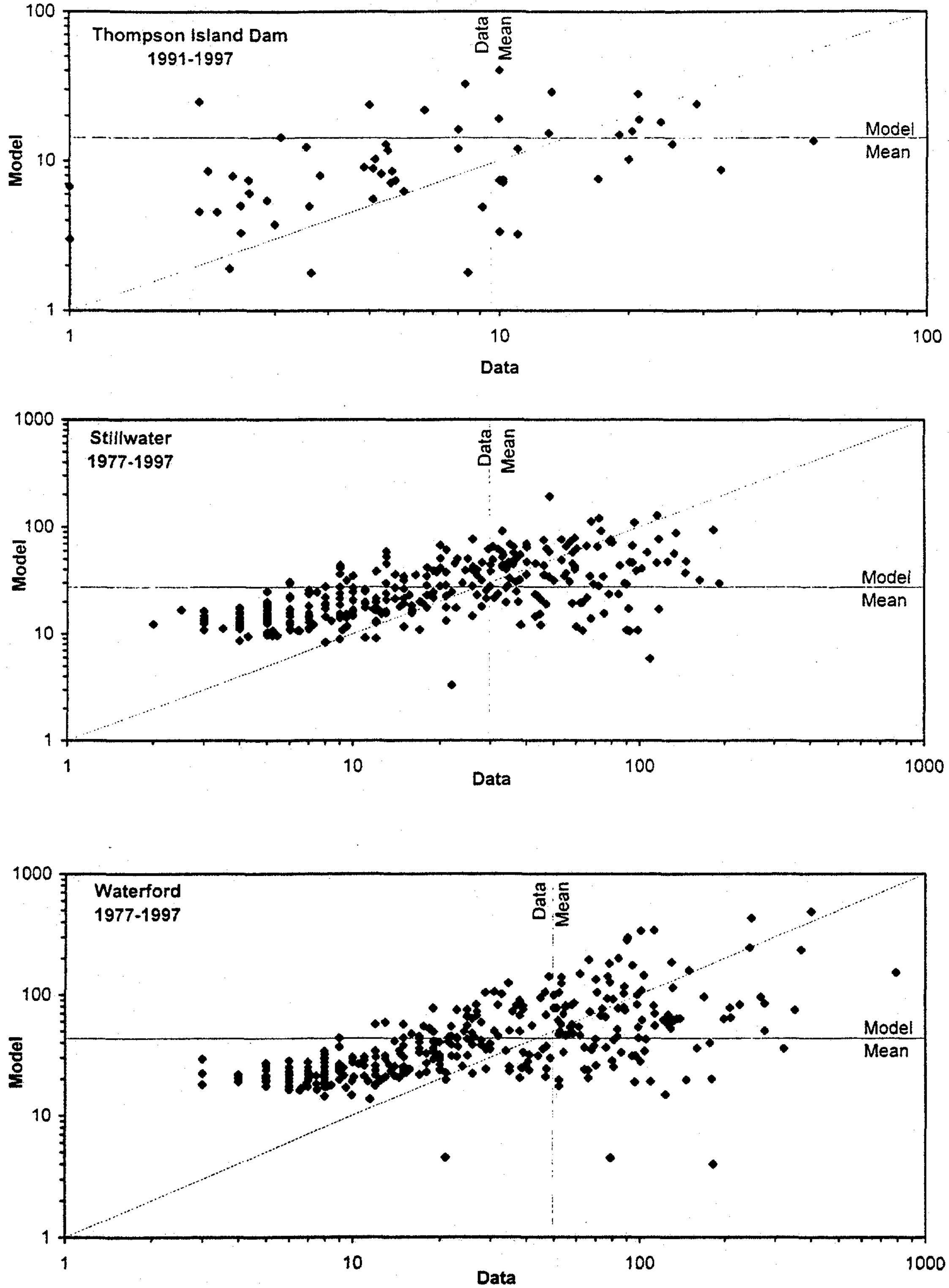

Figure 7-9. Comparison Between Computed and Observed Suspended Solids Concentrations for Fort Edward Flows Greater Than 10,000 cfs.

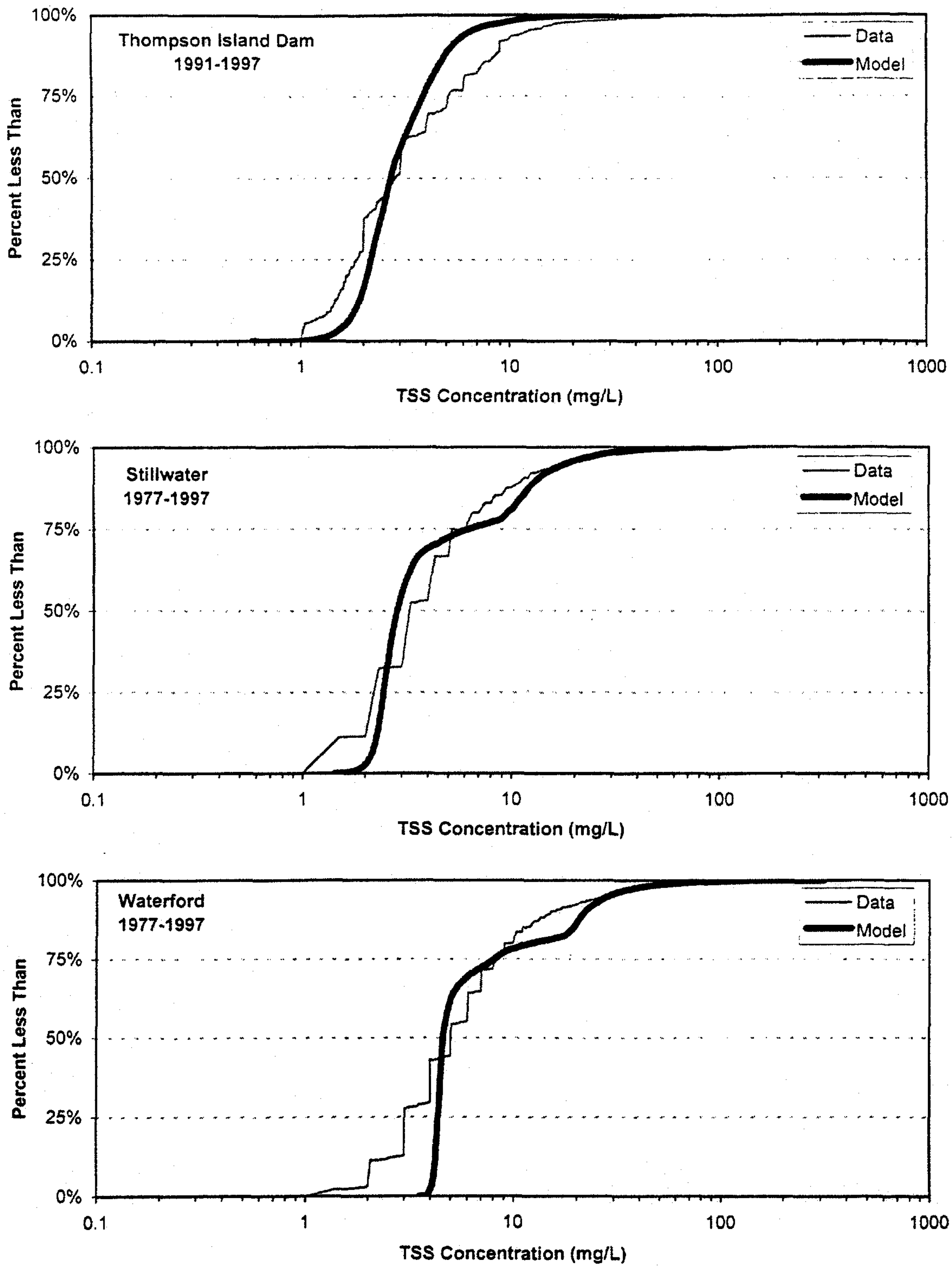

Figure 7-10. Comparison Between Computed and Observed Probability Distributions for Total Suspended Solids (TSS) for Fort Edward Flows Less Than 10,000 cfs.

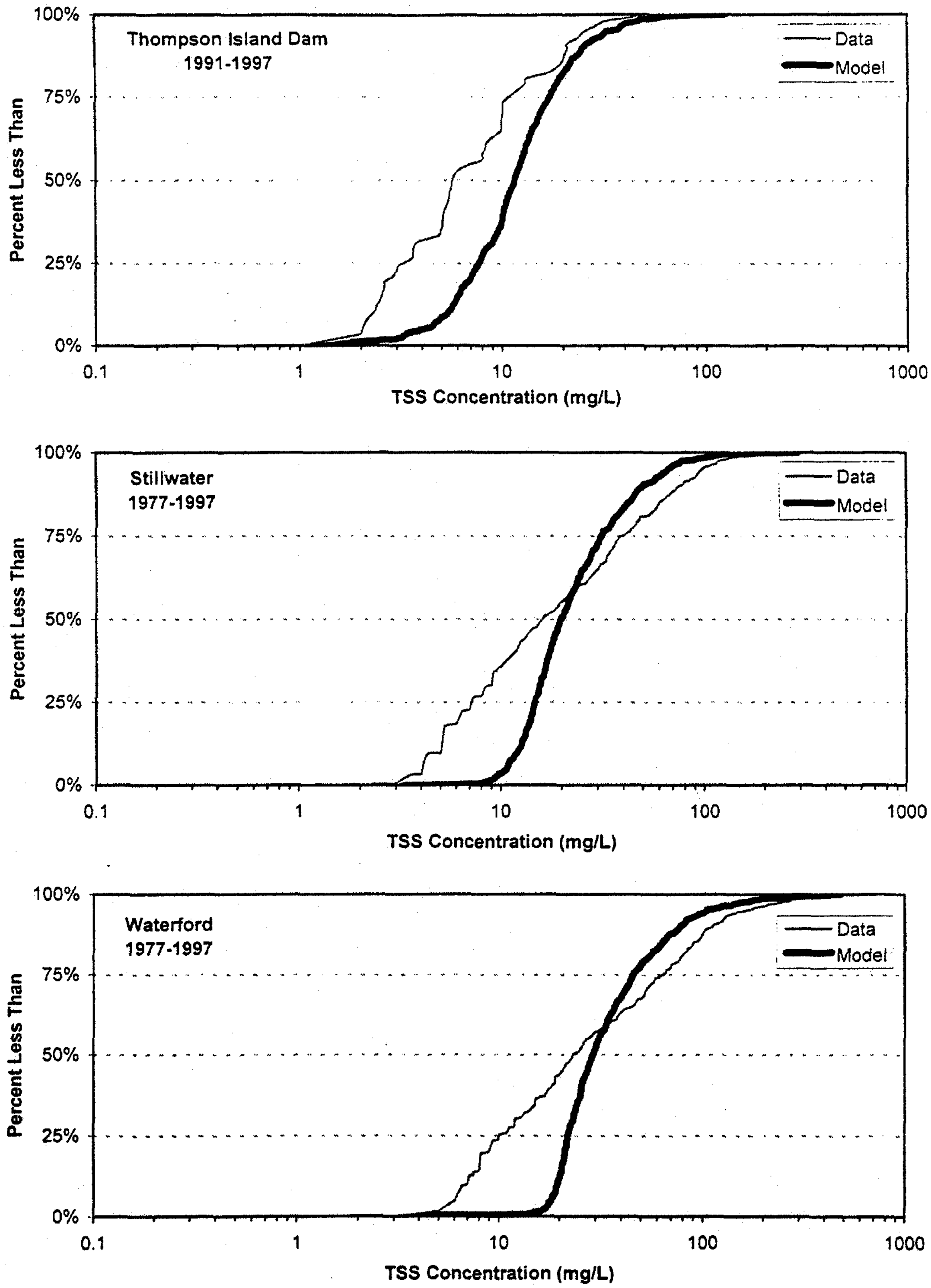

Figure 7-11. Comparison Between Computed and Observed Probability Distributions for Total Suspended Solids (TSS) for Fort Edward Flows Greater Than 10,000 cfs.

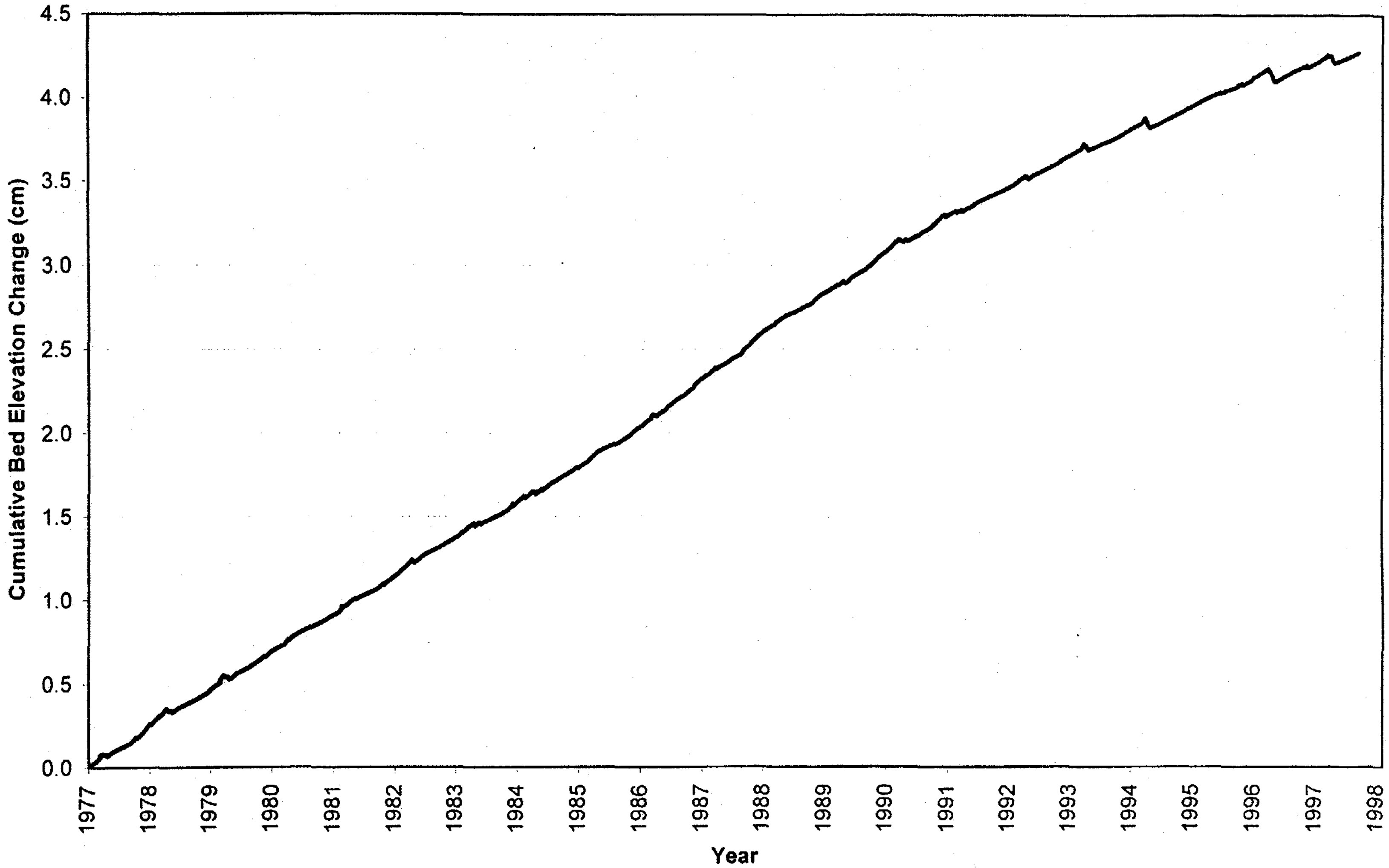

Figure 7-12. Computed Cumulative Sediment Bed Elevation Change in Thompson Island Pool, 1977-1997.

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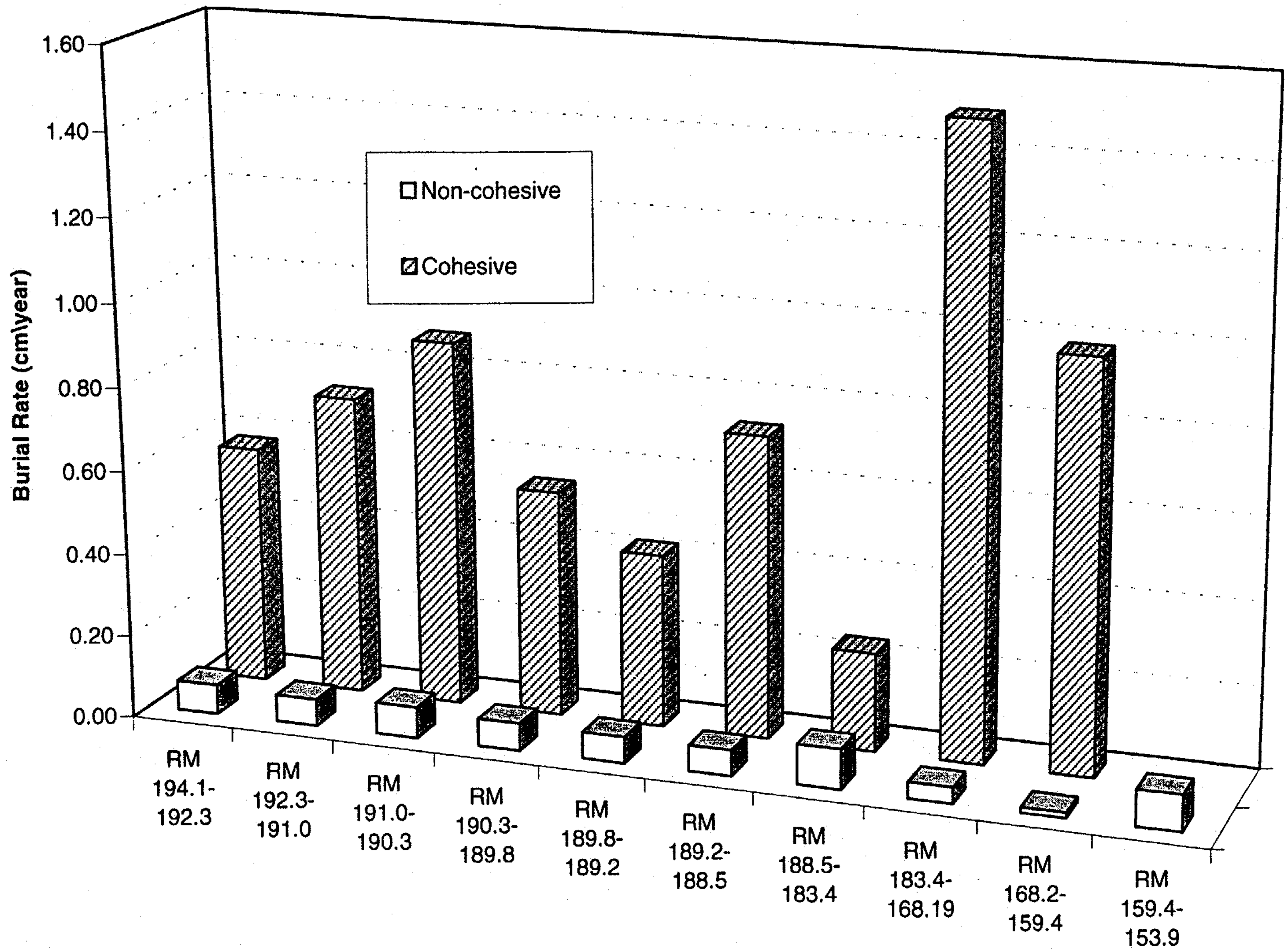


Figure 7-13. Computed Annual Average Solids Burial Rates, 1977-1997.

303595

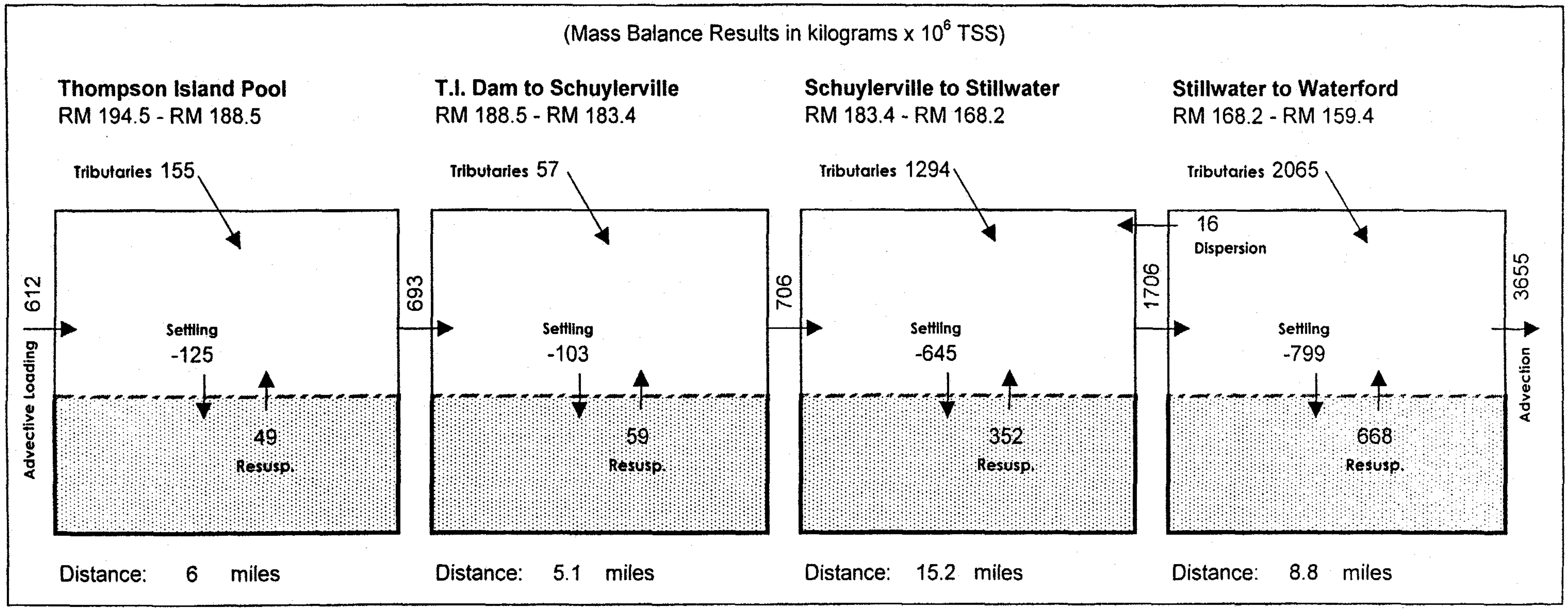


Figure 7-14. Computed Solids Mass Balance Components Analysis for 1977 - 1997.

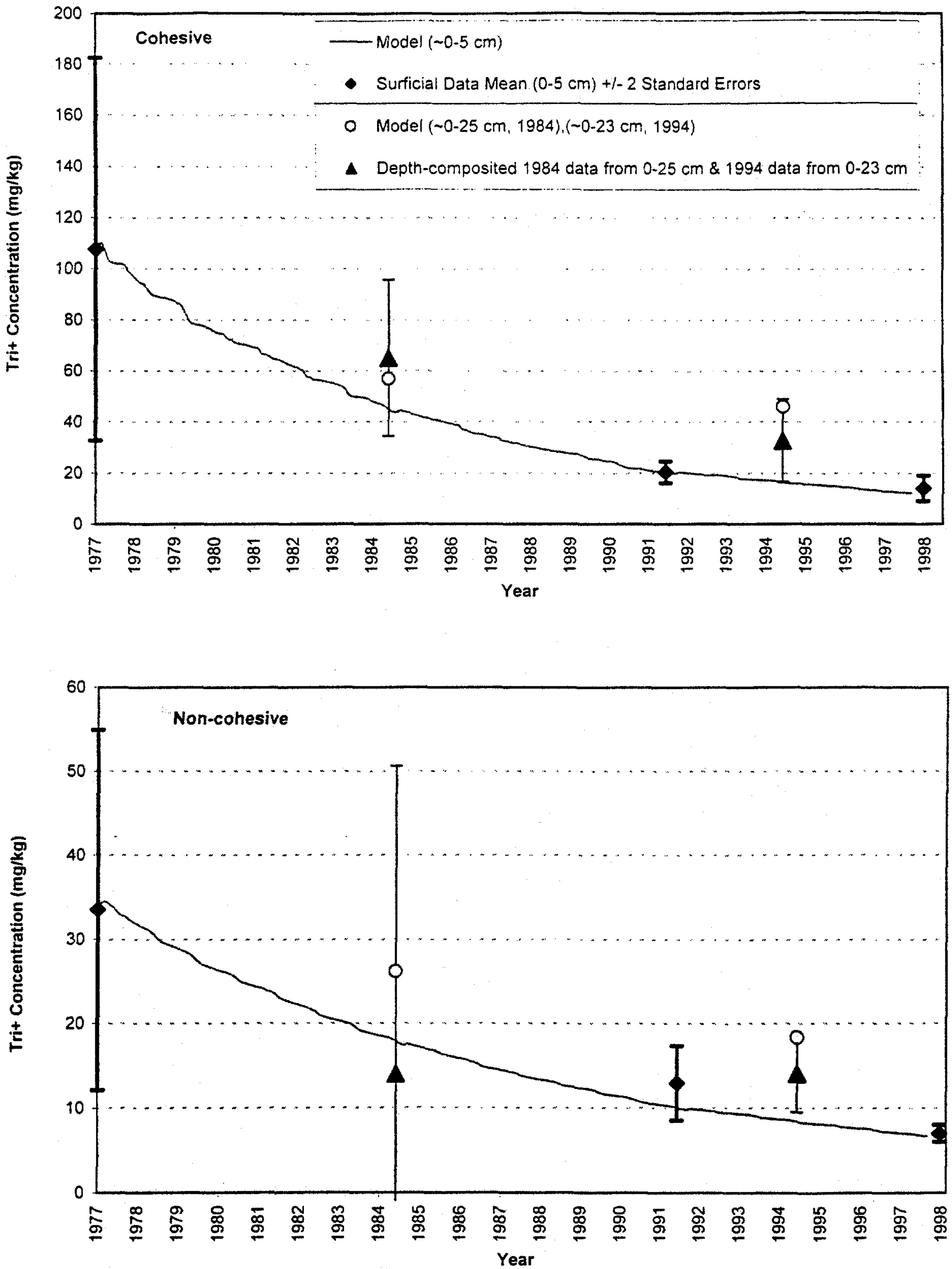
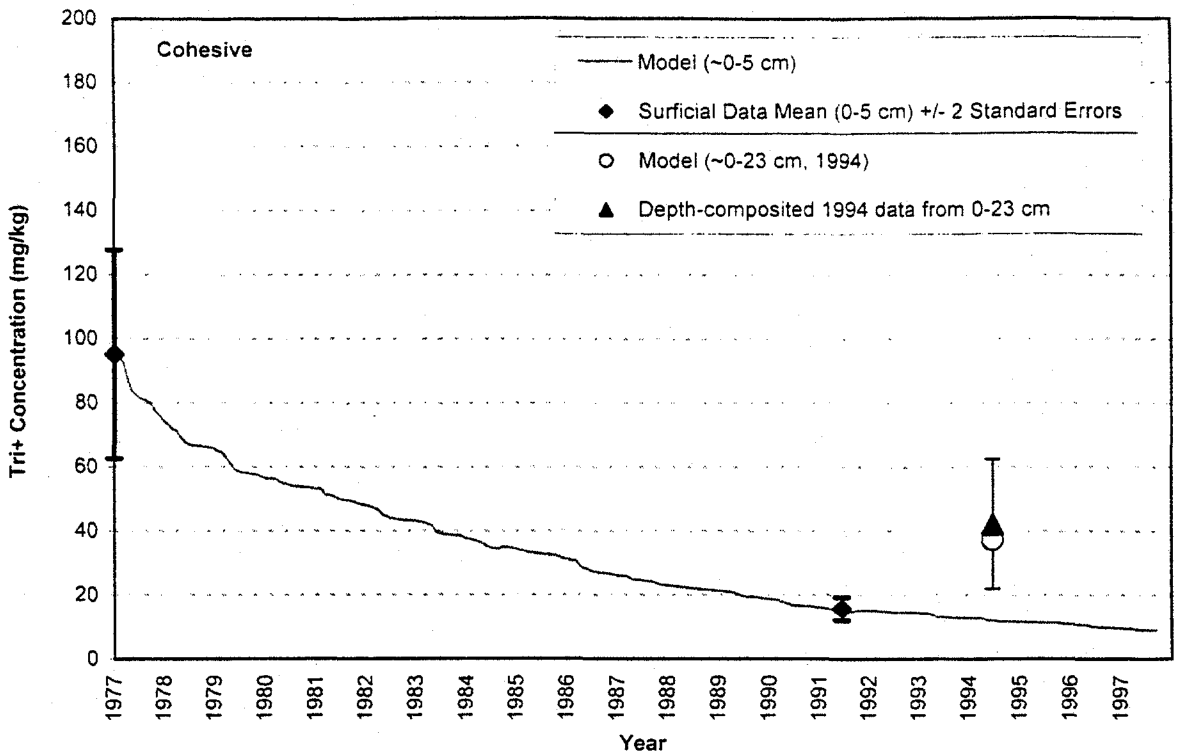


Figure 7-15a. Comparison Between Computed and Observed (Surficial and Depth-Composited) Sediment Tri+ Concentrations for Thompson Island Pool.



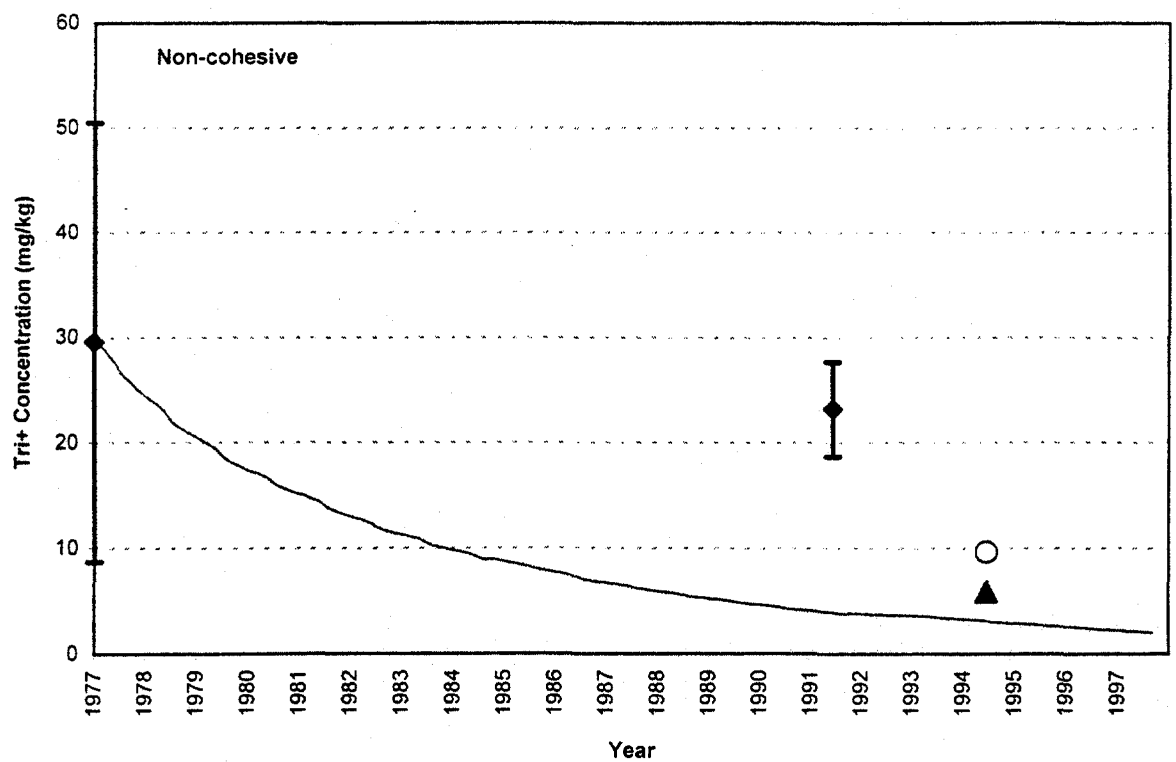


Figure 7-15b. Comparison Between Computed and Observed (Surficial and Depth-Composited) Sediment Tri+ Concentrations for Schuylerville Reach.

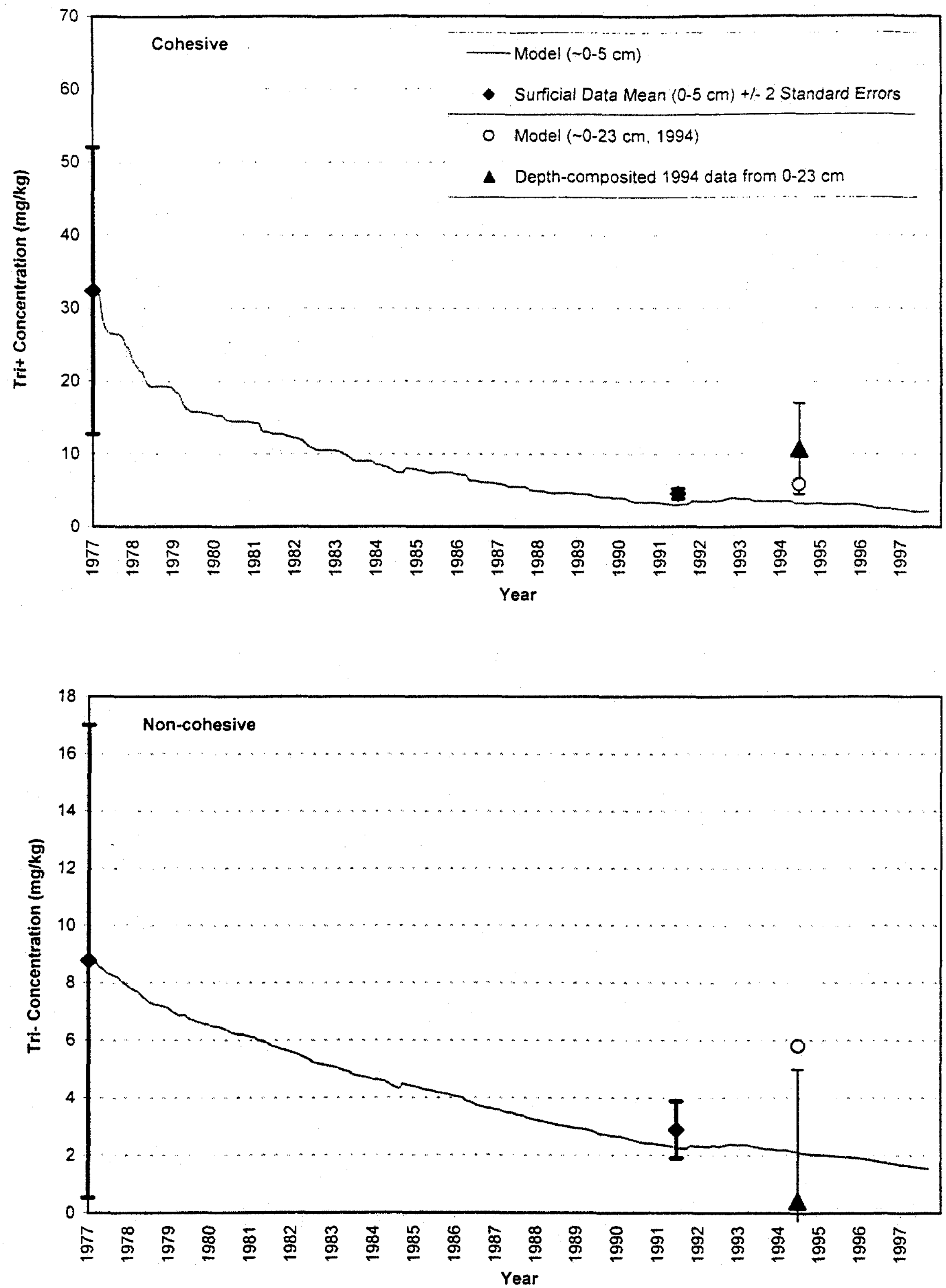


Figure 7-15c. Comparison Between Computed and Observed (Surficial and Depth-Composited) Sediment Tri+ Concentrations for Stillwater Reach.

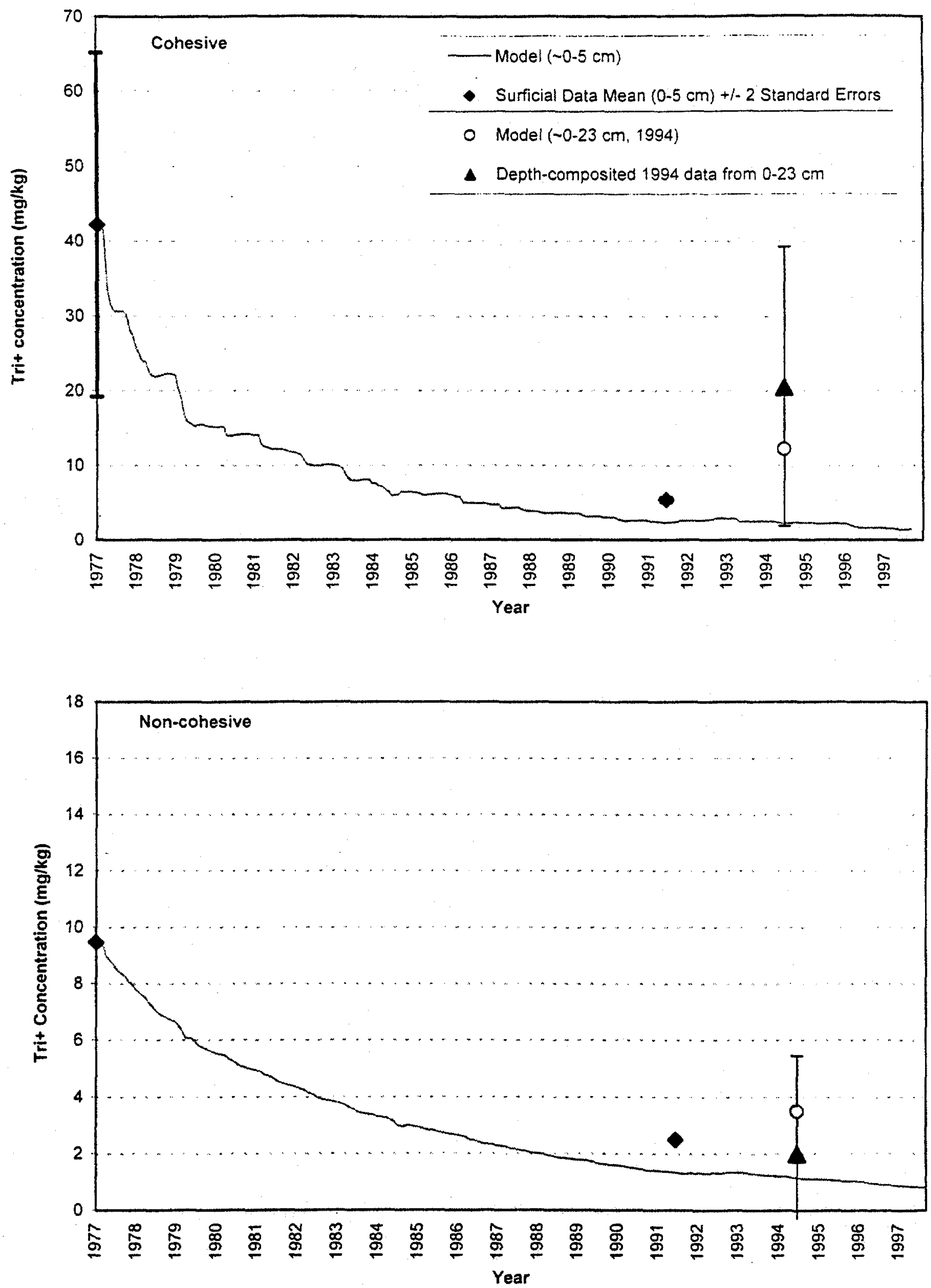


Figure 7-15d. Comparison Between Computed and Observed (Surficial and Depth-Composited) Sediment Tri+ Concentrations for Waterford Reach.

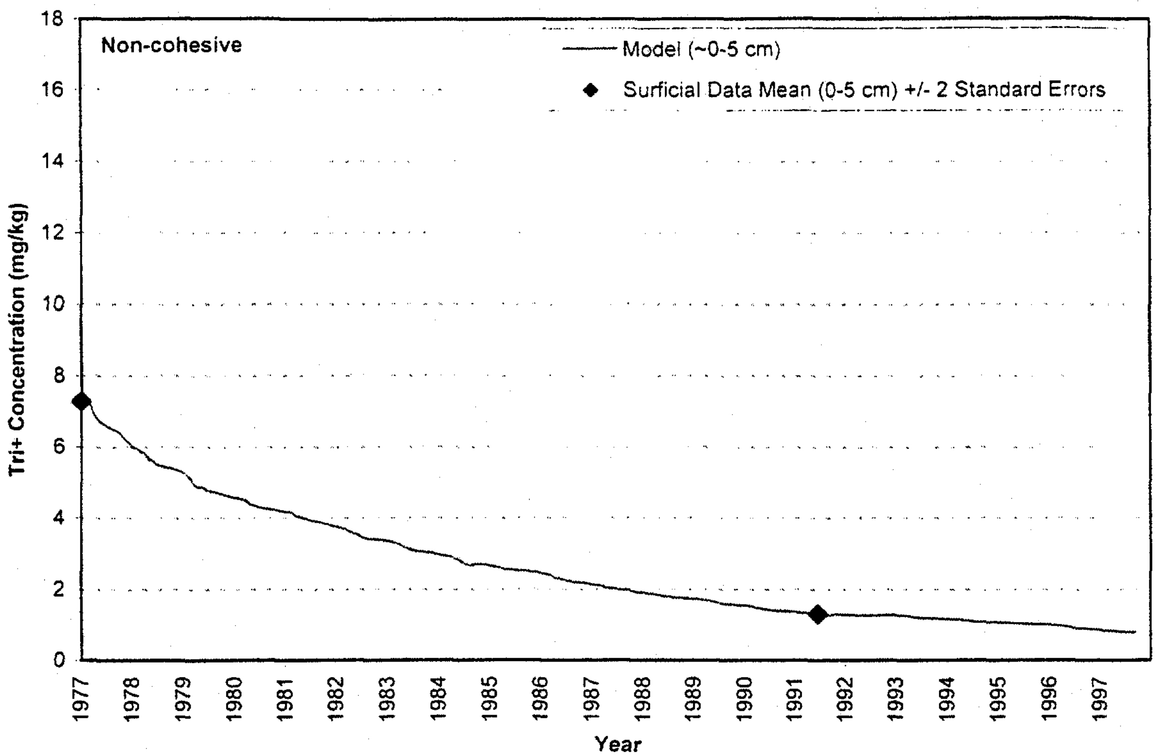
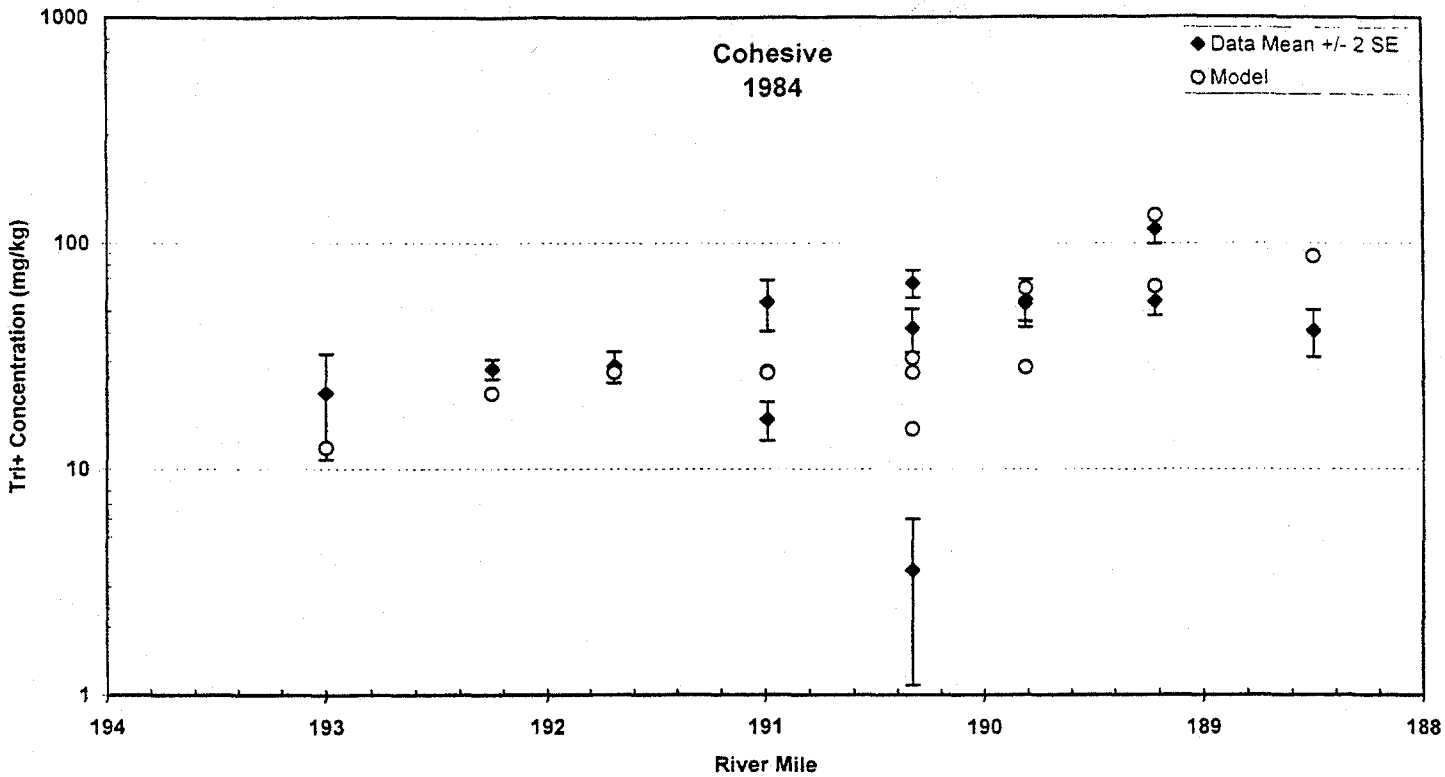


Figure 7-15e. Comparison Between Computed and Observed (Surficial and Depth-Composited) Sediment Tri+ Concentrations for Federal Dam Reach.



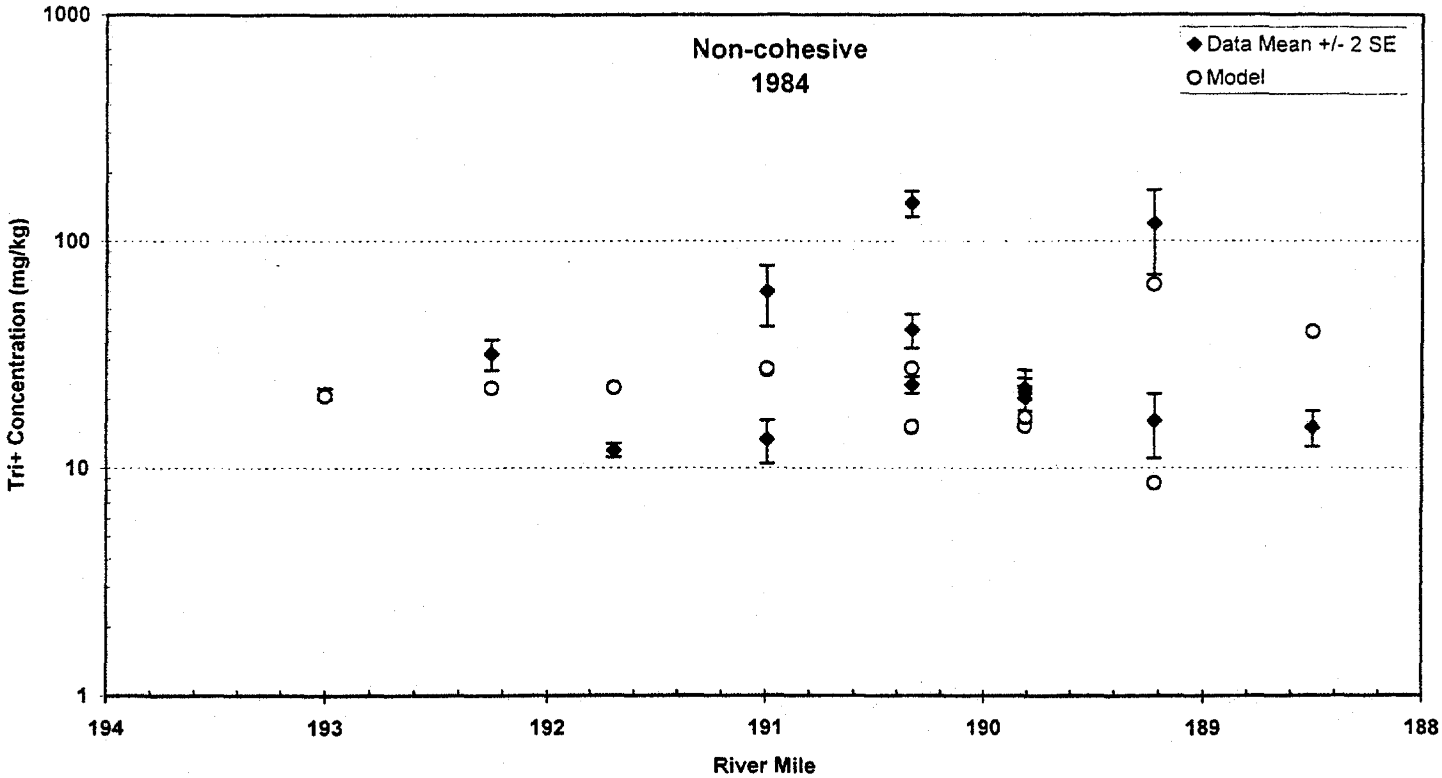


Figure 7-16. Comparison Between Computed and Observed Depth-Averaged Sediment Tri+ Concentrations in Thompson Island Pool in 1984.

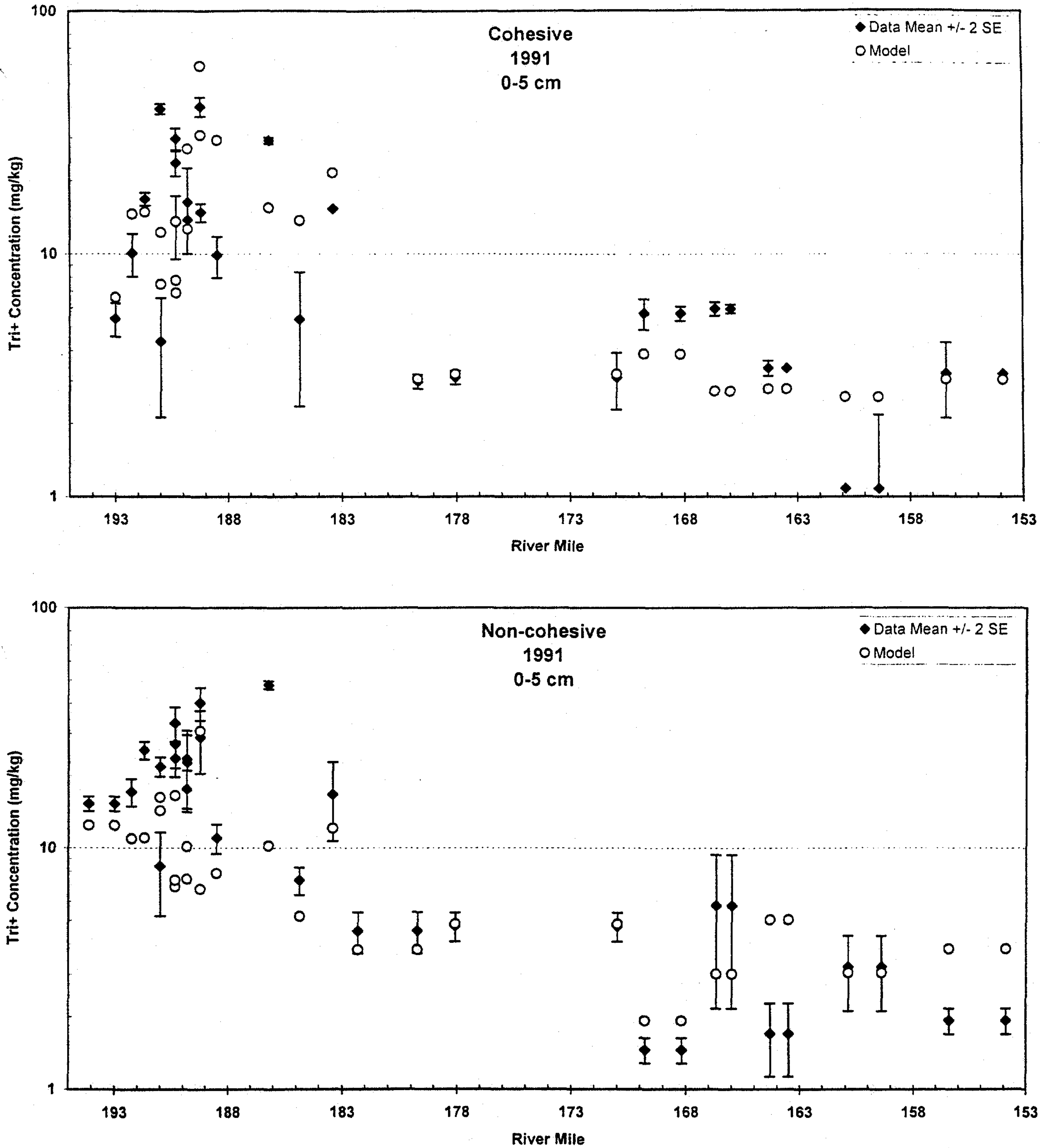


Figure 7-17. Comparison Between Computed and Observed Depth-Averaged (0-5 cm) Sediment Tri+ Concentrations From Fort Edward to Federal Dam in 1991.

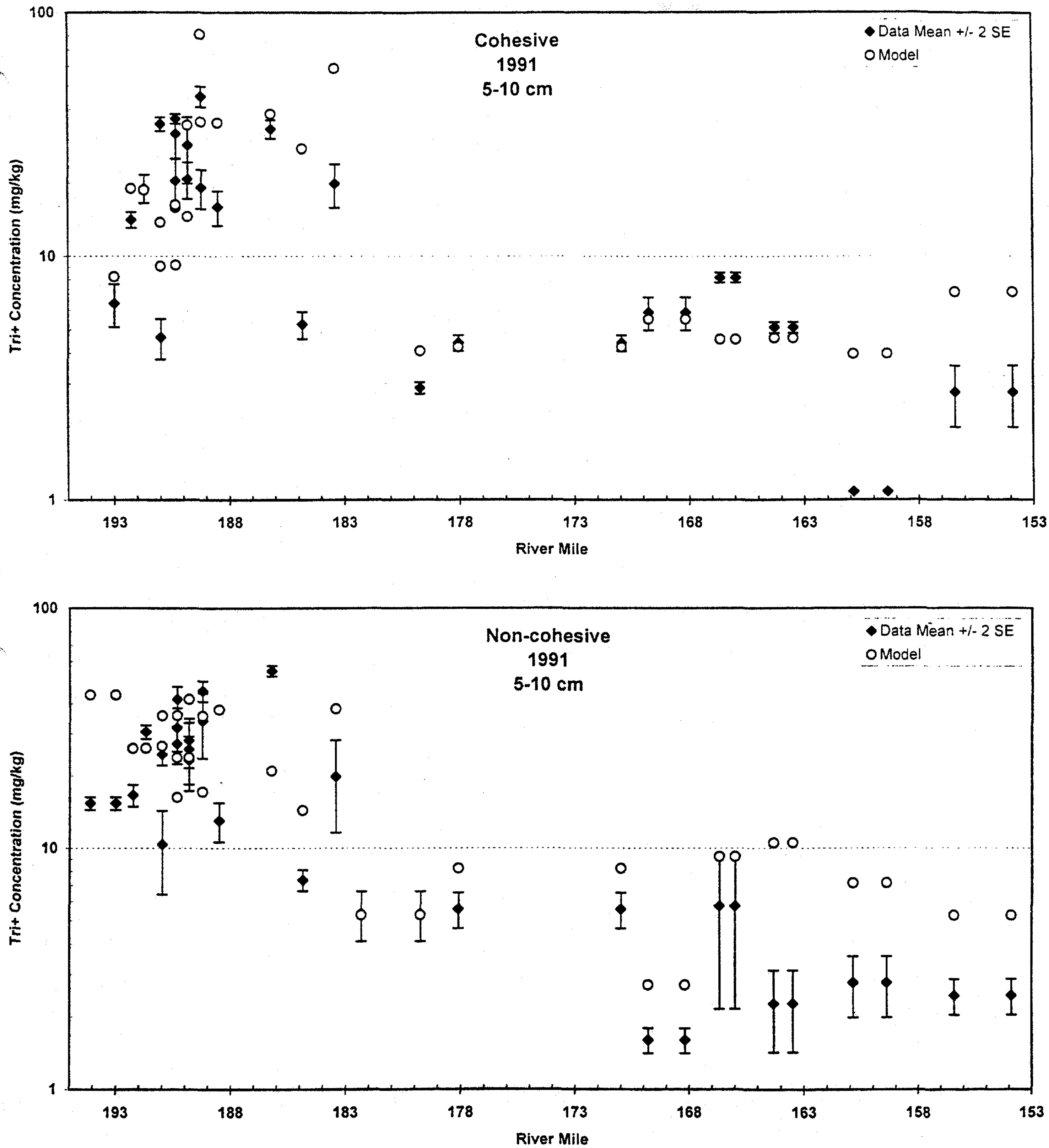


Figure 7-18. Comparison Between Computed and Observed Depth-Averaged (5-10 cm) Sediment Tri+ Concentrations From Fort Edward to Federal Dam in 1991.

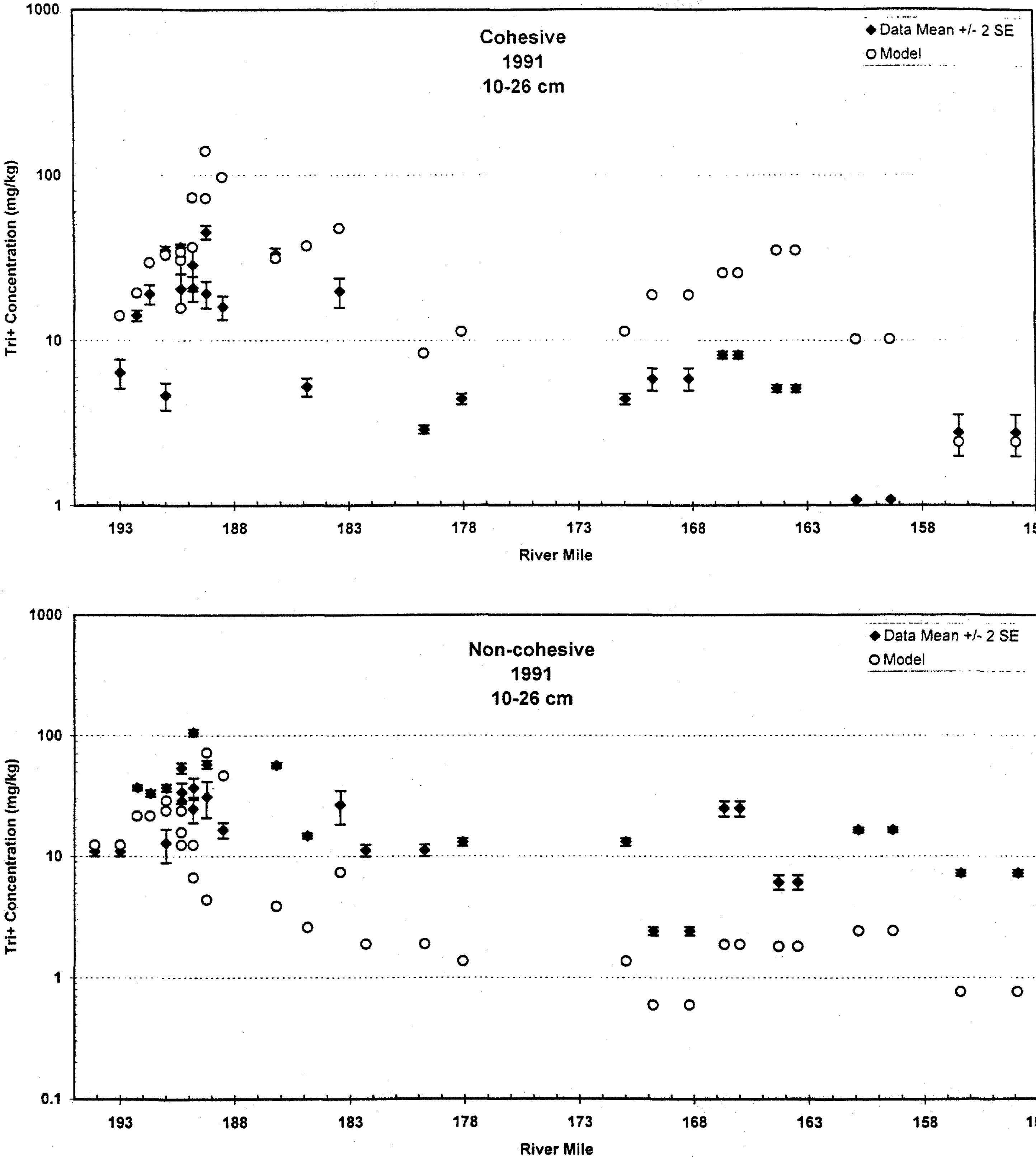


Figure 7-19. Comparison Between Computed and Observed Depth-Averaged (10-26 cm) Sediment Tri+ Concentrations From Fort Edward to Federal Dam in 1991.

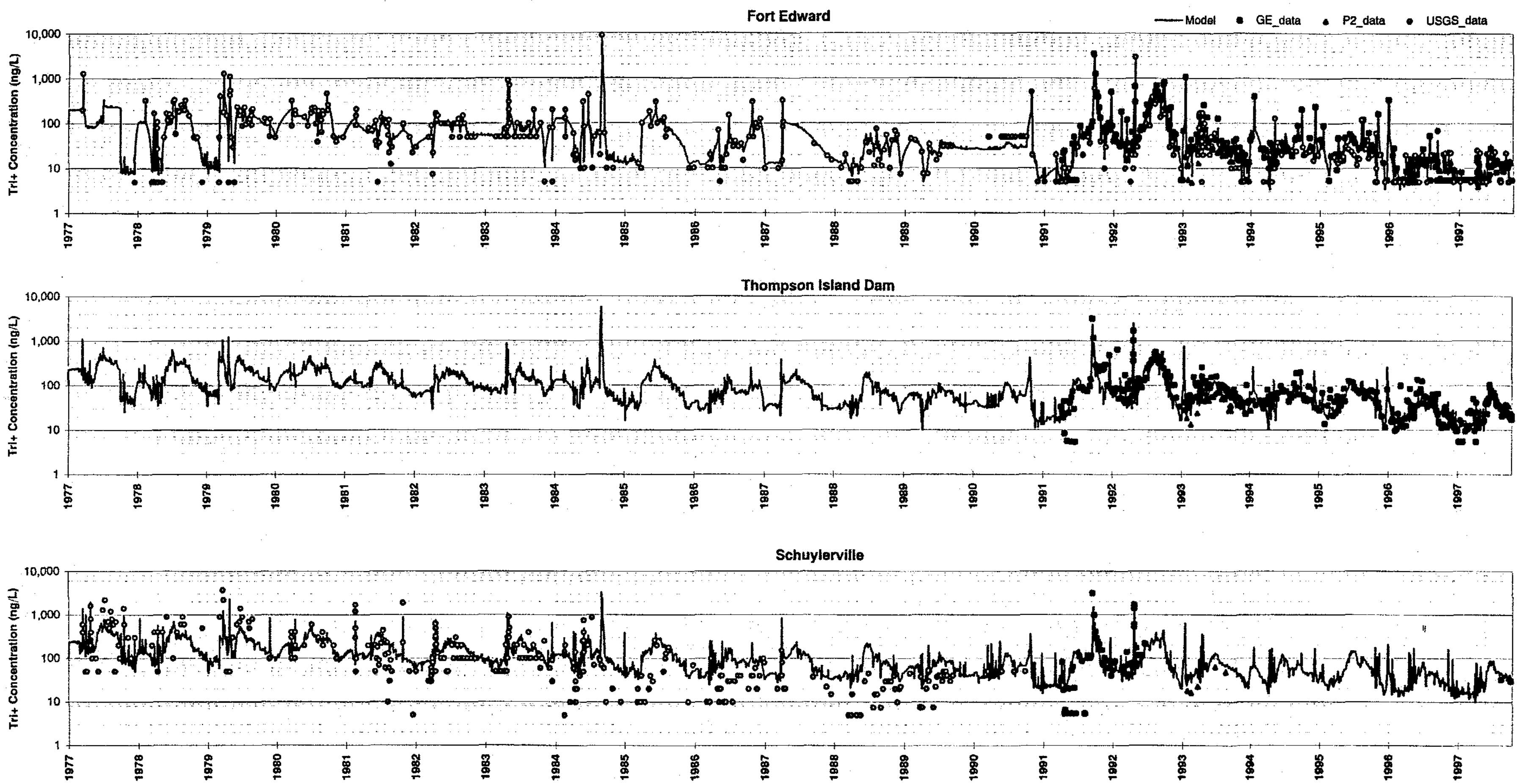


Figure 7-20a. Comparison Between Computed and Observed Tri+ Concentrations at Mainstem Stations.

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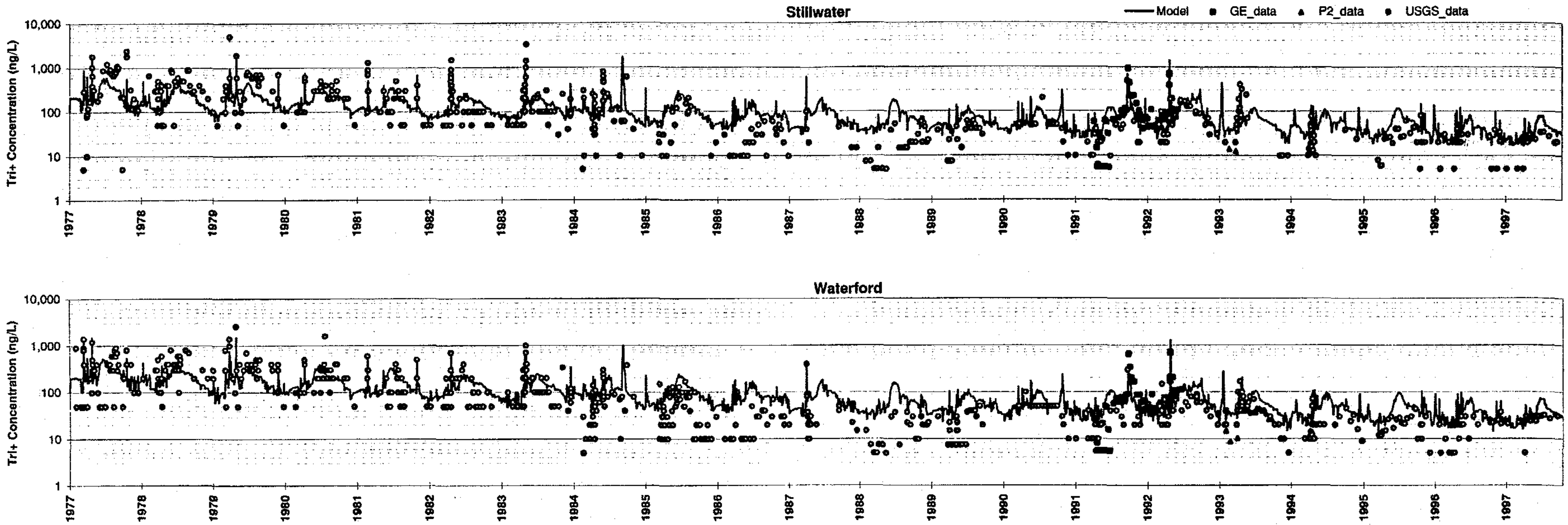

Figure 7-20b. Comparison Between Computed and Observed Tri+ Concentrations at Mainstem Stations.

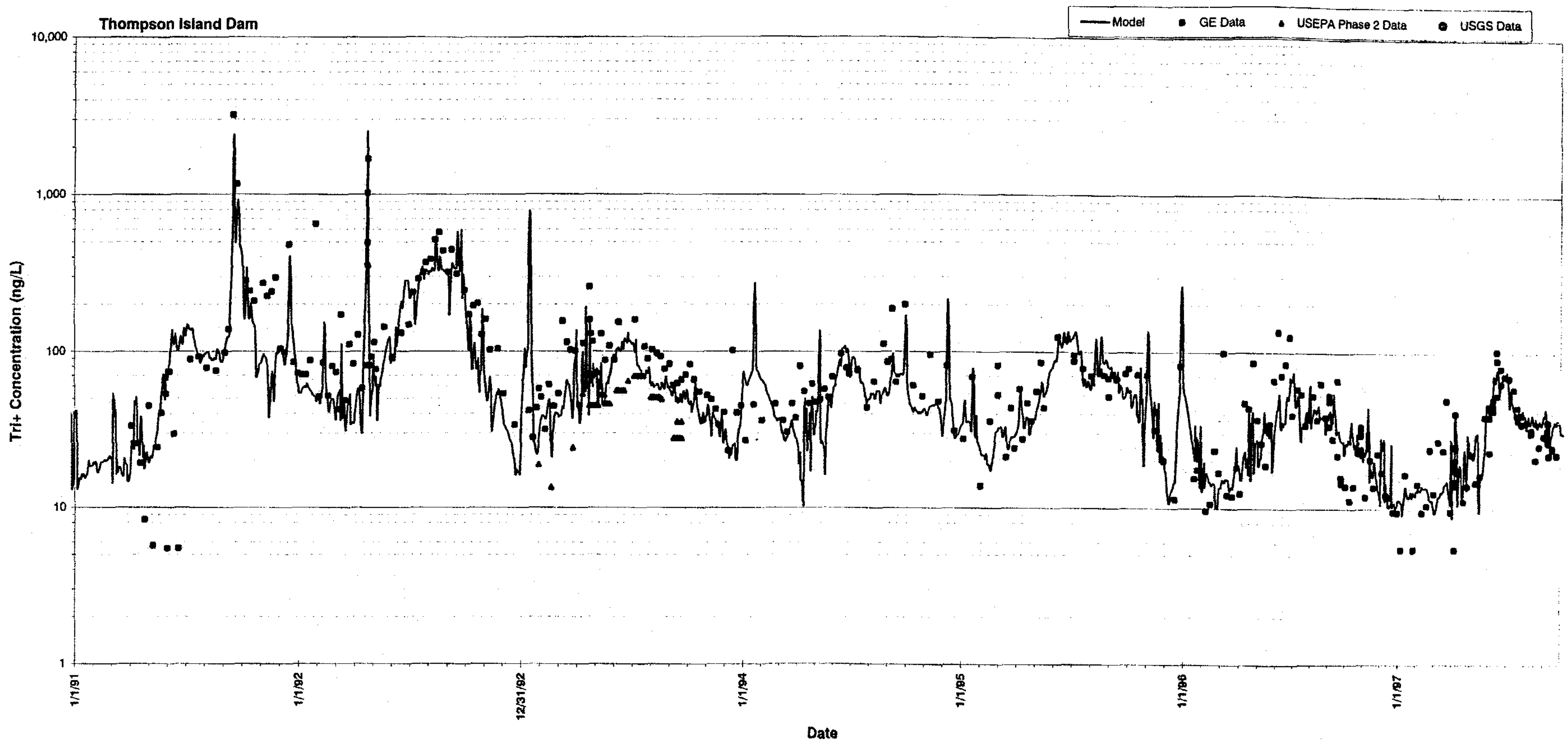

Figure 7-20c. Comparison Between Computed and Observed Tri+ Concentrations at Thompson Island Dam, 1991-1997.

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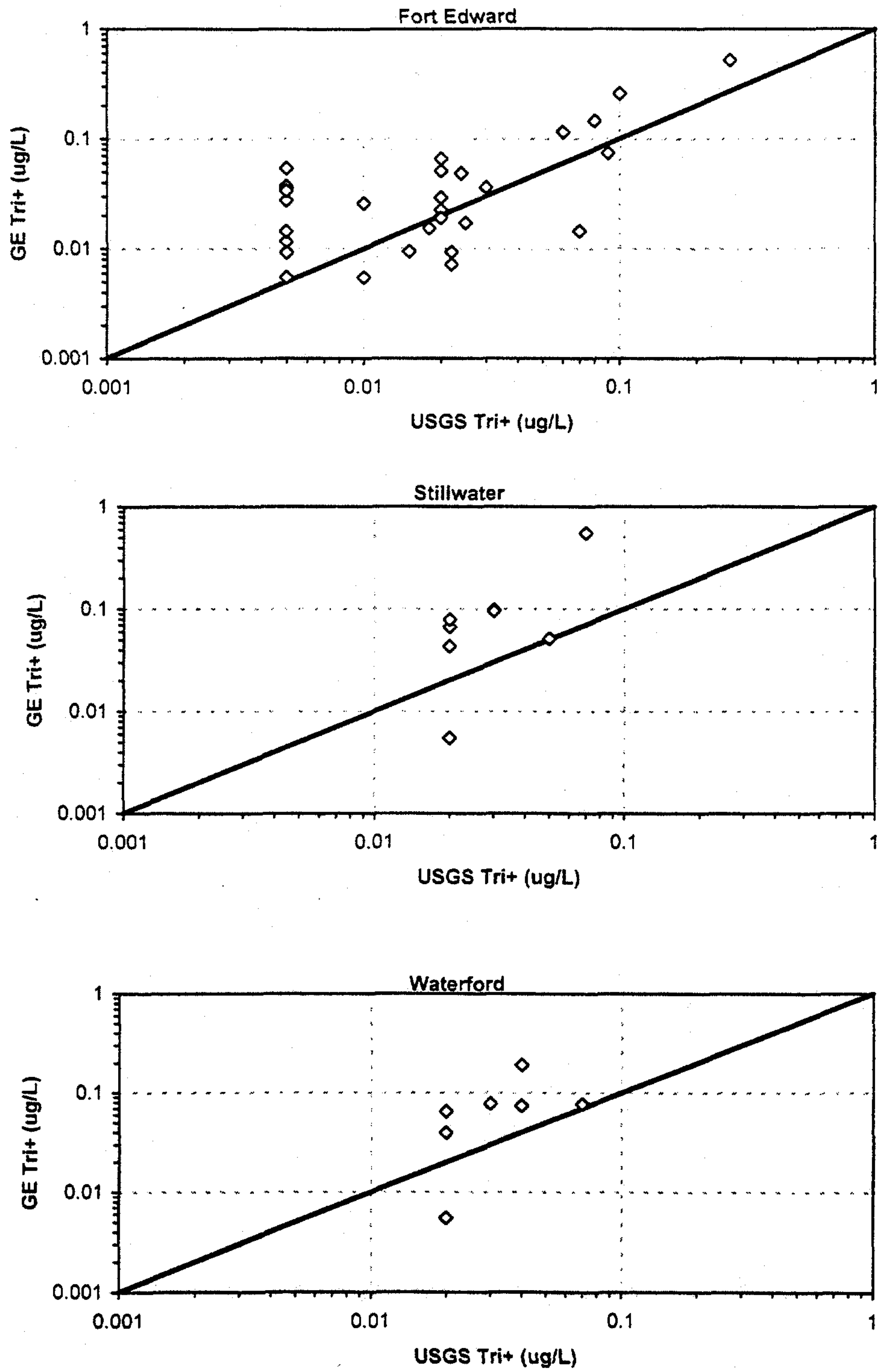
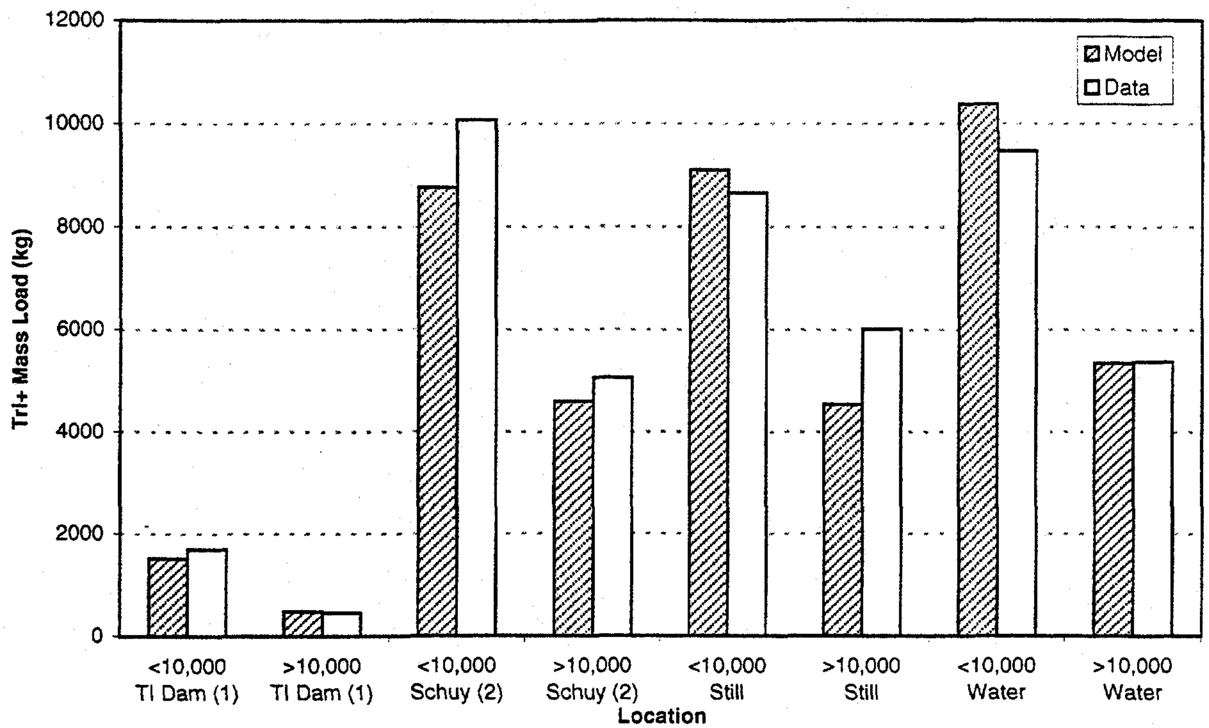
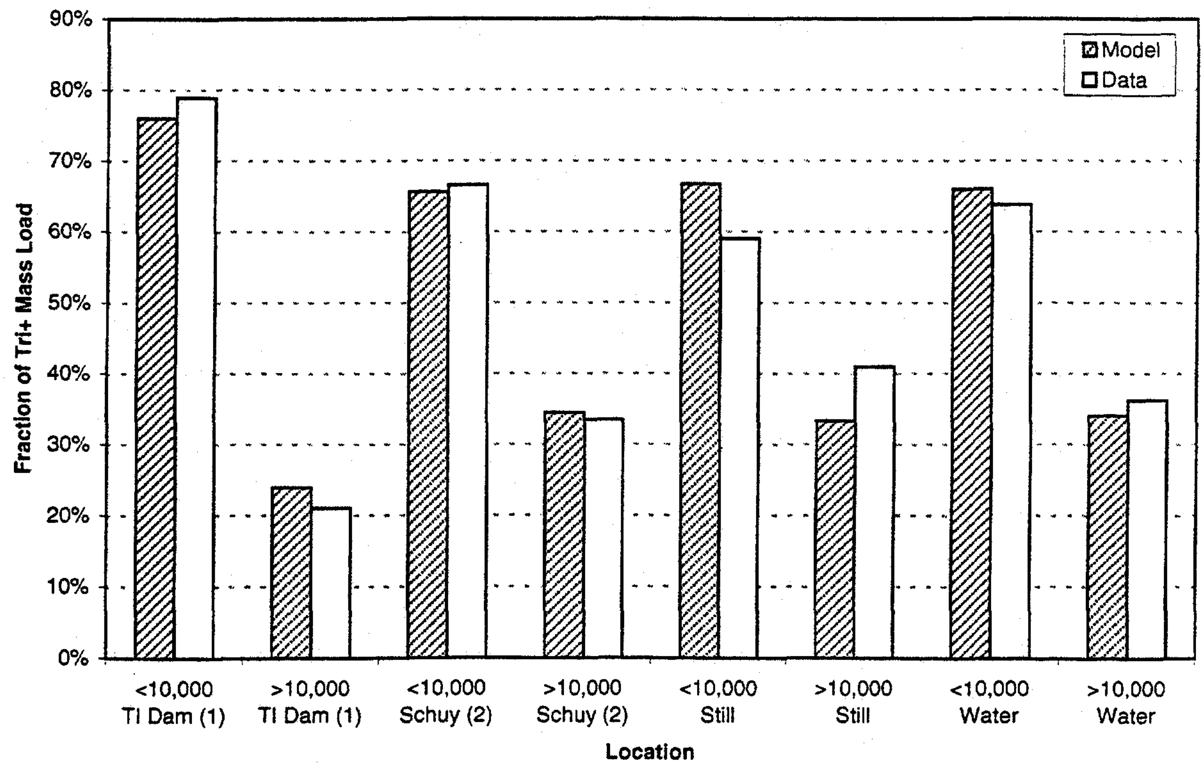


Figure 7-21. Comparisons of Same Day Tri+ Concentration Data by Source at Fort Edward, Stillwater and Waterford.



(1) TI Dam was evaluated over the period of 1/1/91 - 9/30/97.
(2) Schuylerville was evaluated over the period 1/1/77-12/31/92.



(1) TI Dam was evaluated over the period of 1/1/91 - 9/30/97.
(2) Schuylerville was evaluated over the period 1/1/77-12/31/92.

Figure 7-22. Comparison Between Model Estimated and Data Estimated In-River Tri+ Loadings from 1977-1997 Stratified by Fort Edward Flow at 10,000 cfs.

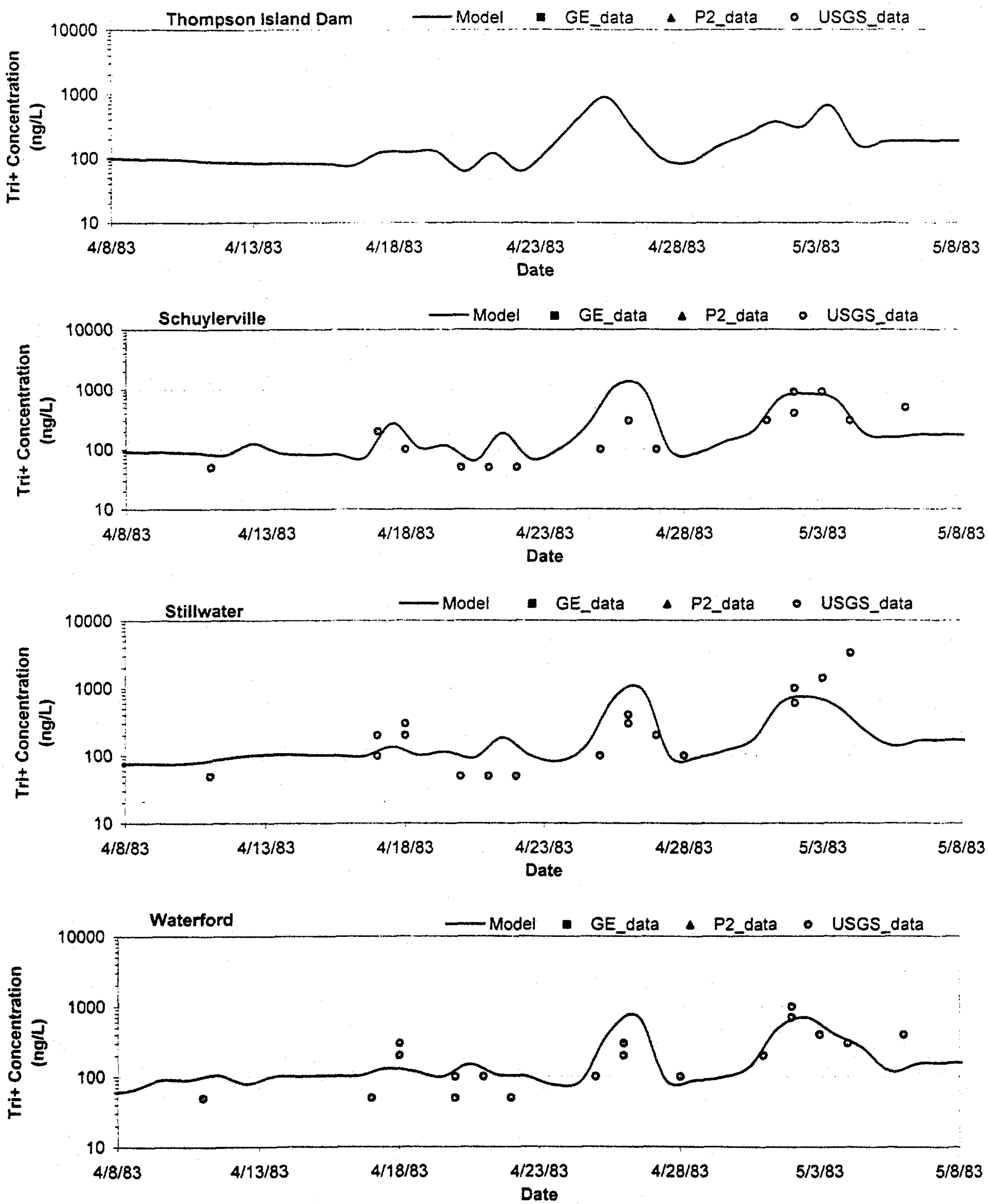


Figure 7-23. Comparison Between Computed and Observed Tri+ Concentrations for the Spring 1983 High Flow Event.

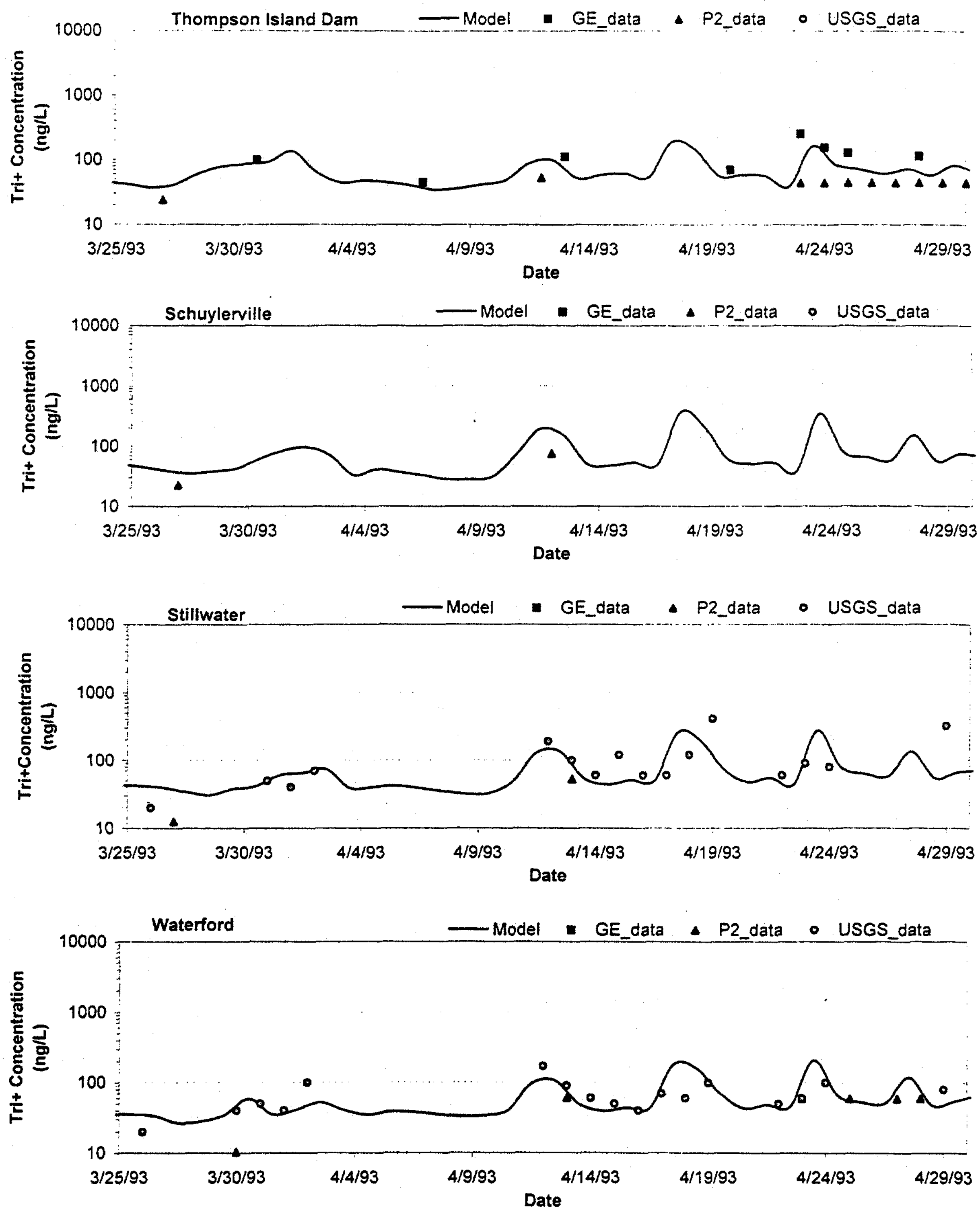


Figure 7-24. Comparison Between Computed and Observed Tri+ Concentrations for the Spring 1993 High Flow Event.

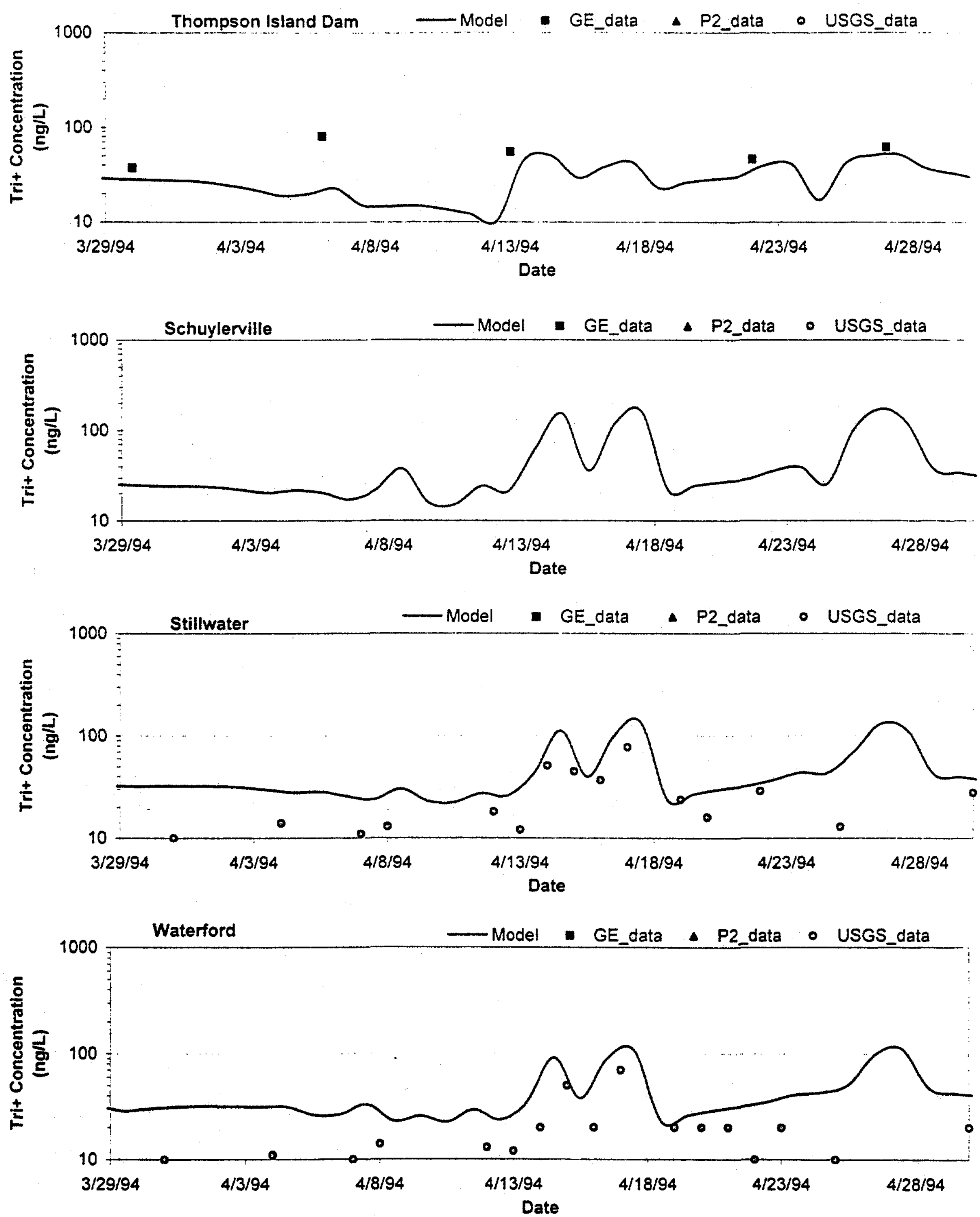


Figure 7-25. Comparison Between Computed and Observed Tri+ Concentrations for the Spring 1994 High Flow Event.

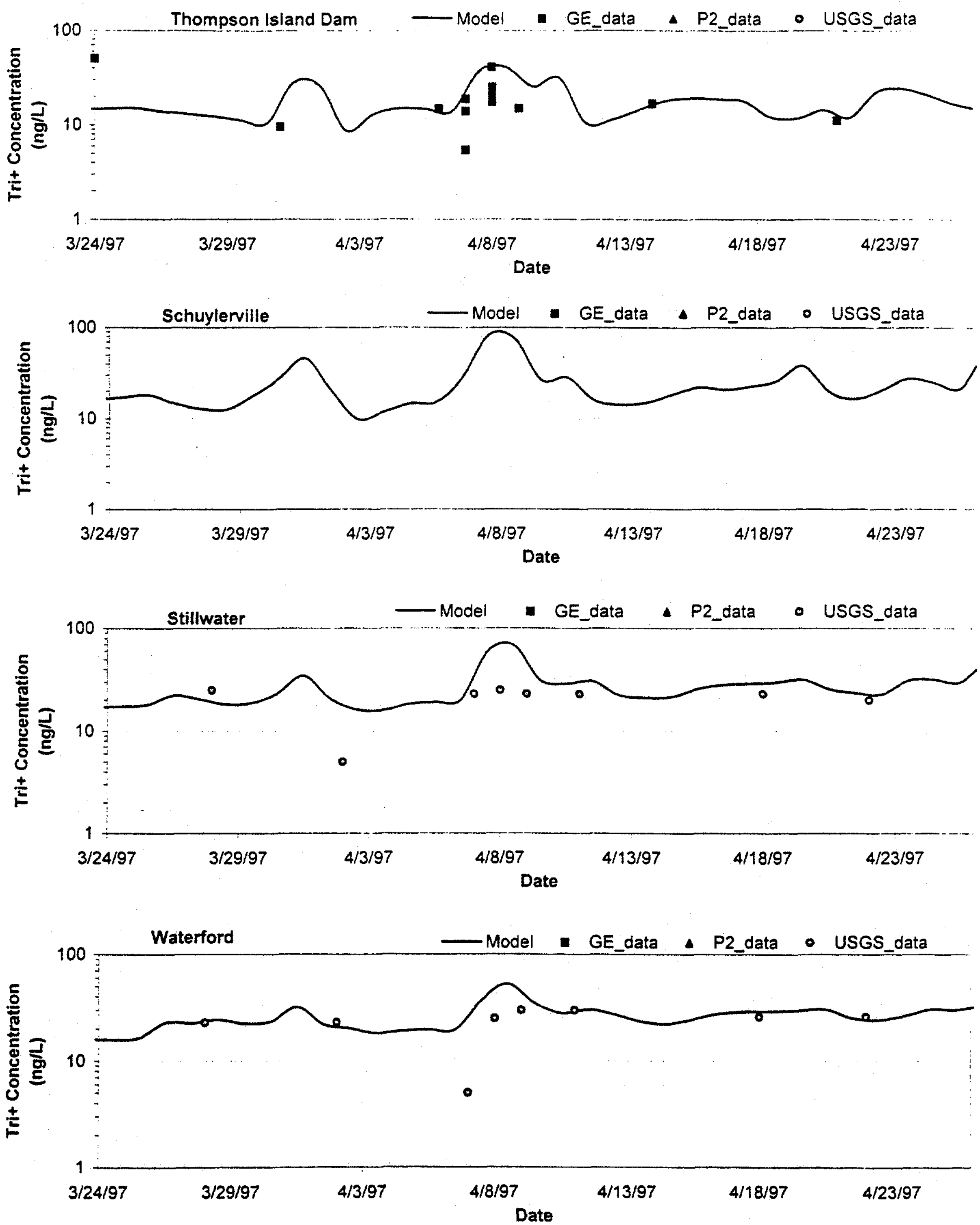


Figure 7-26. Comparison Between Computed and Observed Tri+ Concentrations for the Spring 1997 High Flow Event.

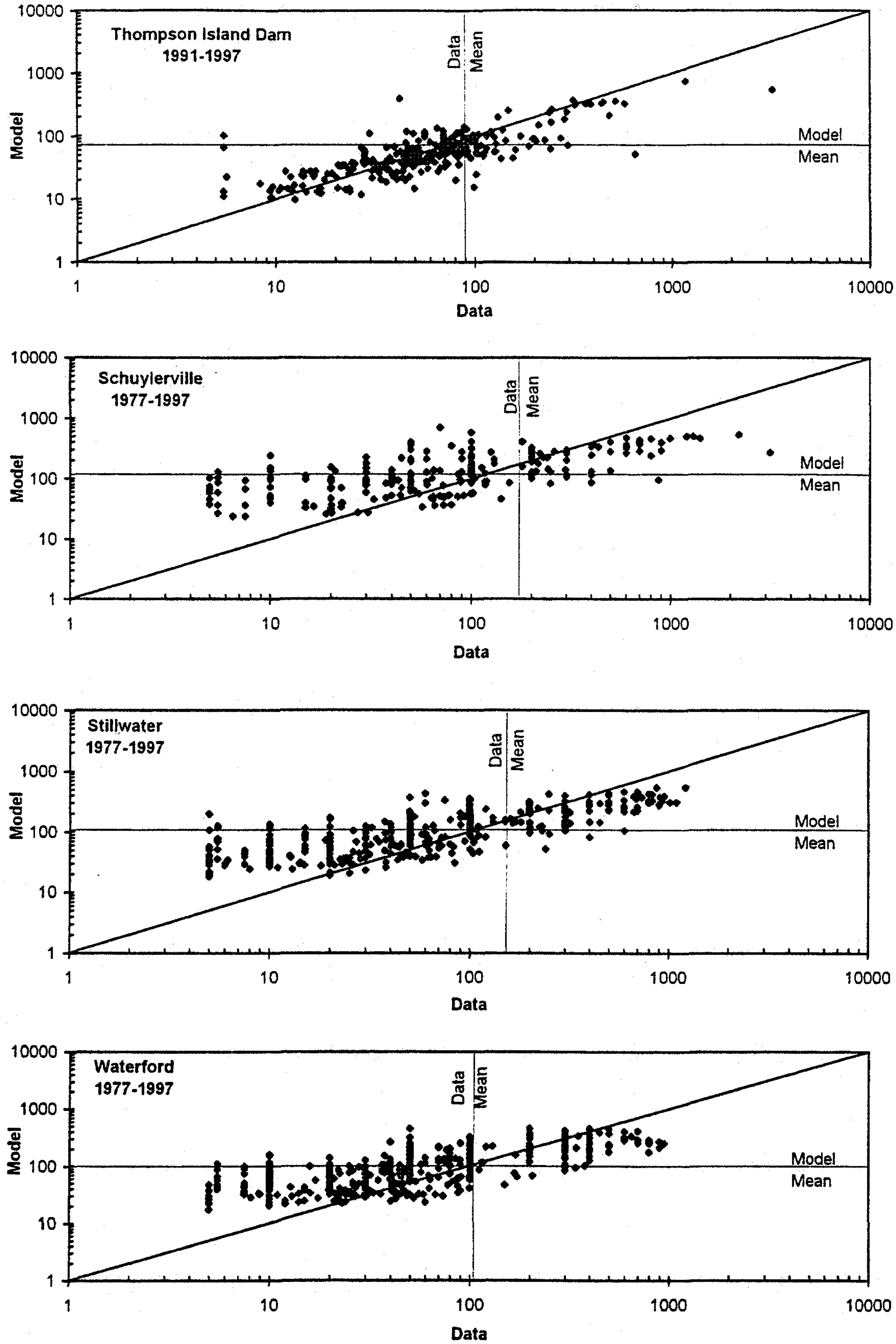


Figure 7-27. Comparison Between Computed and Observed Tri+ Concentrations for Fort Edward Flow Less Than 10,000 cfs.

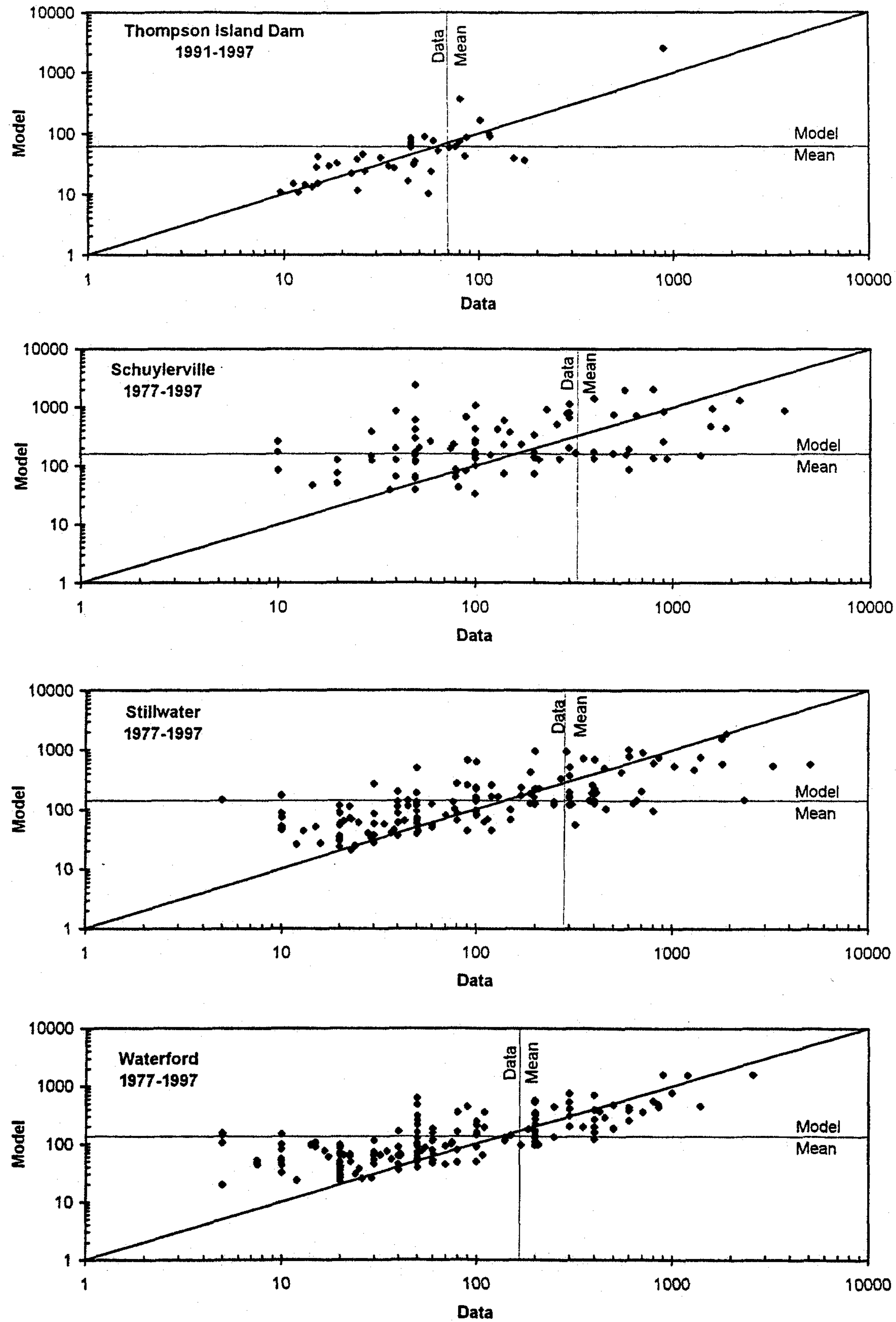


Figure 7-28. Comparison Between Computed and Observed Tri+ Concentrations for Fort Edward Flow Greater Than 10,000 cfs.

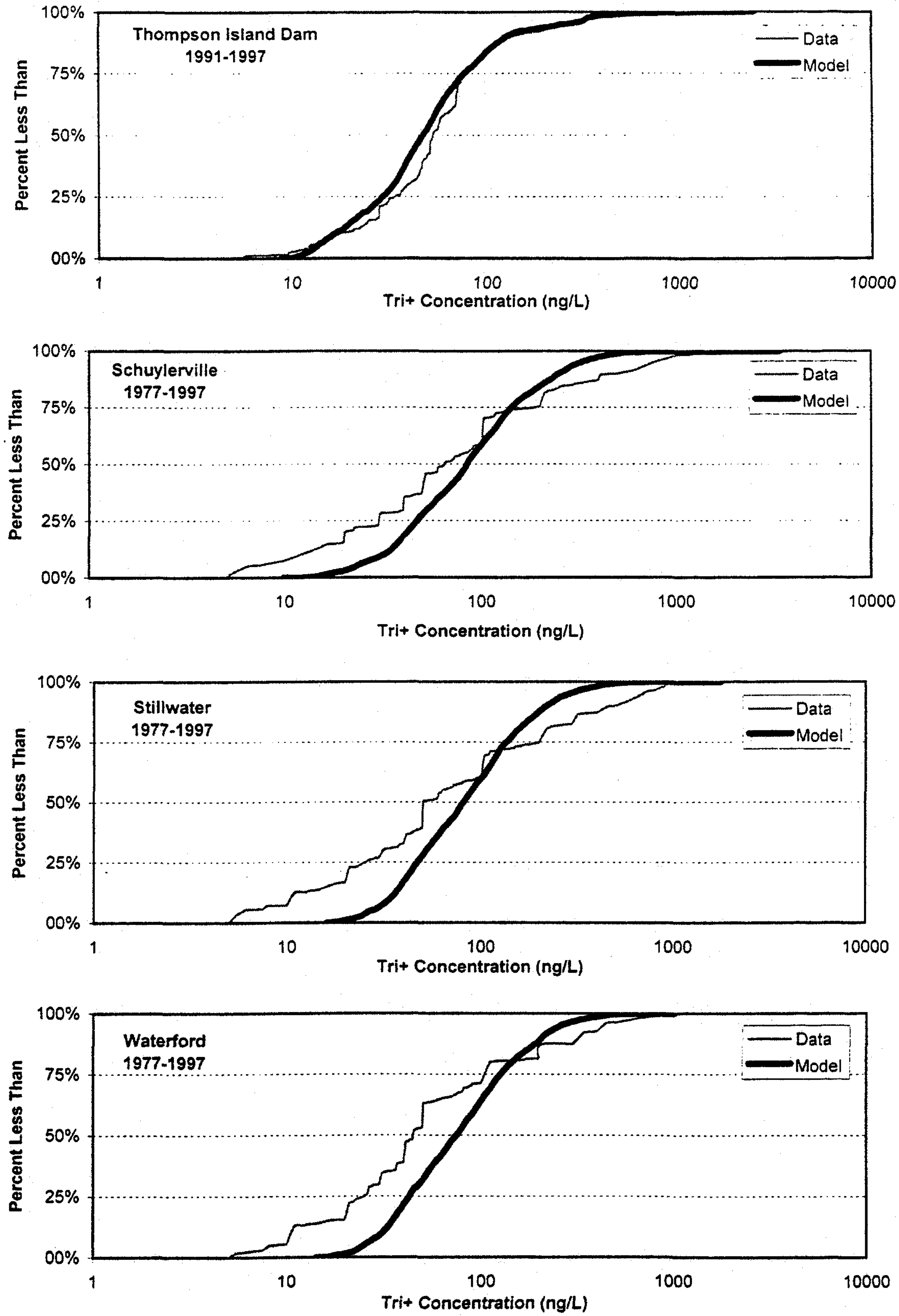


Figure 7-29. Comparison Between Computed and Observed Probability Distributions for Tri+ at Fort Edward Flow Less Than 10,000 cfs.

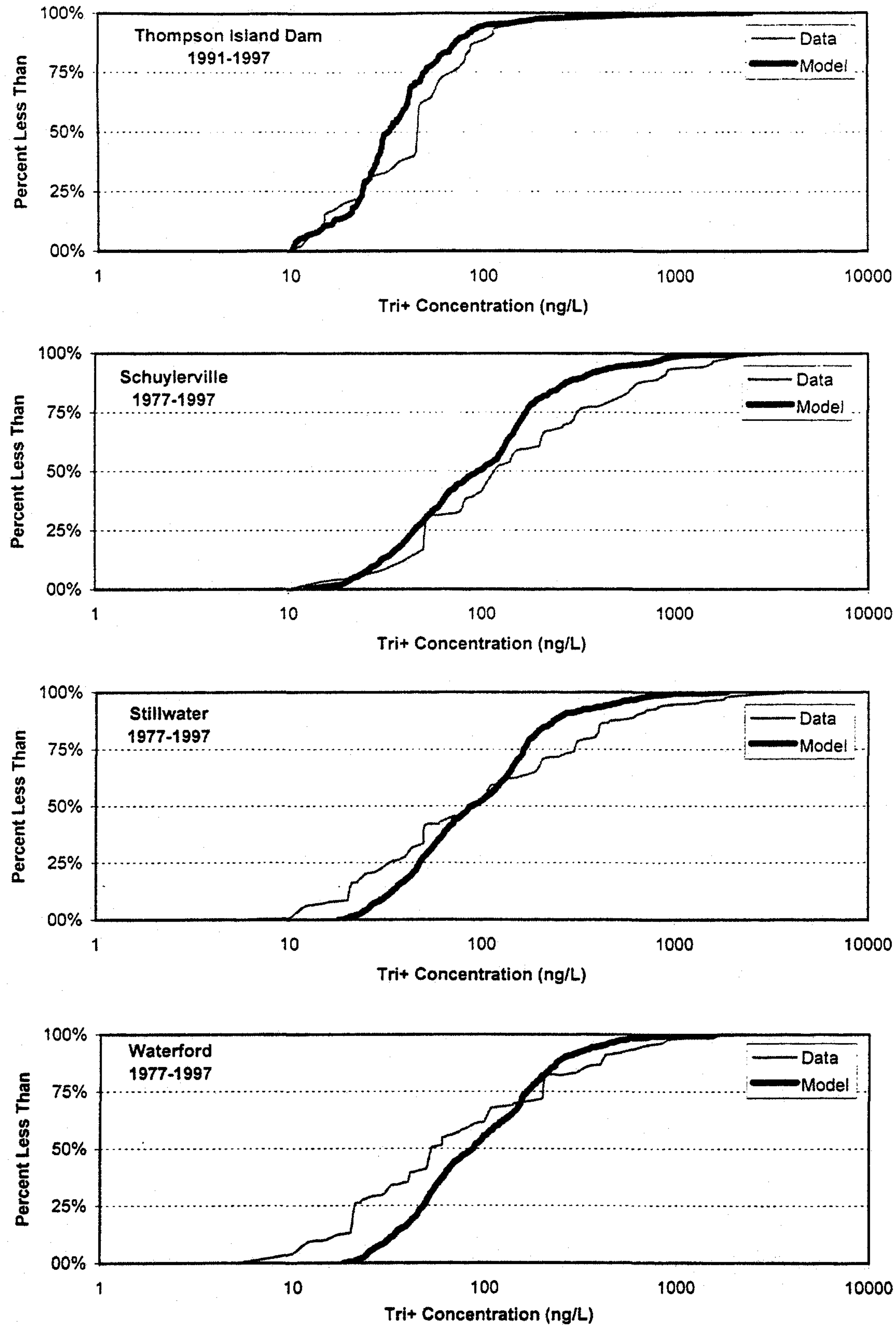


Figure 7-30. Comparison Between Computed and Observed Probability Distributions for Tri+ at Fort Edward Flow Greater Than 10,000 cfs.

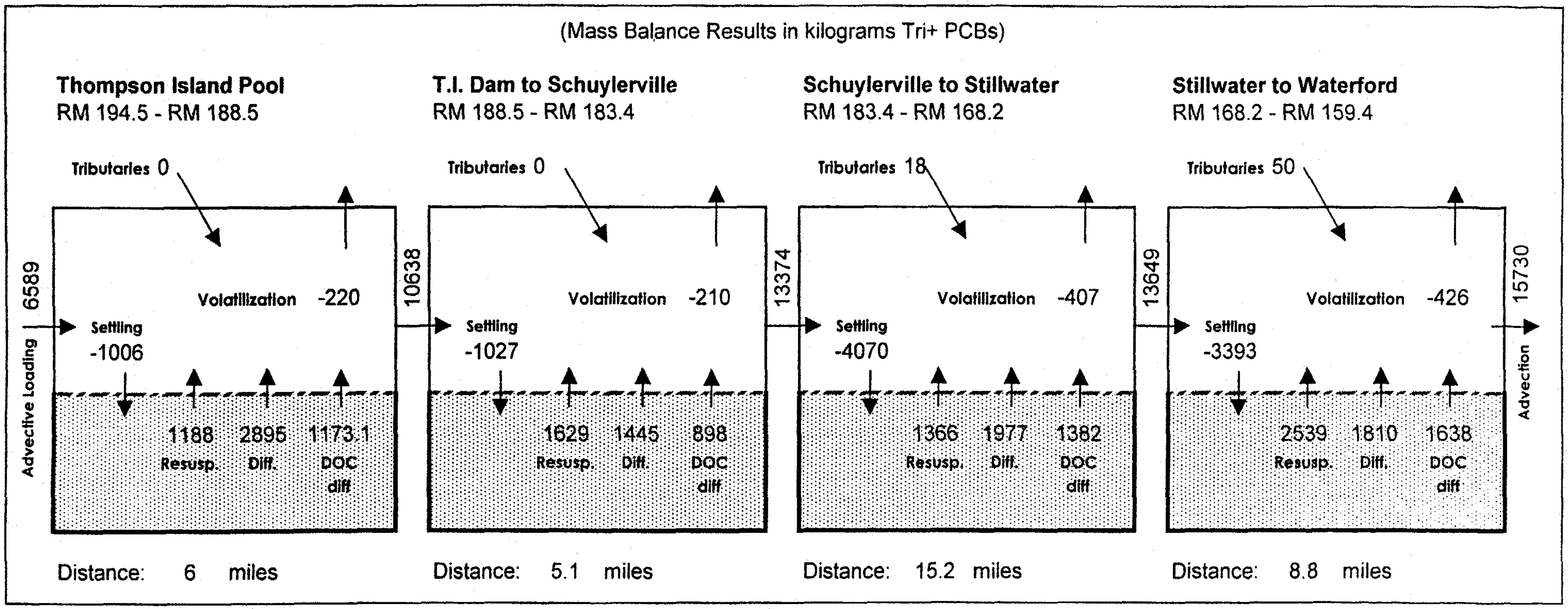


Figure 7-31. Computed Tri+ PCB Mass Balance Components Analysis for 1977-1997.

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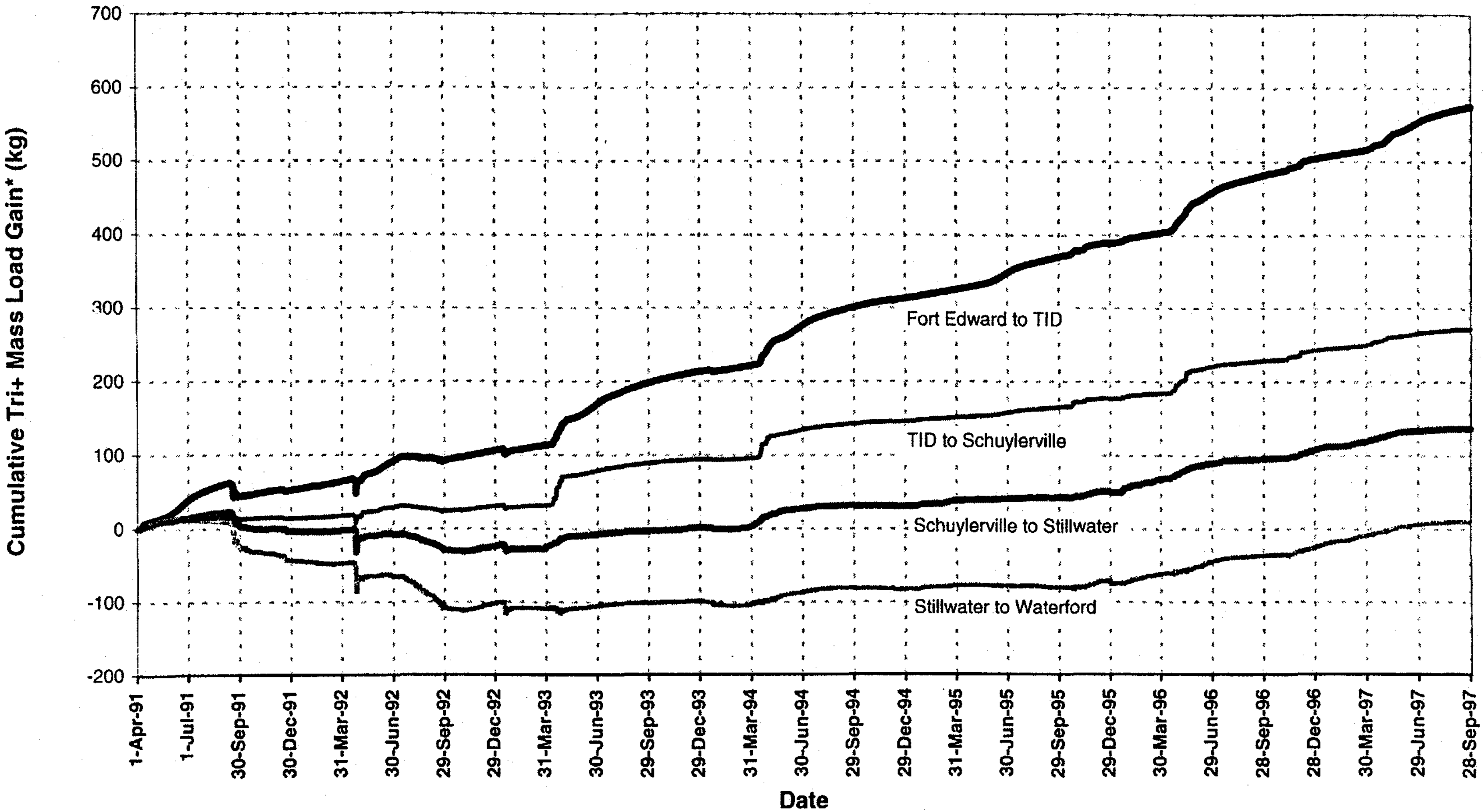


*Load gain by reach computed as: (upstream load + tributary load) - load out - volatilization loss

Figure 7-32. Computed Cumulative Contribution Tri+ Load Gain Between Mainstem Hudson River Sampling Stations from 1991 to 1997.

303620

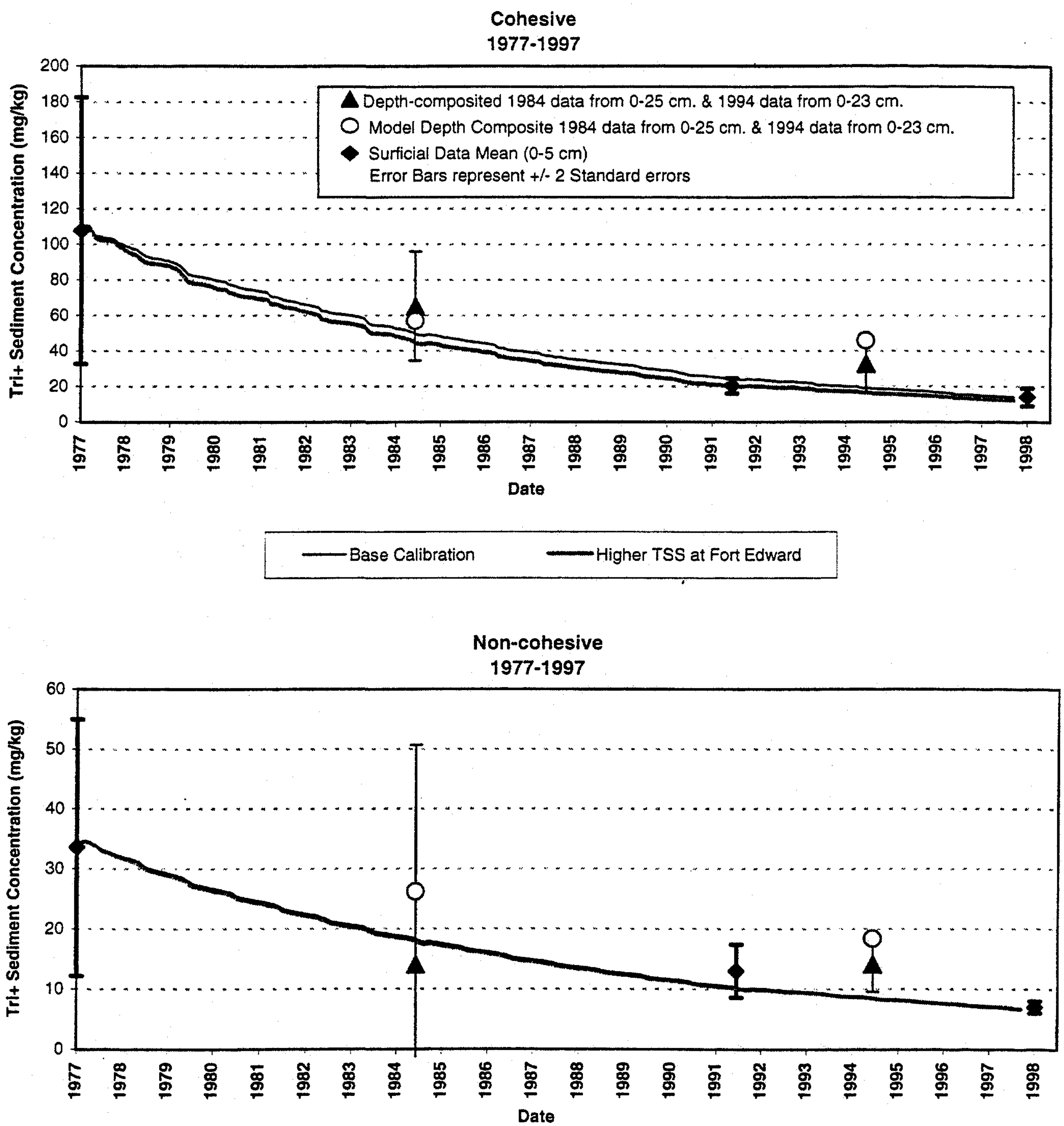


Figure 7-33. Sediment Responses in Thompson Island Pool to Alternate Solids Loads at Fort Edward.

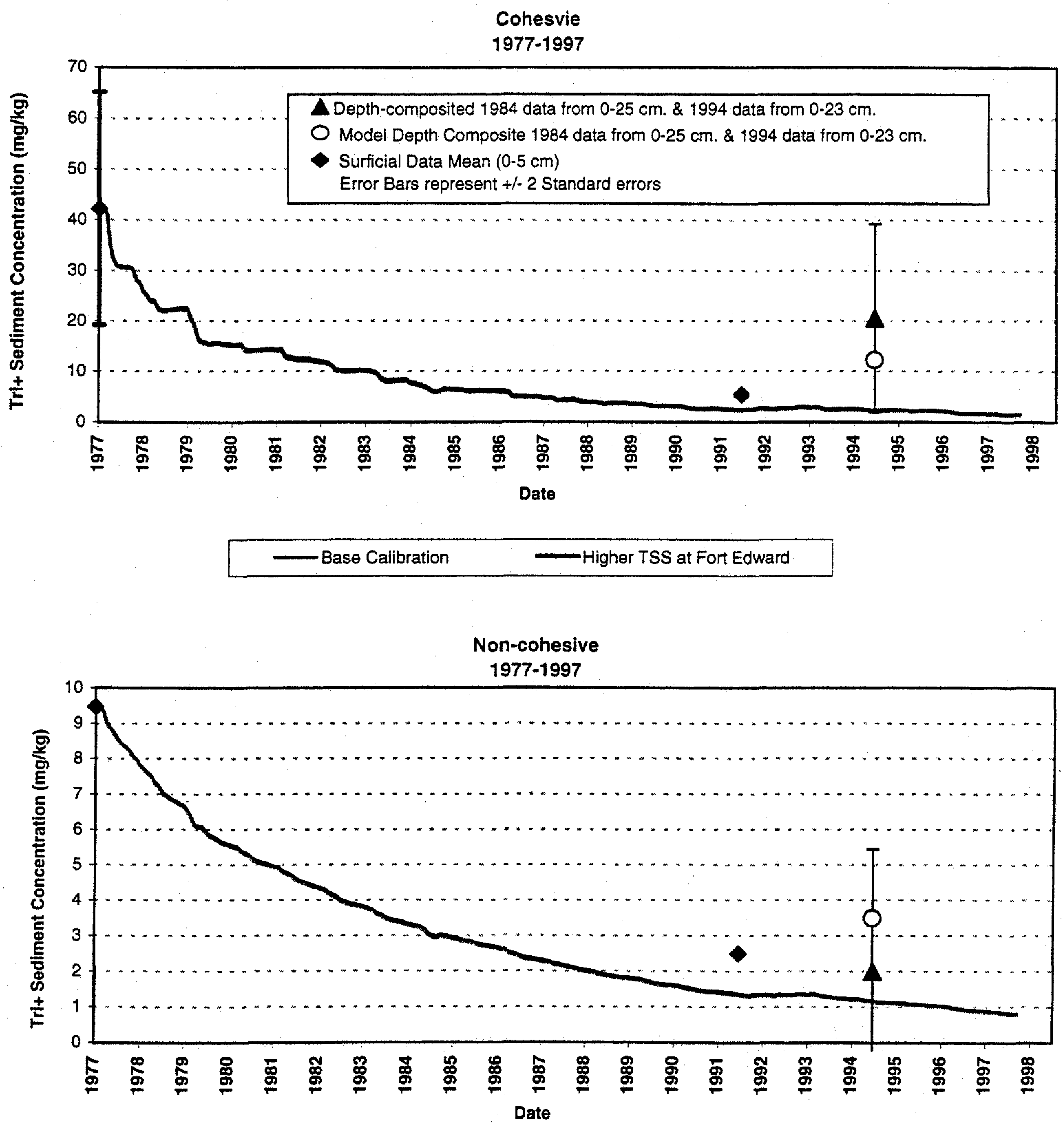


Figure 7-34. Sediment Responses in Waterford to Alternative Solids Loads at Fort Edward.

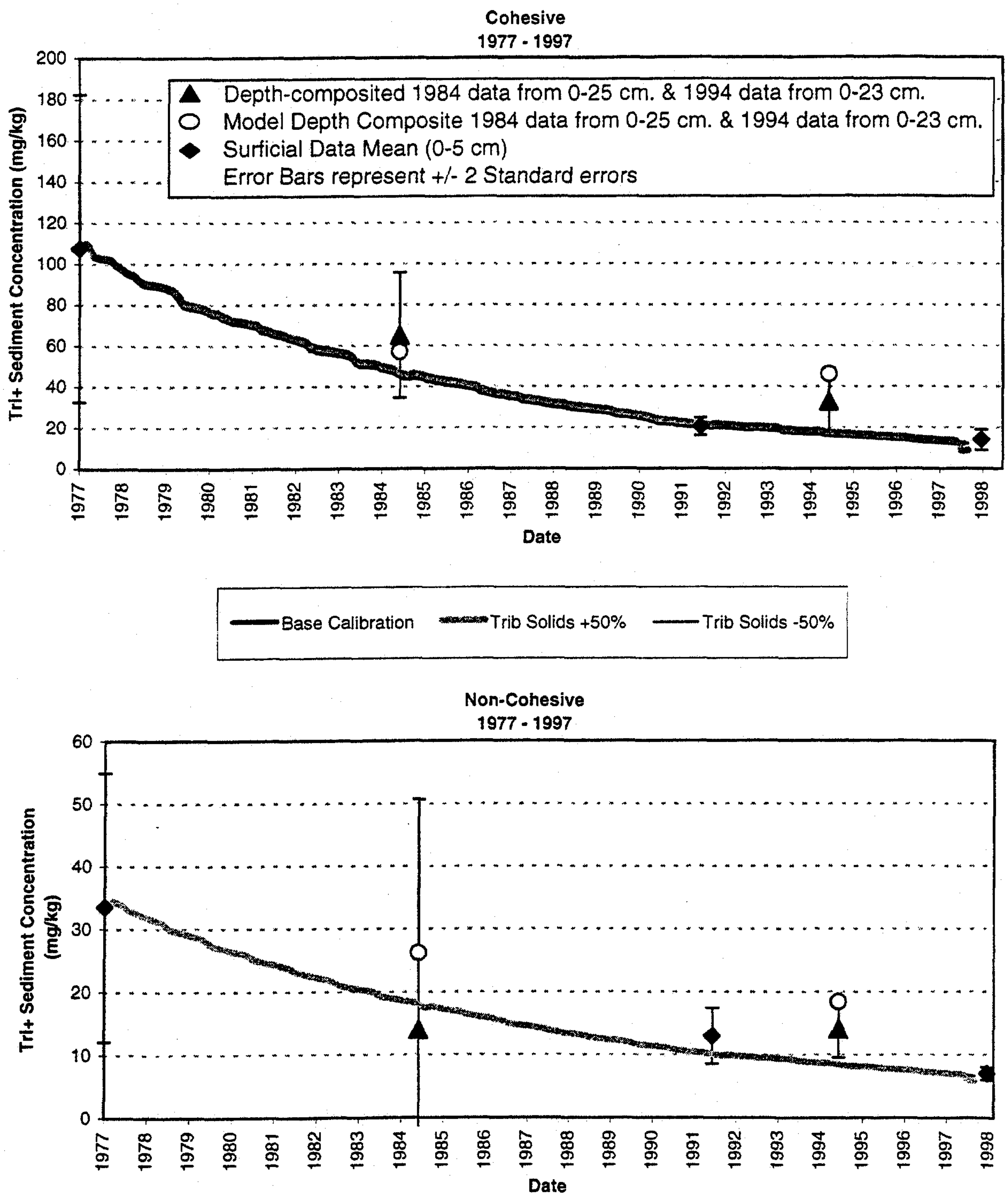


Figure 7-35. Sediment Responses in Thompson Island Pool to Changes in Tributary Solids Loadings.

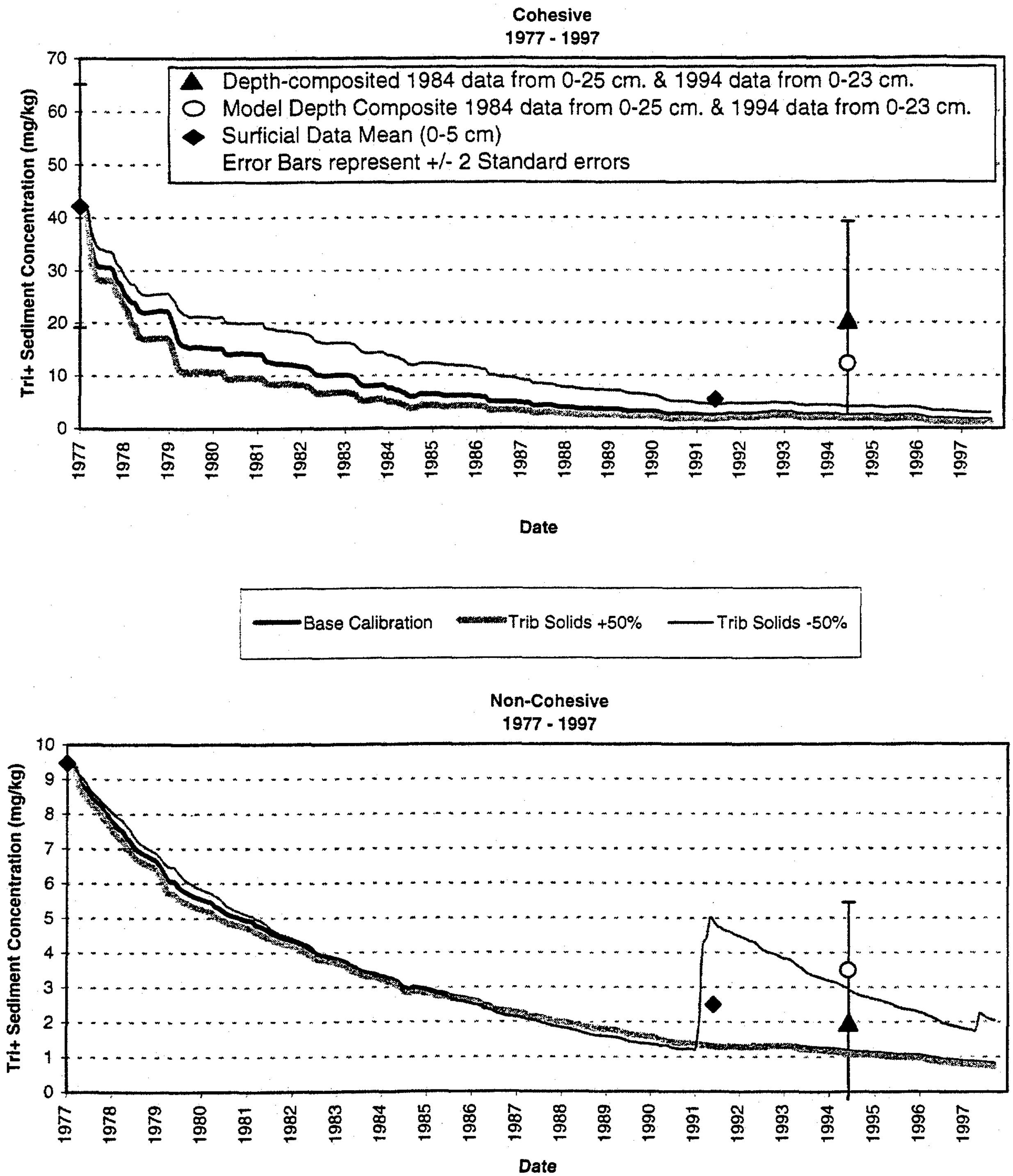


Figure 7-36. Sediment Responses at Waterford to Changes in Tributary Solids Loadings.

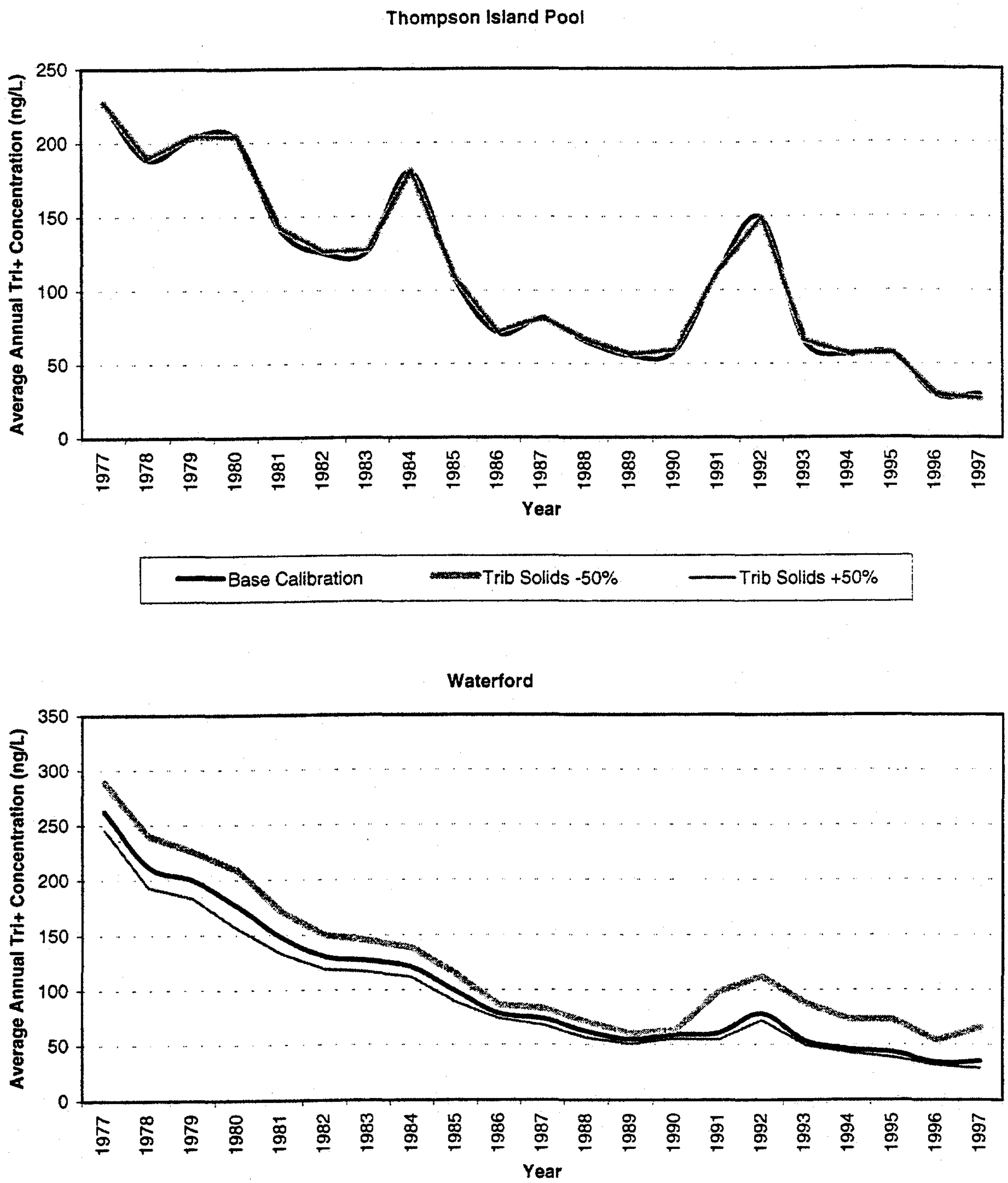


Figure 7-37. Water Column Responses to Changes in Tributary Solids Loadings.

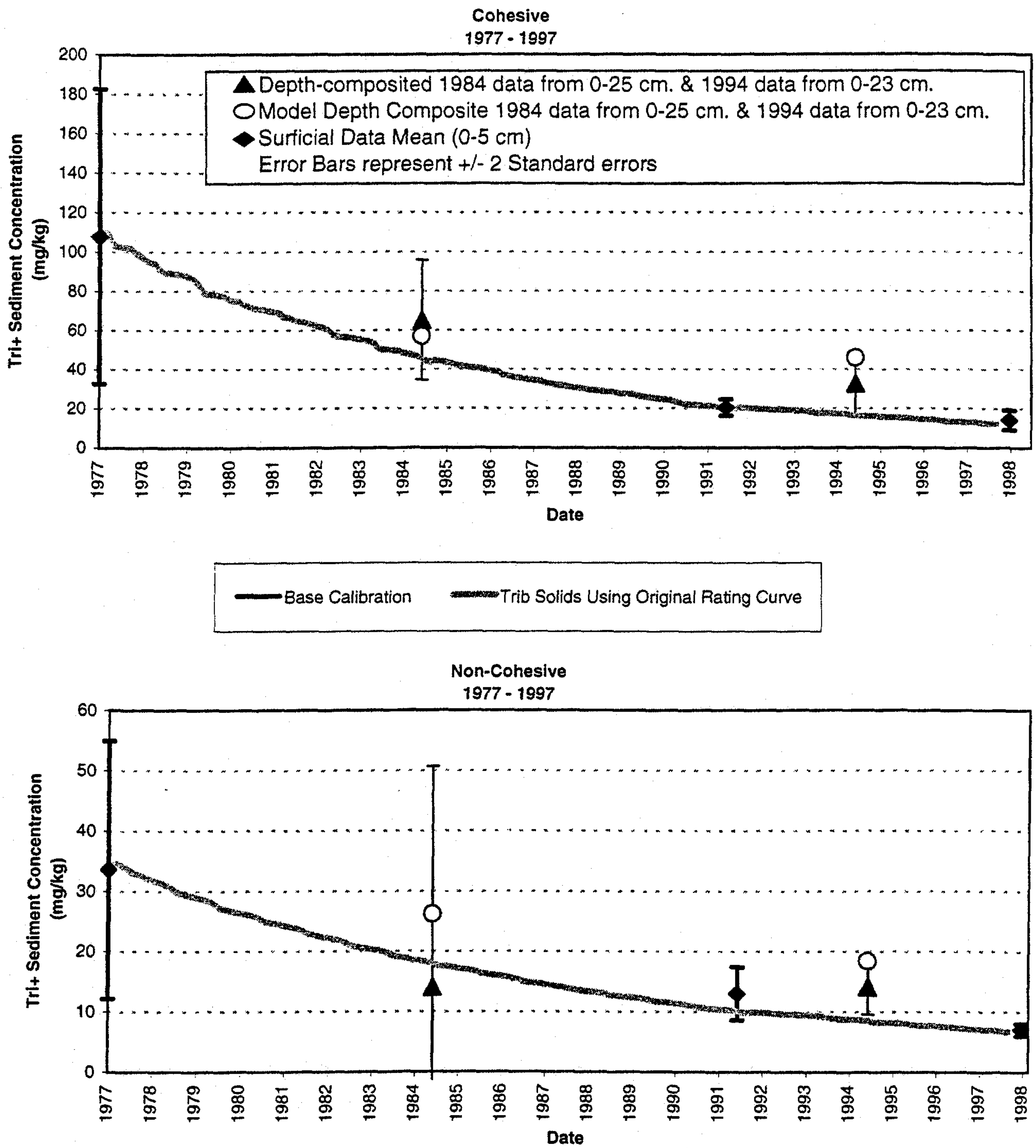


Figure 7-38. Sediment Responses in Thompson Island Pool to Changes in Tributary Solids Loads Due to Specification of Rating Curves.

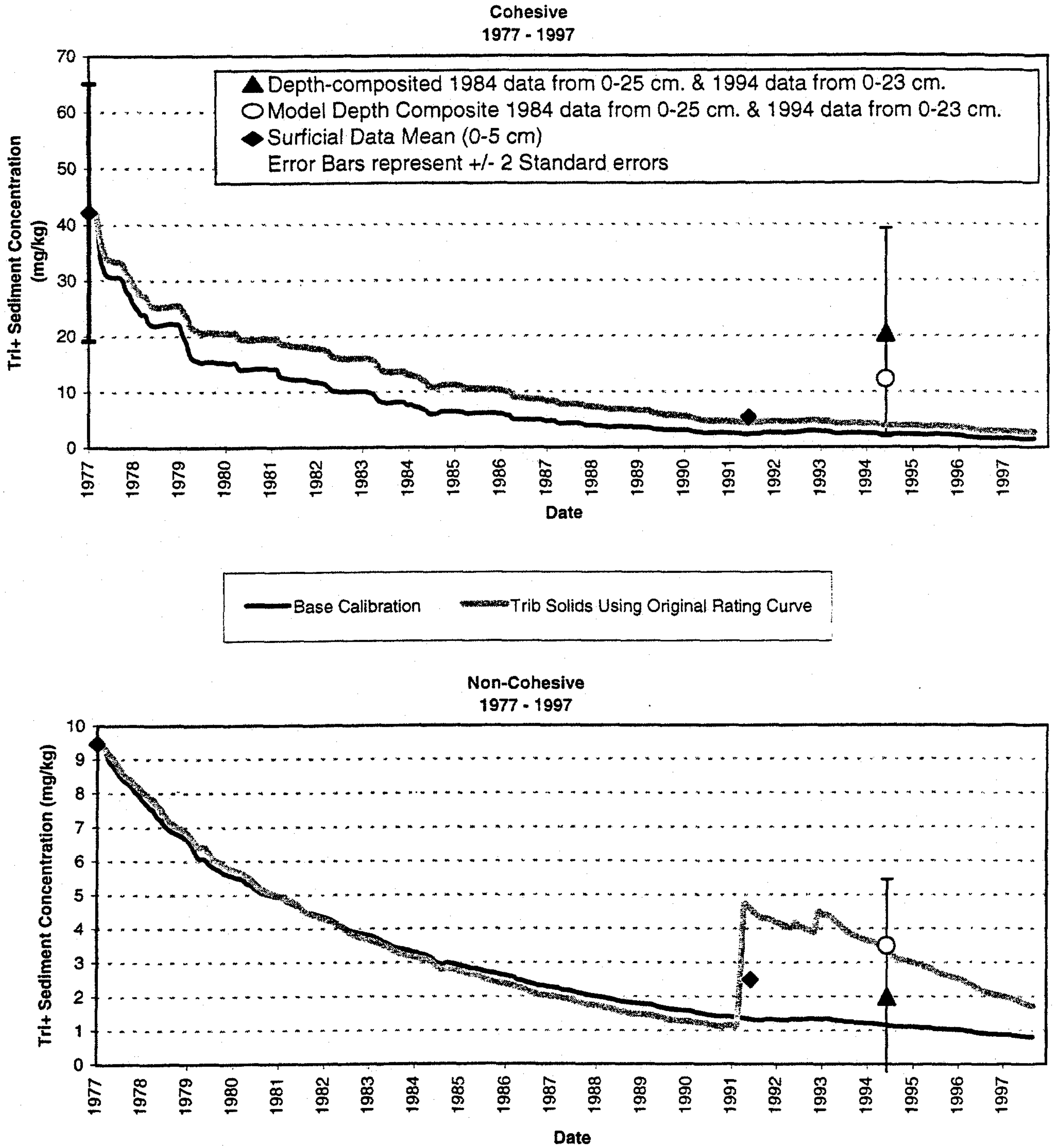


Figure 7-39. Sediment Responses at Waterford to Changes in Tributary Solids Loadings Due to Specification of Rating Curves.

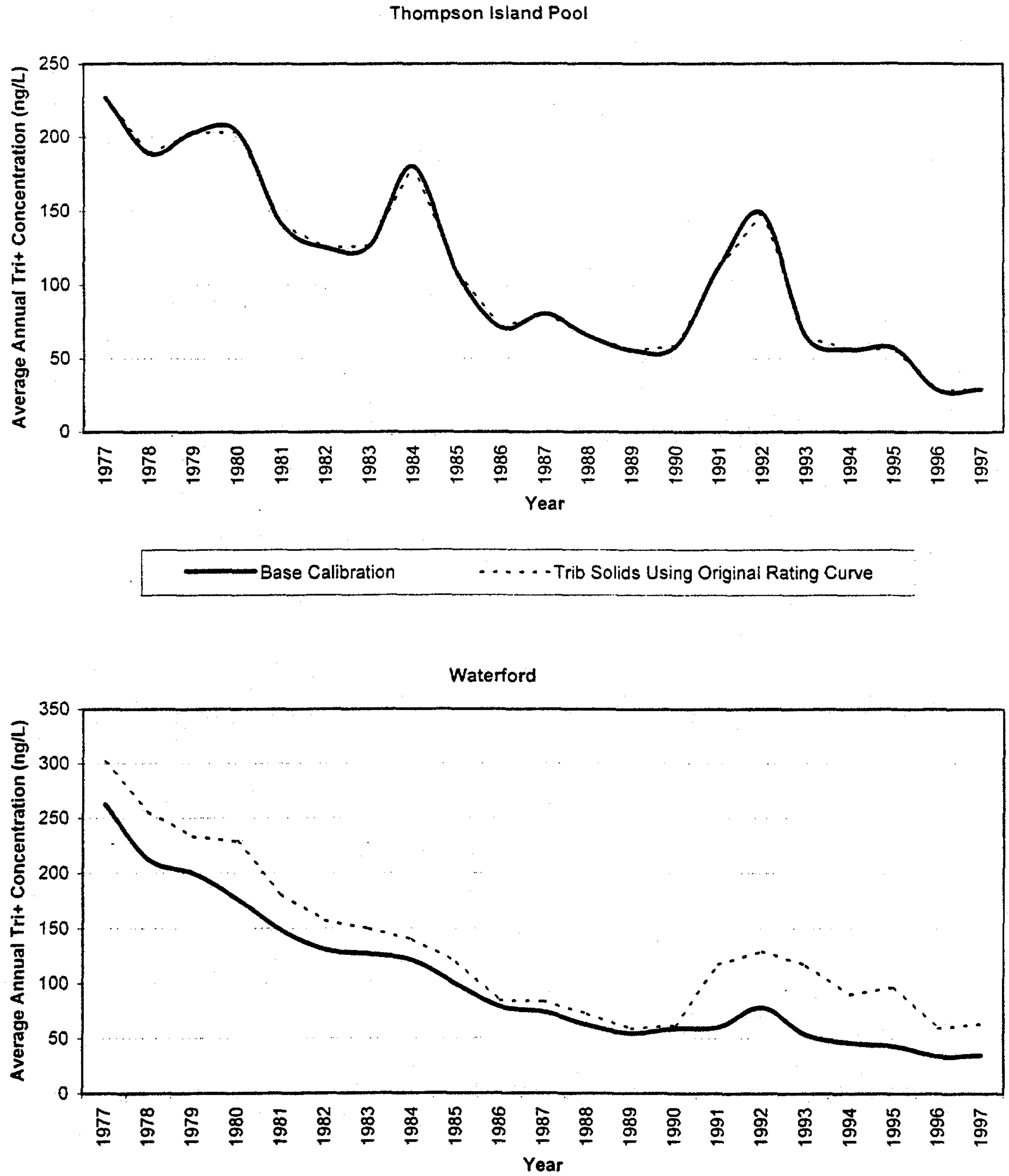
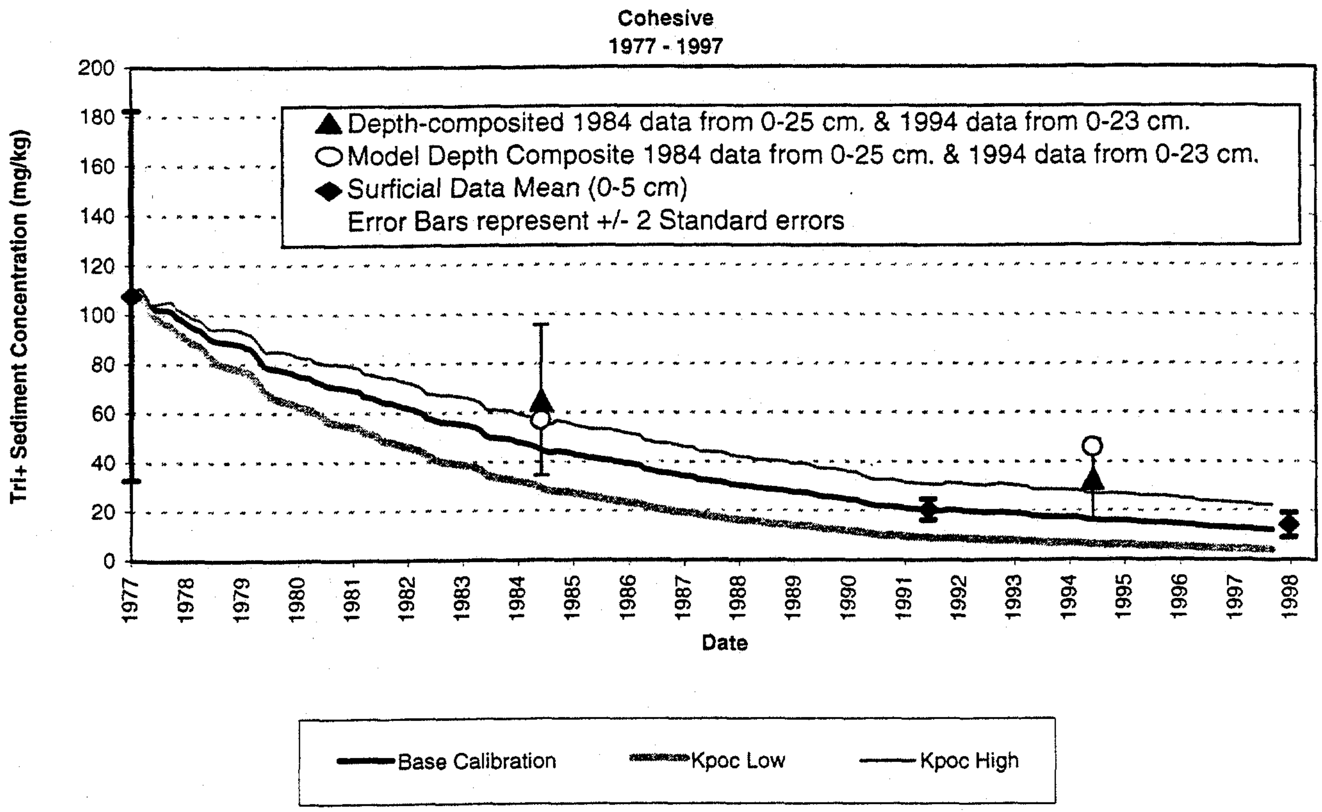


Figure 7-40. Water Column Responses to Changes in Tributary Solids Loadings Due to Specification of Rating Curve.



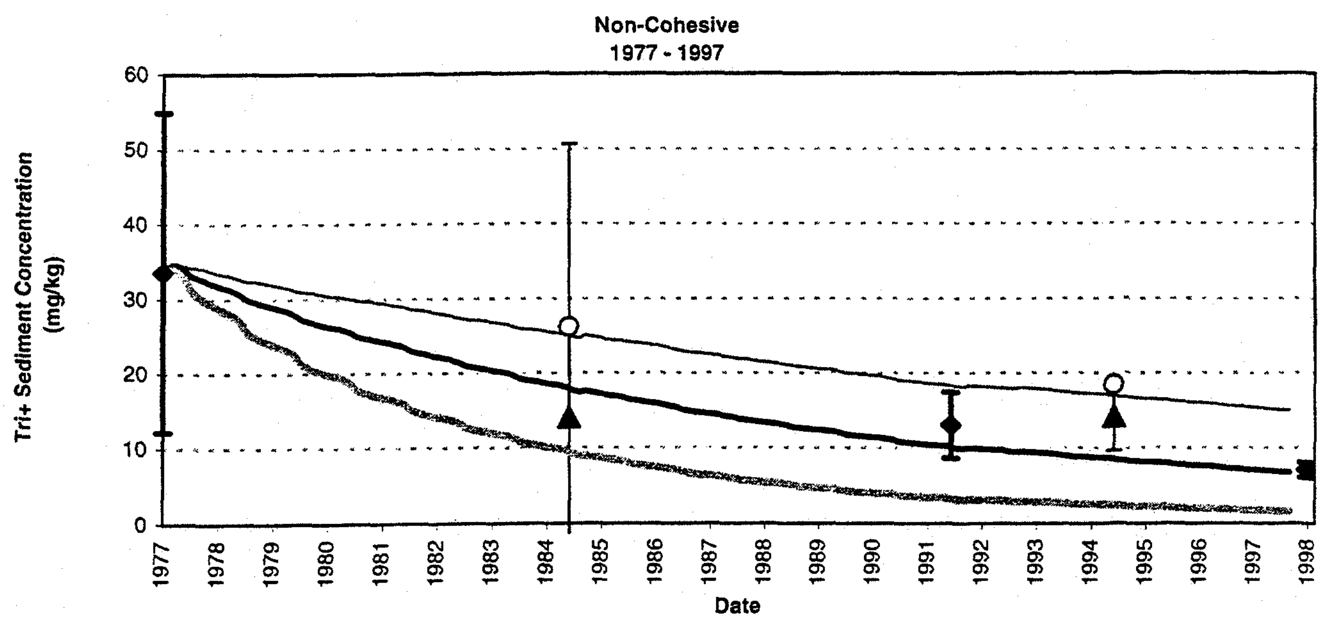


Figure 7-41. Sediment Responses in Thompson Island Pool to Changes in Partitioning.

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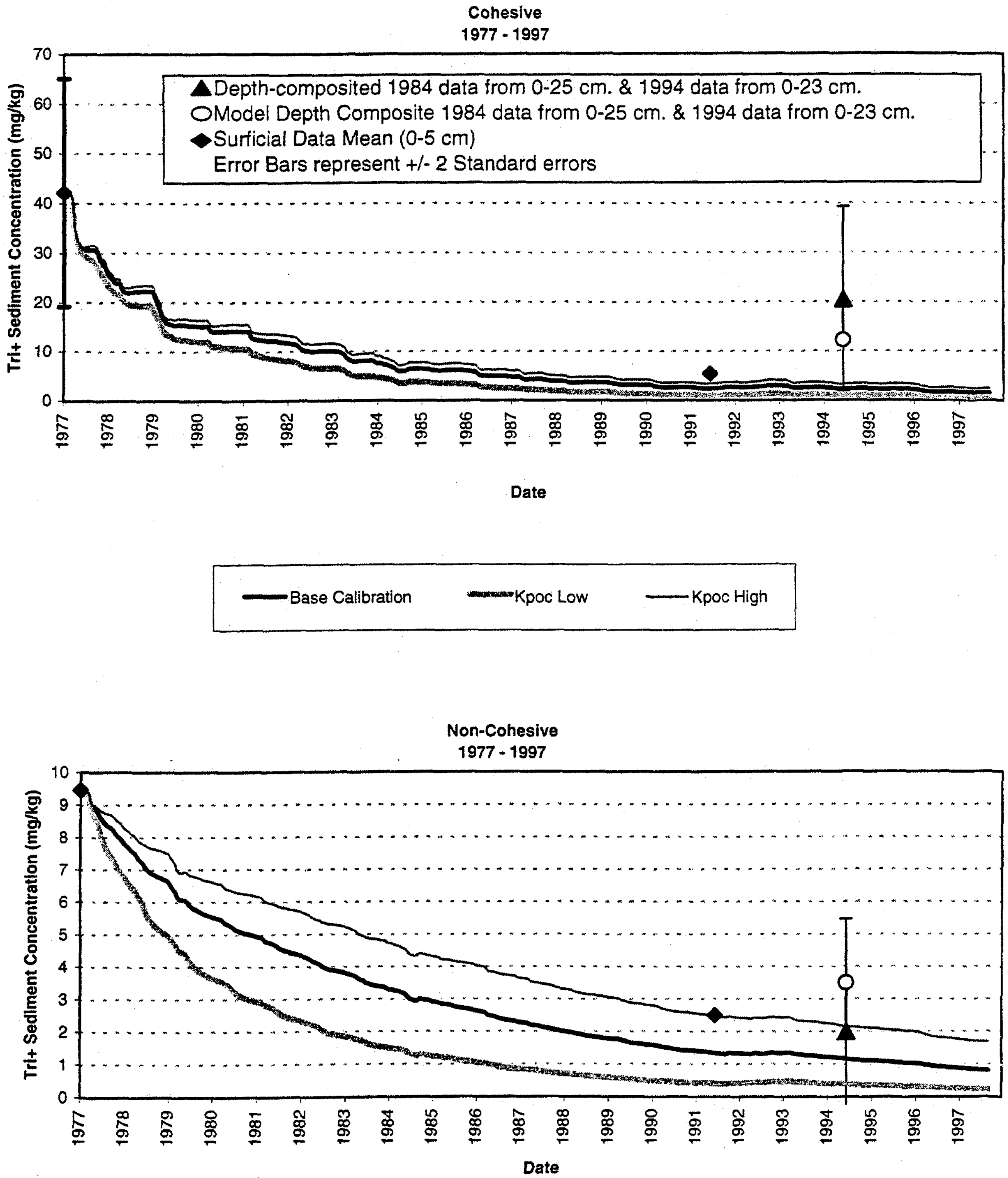


Figure 7-42. Sediment Responses in Waterford Reach to Changes in Partitioning.

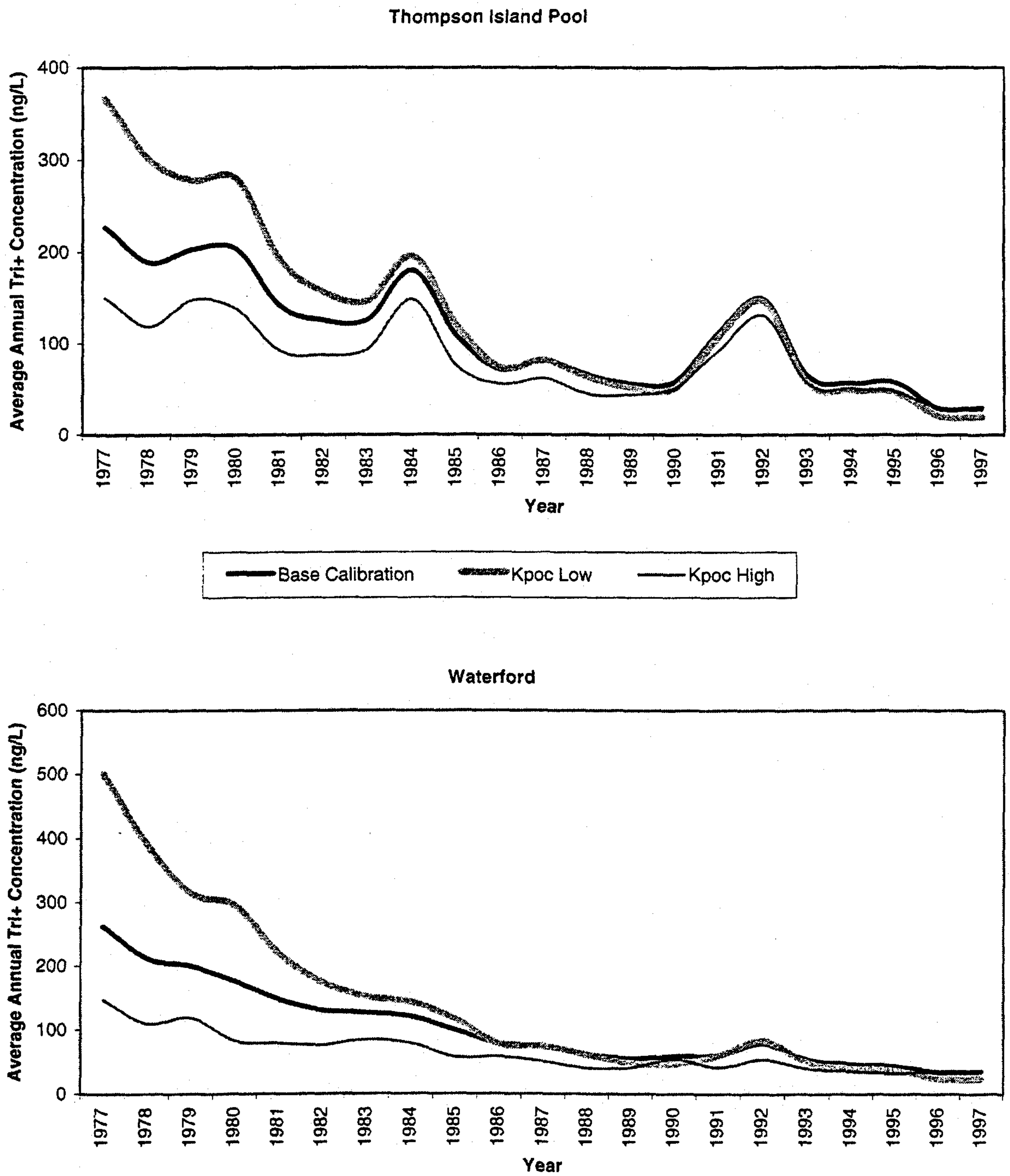
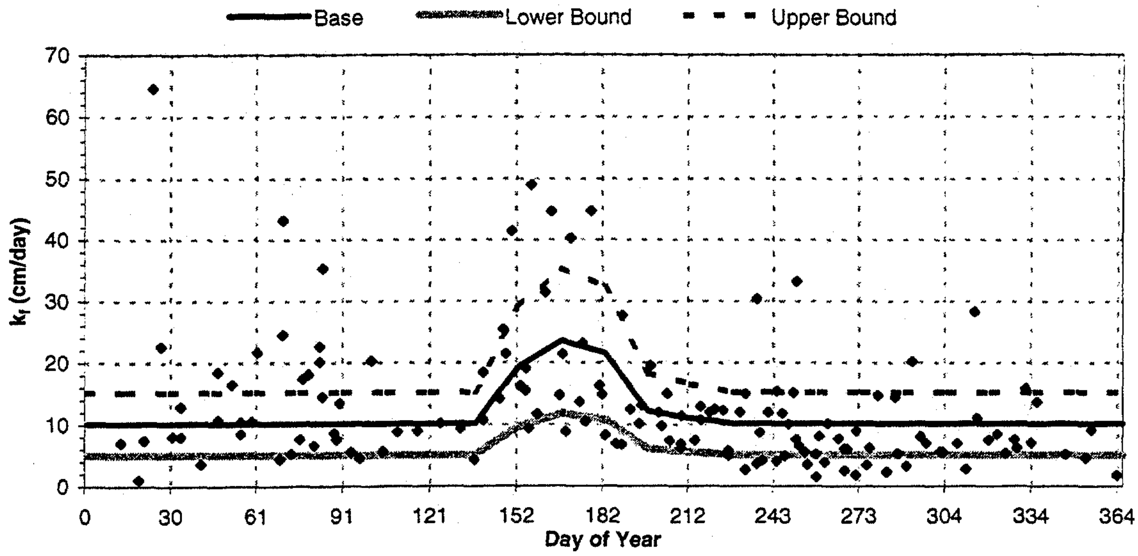


Figure 7-43. Water Column Responses to Changes in Partitioning.

303631



Note: Days when FE Q > 10,000 cfs or TSS at FE or TID > 10 mg/L were not used. 1991 and 1992 data were not used. Values of $k_f < 0$ were not used.

Figure 7-44. Time Series for Effective Mass Transfer Rate in HUDTOX.

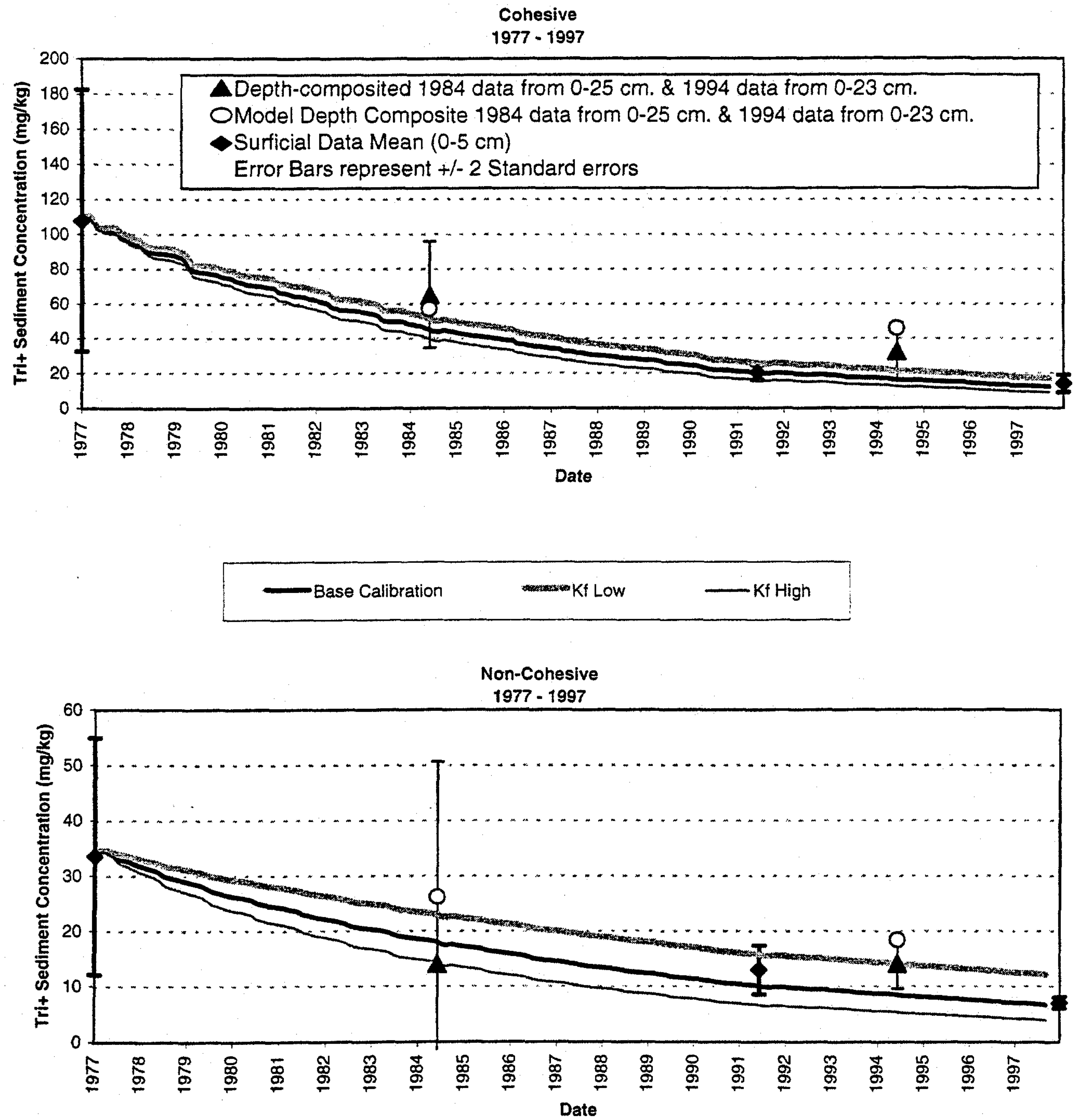


Figure 7-45. Sediment Responses in Thompson Island Pool to Changes in Sediment-Water Mass Transfer Rate.

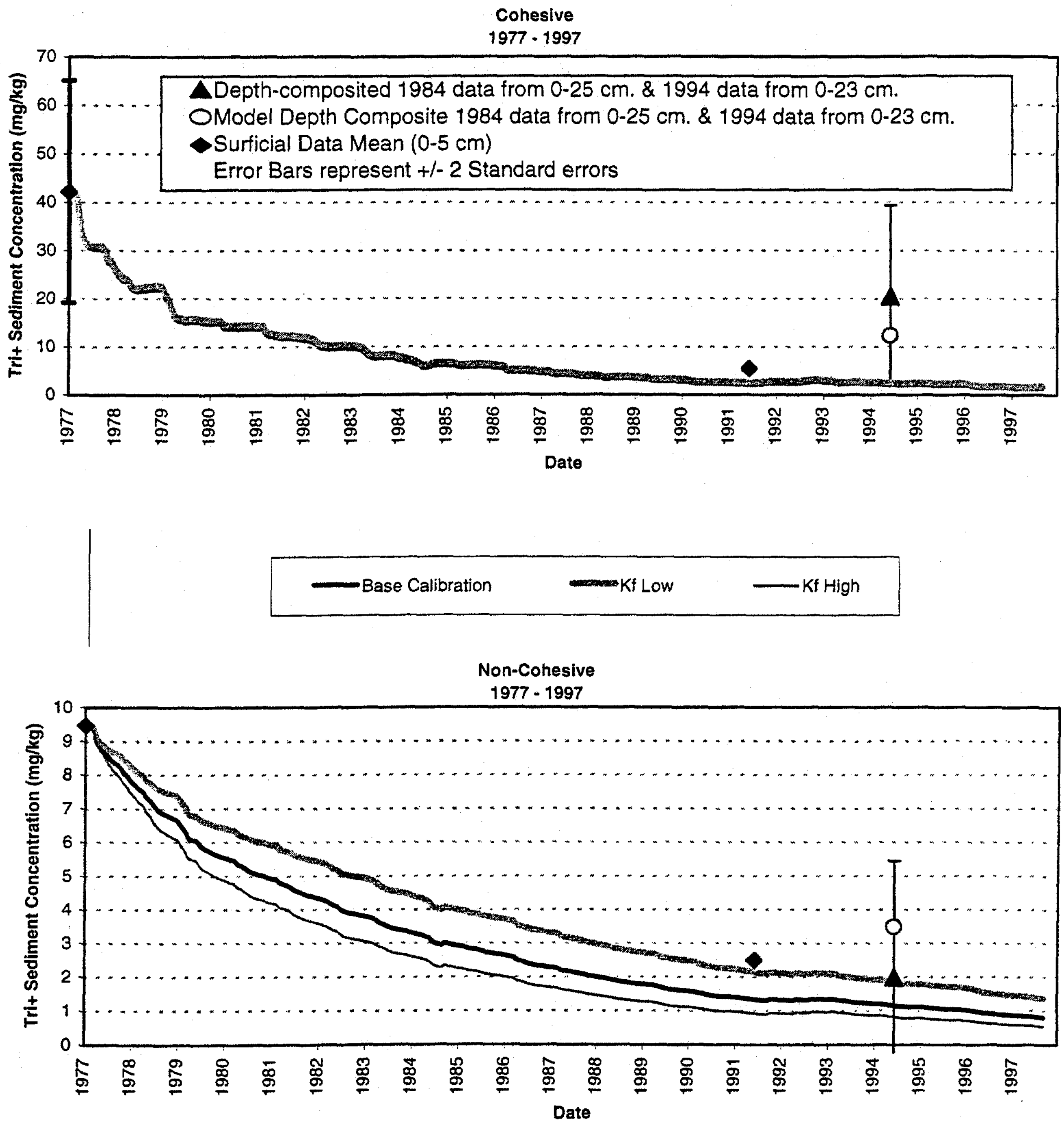


Figure 7-46. Sediment Responses in Waterford Reach to Changes in Sediment-Water Mass Transfer Rate.

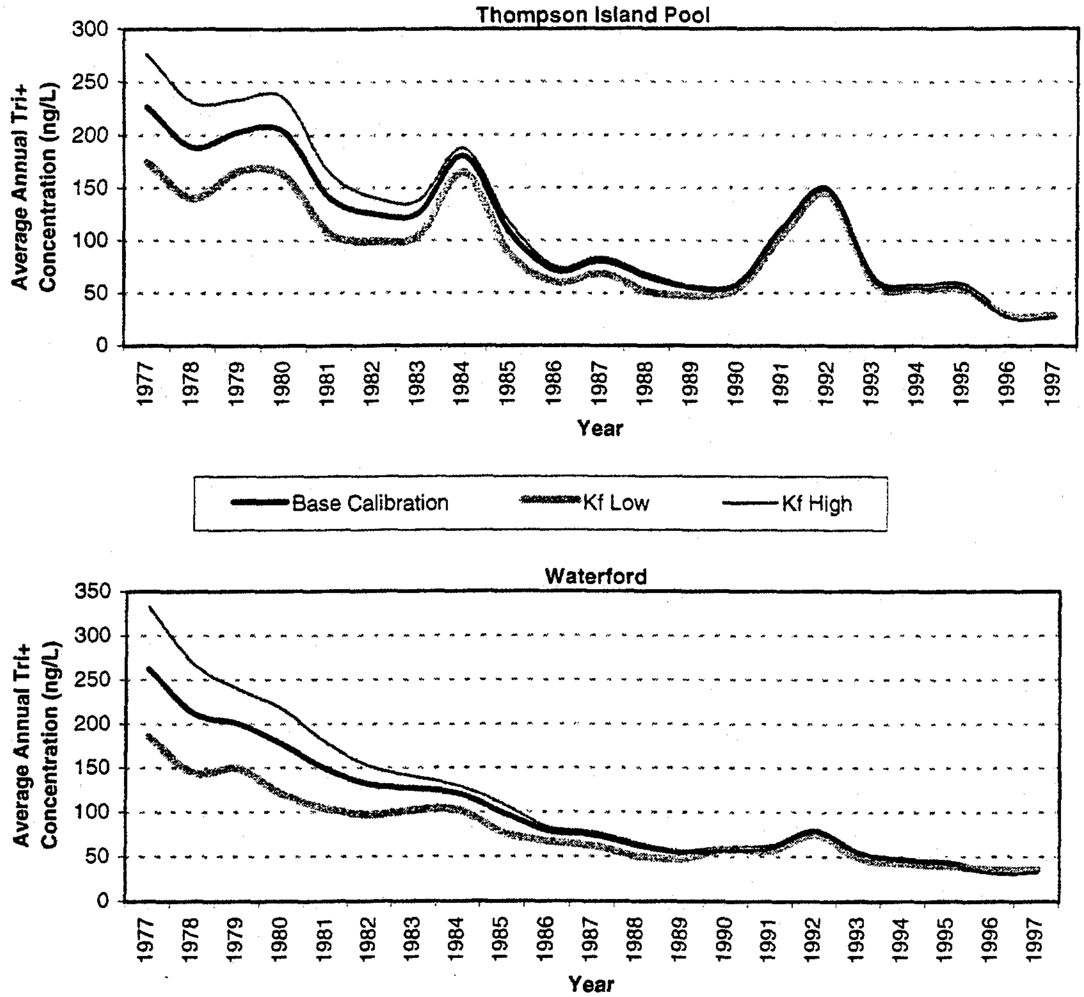


Figure 7-47. Water Column Responses to Changes in Sediment-Water Mass Transfer Rate.

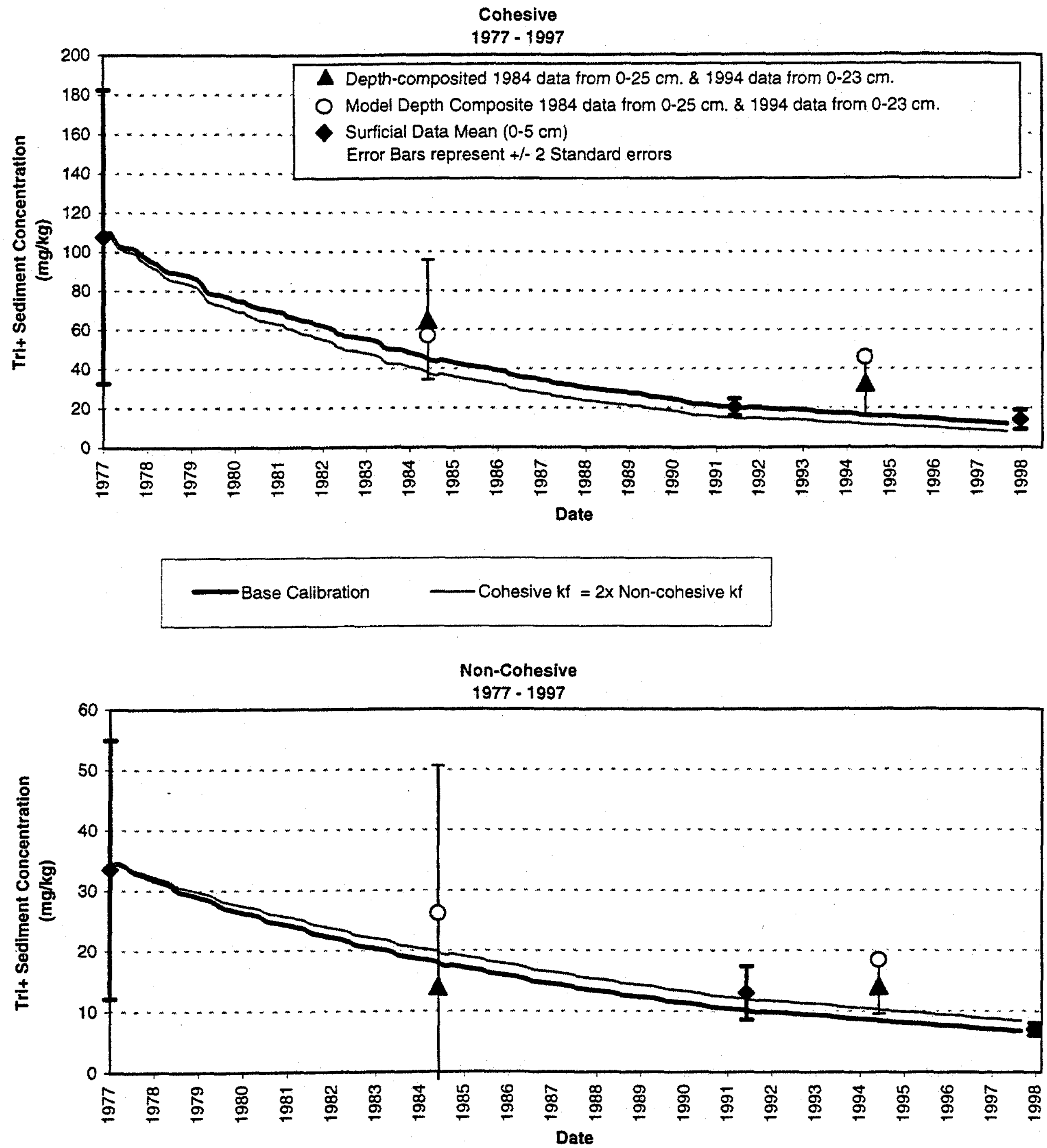
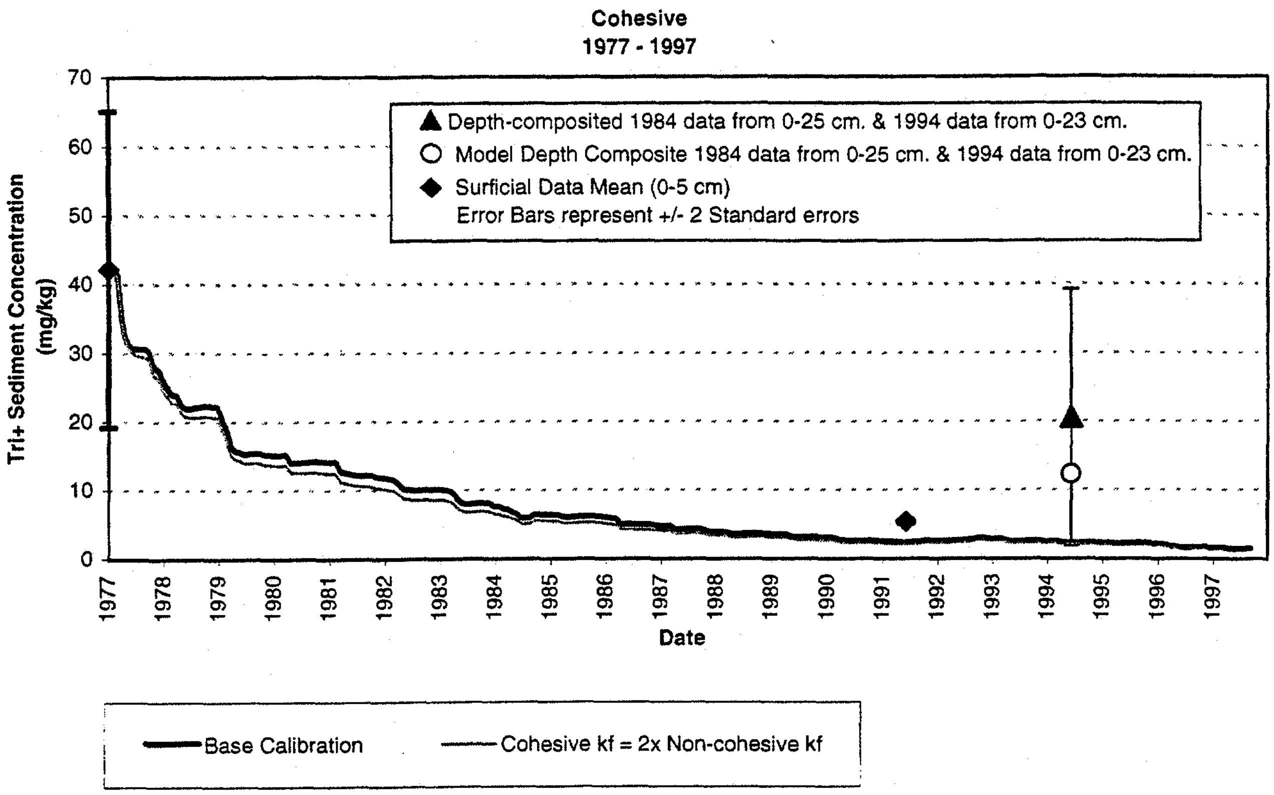


Figure 7-48. Sediment Responses in Thompson Island Pool to Changes in Cohesive and Non-cohesive Specific Sediment to Water Effective Mass Transfer Rates.



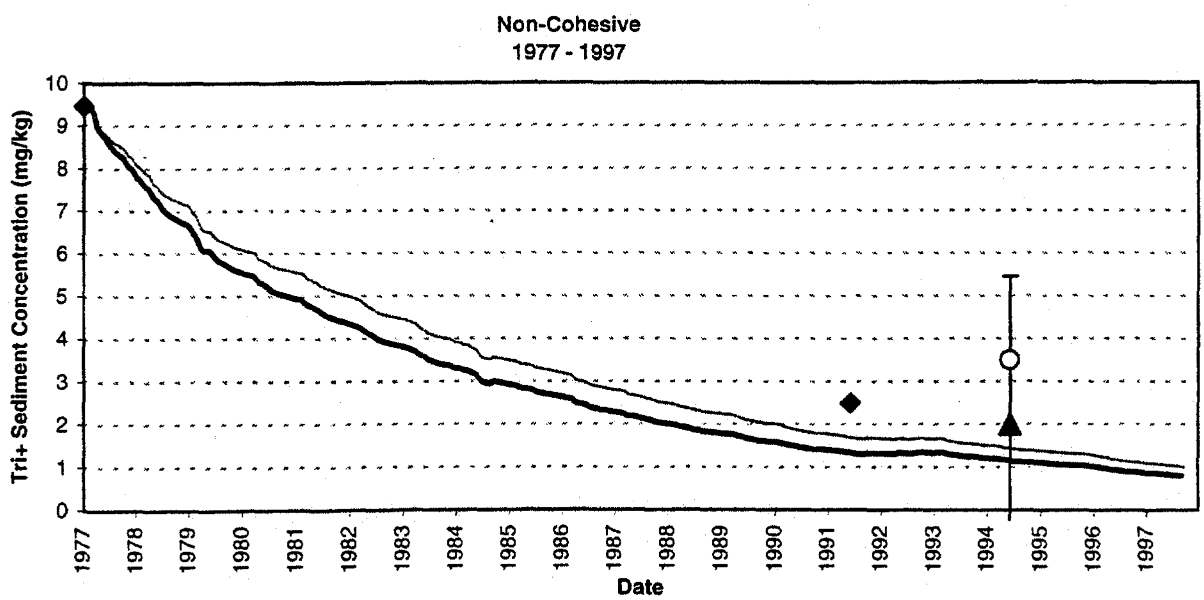


Figure 7-49. Sediment Responses in Waterford to Changes in Cohesive and Non-cohesive Specific Sediment to Water Effective Mass Transfer Rates.

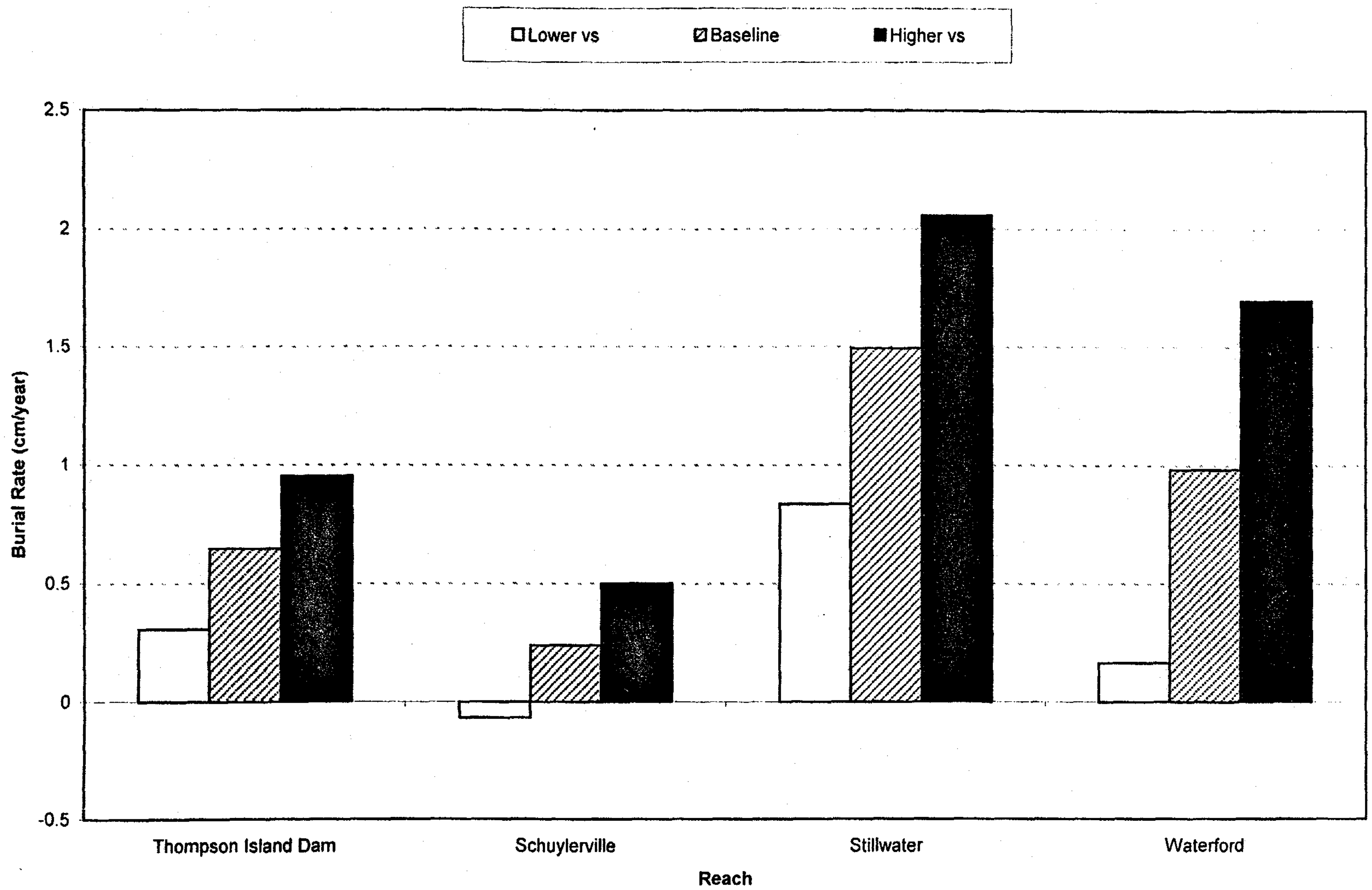


Figure 7-50. Responses of Burial Rates in Cohesive Sediments to Changes in Gross Settling Velocities.

303638

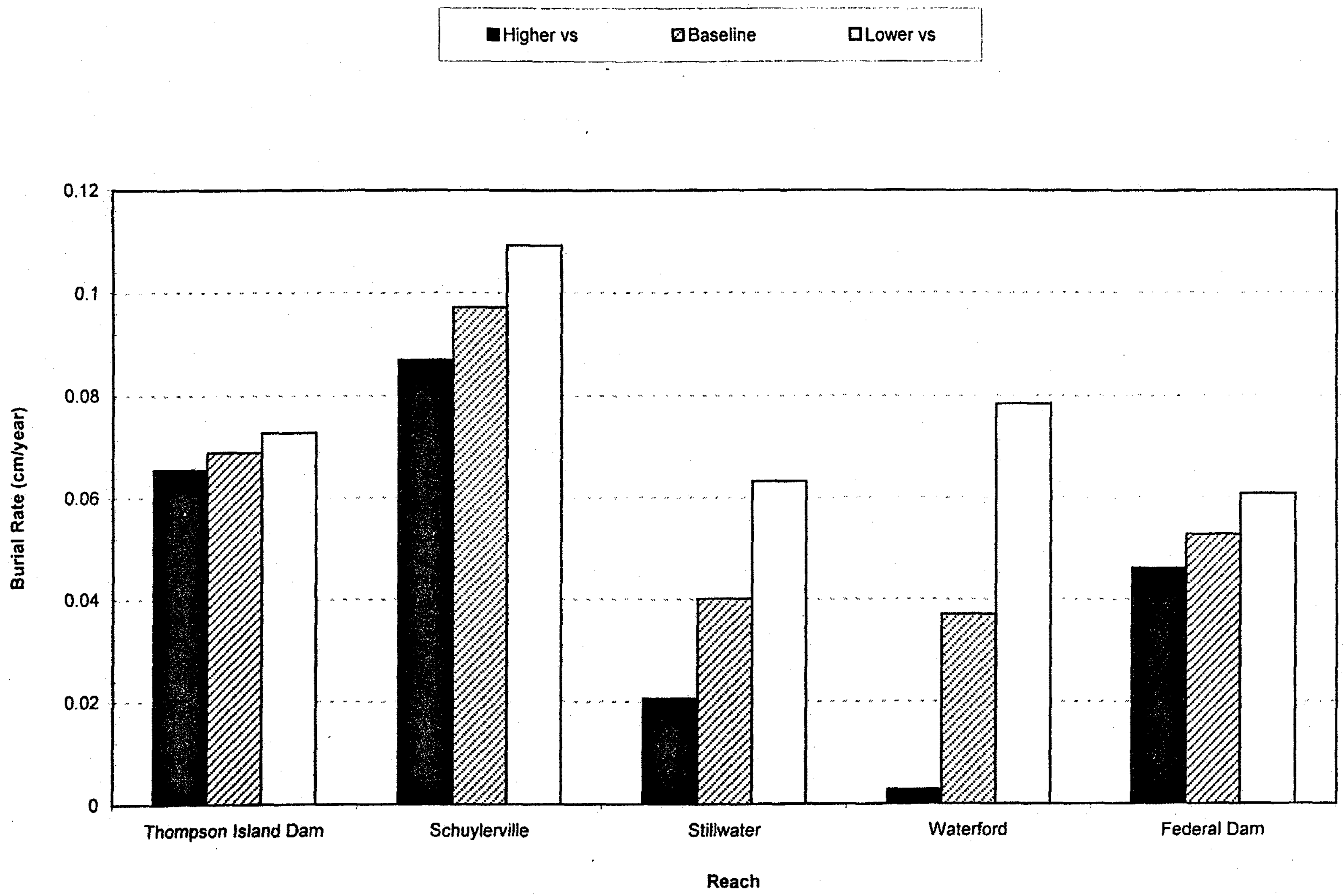


Figure 7-51. Responses of Burial Rates in Non-Cohesive Sediments to Changes in Gross Settling Velocities.

303639

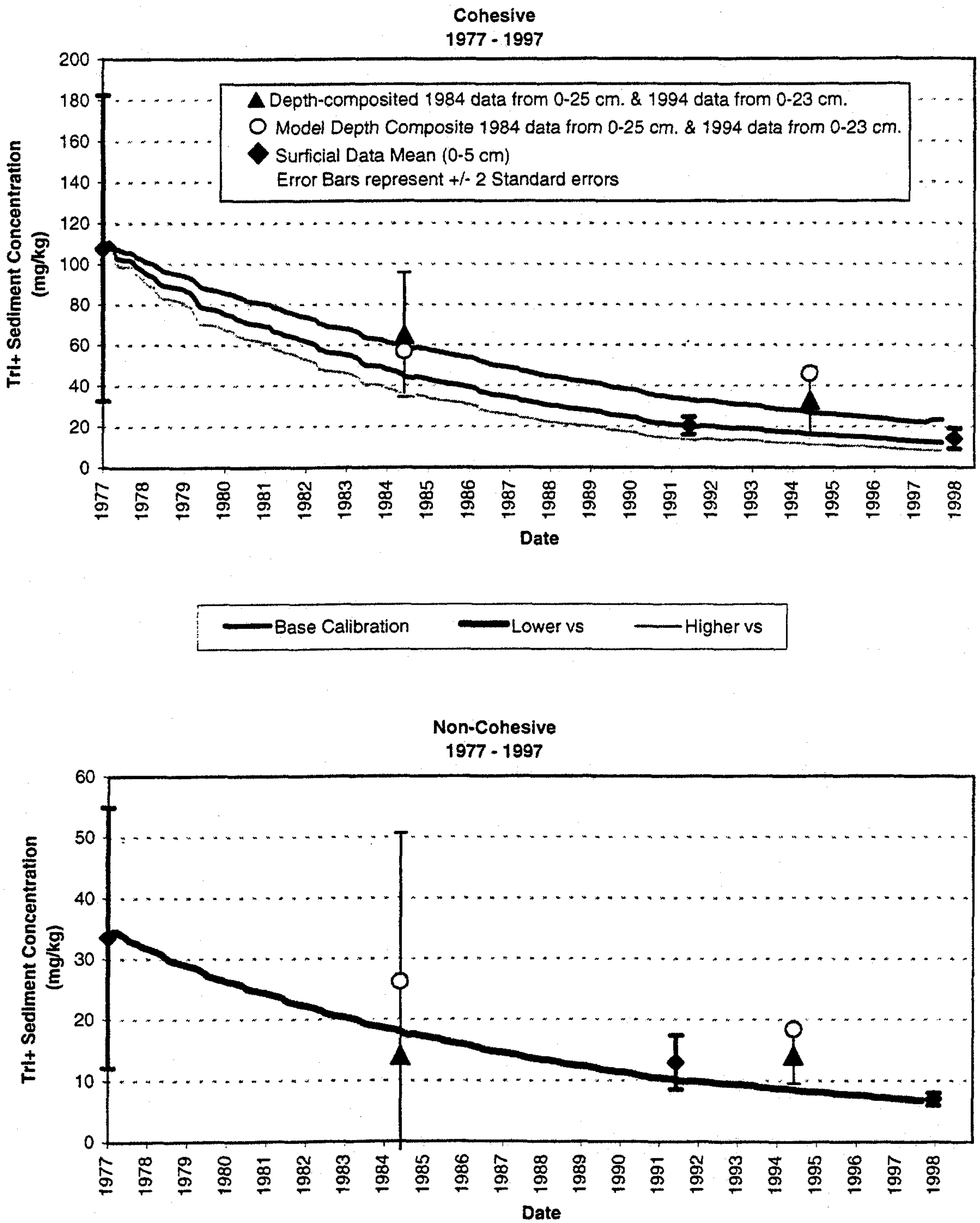


Figure 7-52. Sediment Responses in Thompson Island Pool to Changes in Gross Settling Velocities.

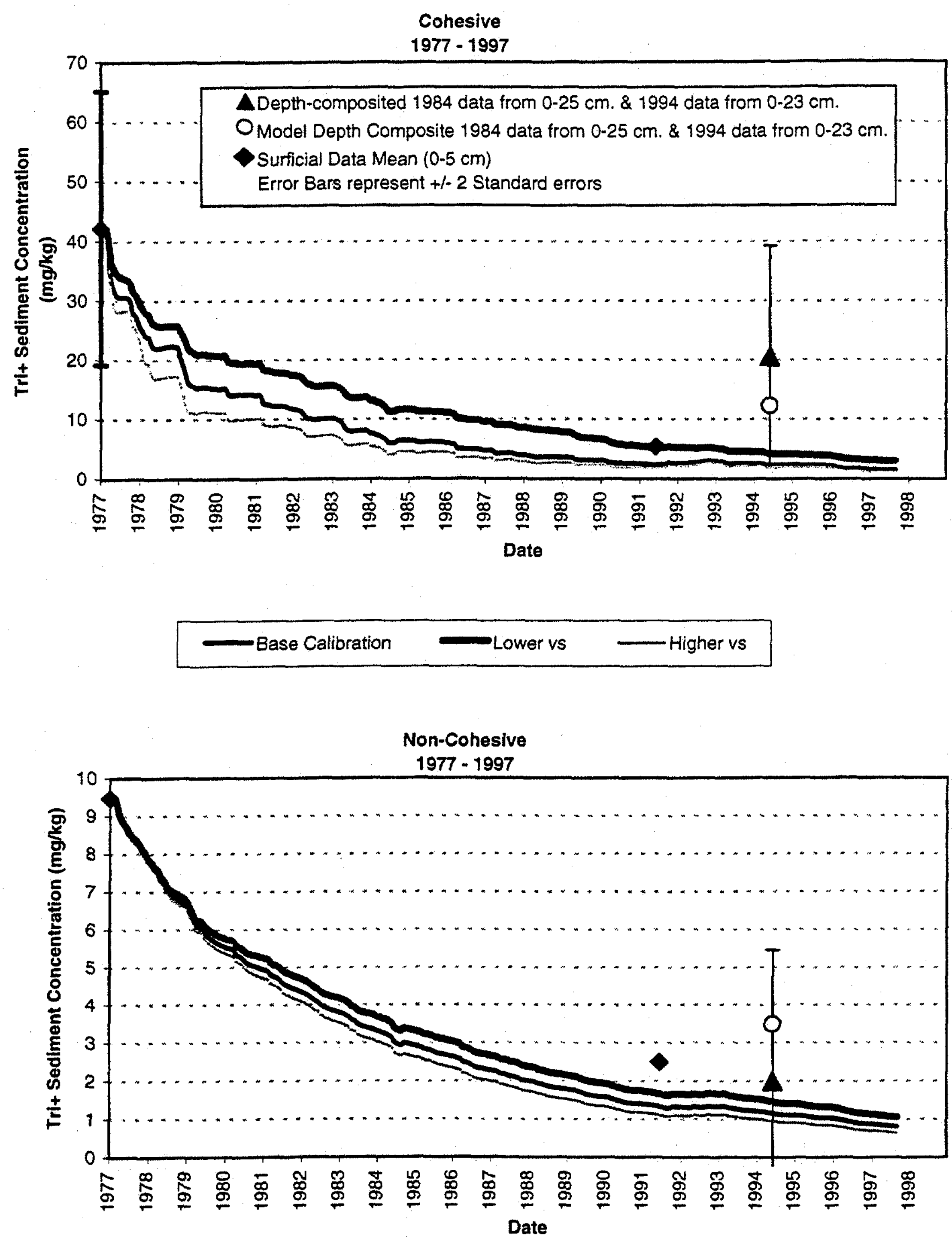


Figure 7-53. Sediment Responses in Waterford Reach to Changes in Gross Settling Velocities.

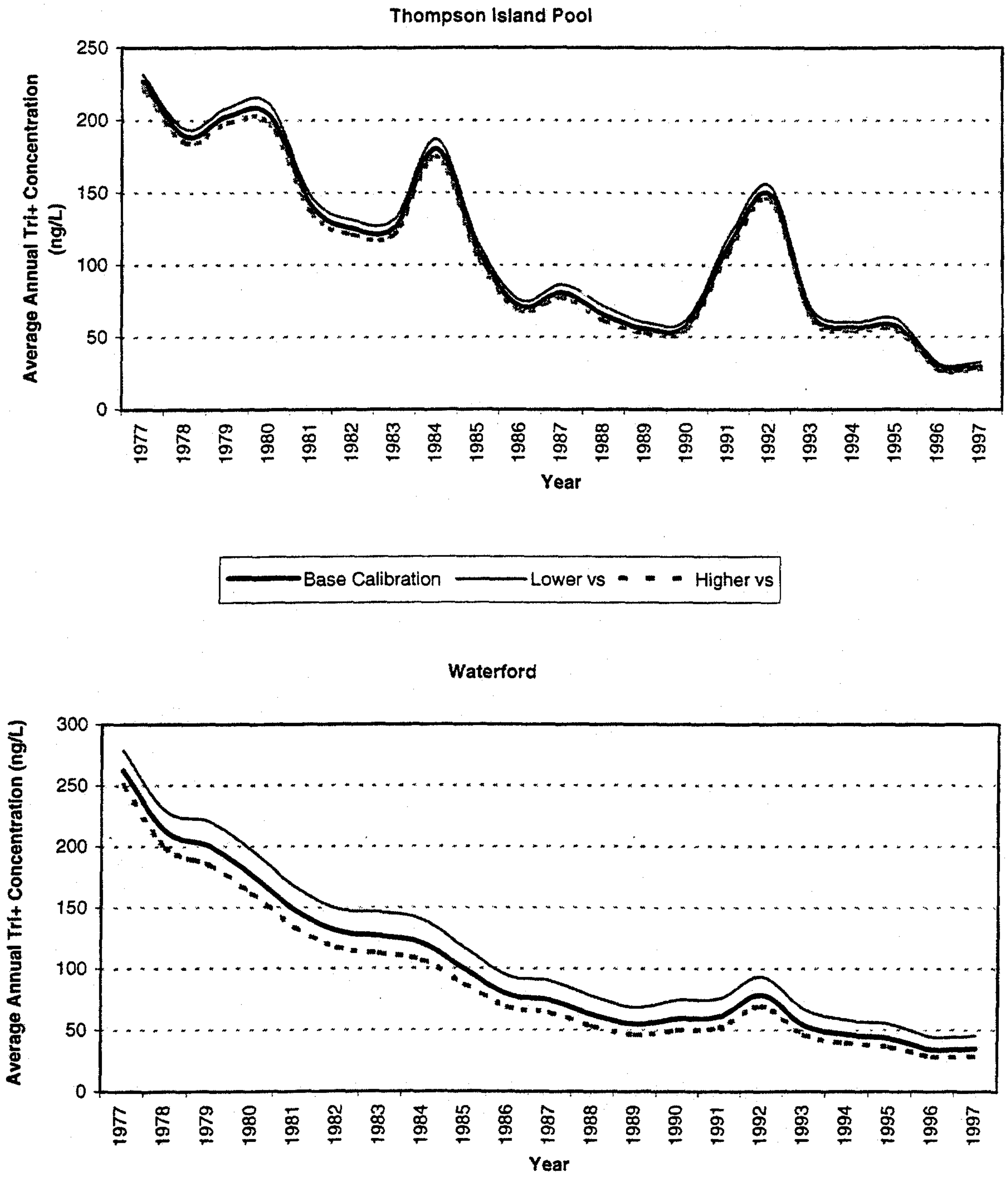


Figure 7-54. Water Column Responses to Changes in Gross Settling Velocities.

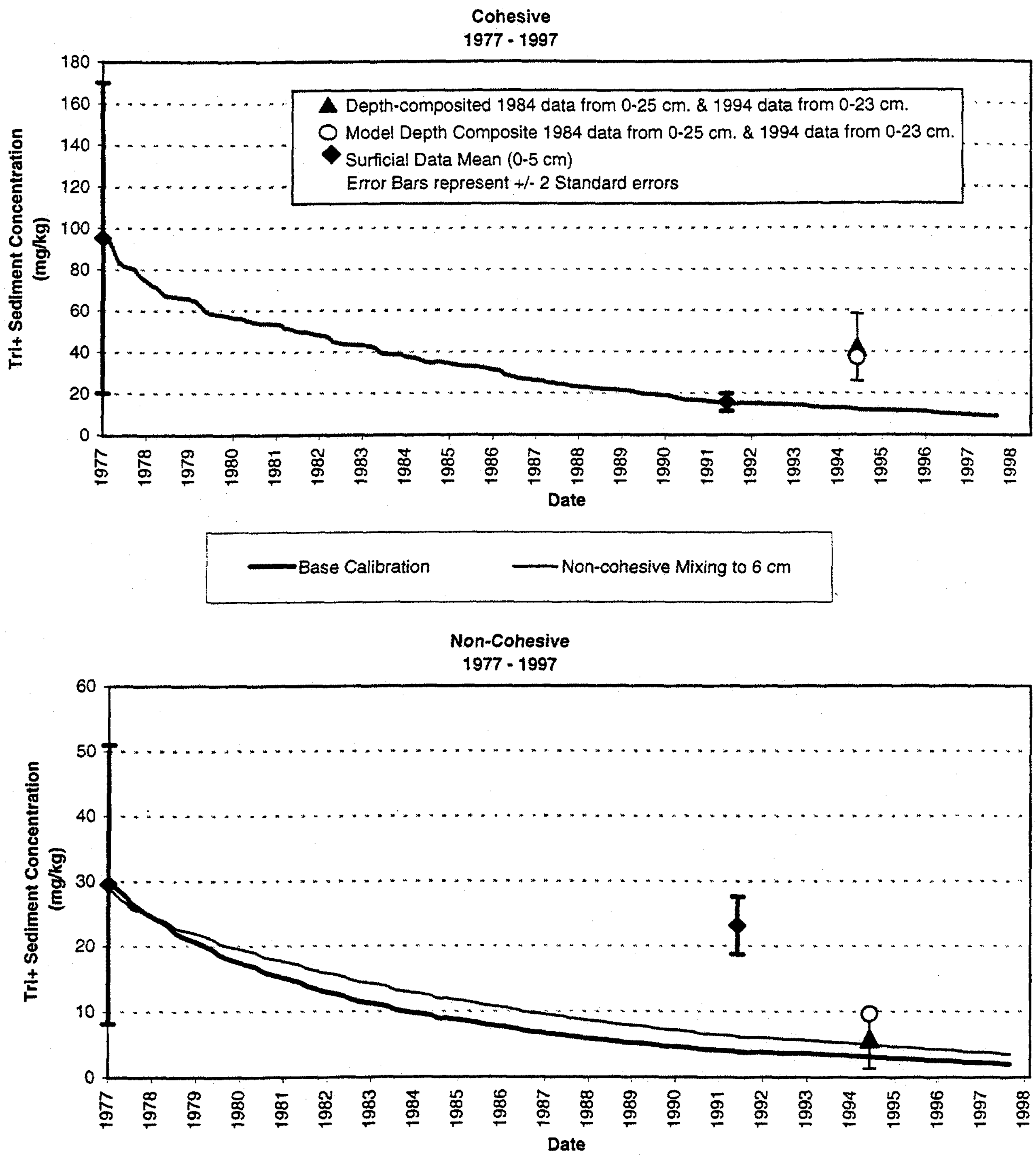


Figure 7-55. Sediment Responses in Schuylerville Reach to Enhanced Mixing (top 6 cm) in Non-cohesive Sediments.

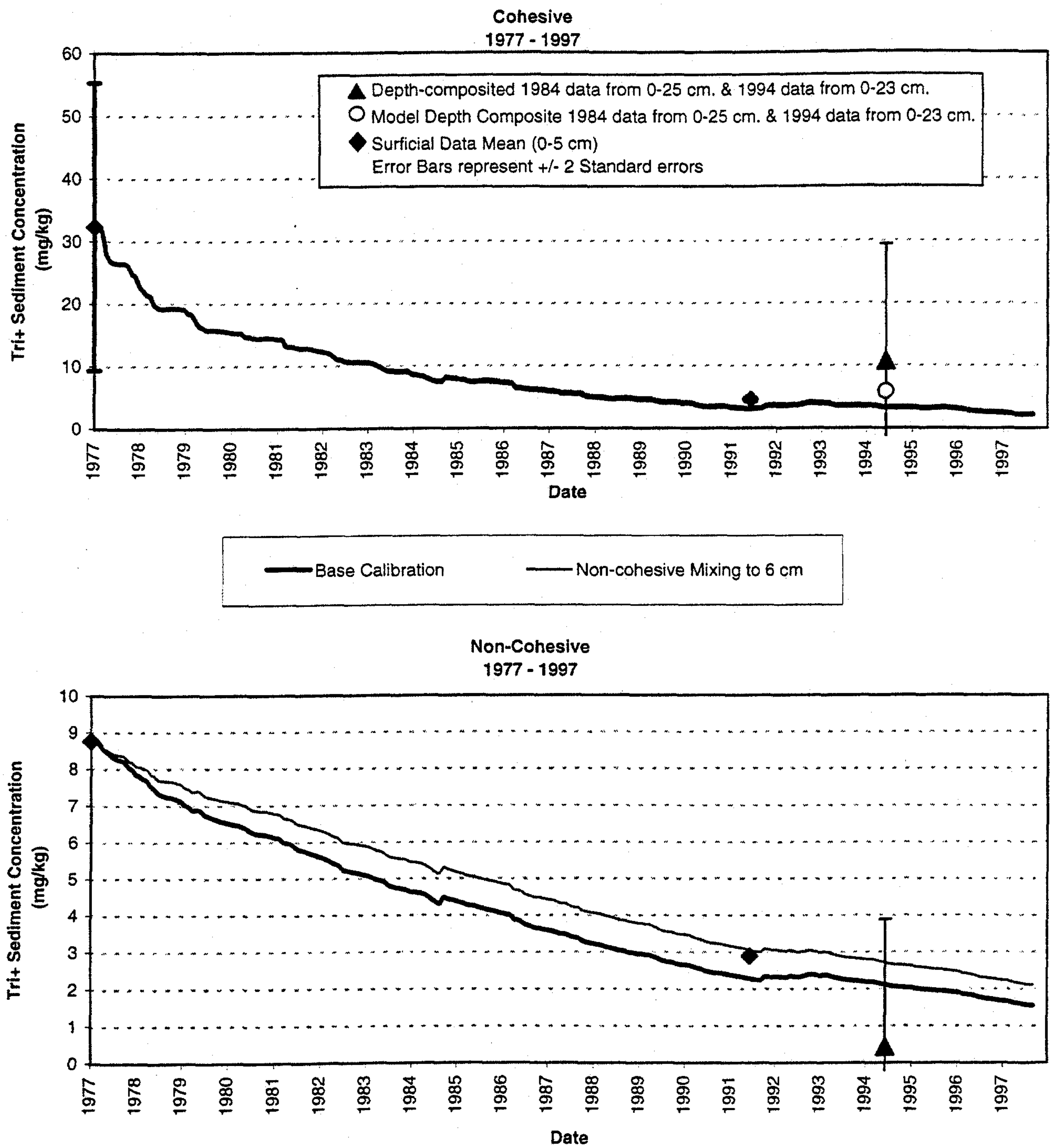


Figure 7-56. Sediment Responses in Stillwater Reach to Enhanced Mixing (top 6 cm) in Non-cohesive Sediments.

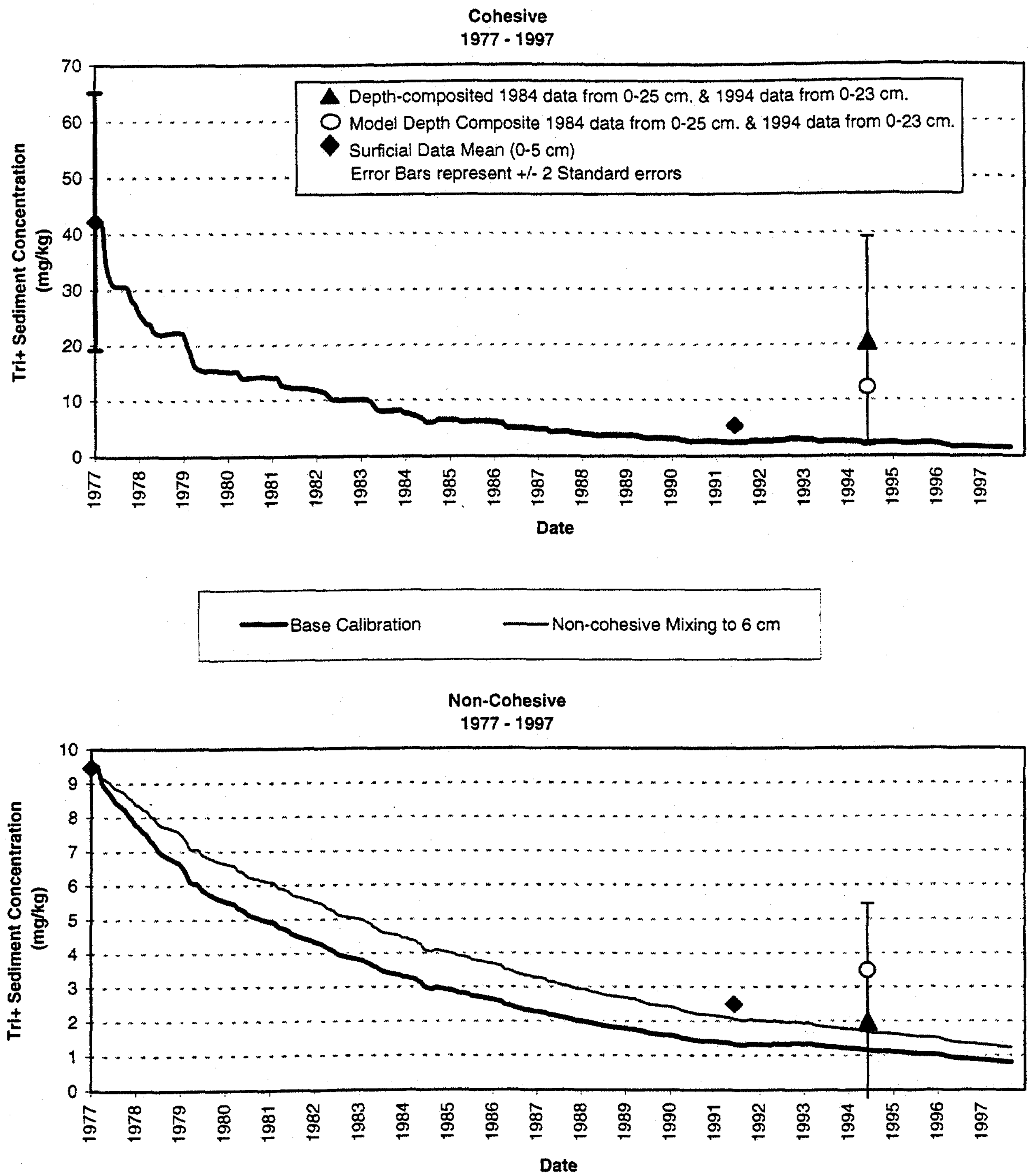


Figure 7-57. Sediment Responses at Waterford to Enhanced Mixing (top 6 cm) in Non-cohesive Sediments.

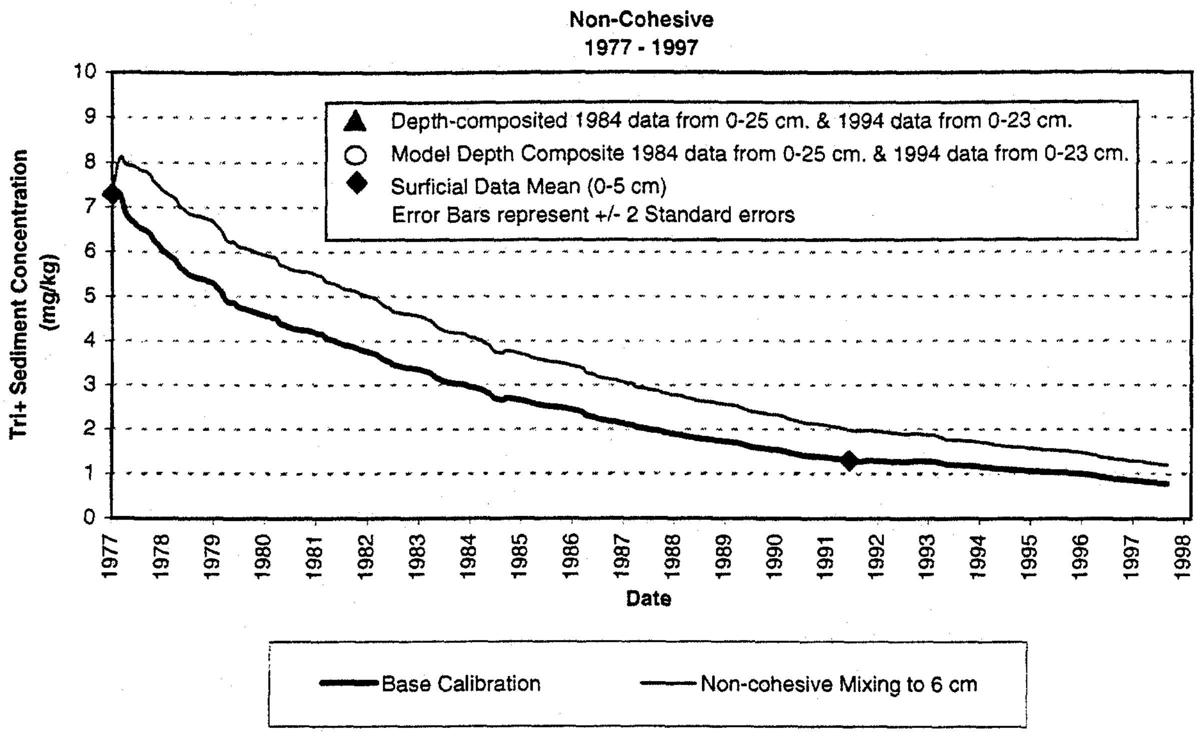


Figure 7-58. Sediment Responses in Federal Dam Reach to Enhanced Mixing (top 6 cm) in Non-cohesive Sediments.

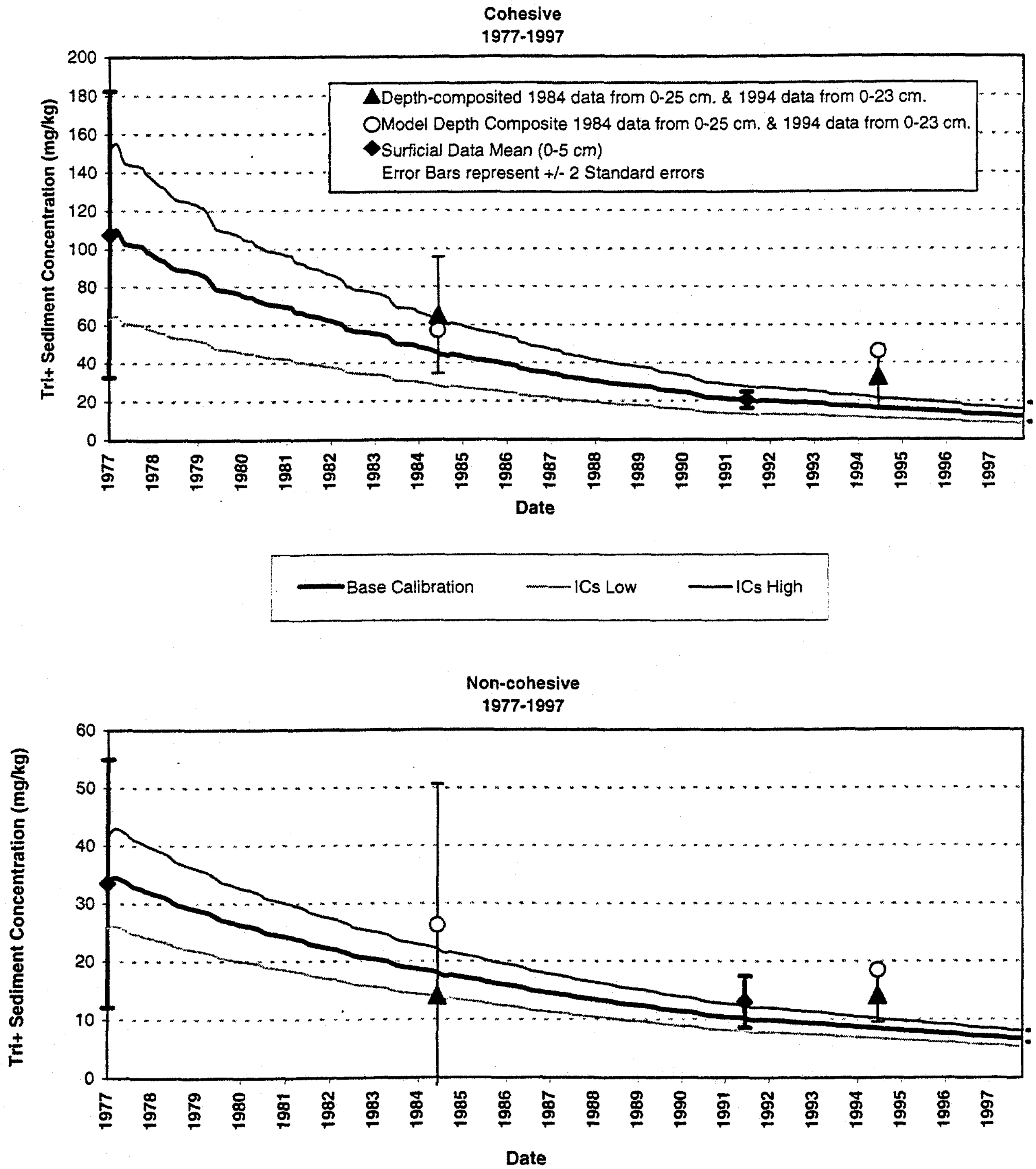


Figure 7-59. Sediment Responses in Thompson Island Pool to Changes in Sediment Initial Conditions.

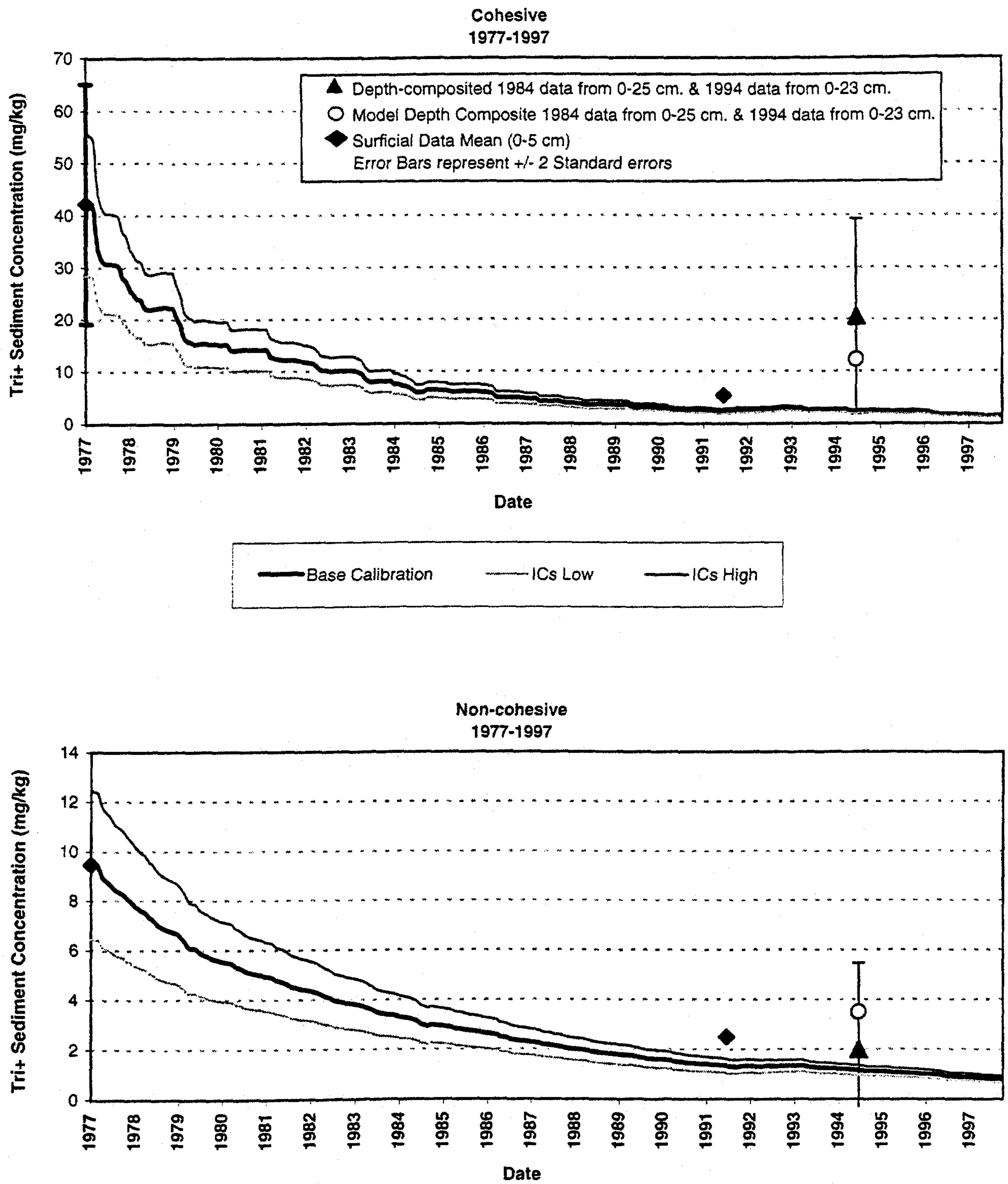


Figure 7-60. Sediment Responses in Waterford to Changes in Sediment Initial Conditions.

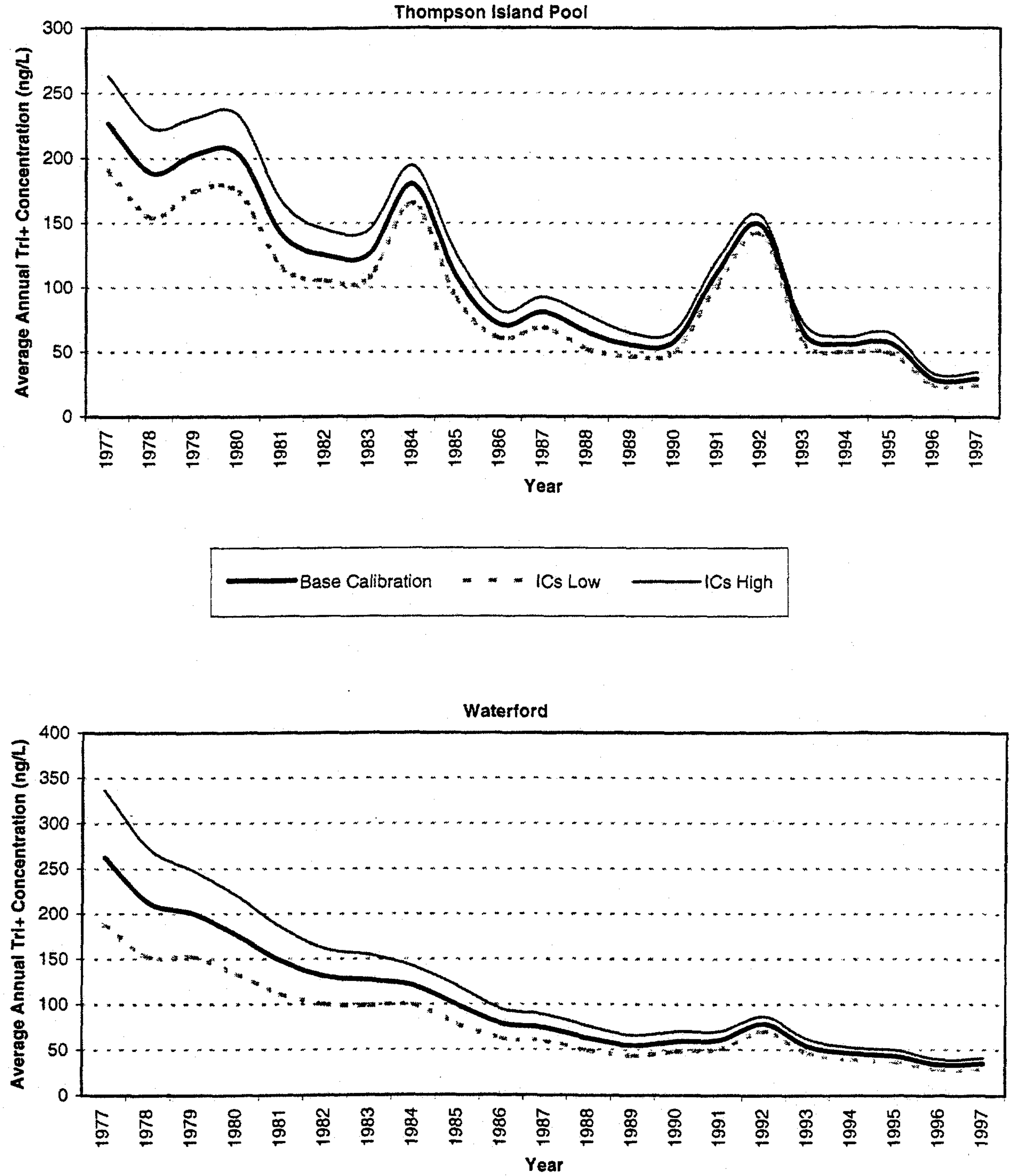


Figure 7-61. Water Column Responses to Changes in Sediment Initial Conditions.

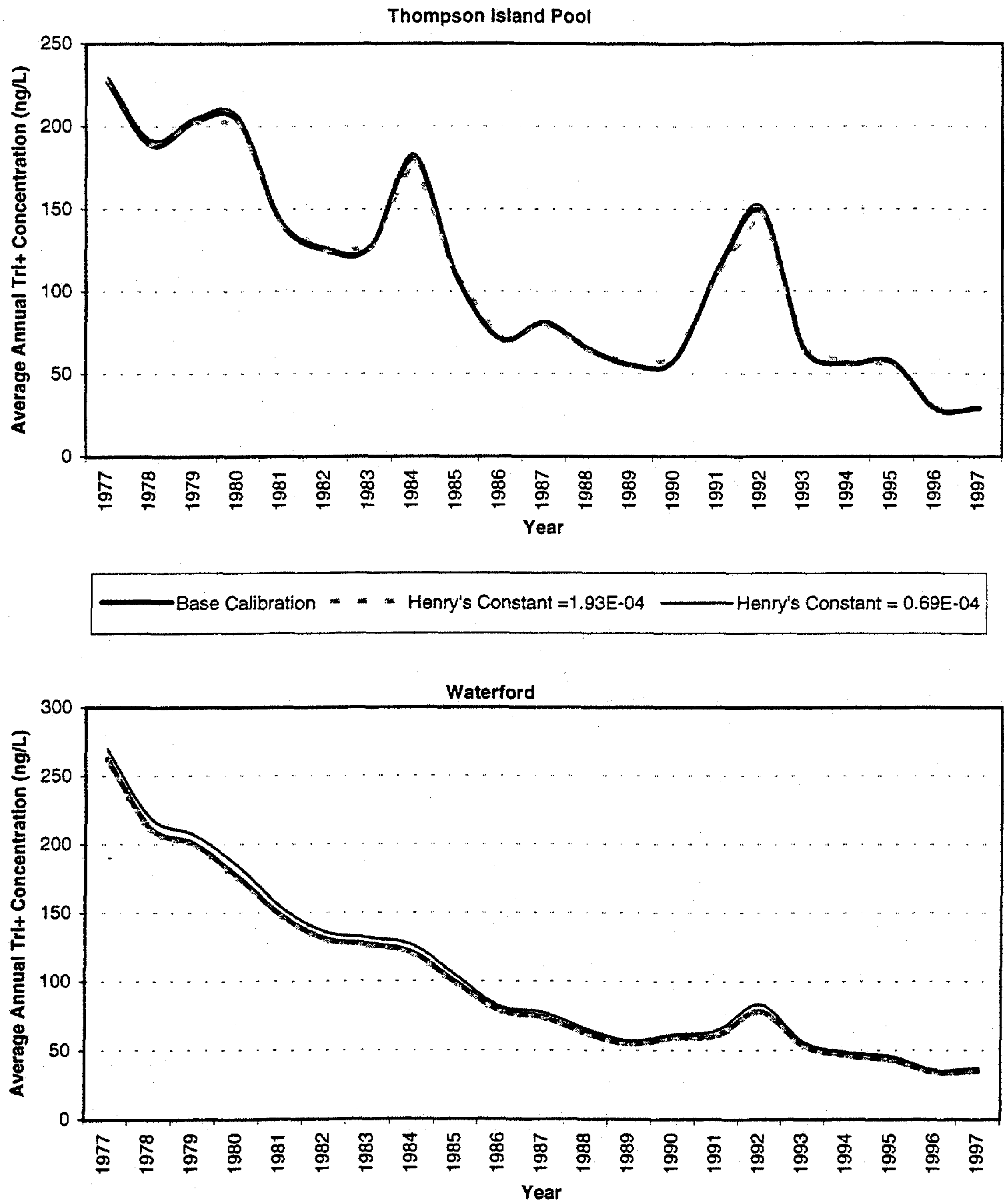


Figure 7-62. Water Column Responses to Changes in Henry's Law Constant.

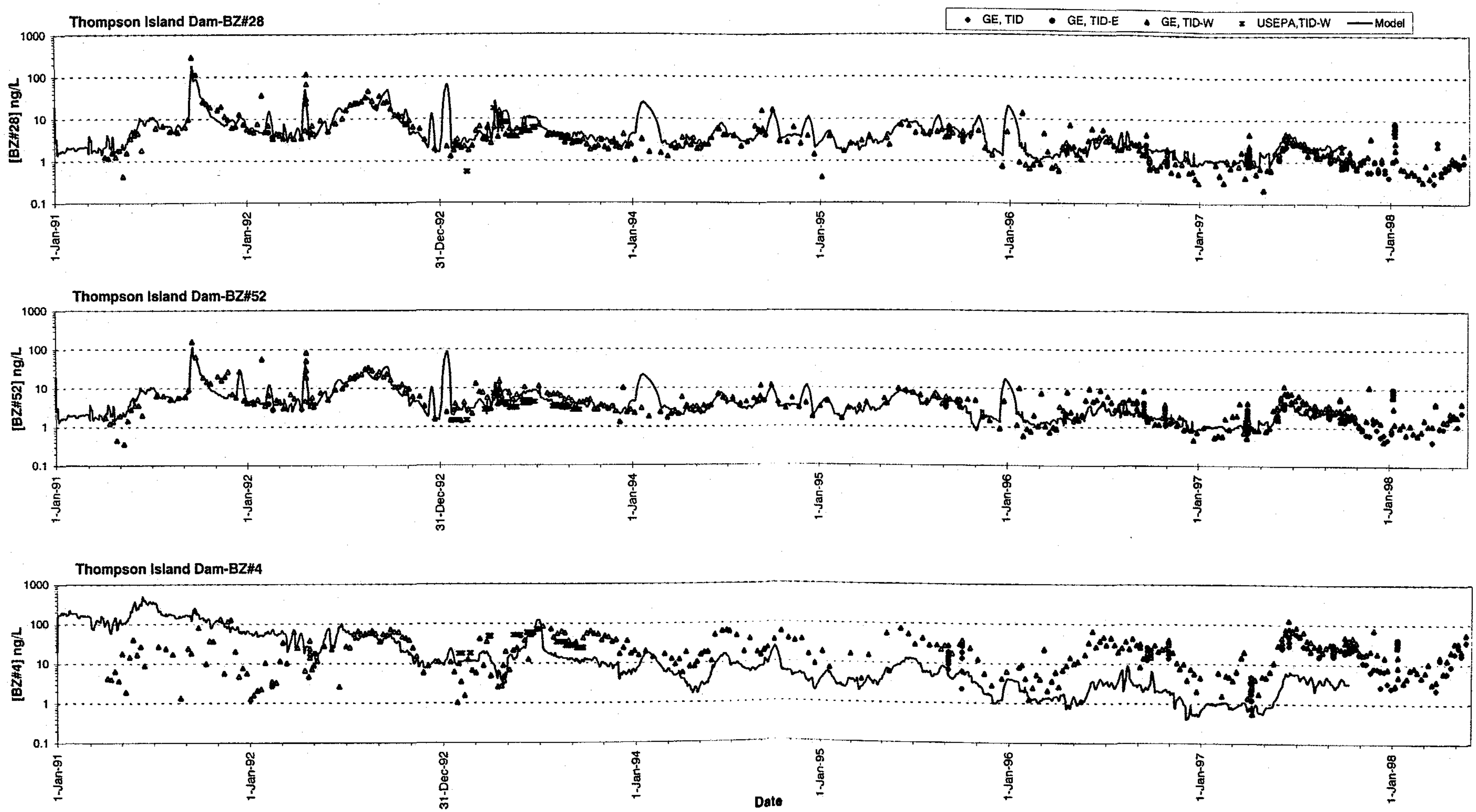
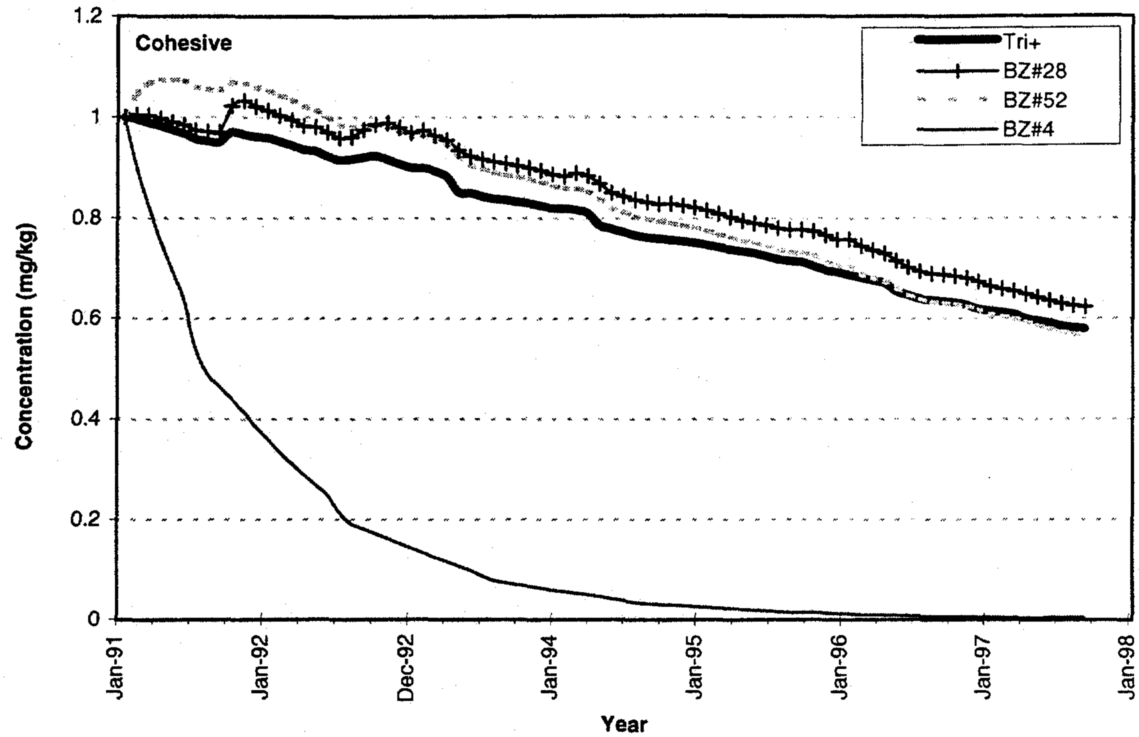


Figure 7-63. Predicted versus Observed BZ#4, BZ#28 and BZ#52 Concentrations Using Historical Calibration Model Parameters.

303651



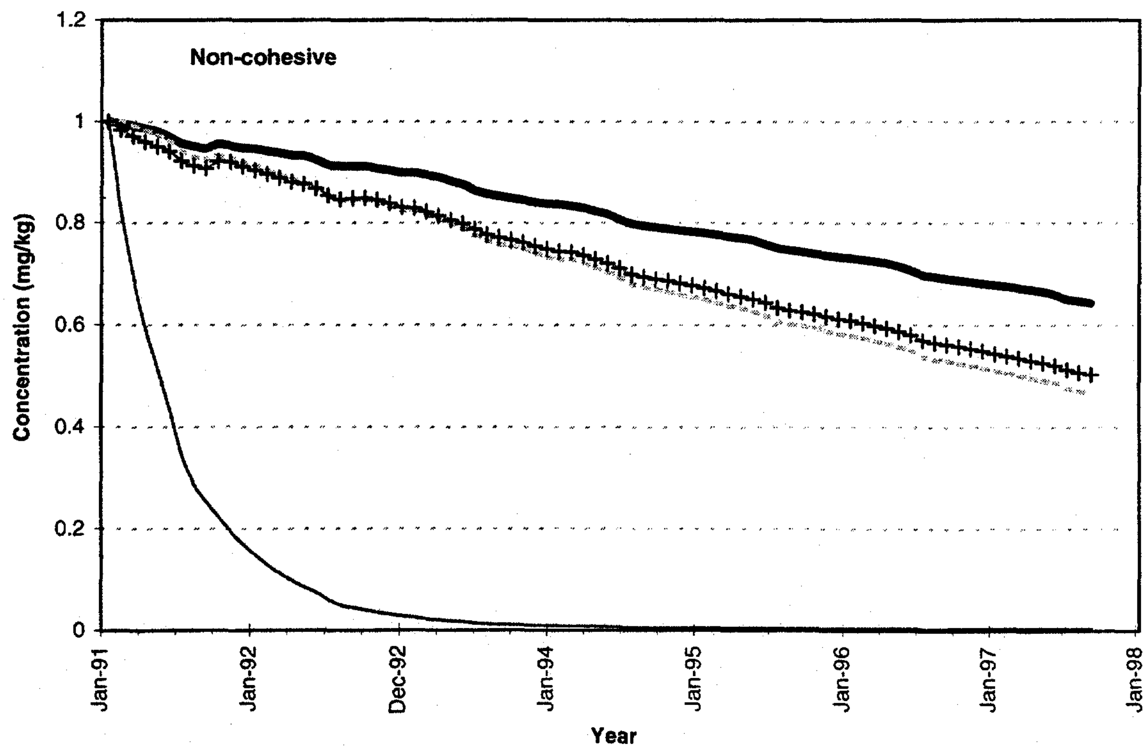


Figure 7-64. Comparison Between Computed Surficial Sediment Tri+, BZ#28, BZ#52 and BZ#4 Concentrations for Thompson Island Pool.

303653

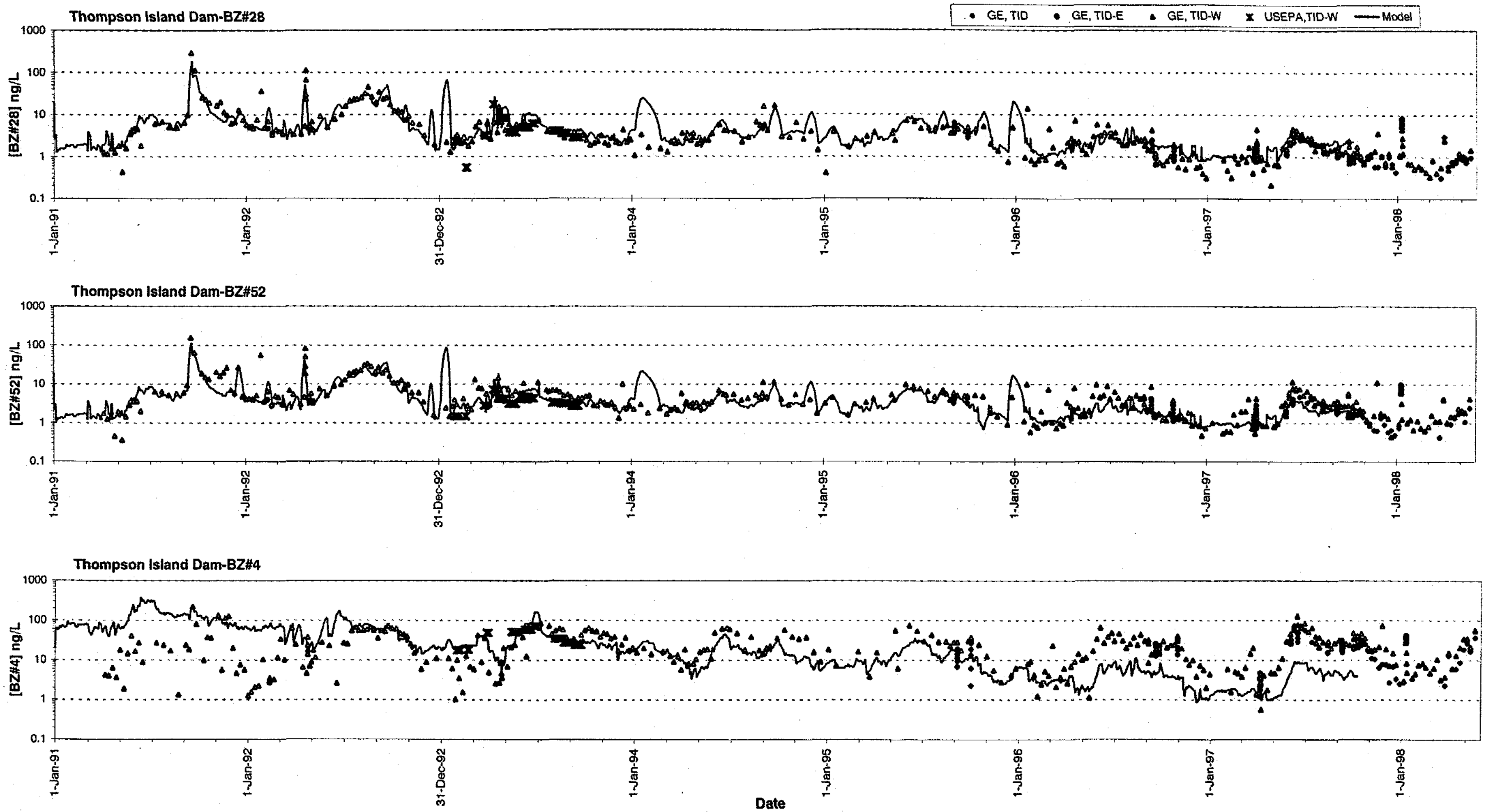


Figure 7-65. Predicted versus Observed BZ#4, BZ#28 and BZ#52 Concentrations Using Sediment-Specific Partitioning (from GE Data).

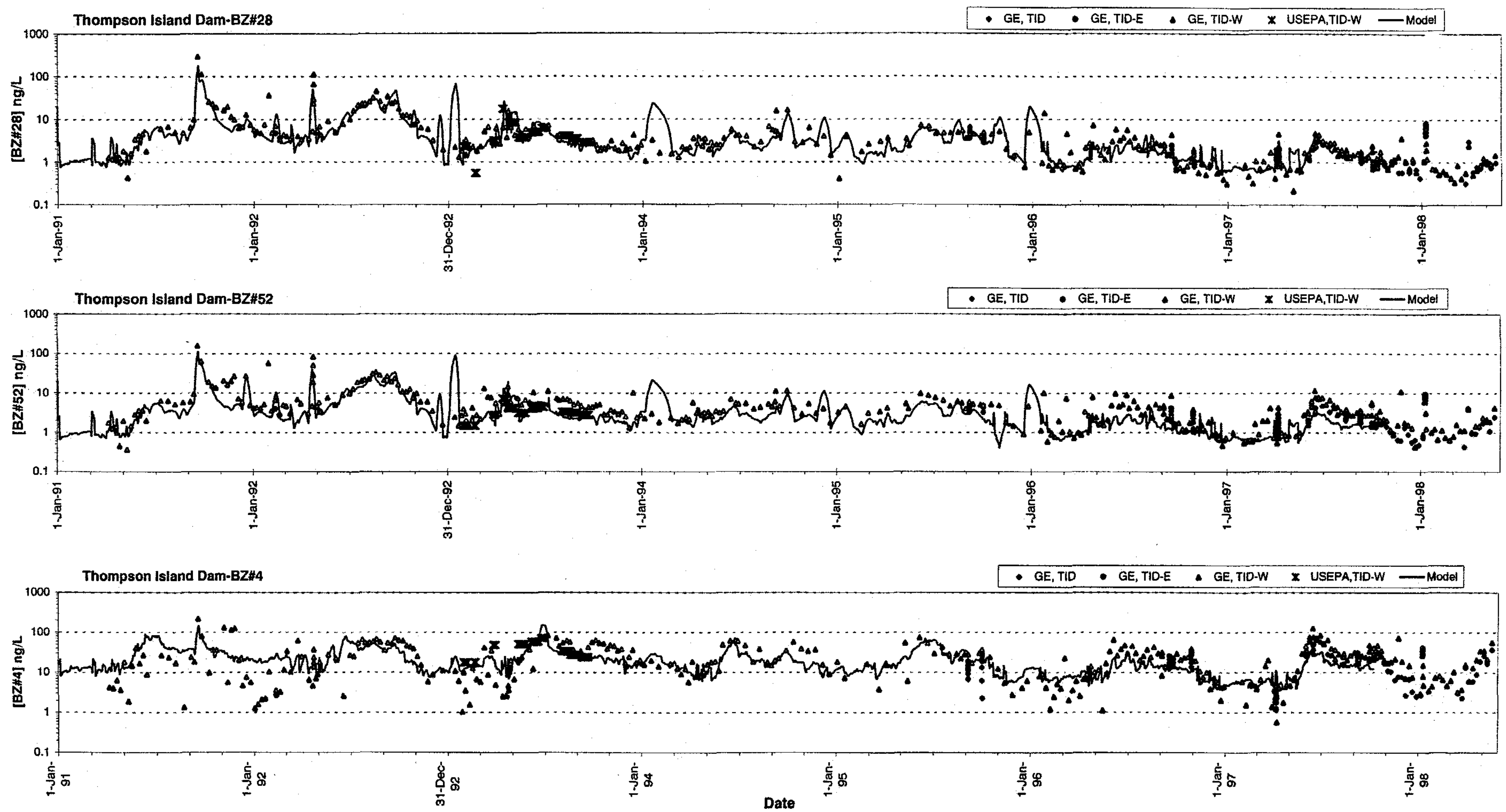


Figure 7-66a. Predicted versus Observed BZ#4, BZ#28 and BZ#52 Concentrations Using Sediment-Specific Partitioning (from GE Data) and Particulate and Porewater Sediment-Water Mass Transfer Pathways.

303654

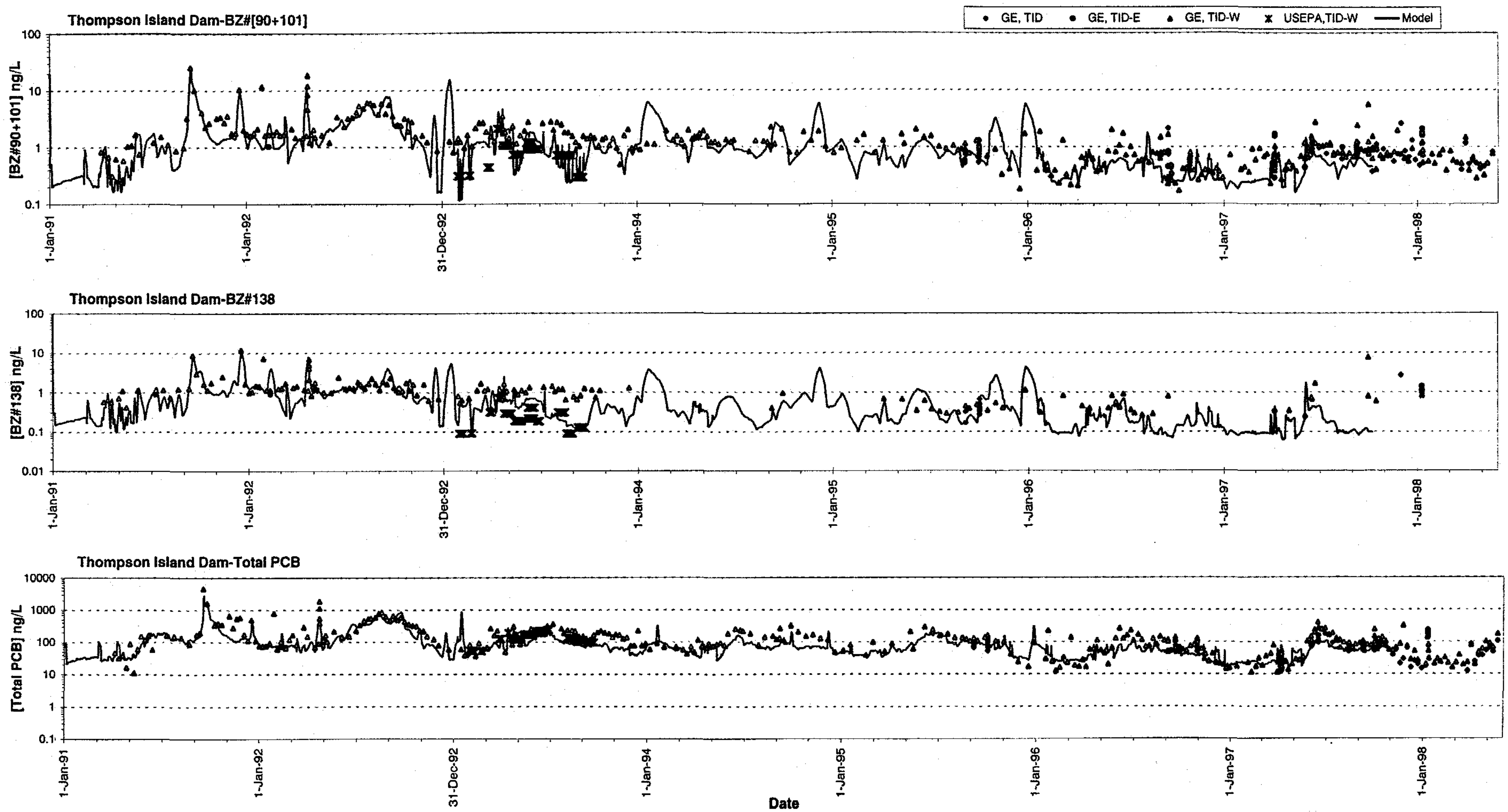


Figure 7-66b. Predicted versus Observed BZ[#90+101], BZ#138 and and Total PCB Concentrations Using Sediment-Specific Partitioning (from GE Data) and Particulate and Dissolved Sediment-Water Mass Transfer Pathways.

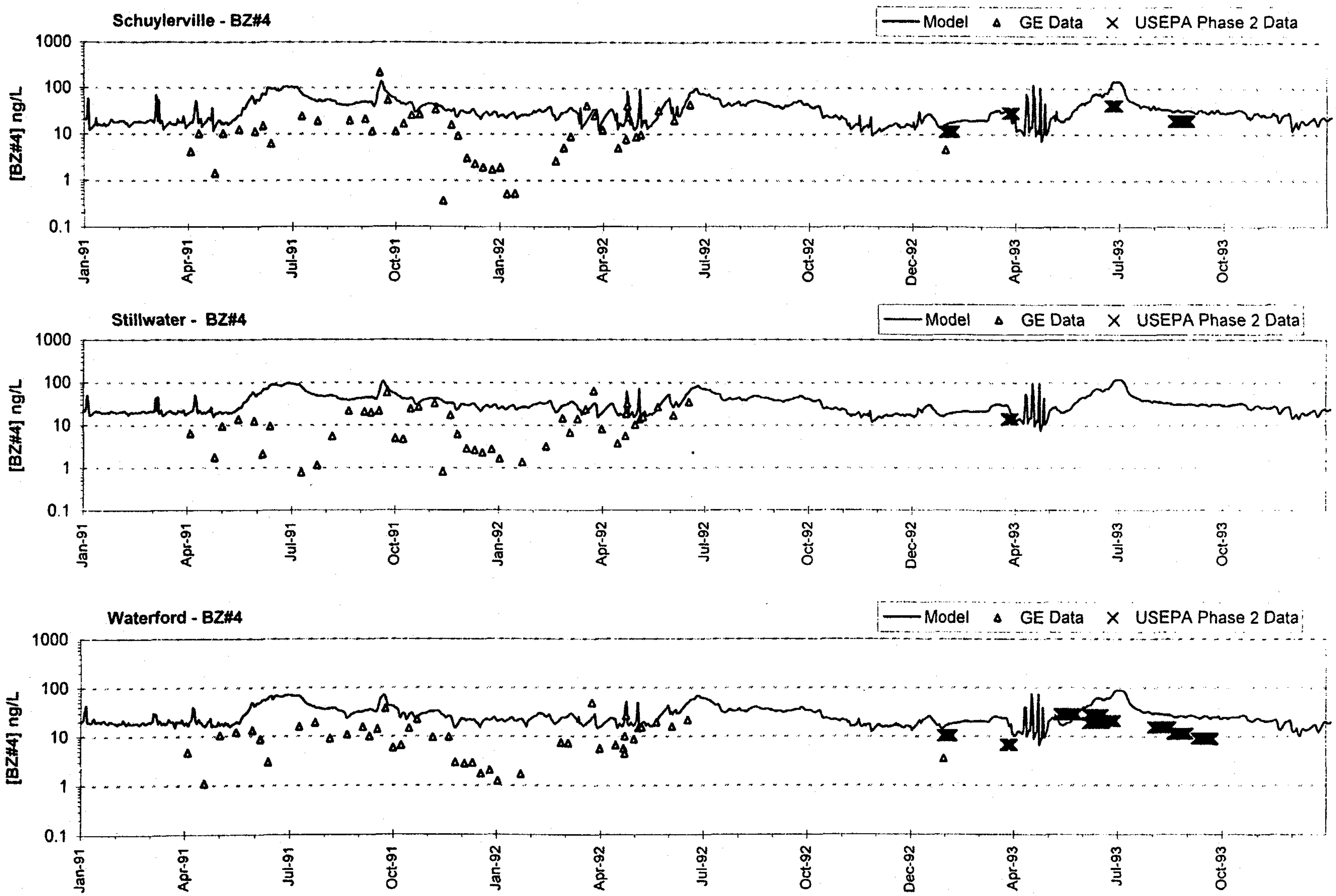


Figure 7-67a. Predicted versus Observed BZ#4 Concentrations Below Thompson Island Dam, 1991-1993.

303656

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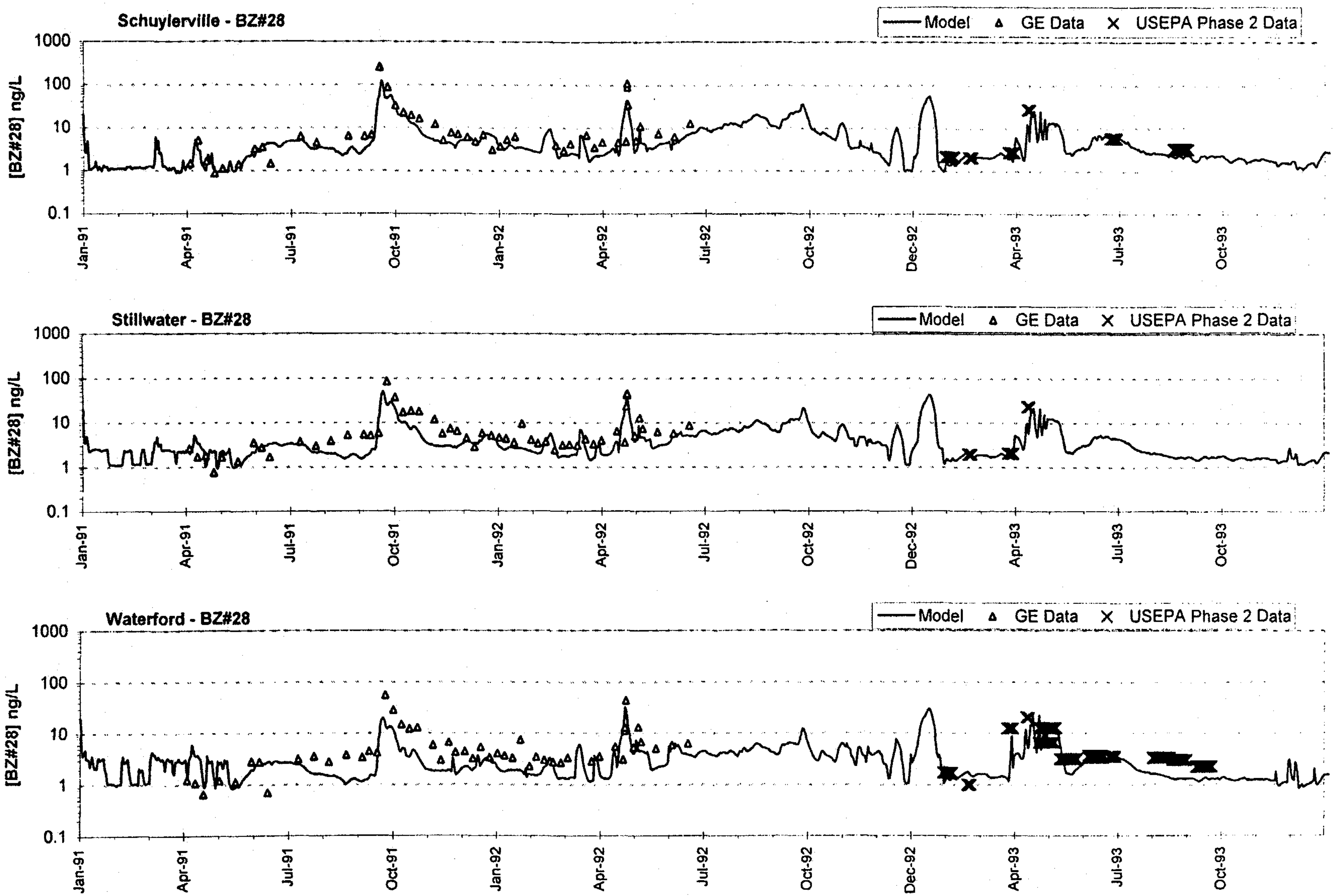

Figure 7-67b. Predicted versus Observed BZ#28 Concentrations Below Thompson Island Dam, 1991-1993.

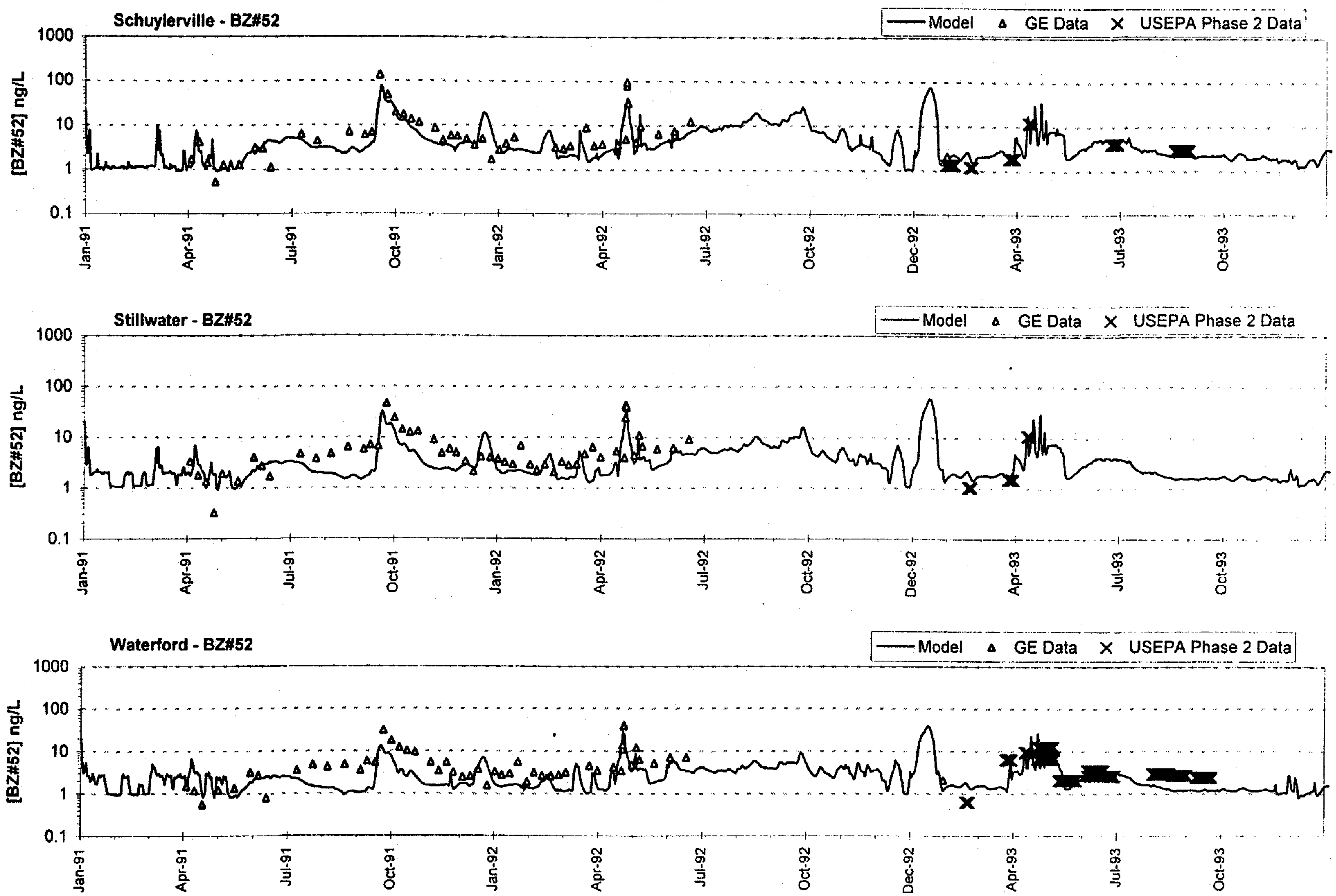

Figure 7-67c. Predicted versus Observed BZ#52 Concentrations Below Thompson Island Dam, 1991-1993.

303658

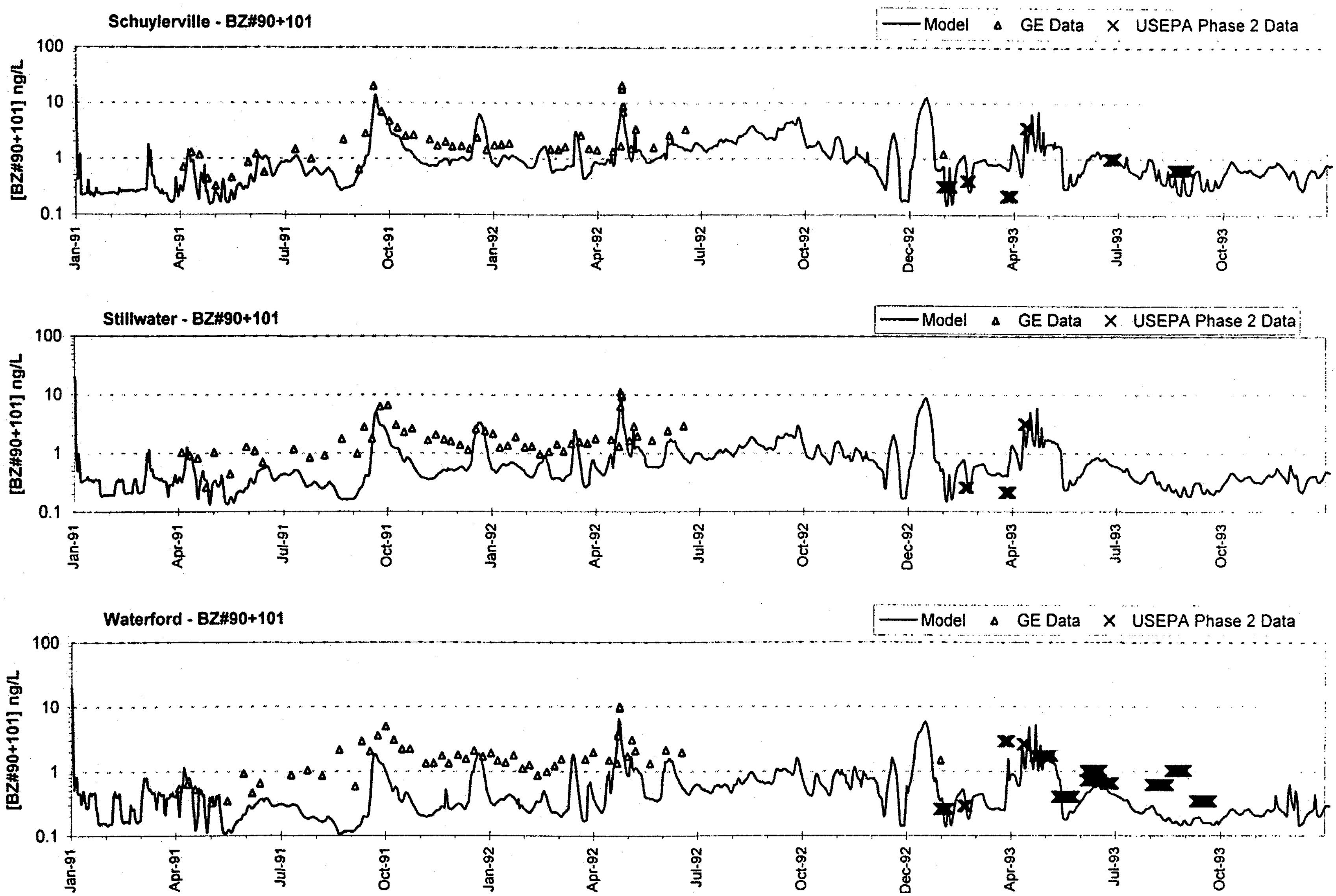

Figure 7-67d. Predicted versus Observed BZ#[90+101] Concentrations Below Thompson Island Dam, 1991-1993.

303659

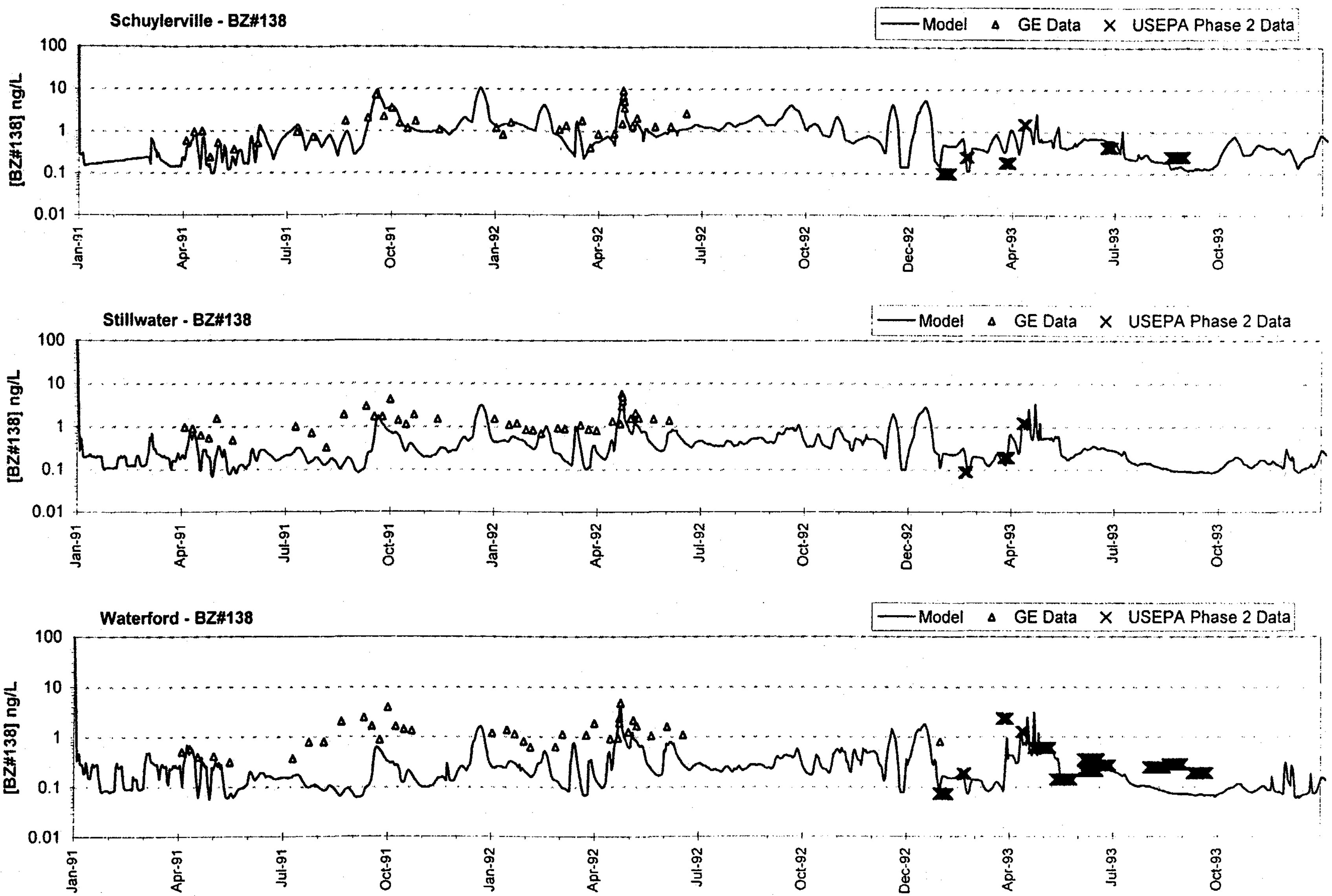

Figure 7-67e. Predicted versus Observed BZ#138 Concentrations Below Thompson Island Dam, 1991-1993.

303660

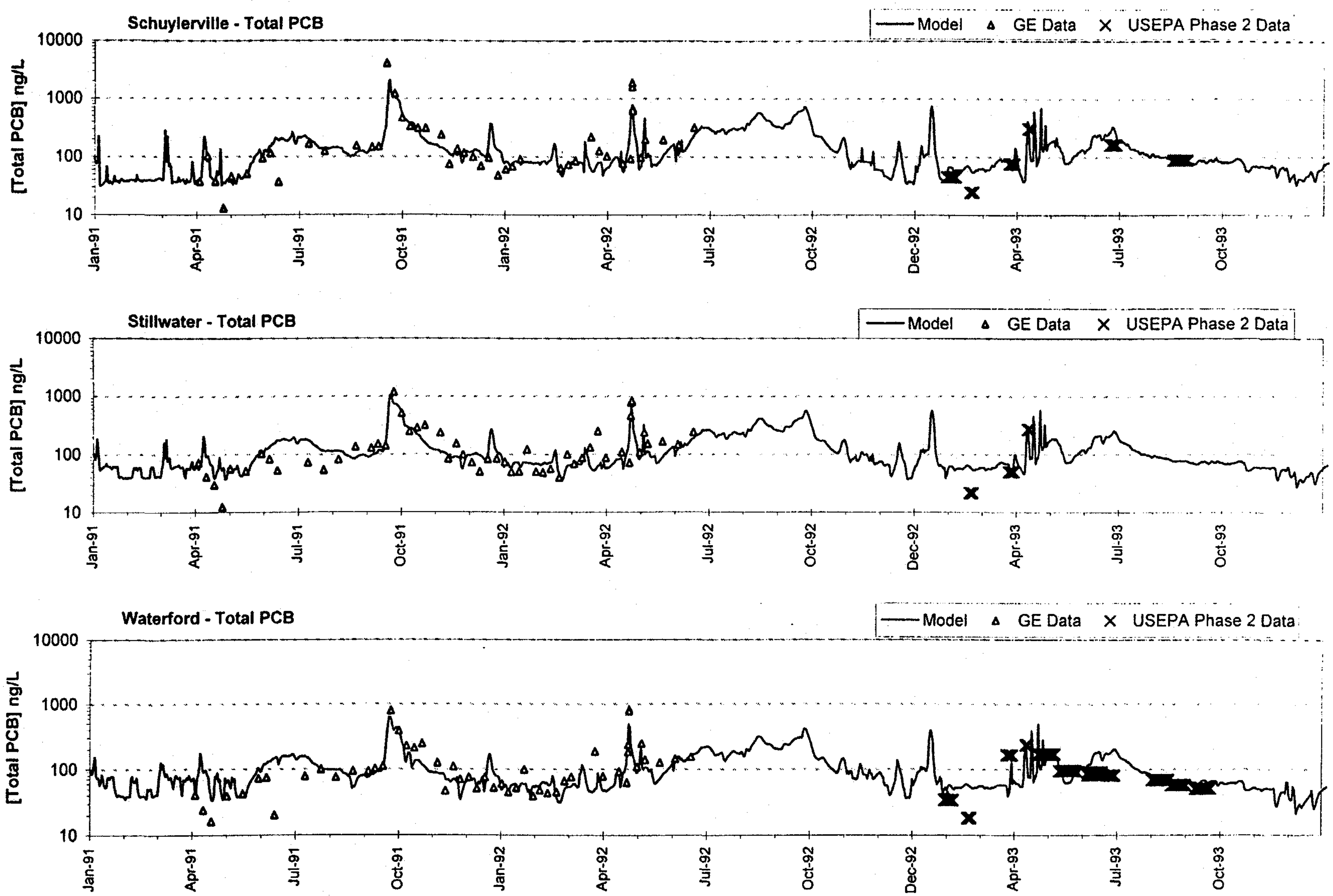

Figure 7-67f. Predicted versus Observed Total PCB Concentrations Below Thompson Island Dam, 1991-1993.

303661

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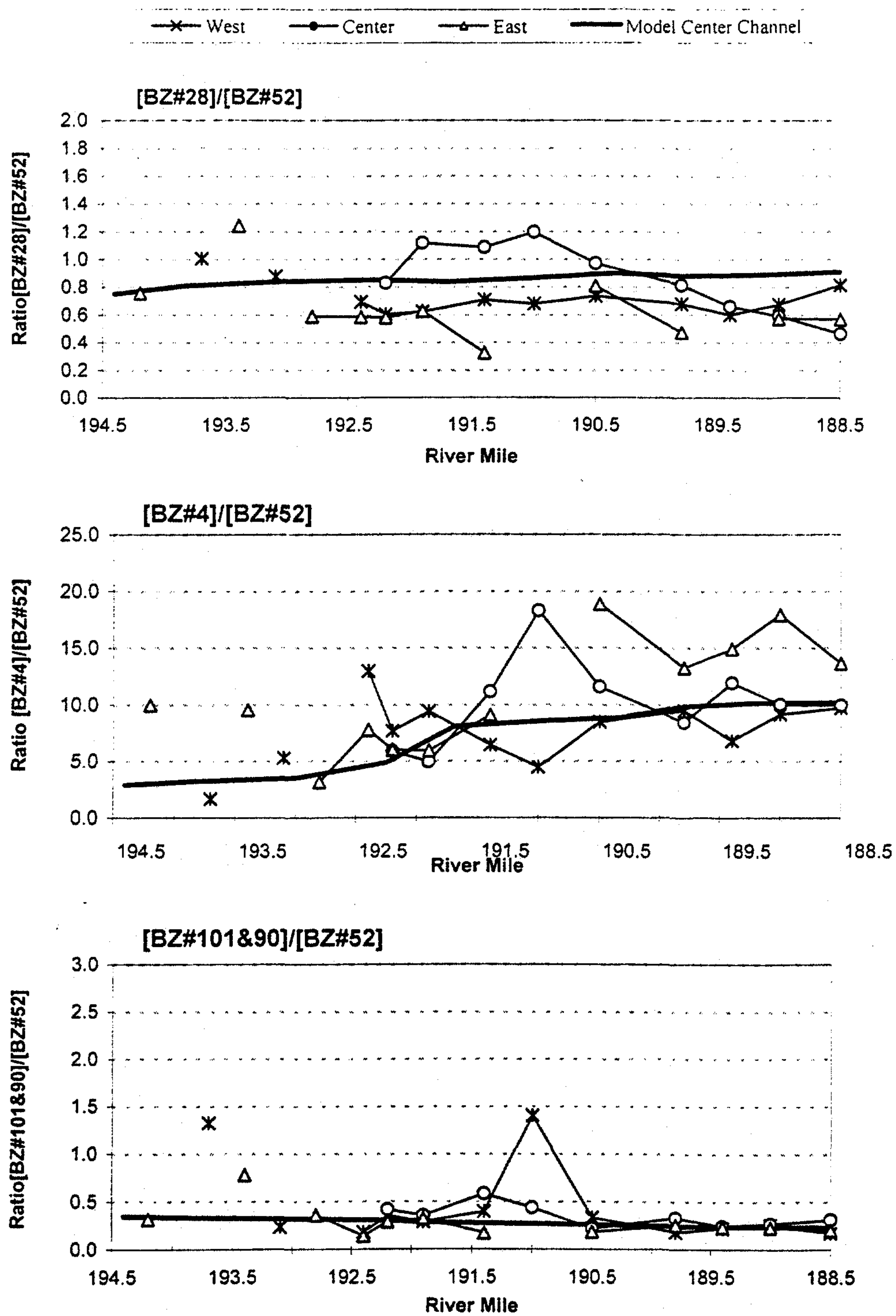


Figure 7-68a. Comparison of Model versus Observed Congener Concentration Ratios: Thompson Island Pool, September 25, 1996 Float Study.

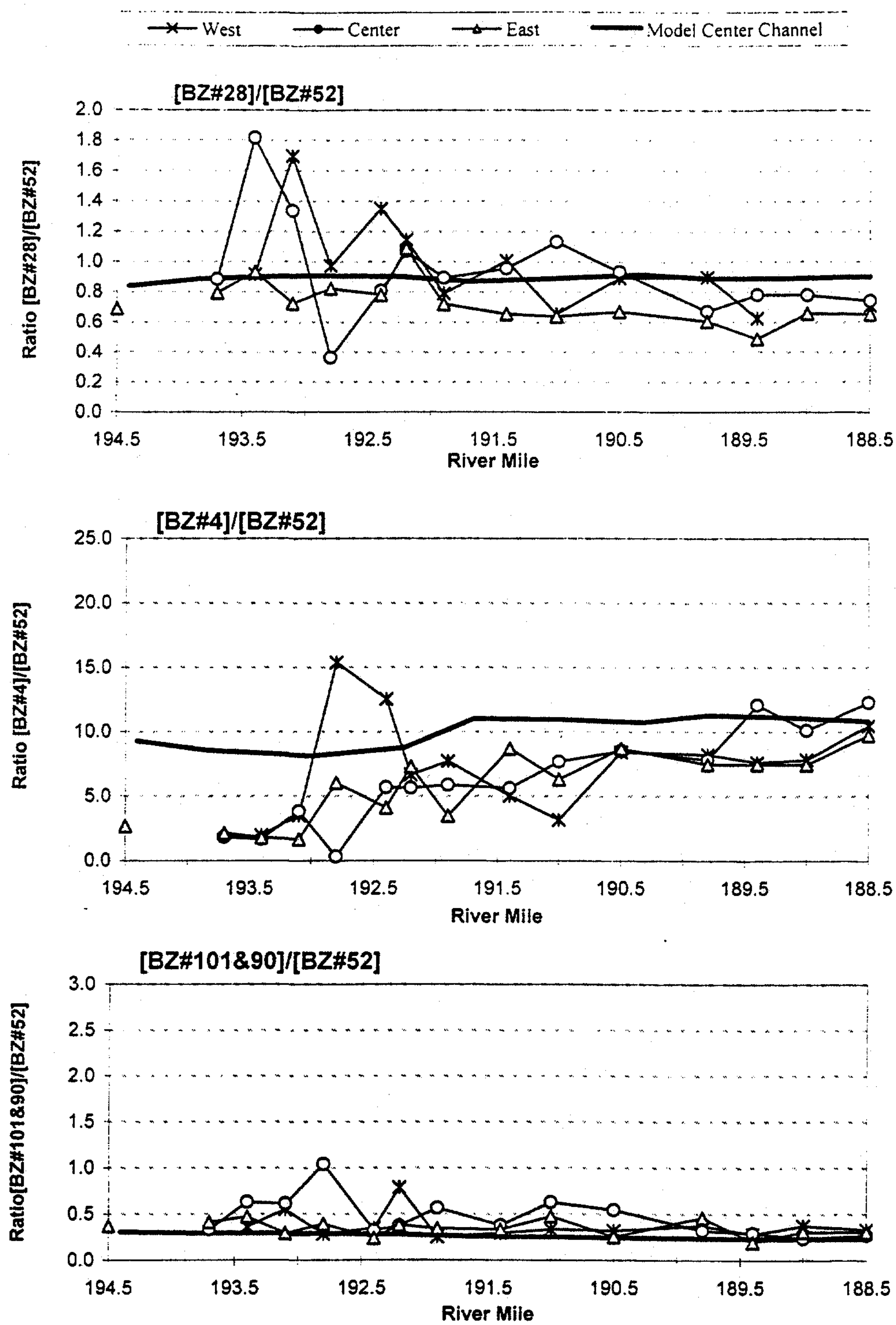


Figure 7-68b. Comparison of Model versus Observed Congener Concentration Ratios: Thompson Island Pool, September 26, 1996 Float Study.

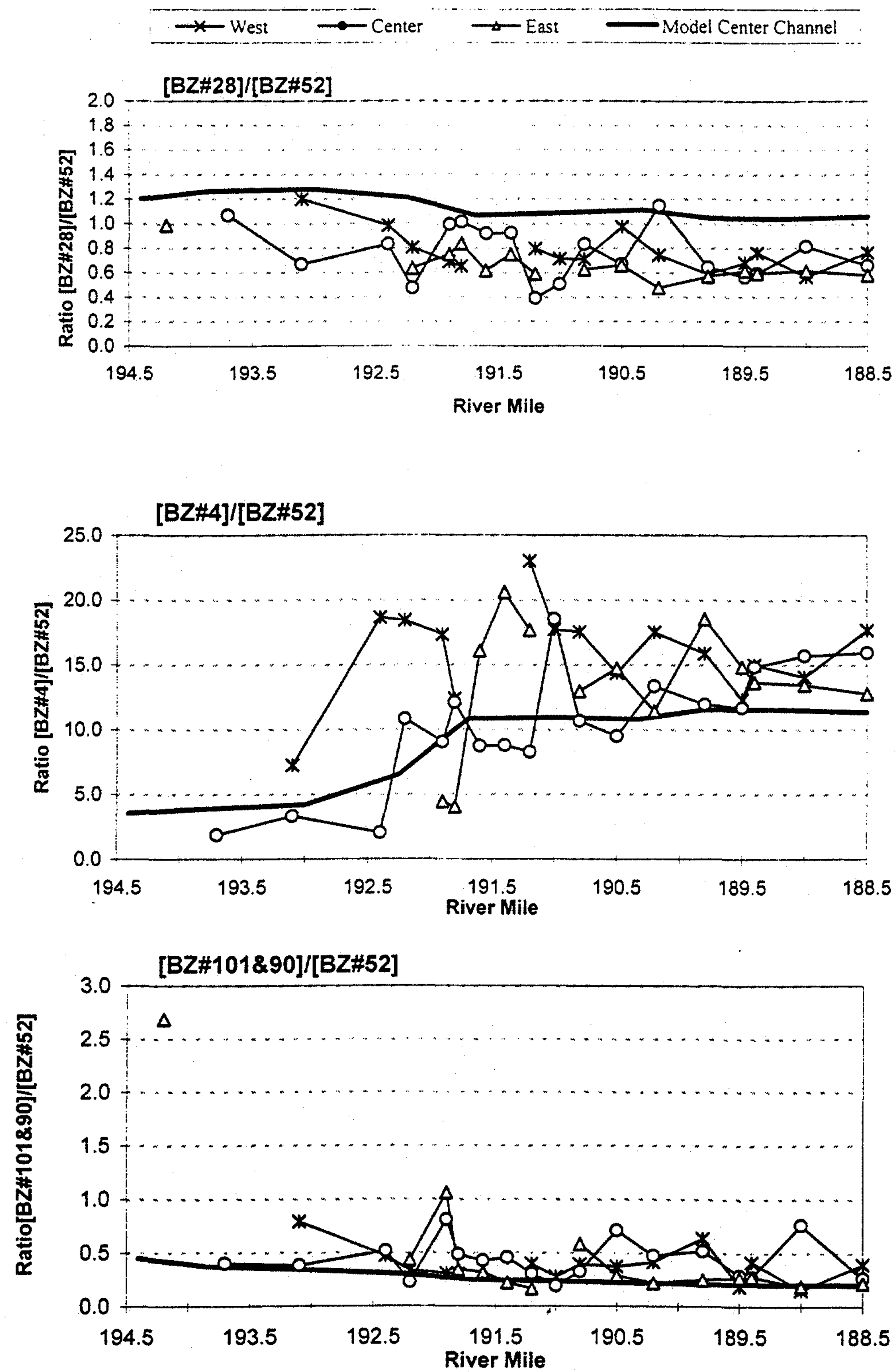


Figure 7-68c. Comparison of Model versus Observed Congener Concentration Ratios: Thompson Island Pool, June 4, 1997 Float Study.

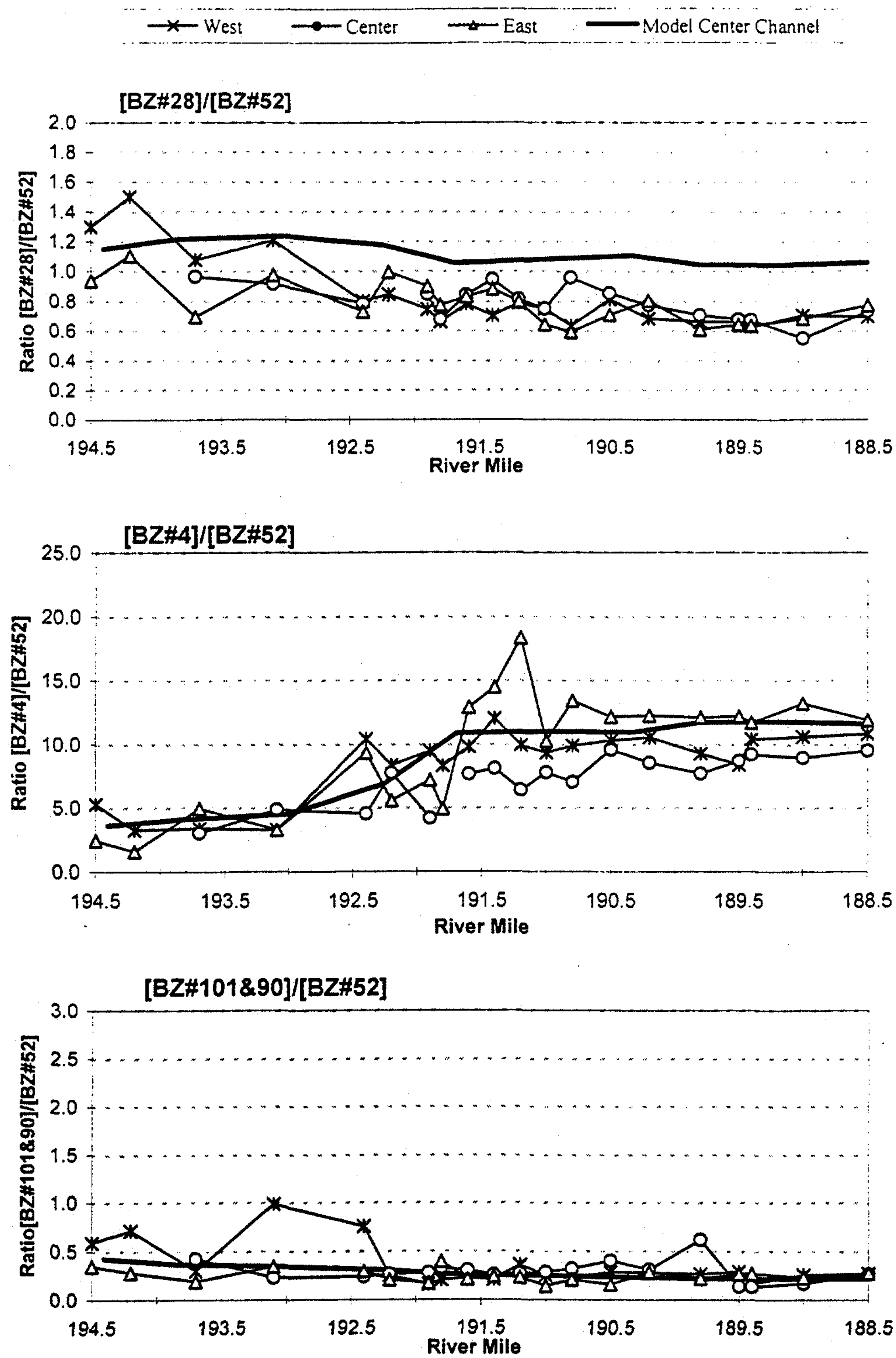
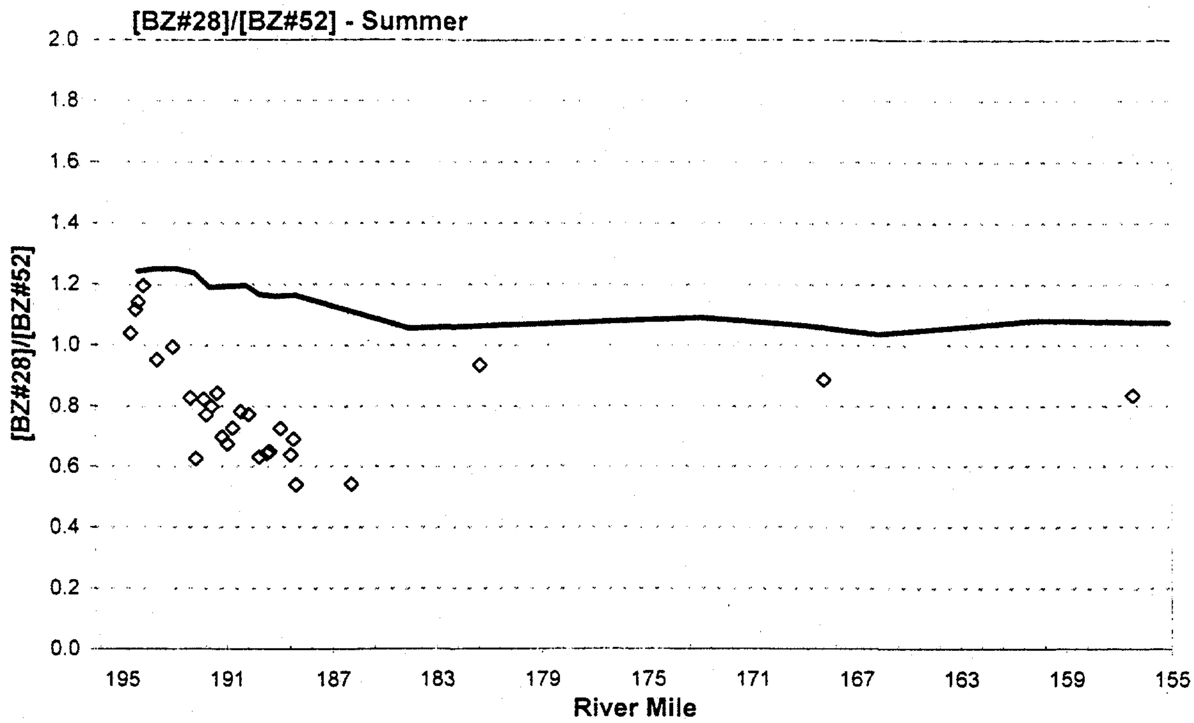


Figure 7-68d. Comparison of Model versus Observed Congener Concentration Ratios: Thompson Island Pool, June 17, 1997 Float Study.



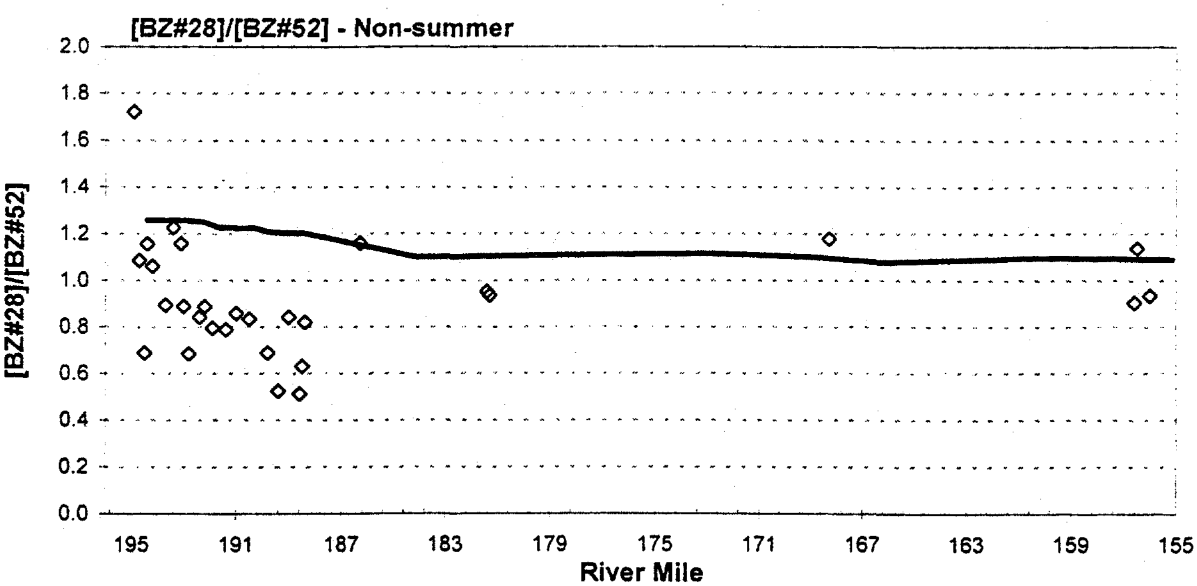
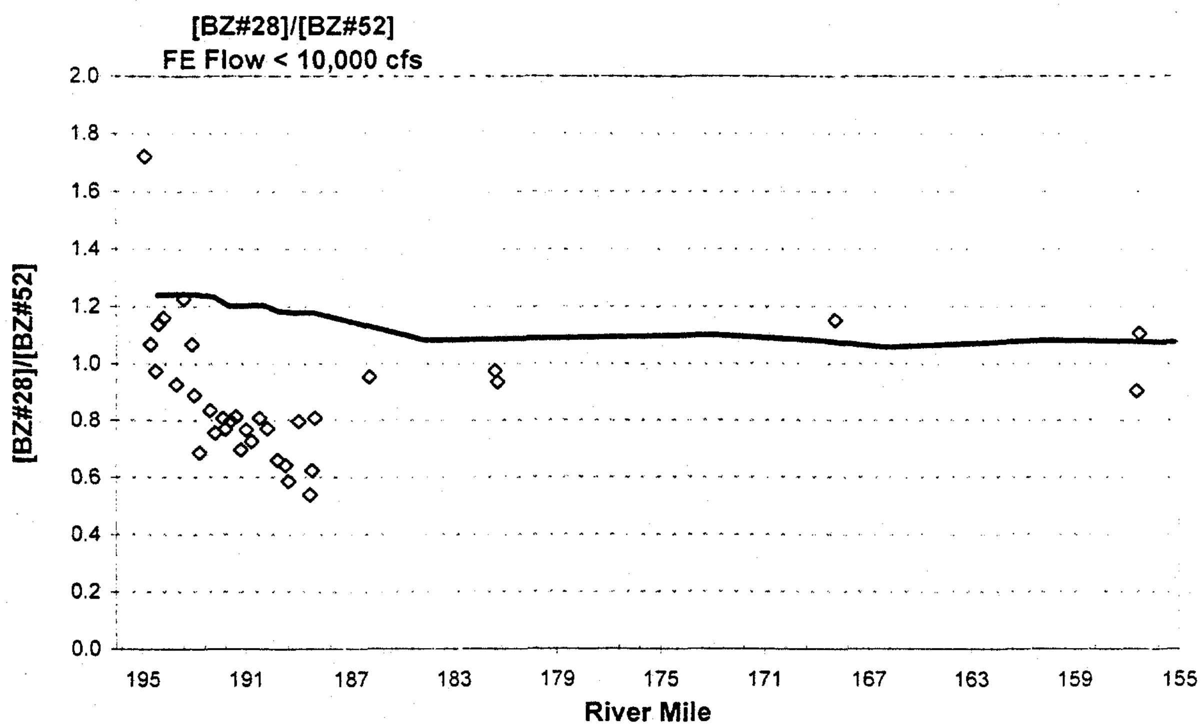


Figure 7-69. Model versus Observed Down-river [BZ#28]/[BZ#52] Ratios by Season, 1991-1997.



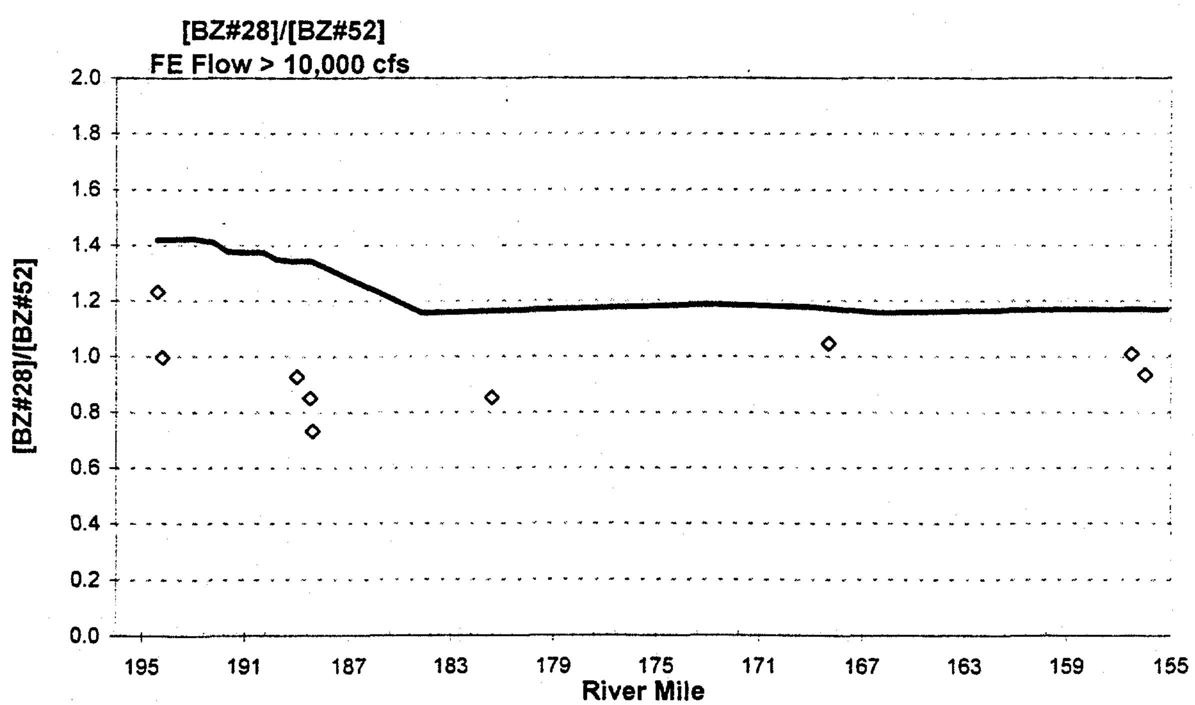


Figure 7-70. Model versus Observed Down-river [BZ#28]/[BZ#52] Ratios Stratified by Fort Edward Flow (< 10,000 cfs and > 10,000 cfs), 1991-1997.

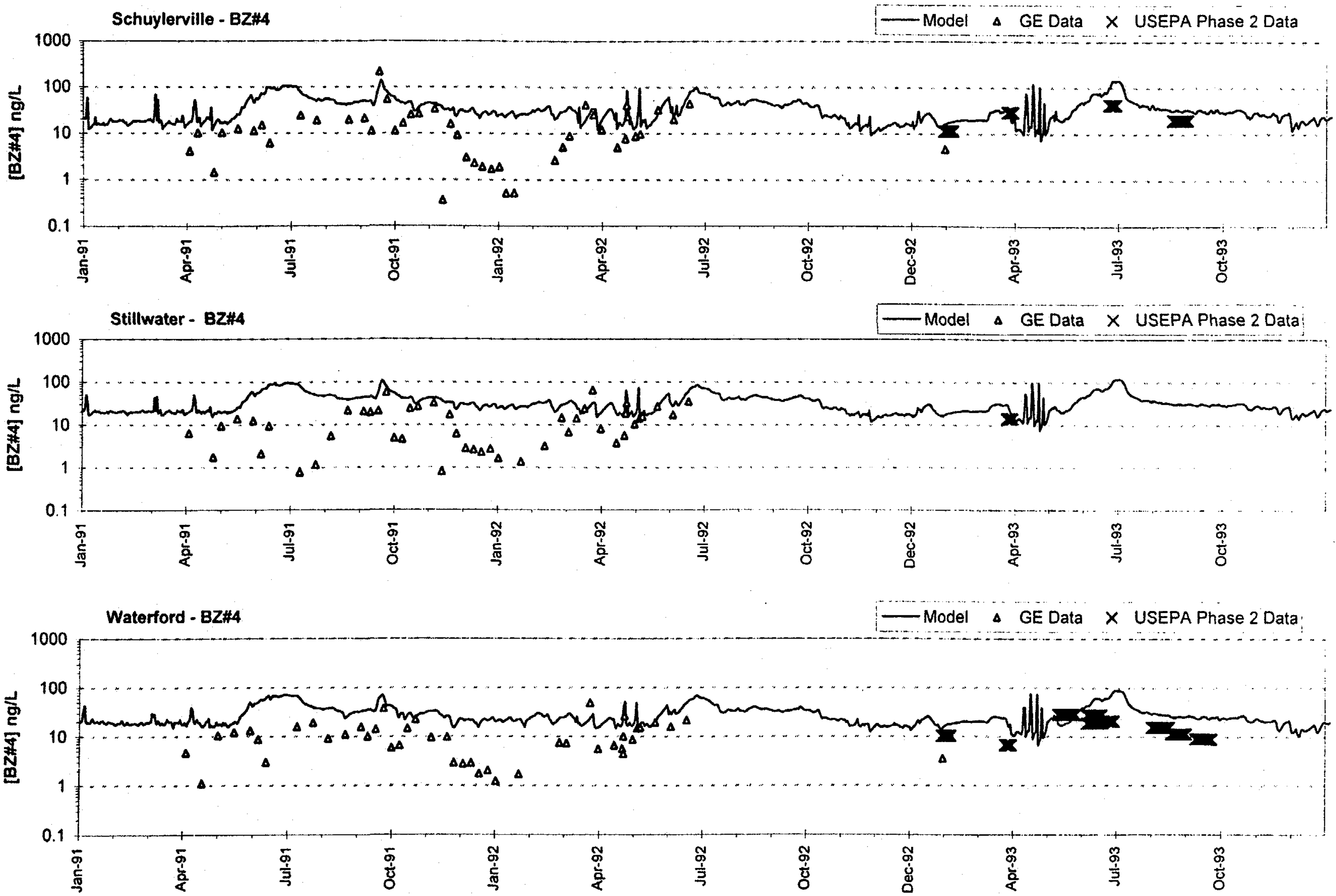


Figure 7-67a. Predicted versus Observed BZ#4 Concentrations Below Thompson Island Dam, 1991-1993.

303668

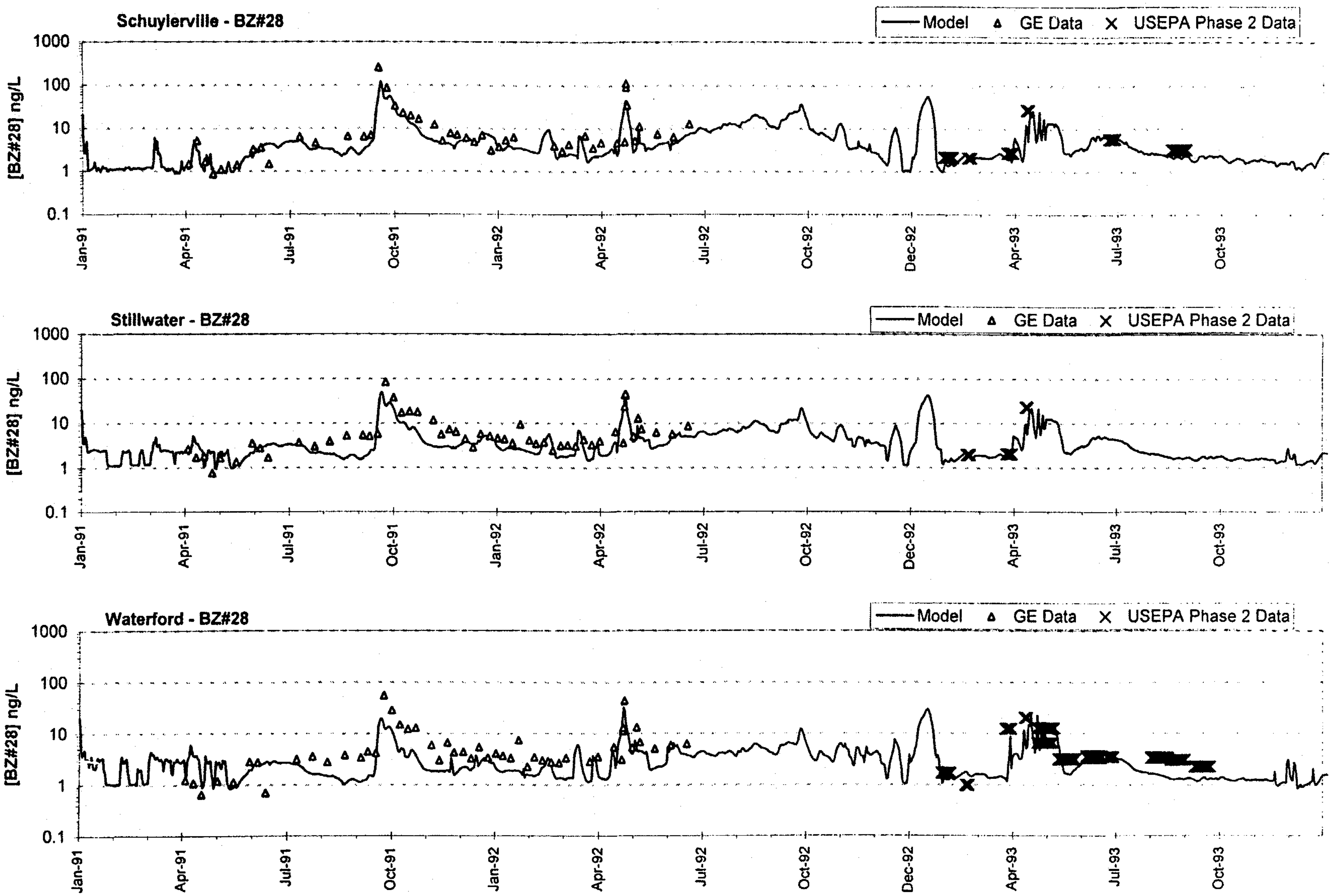


Figure 7-67b. Predicted versus Observed BZ#28 Concentrations Below Thompson Island Dam, 1991-1993.

303669

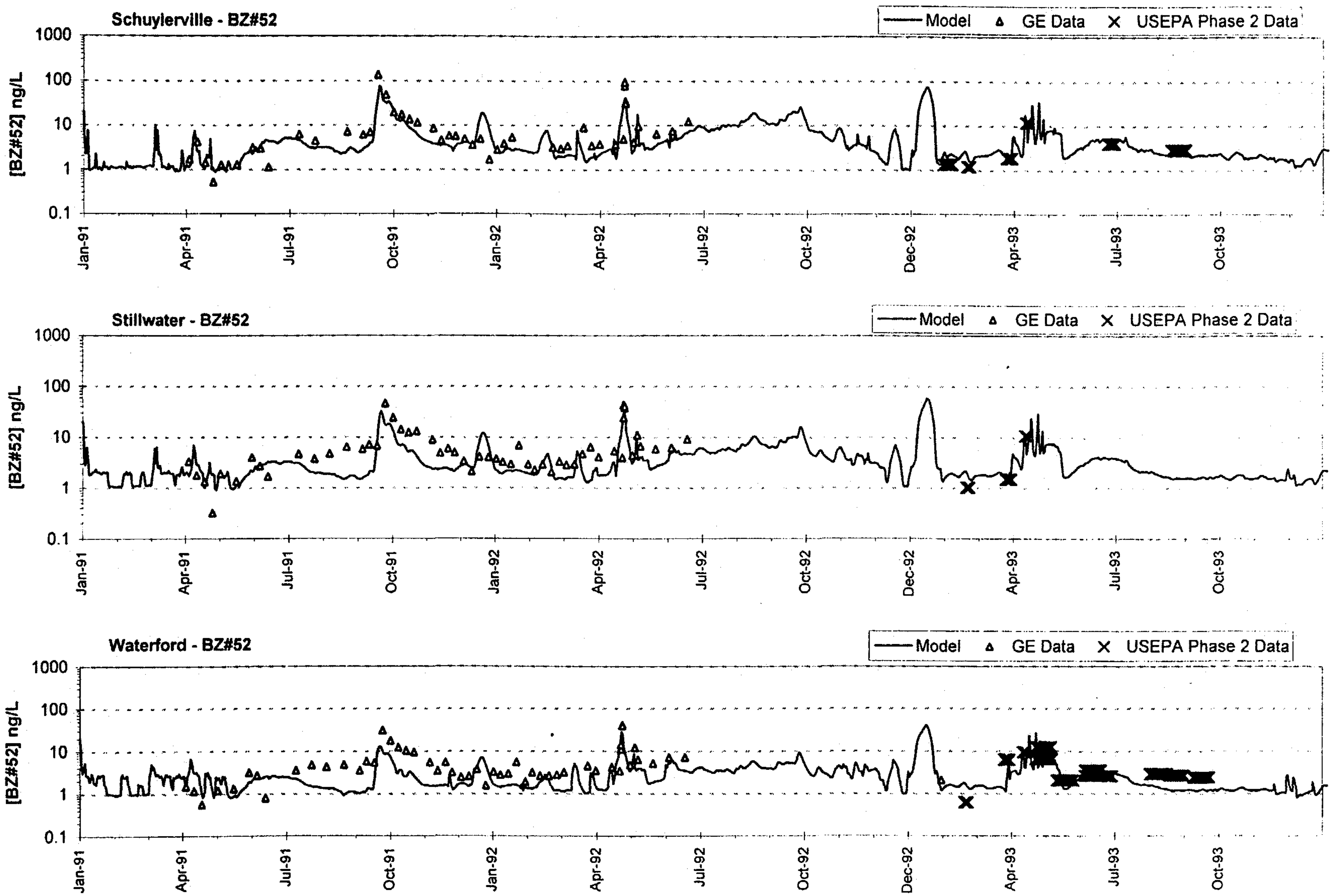


Figure 7-67c. Predicted versus Observed BZ#52 Concentrations Below Thompson Island Dam, 1991-1993.

303670

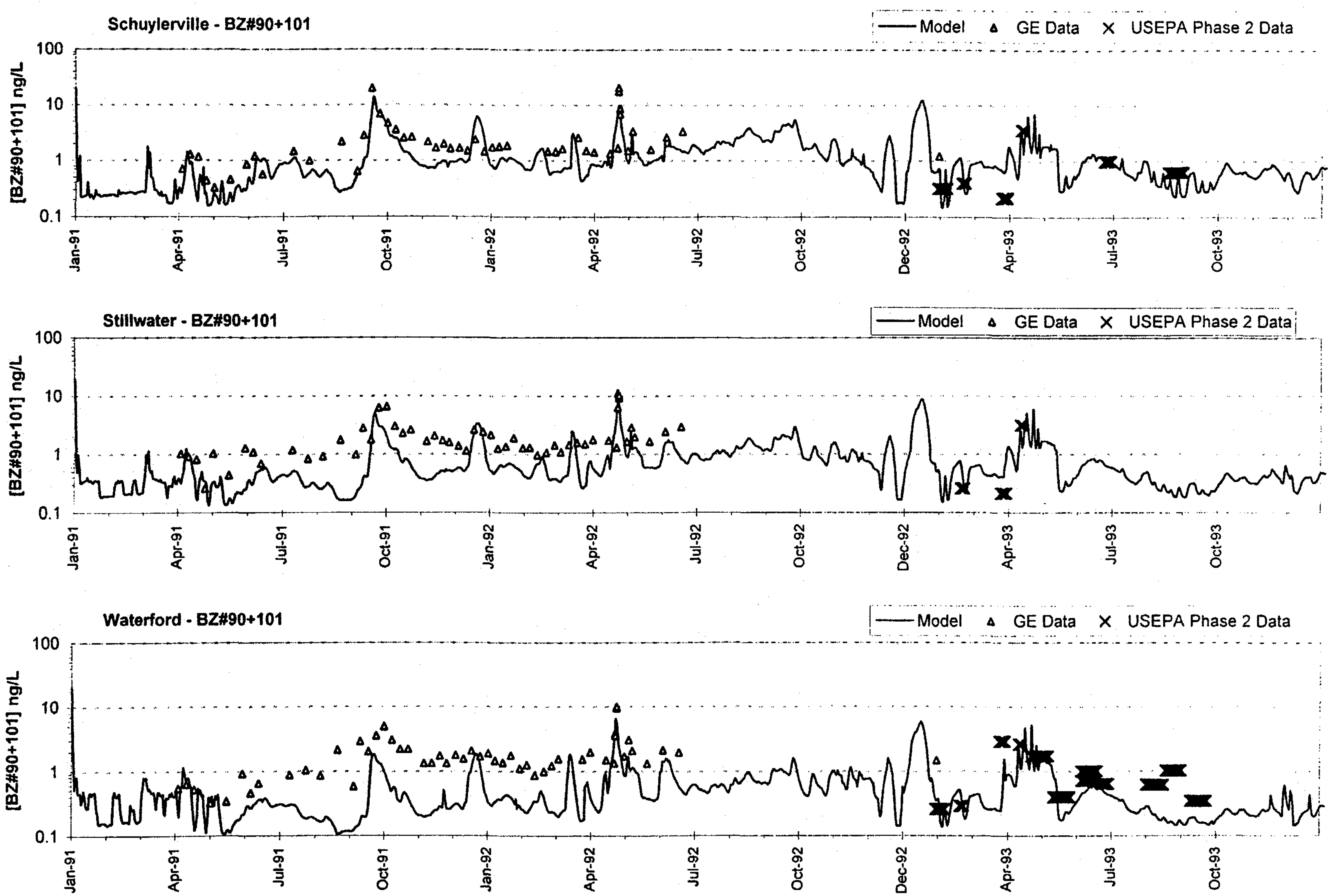


Figure 7-67d. Predicted versus Observed BZ#[90+101] Concentrations Below Thompson Island Dam, 1991-1993.

303671

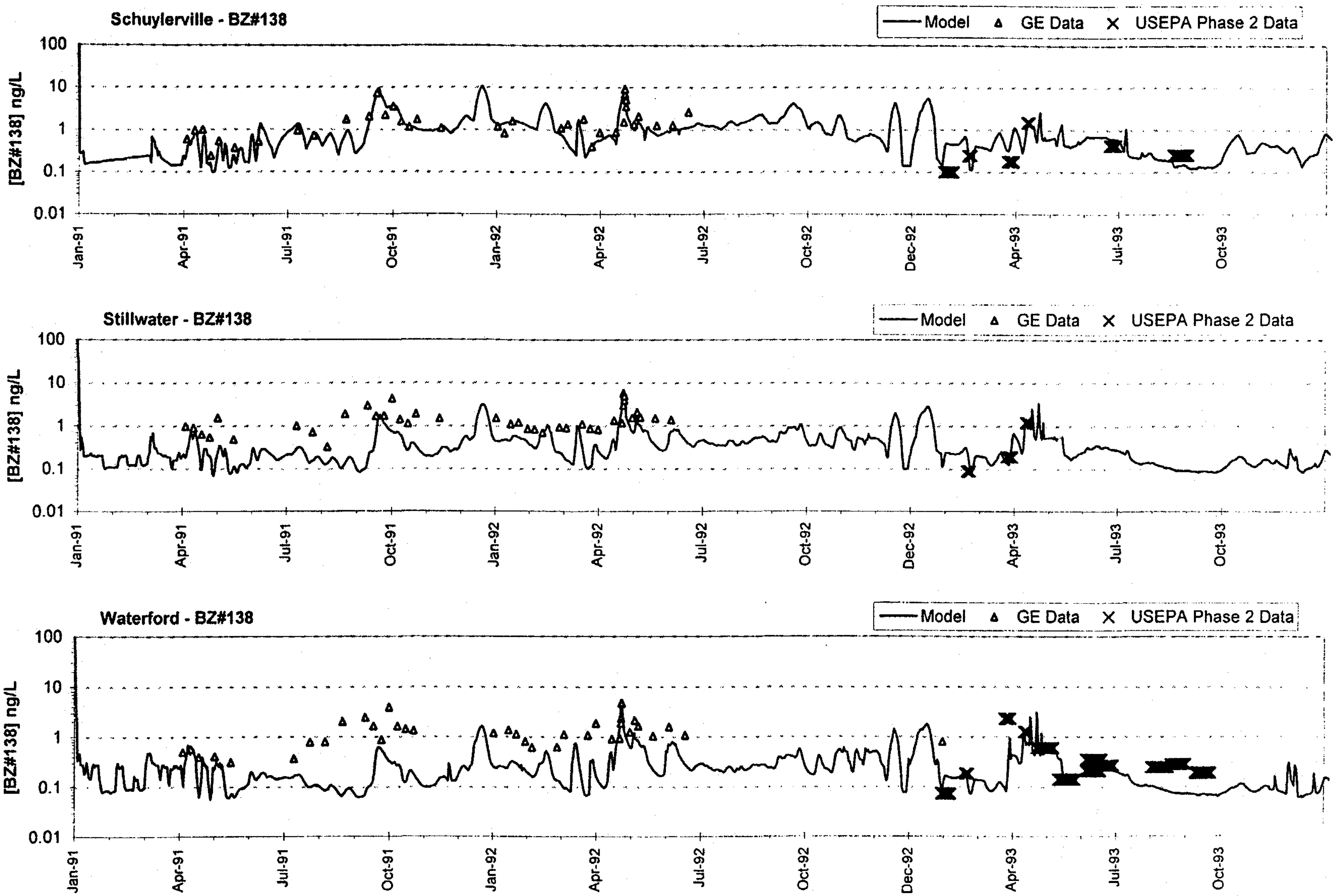
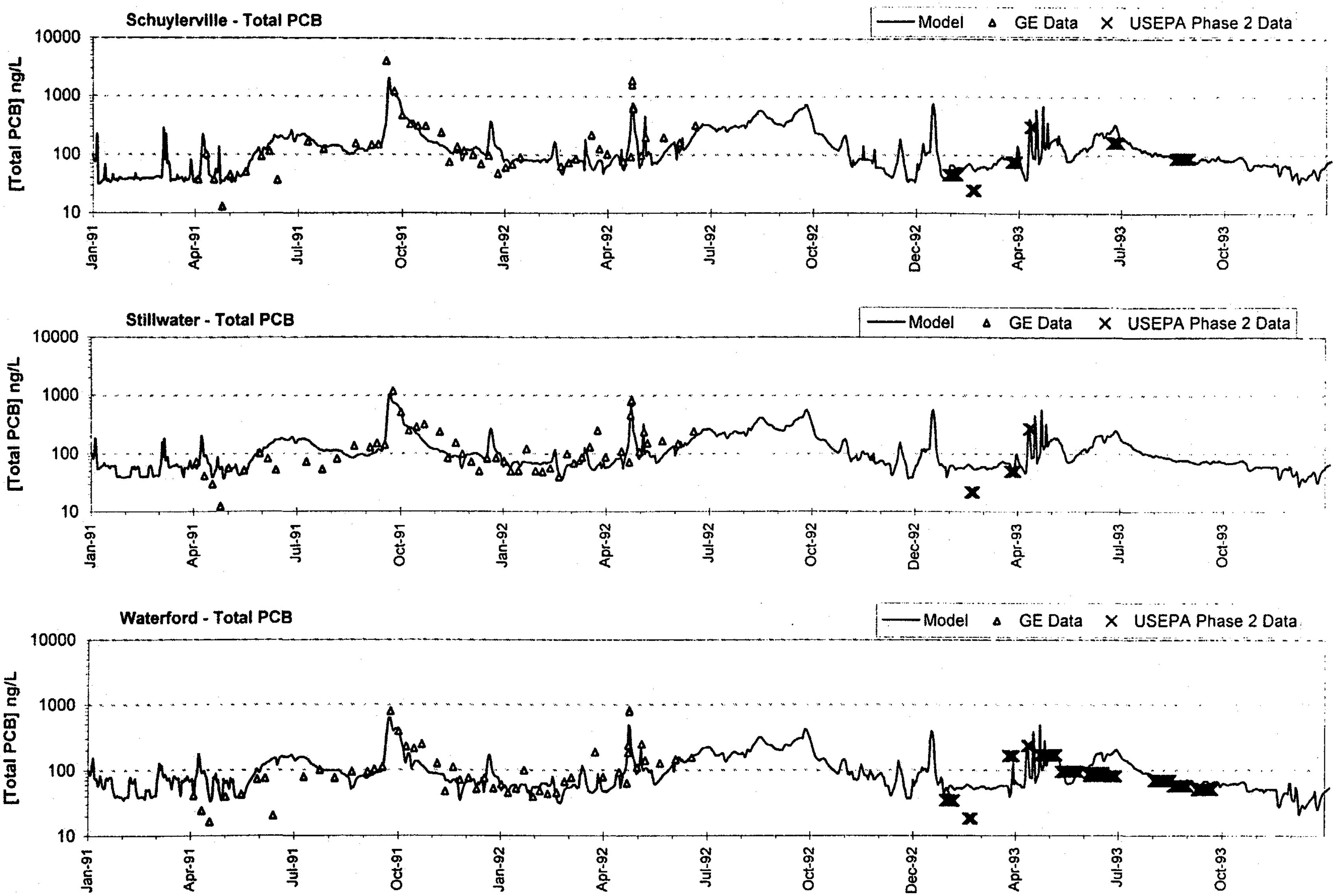


Figure 7-67e. Predicted versus Observed BZ#138 Concentrations Below Thompson Island Dam, 1991-1993.

303672



303673

Figure 7-67f. Predicted versus Observed Total PCB Concentrations Below Thompson Island Dam, 1991-1993.

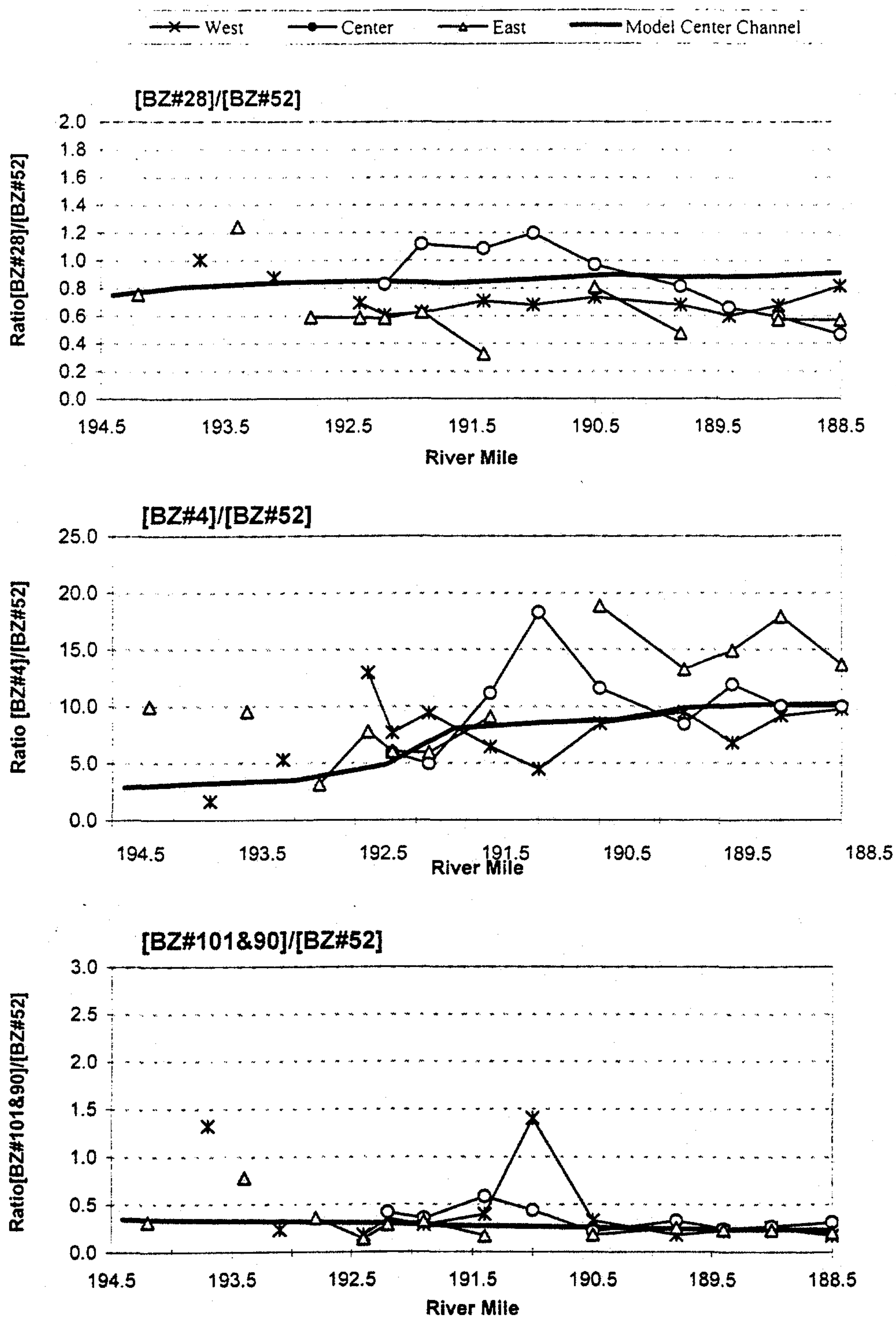


Figure 7-68a. Comparison of Model versus Observed Congener Concentration Ratios: Thompson Island Pool, September 25, 1996 Float Study.

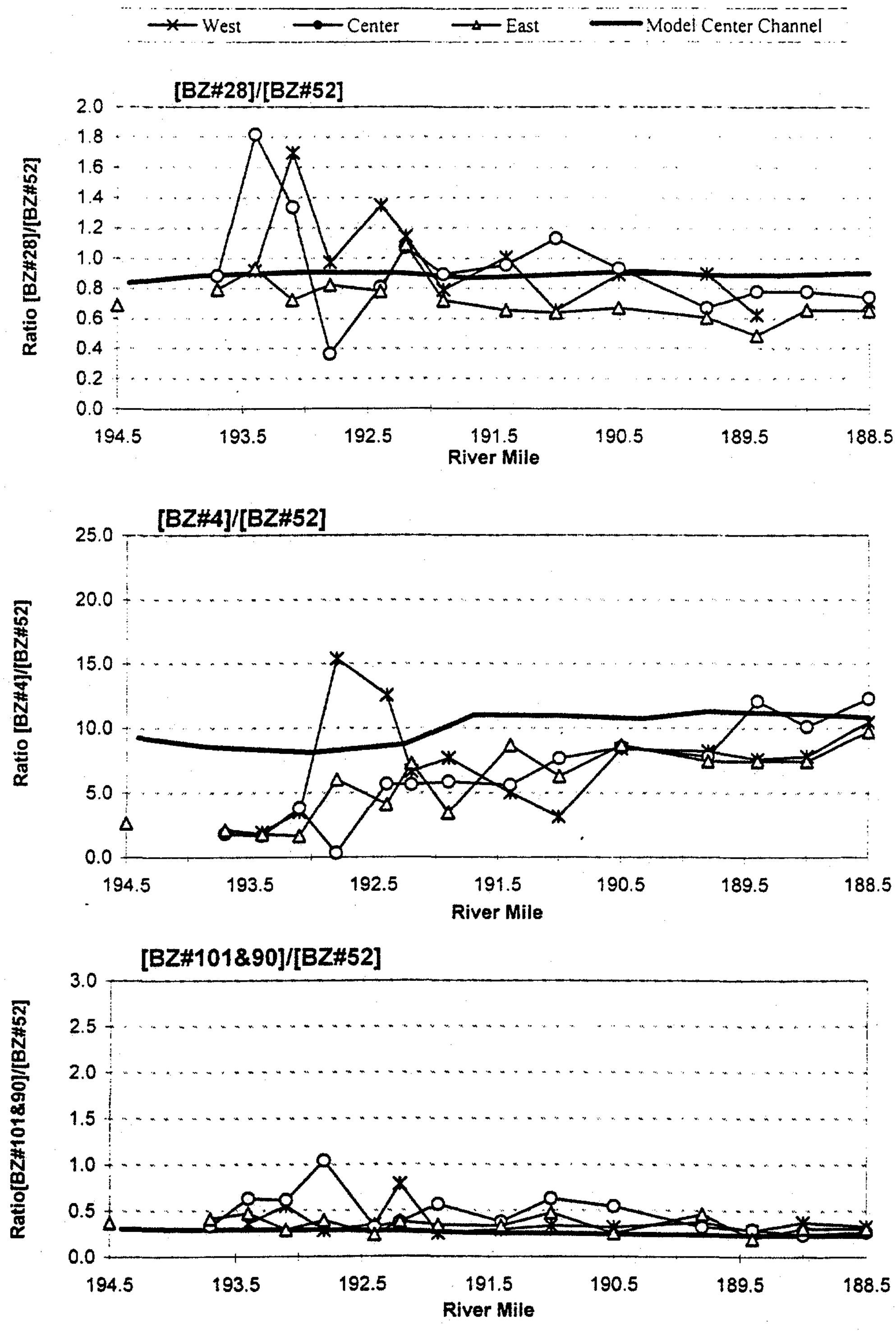


Figure 7-68b. Comparison of Model versus Observed Congener Concentration Ratios: Thompson Island Pool, September 26, 1996 Float Study.

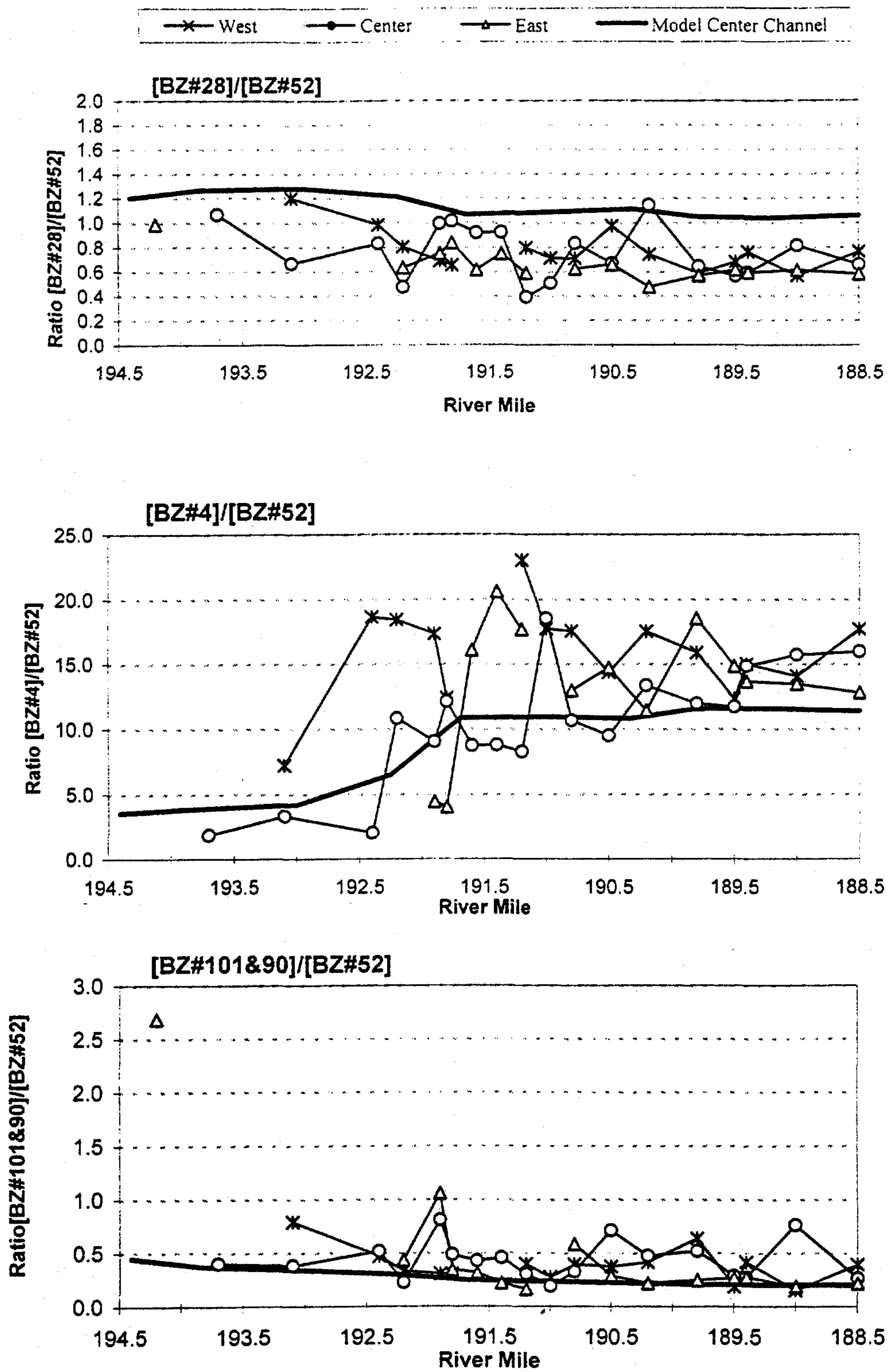


Figure 7-68c. Comparison of Model versus Observed Congener Concentration Ratios: Thompson Island Pool, June 4, 1997 Float Study.

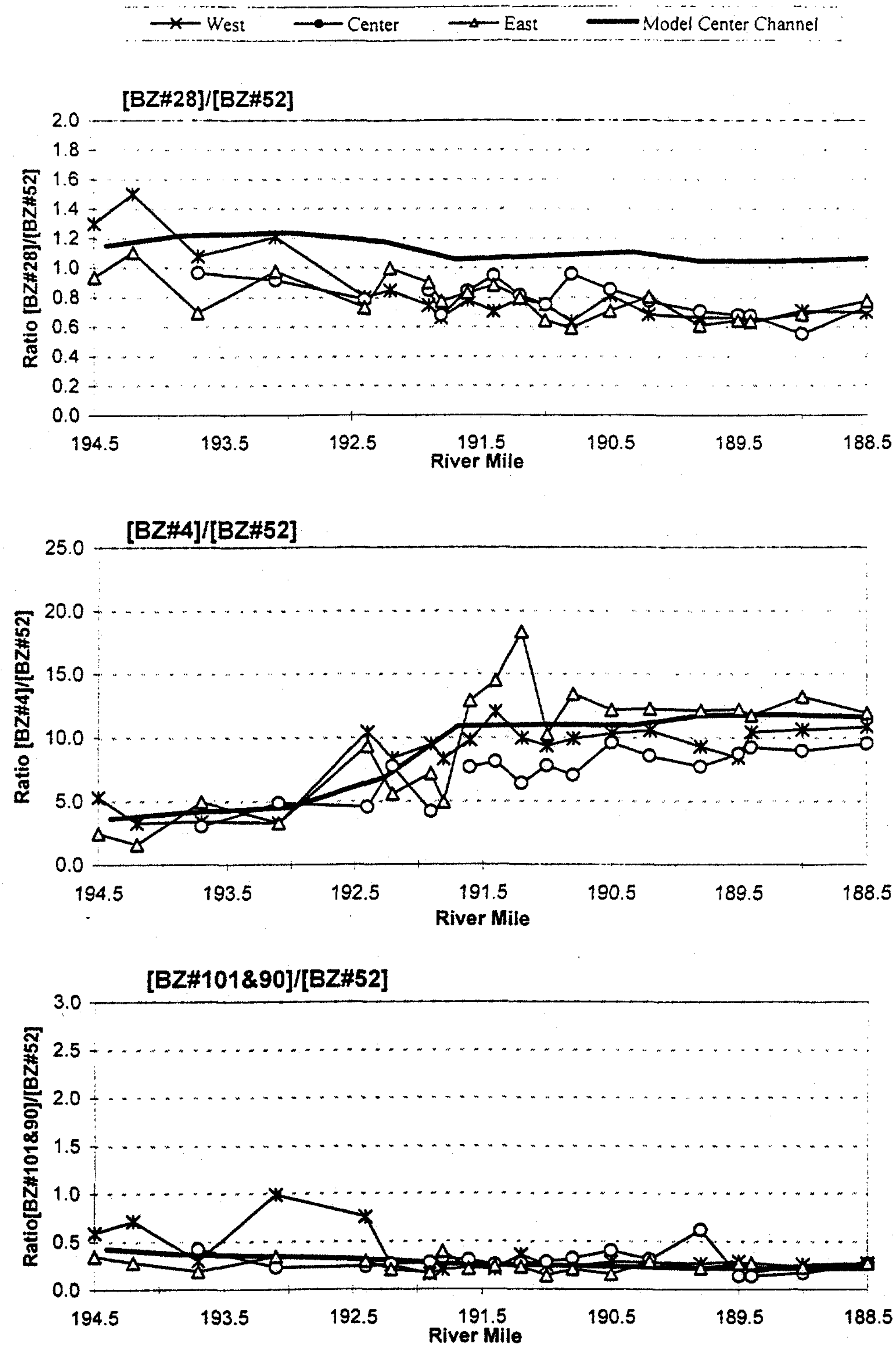
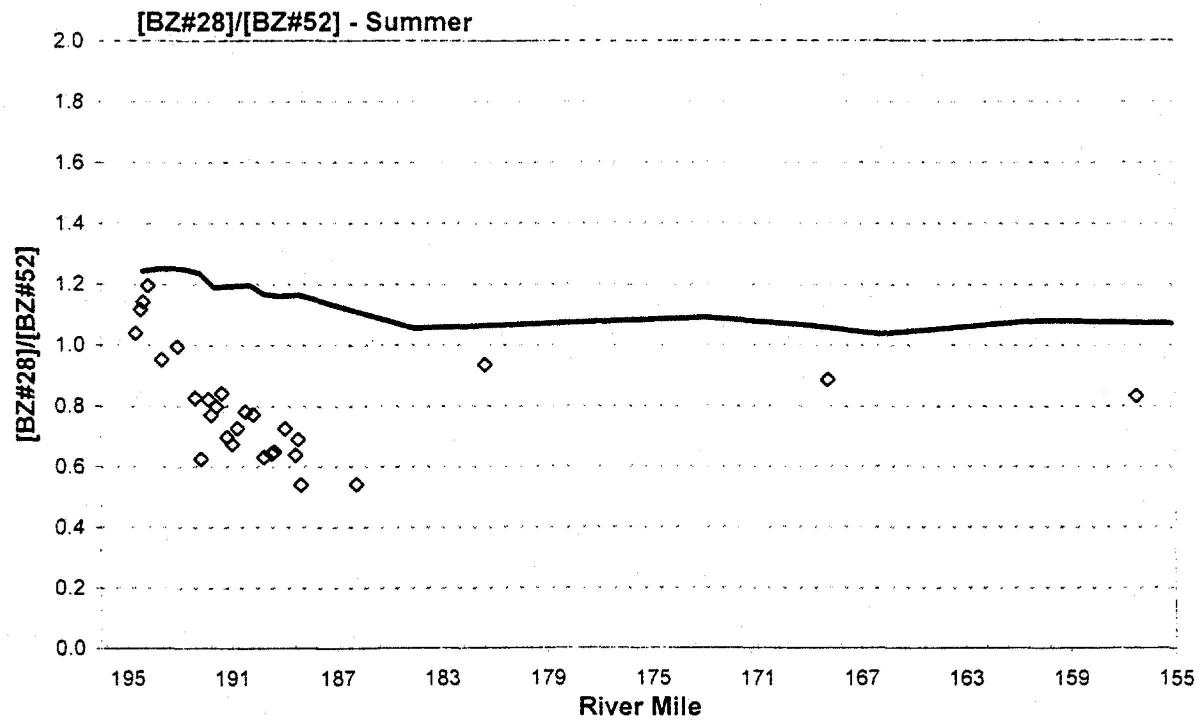


Figure 7-68d. Comparison of Model versus Observed Congener Concentration Ratios: Thompson Island Pool, June 17, 1997 Float Study.



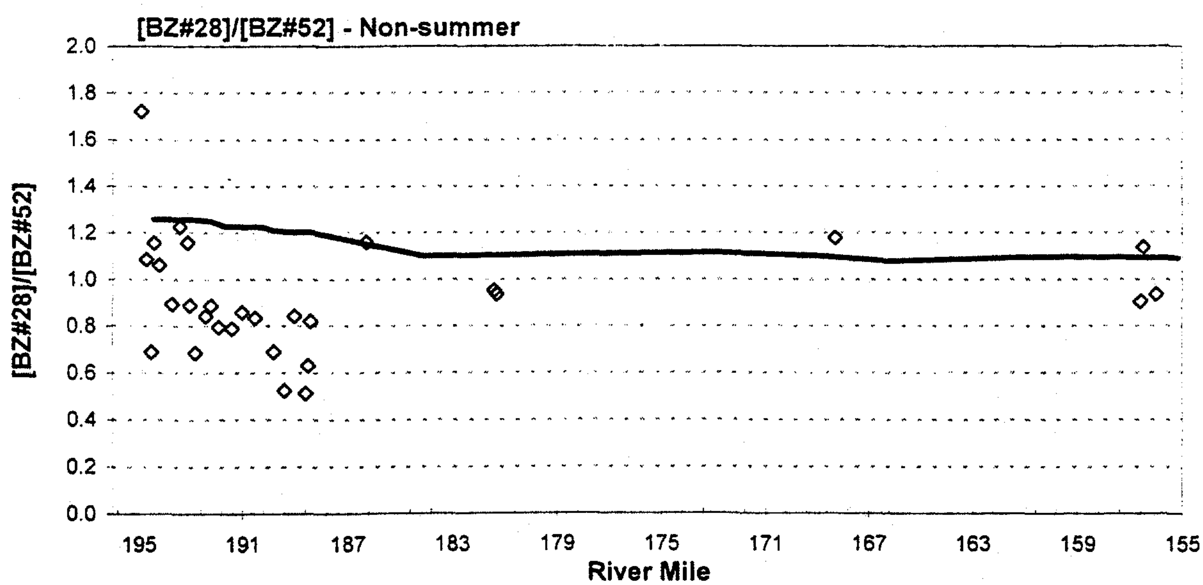
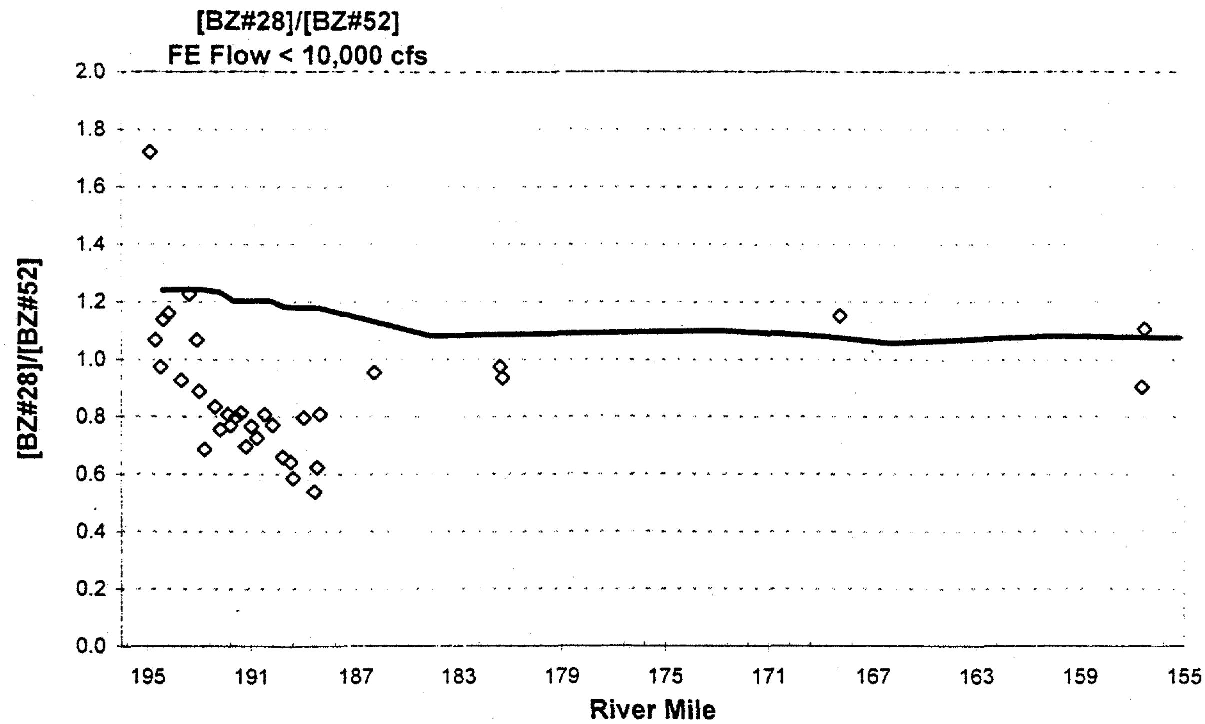


Figure 7-69. Model versus Observed Down-river [BZ#28]/[BZ#52] Ratios by Season, 1991-1997.



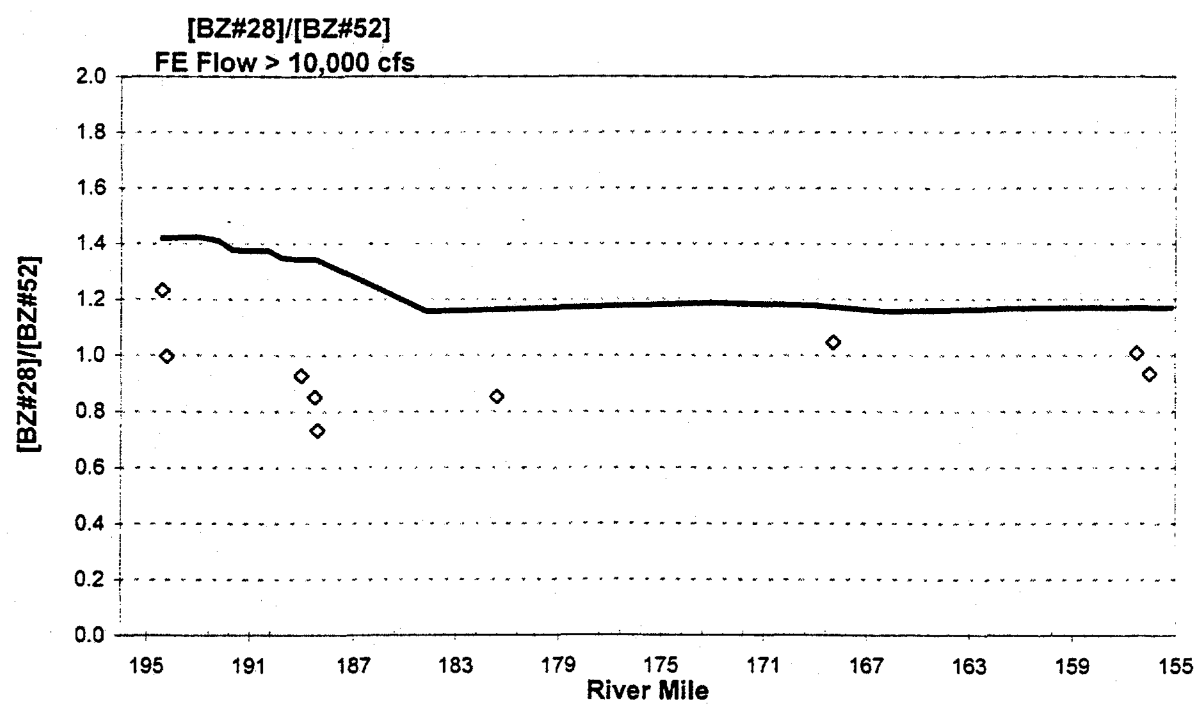


Figure 7-70. Model versus Observed Down-river [BZ#28]/[BZ#52] Ratios Stratified by Fort Edward Flow (< 10,000 cfs and > 10,000 cfs), 1991-1997.

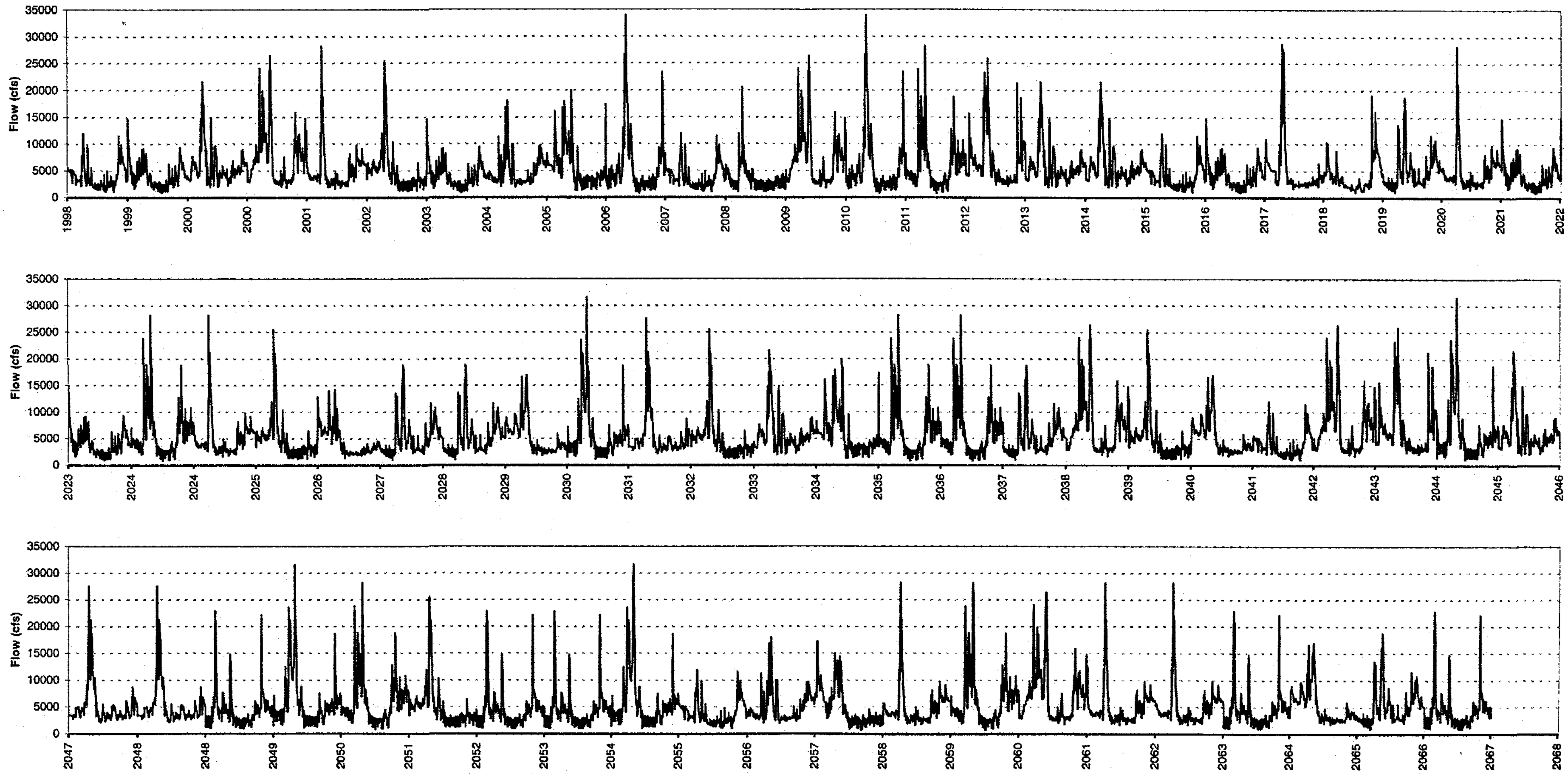


Figure 8-1. 70-Year Hydrograph for the No Action Forecast Simulation: 1998-2067

Total PCB

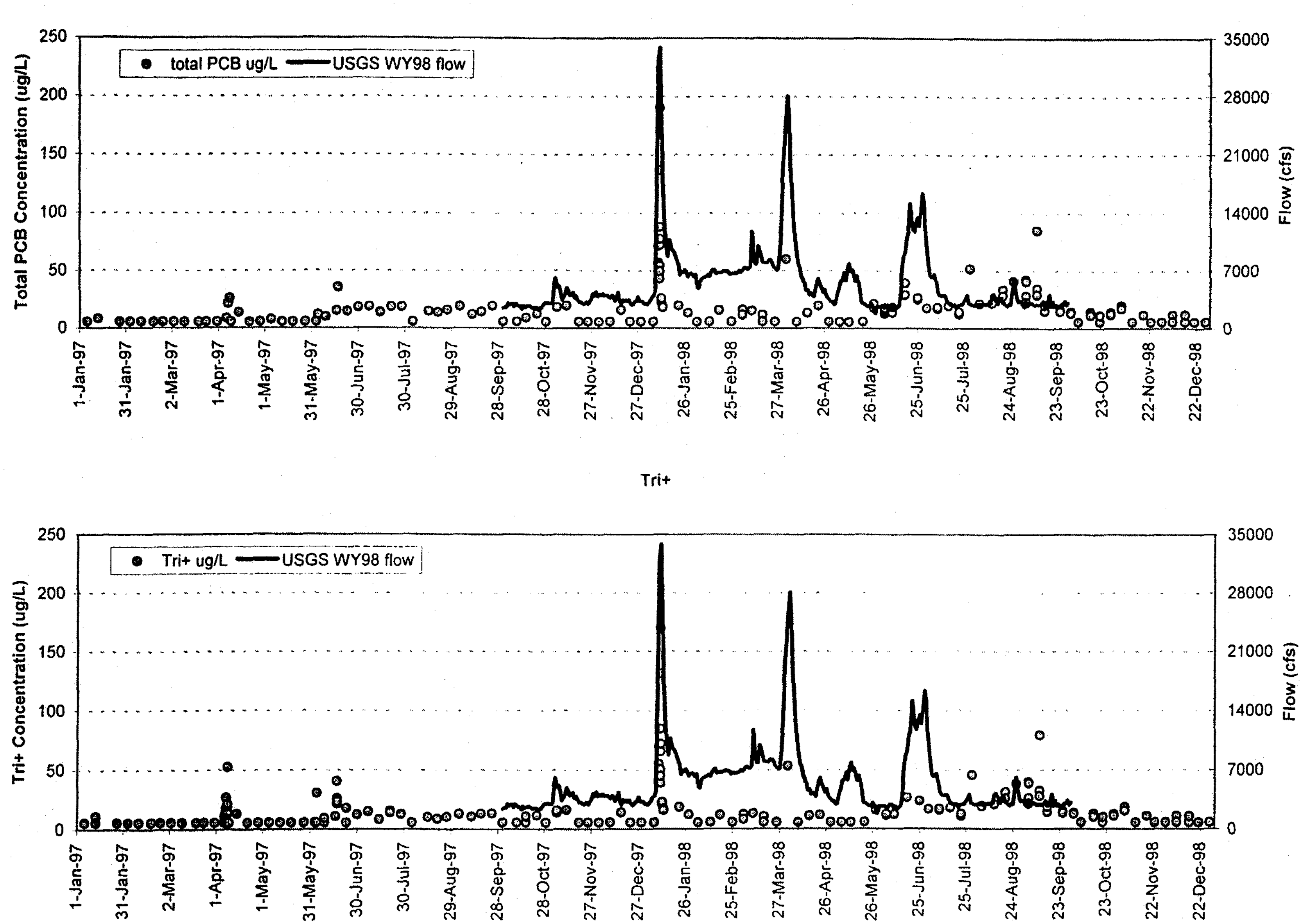


Figure 8-2. Observed Total PCB and Tri+ PCB Concentrations at Fort Edward During 1997 and 1998.

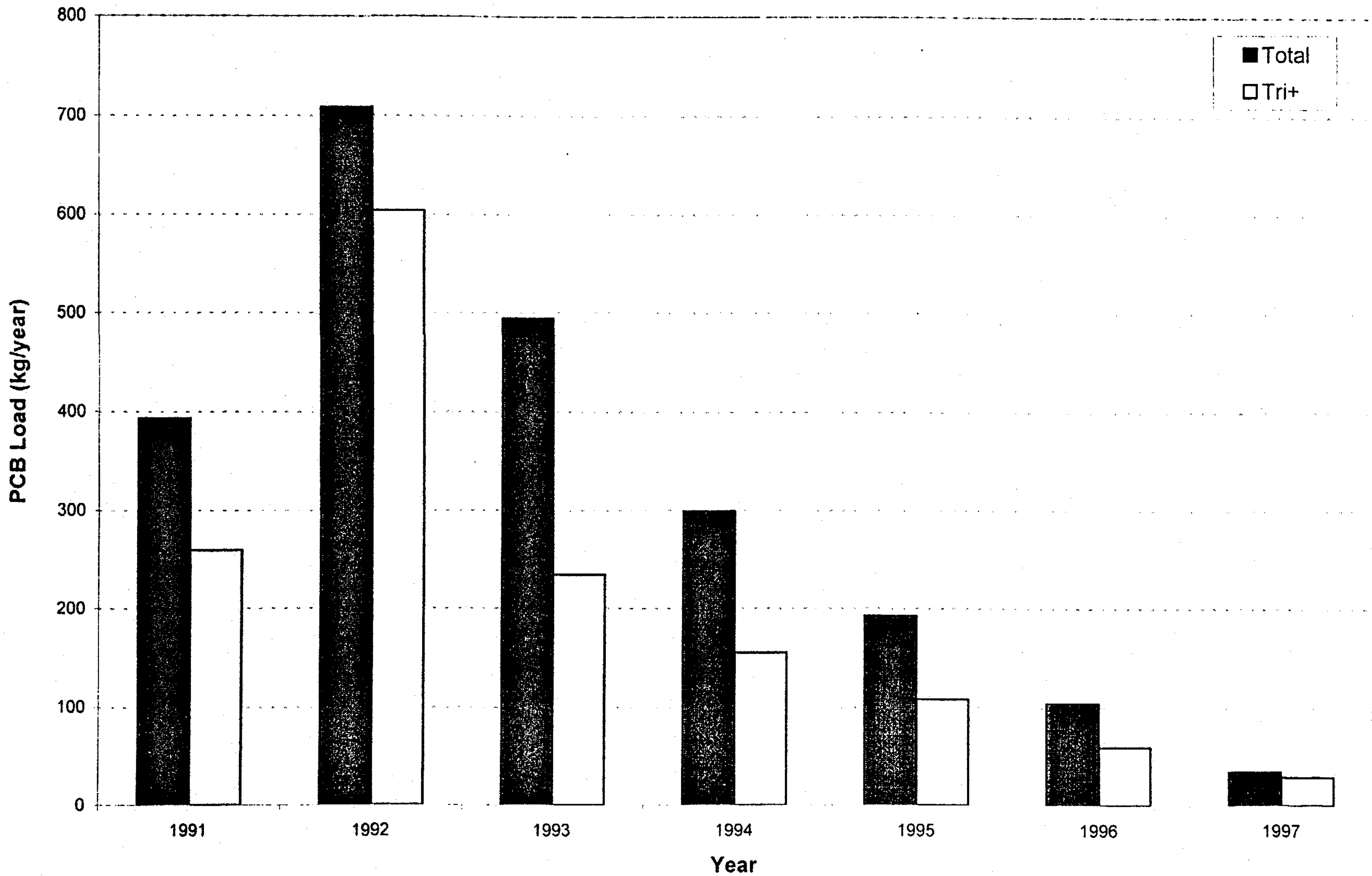


Figure 8-3. Data-Based Estimate of Annual Total and Tri+ PCB Load by Year at Fort Edward, 1991-1997.

303682

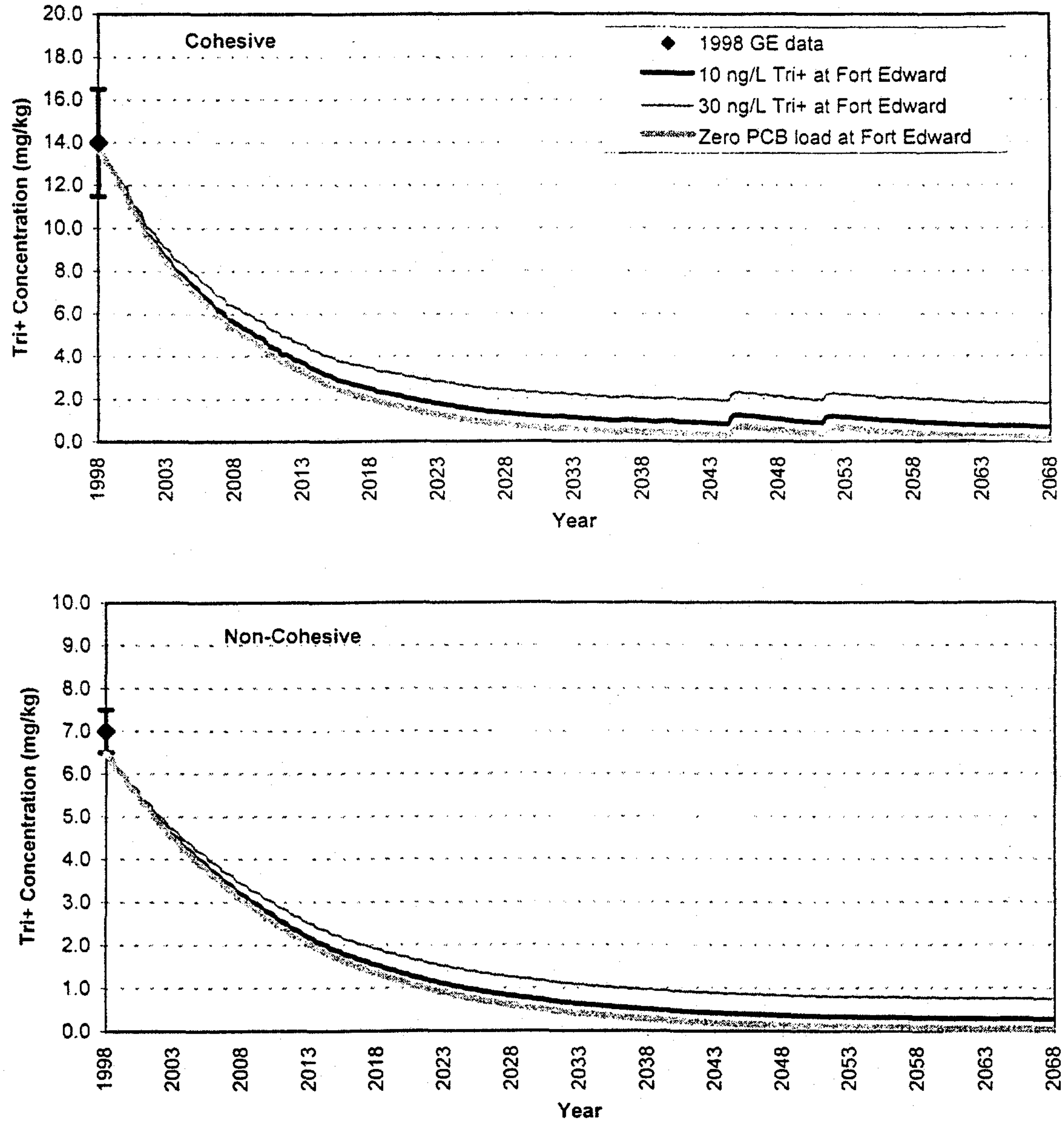
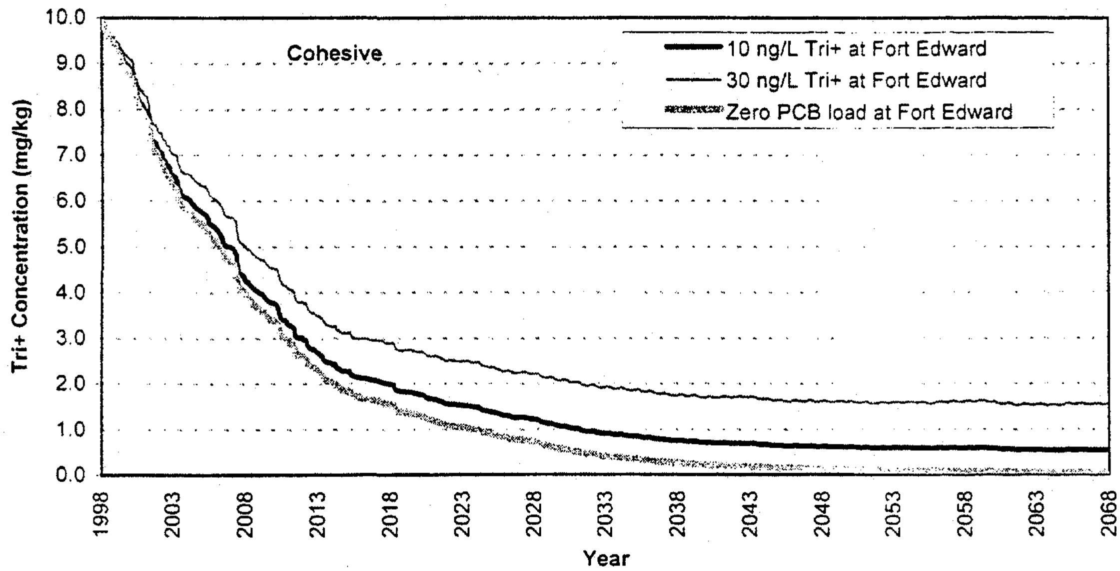


Figure 8-4a. Forecast Sediment Tri+ Concentrations for Thompson Island Pool with Constant Upstream Tri+ Concentrations at 10 ng/L, 30 ng/L, and 0 ng/L, 1998-2067.



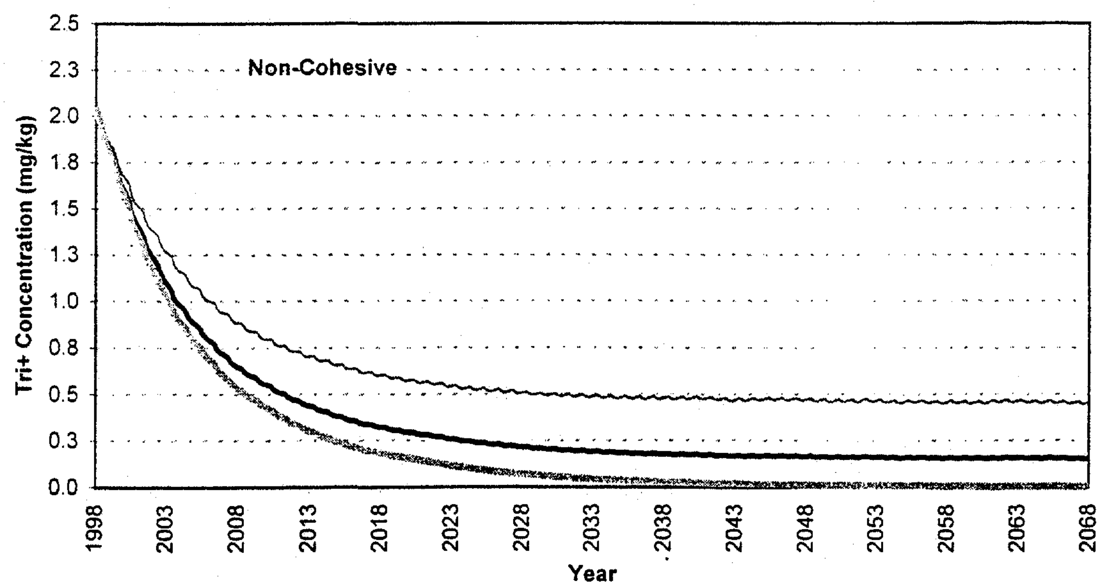


Figure 8-4b. Forecast Sediment Tri+ Concentrations for the Schuylerville Reach with Constant Upstream Tri+ Concentrations at 10 ng/L, 30 ng/L, and 0 ng/L, 1998-2067.

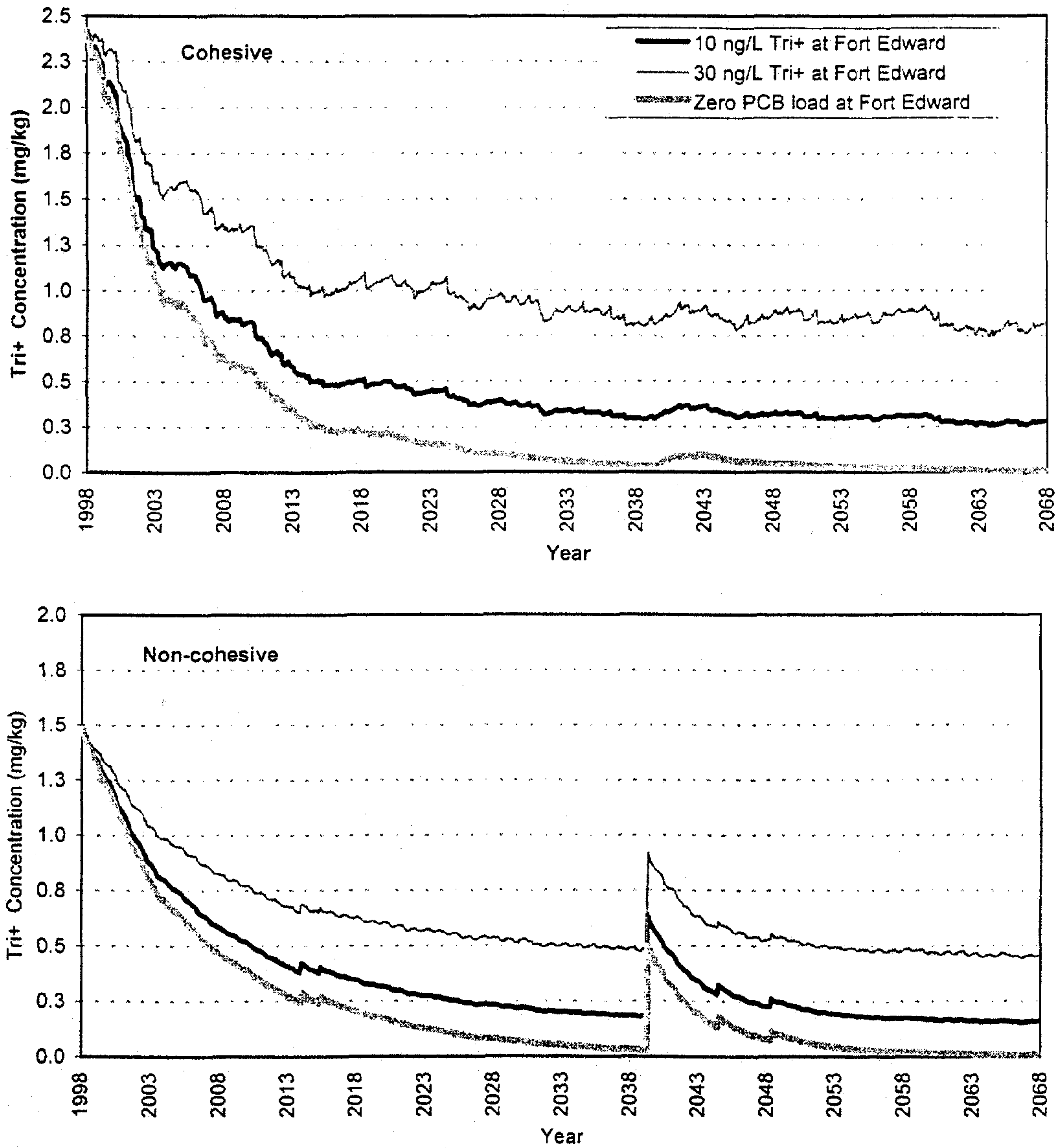
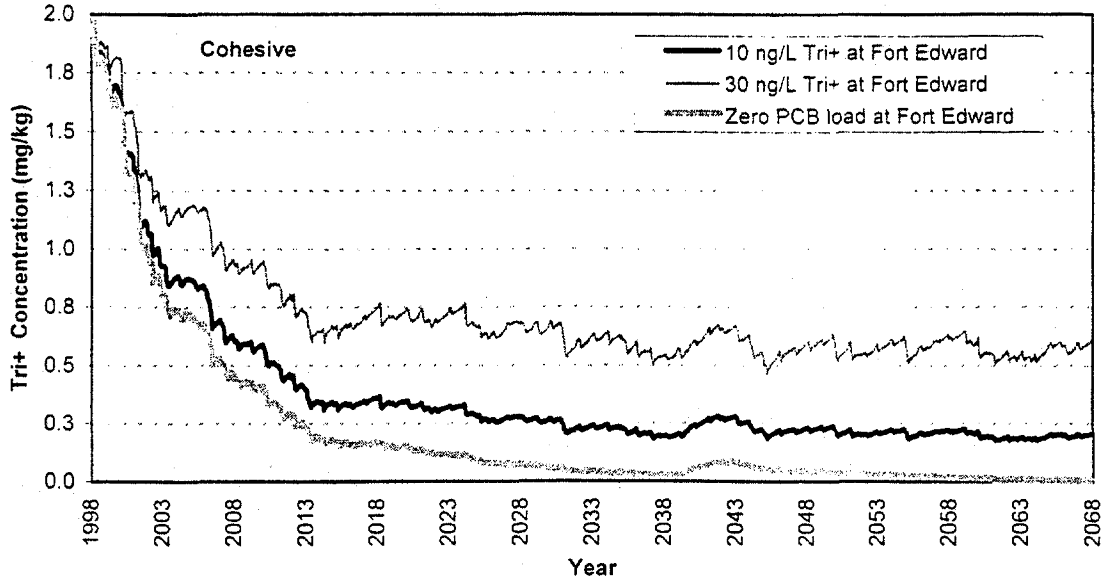


Figure 8-4c. Forecast Sediment Tri+ Concentrations for the Stillwater Reach with Constant Upstream Tri+ Concentrations at 10 ng/L, 30 ng/L, and 0 ng/L, 1998-2067.



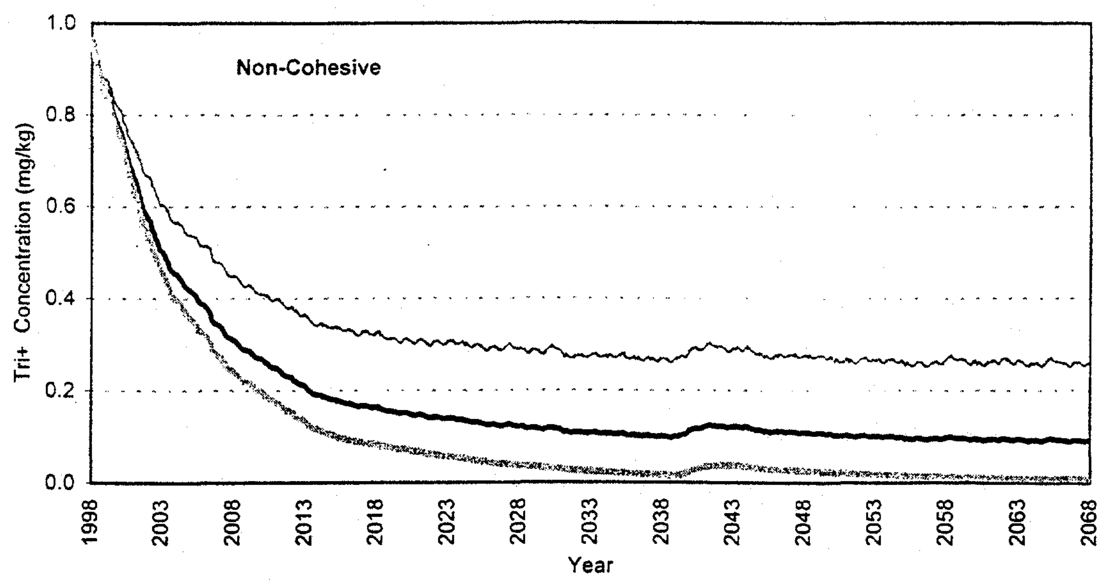


Figure 8-4d. Forecast Sediment Tri+ Concentrations for the Waterford Reach with Constant Upstream Tri+ Concentrations at 10 ng/L, 30 ng/L, and 0 ng/L, 1998-2067.

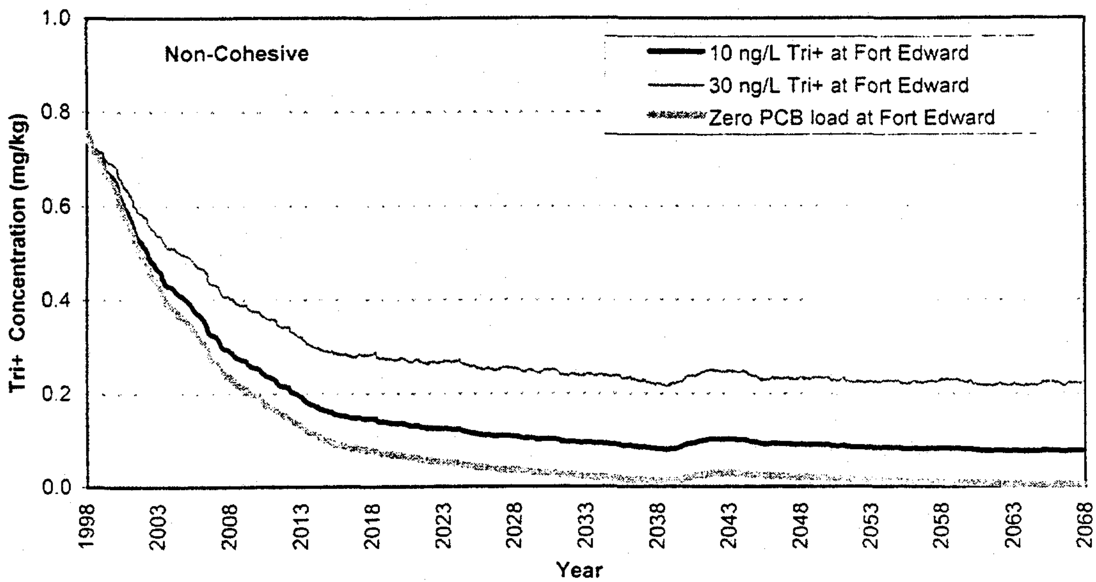


Figure 8-4e. Forecast Sediment Tri+ Concentrations for the Federal Dam Reach with Constant Upstream Tri+ Concentrations at 10 ng/L, 30 ng/L, and 0 ng/L, 1998-2067.

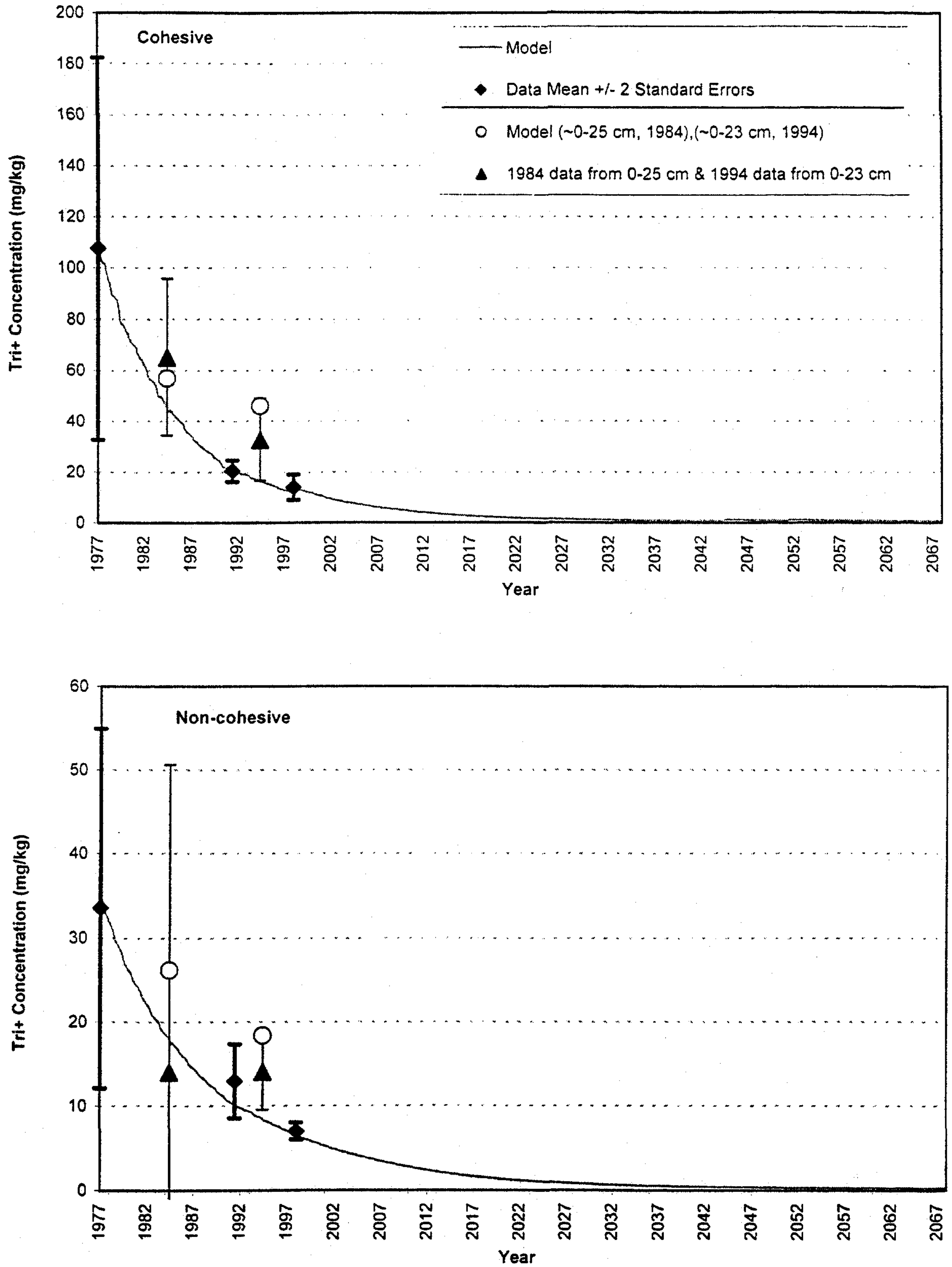
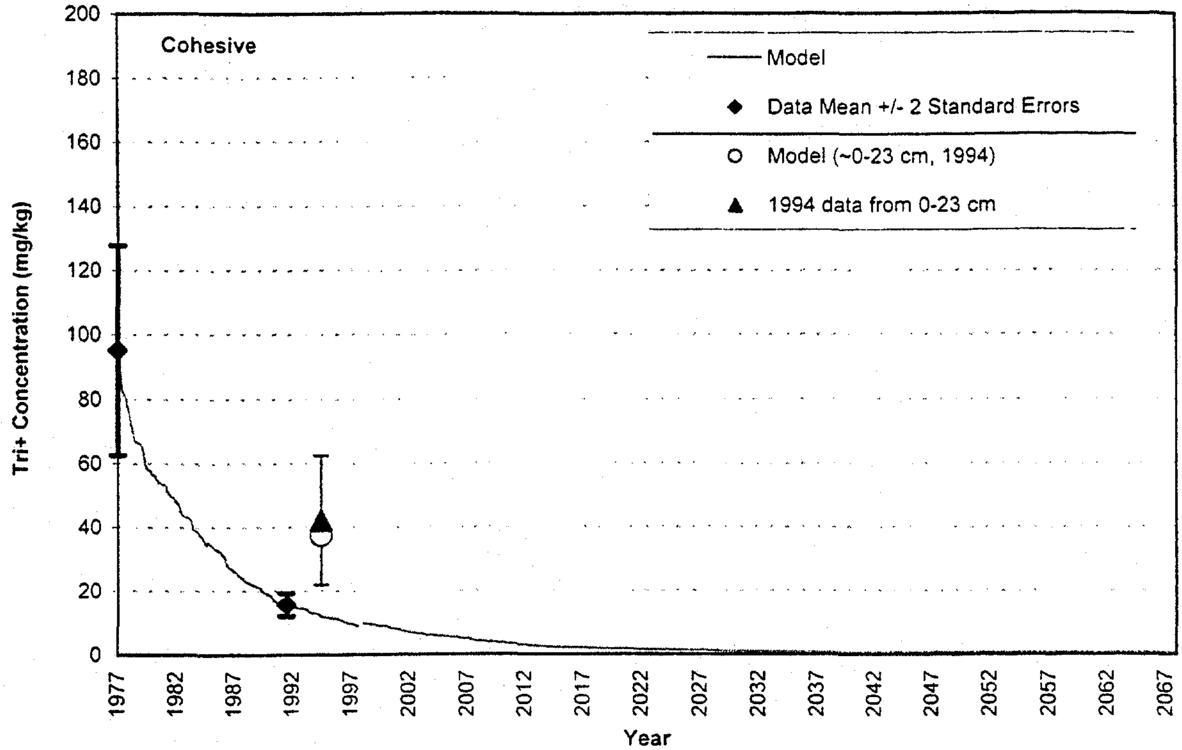


Figure 8-5a. Predicted Sediment Tri+ Concentrations for Thompson Island Pool with Forecasted Constant Upstream Tri+ Concentration at 10 ng/L.



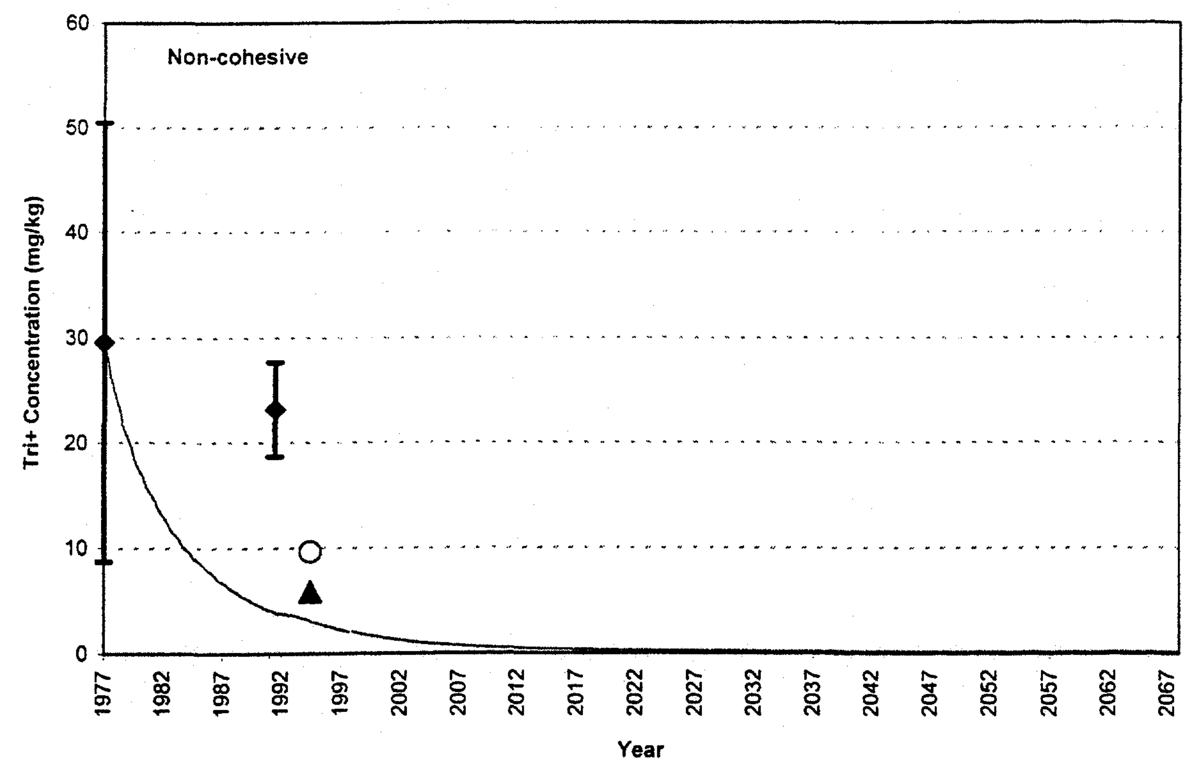
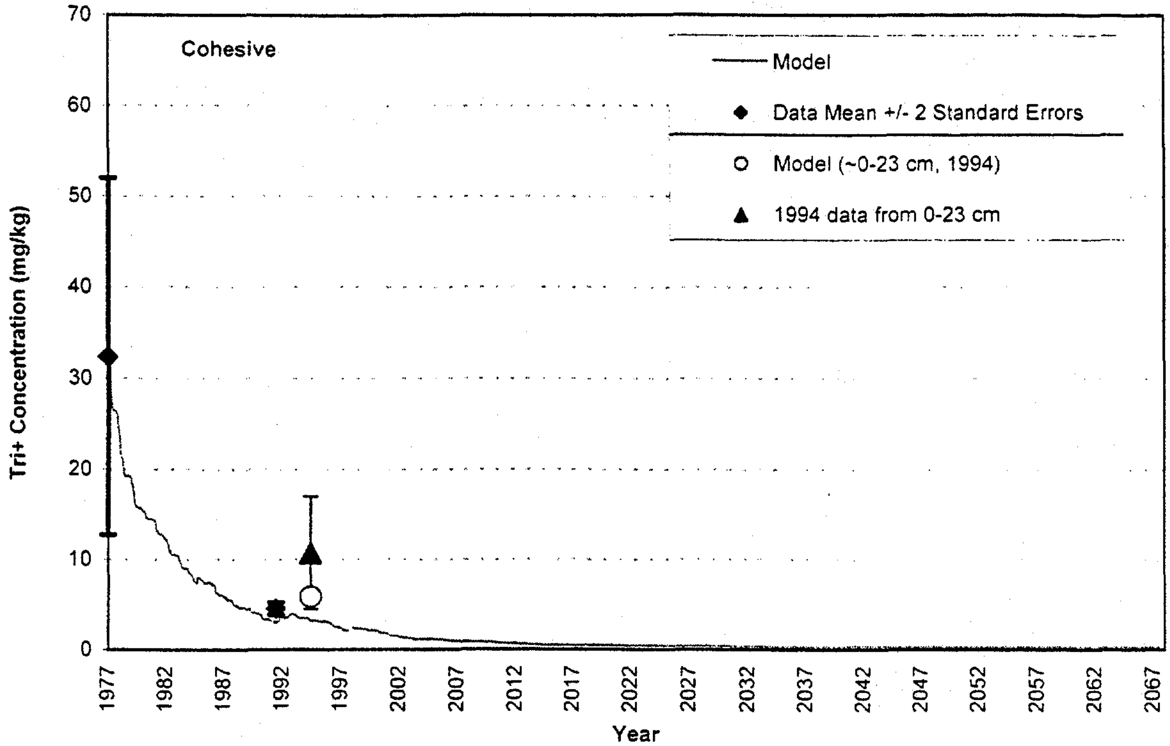


Figure 8-5b. Predicted Sediment Tri+ Concentrations for Schuylerville Reach with Forecasted Constant Upstream Tri+ Concentration at 10 ng/L.



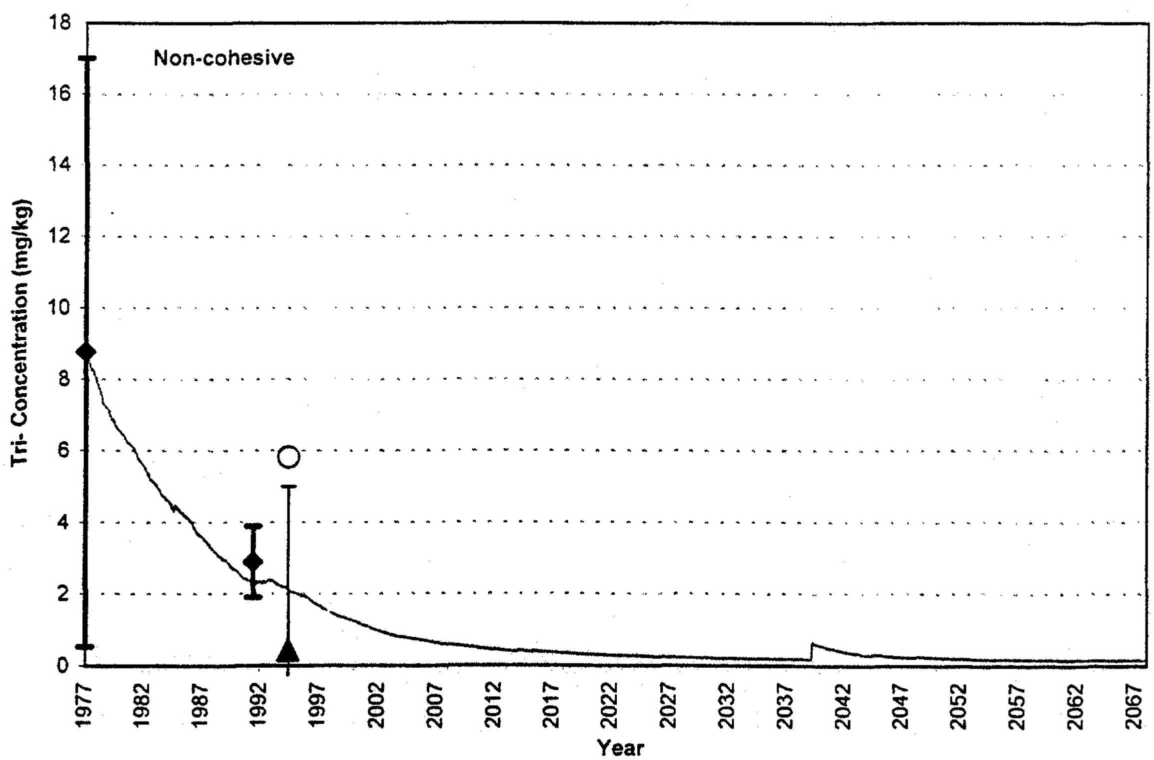


Figure 8-5c. Predicted Sediment Tri+ Concentrations for Stillwater Reach with Forecasted Constant Upstream Tri+ Concentration at 10 ng/L.

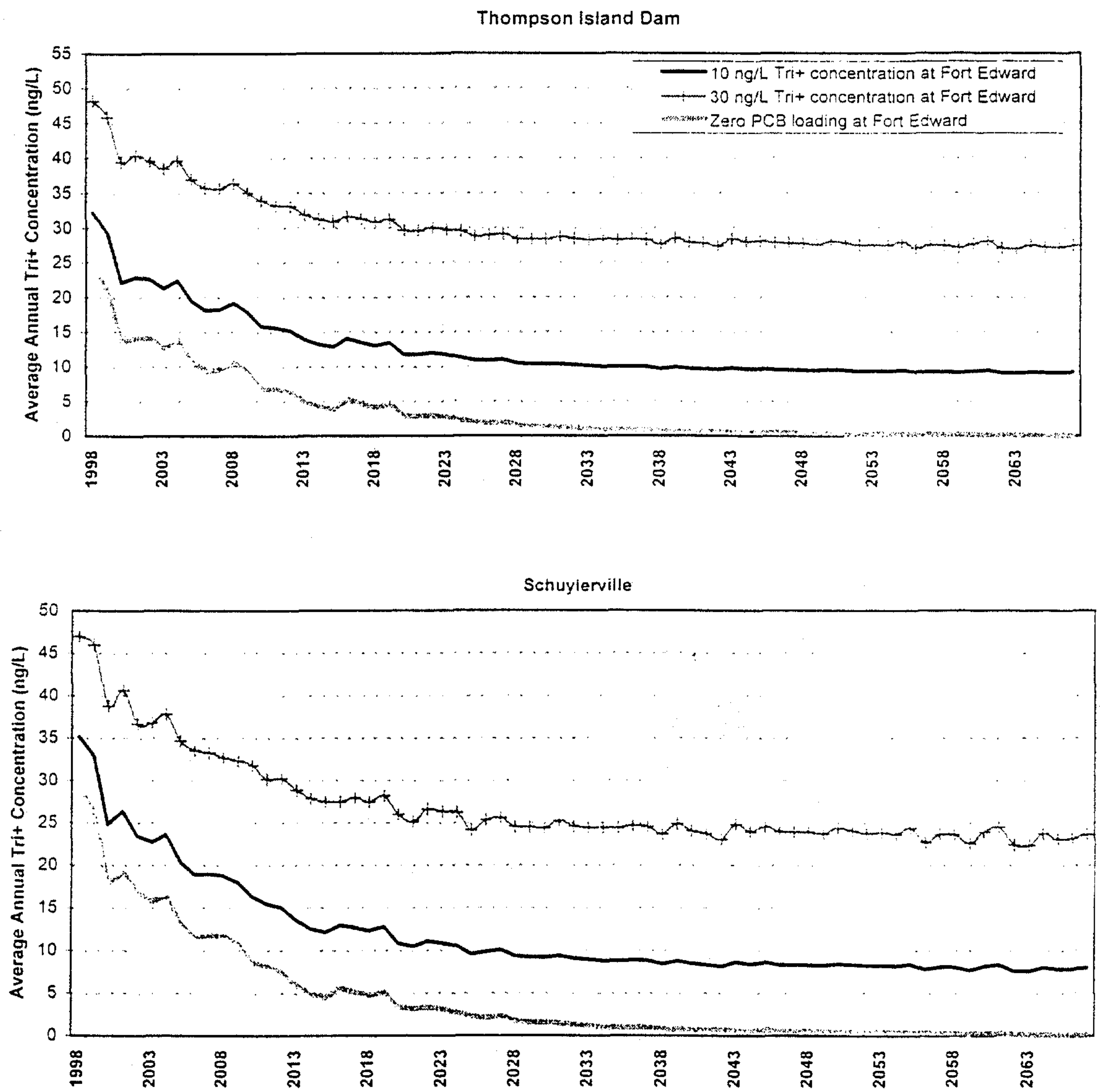
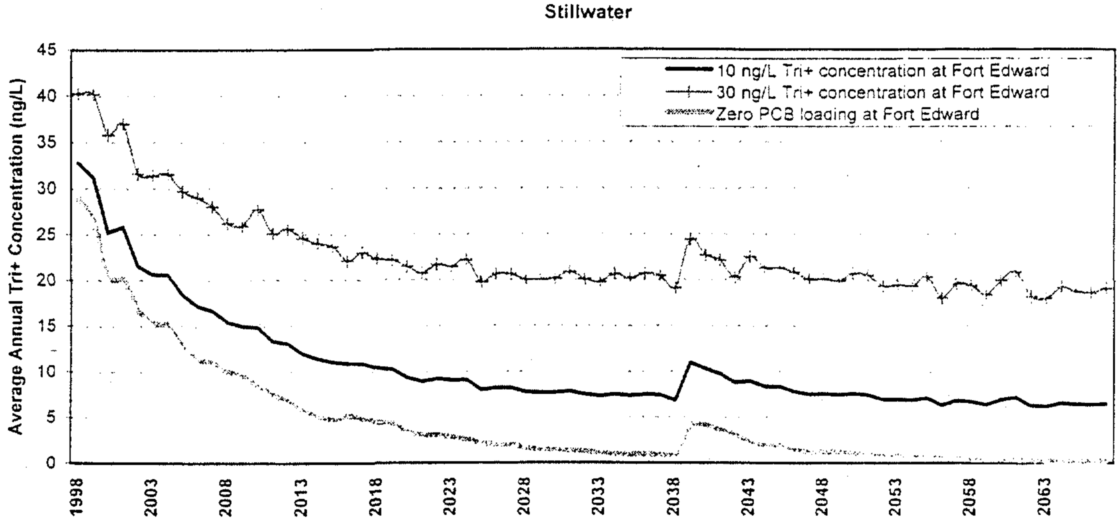


Figure 8-6a. Forecast Average Annual Tri+ Concentrations at Thompson Island Dam and Schuylerville with Constant Upstream Concentrations of 10 ng/L, 30 ng/L, and 0 ng/L Tri+ at Fort Edward, 1998 - 2067.



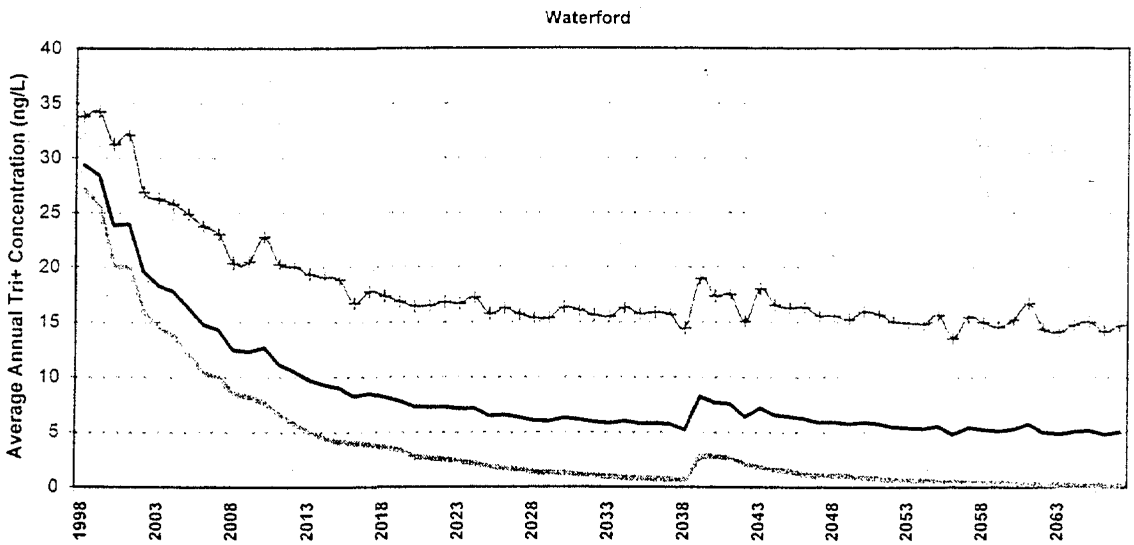


Figure 8-6b. Forecast Average Annual Tri+ Concentrations at Stillwater and Waterford with Constant Upstream Concentrations of 10 ng/L, 30 ng/L, and 0 ng/L Tri+ at Fort Edward, 1998 - 2067.

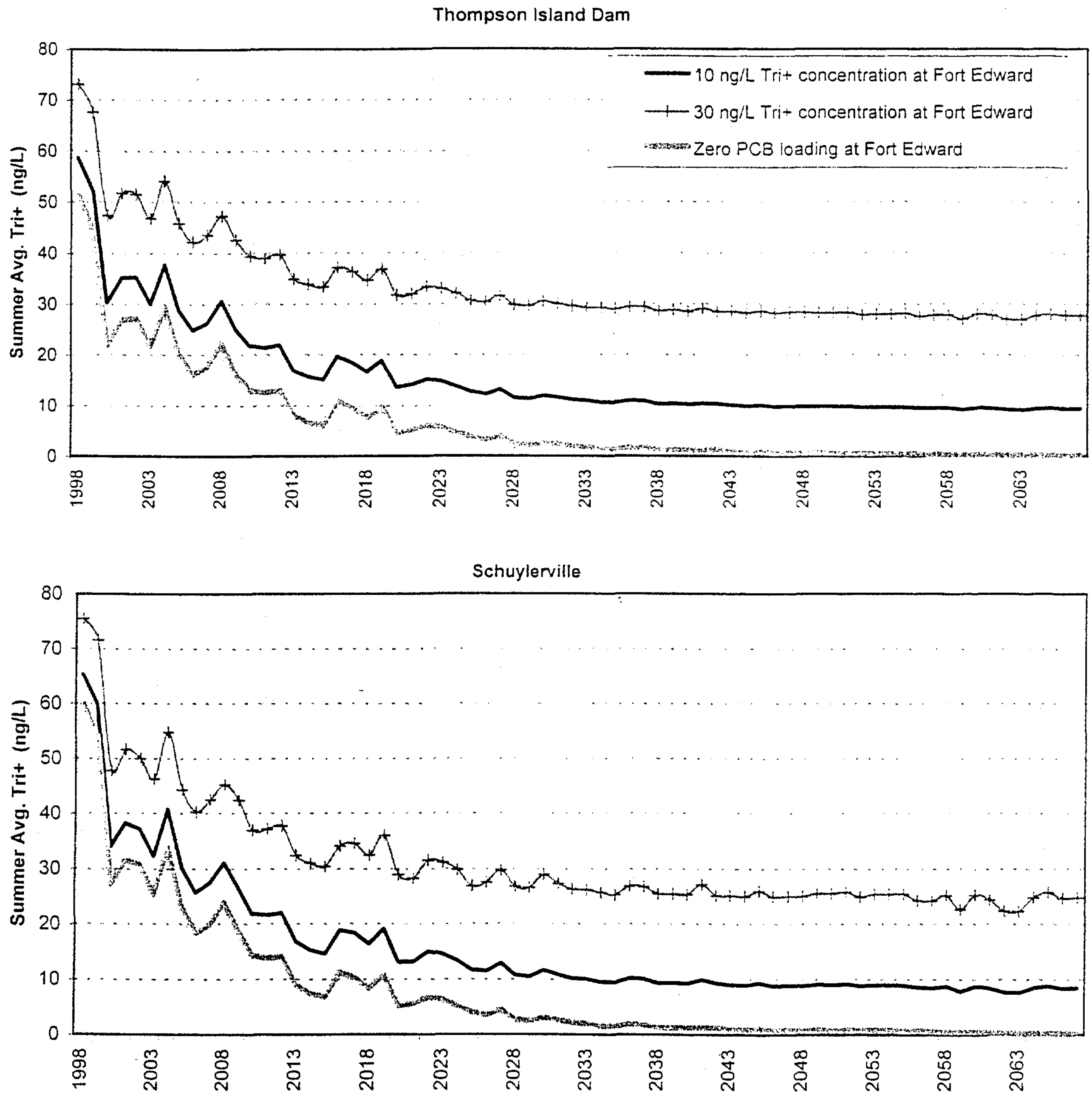
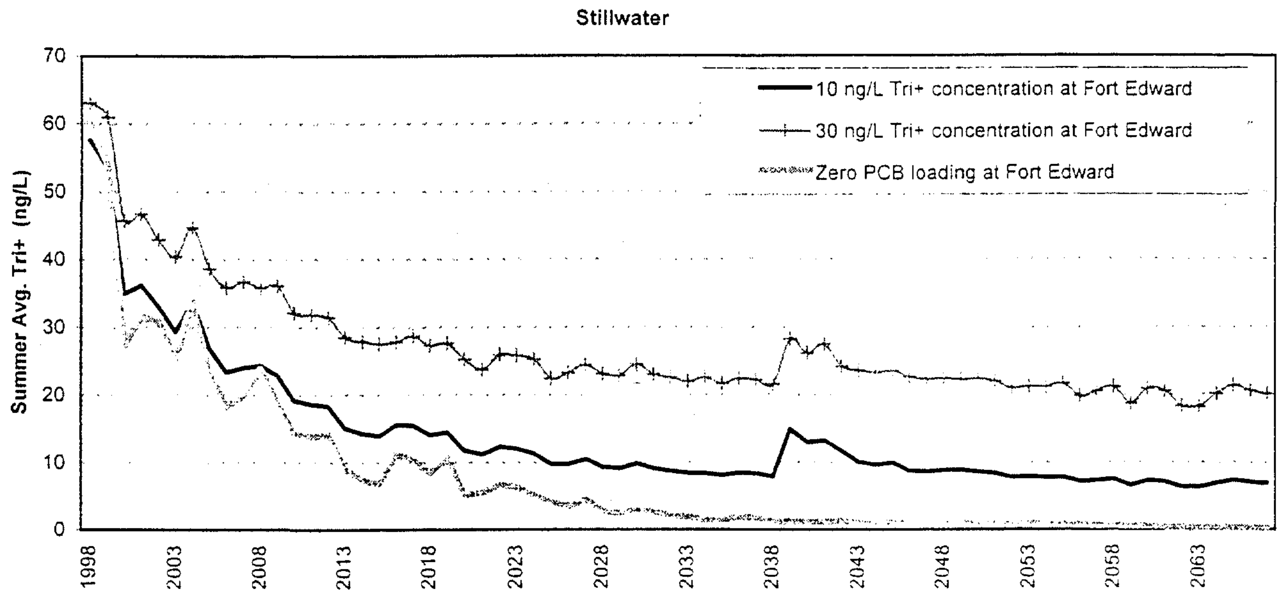


Figure 8-7a. Forecast Average Summer Tri+ Concentrations at Thompson Island Dam and Schuylerville with Constant Upstream Concentrations of 10 ng/L, 30 ng/L, and 0 ng/L Tri+ at Fort Edward, 1998 - 2067.



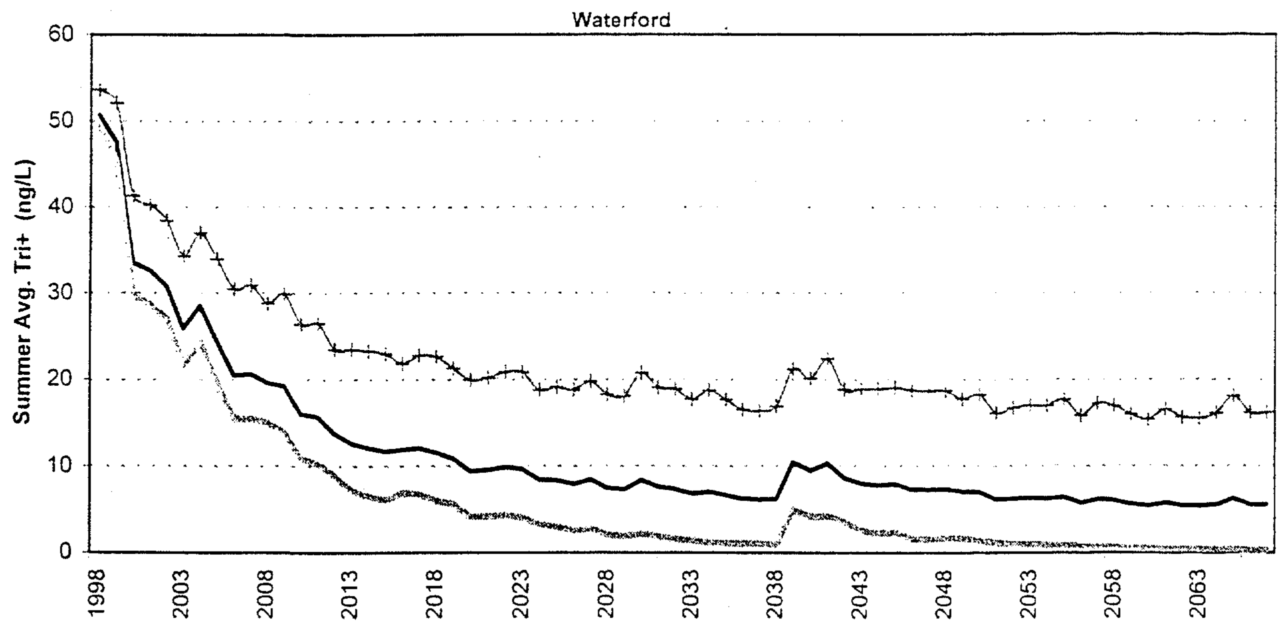
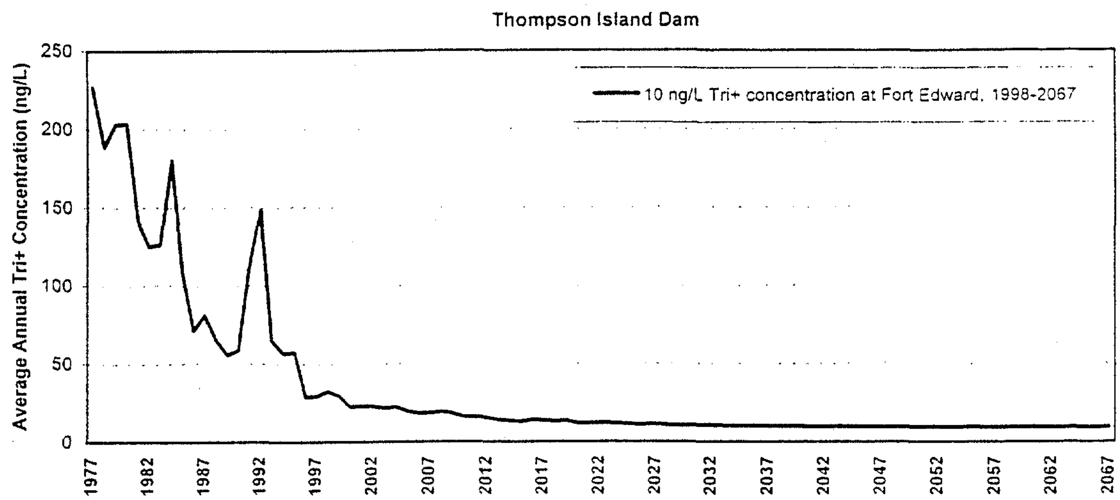
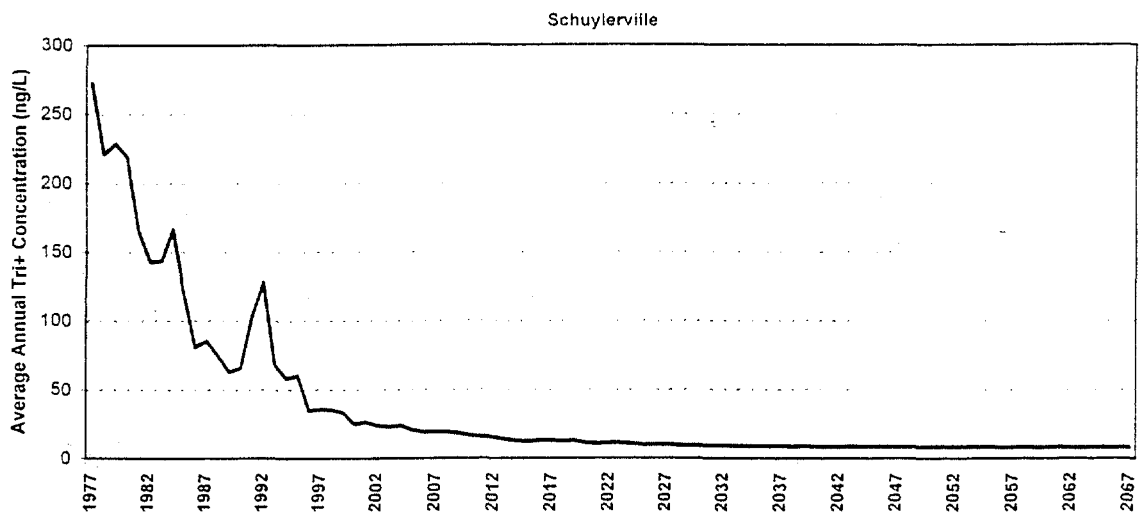
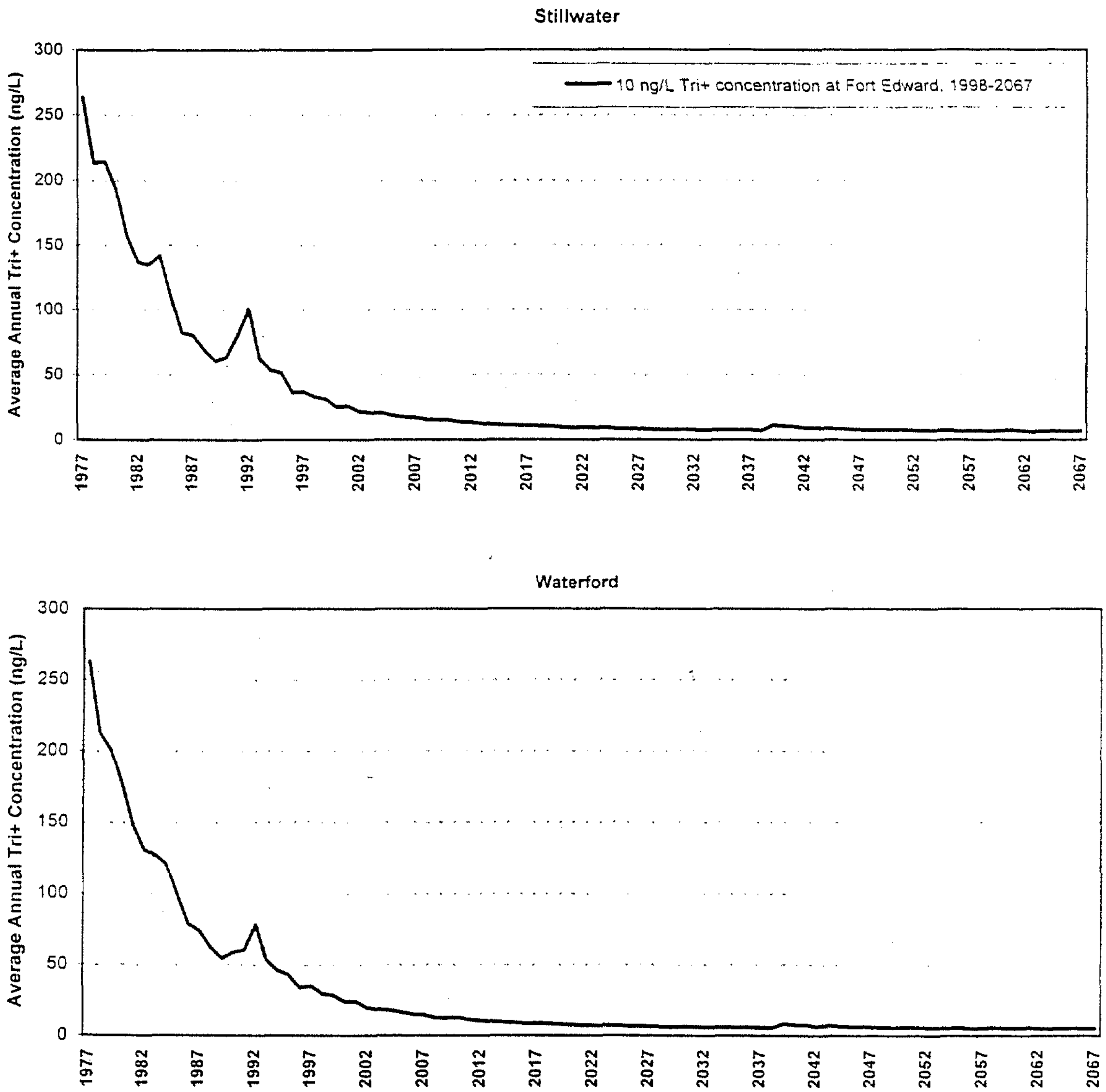


Figure 8-7b. Forecast Average Summer Tri+ Concentrations at Stillwater and Waterford with Constant Upstream Concentrations of 10 ng/L, 30 ng/L, and 0 ng/L Tri+ at Fort Edward, 1998 - 2067.





8-8a. Predicted Average Annual Water Column Tri+ Concentrations at Thompson Island Dam and Schuylerville with Forecasted Constant Upstream Tri+ Concentration at 10 ng/L, 1977-2067.



8-8b. Predicted Average Annual Water Column Tri+ Concentrations at Stillwater and Waterford with Forecasted Constant Upstream Tri+ Concentration at 10 ng/L, 1977-2067.

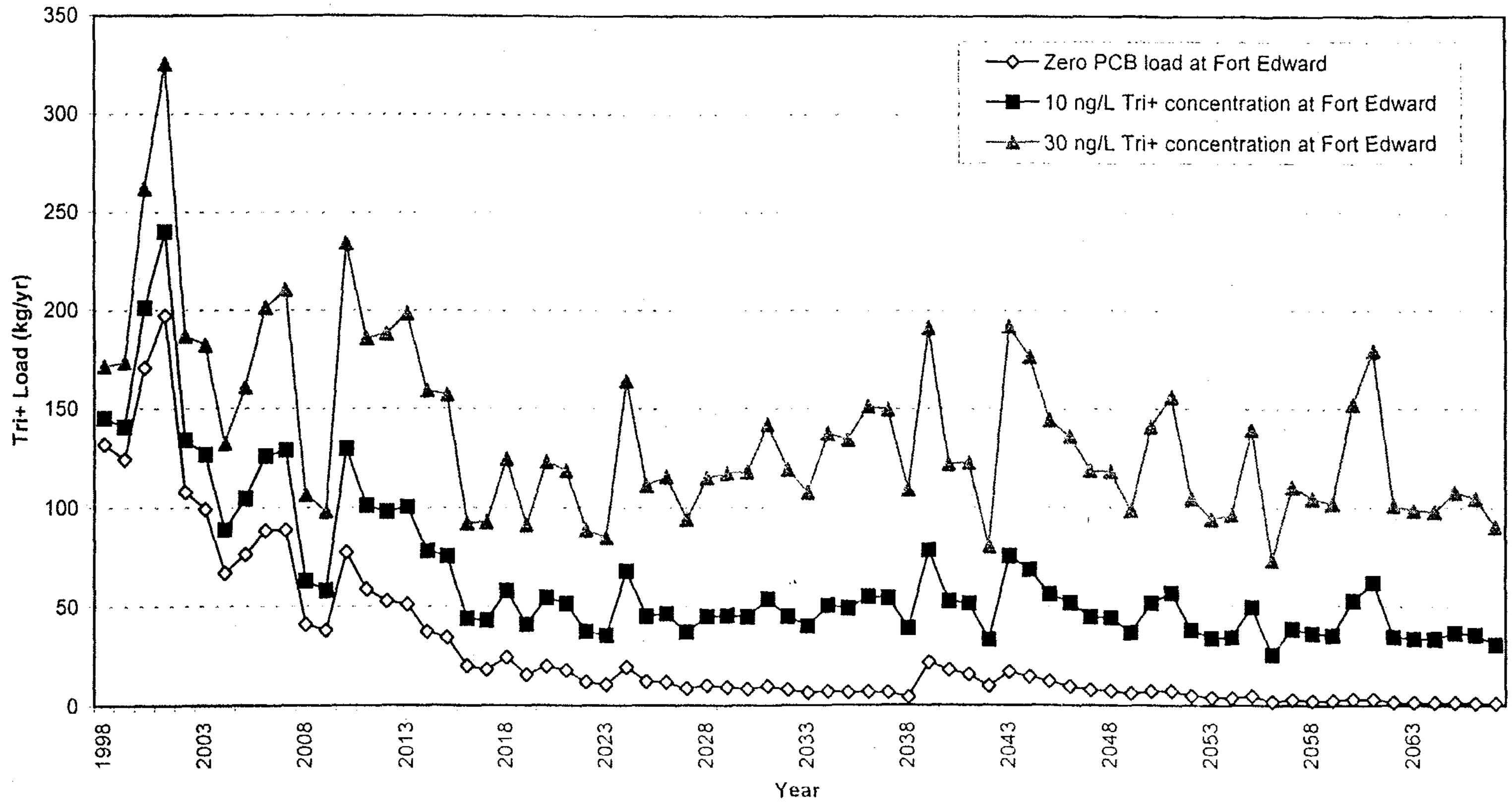


Figure 8-9a. No-Action Forecast Annual Tri+ Load to the Lower Hudson River with Constant Upstream Concentrations of 10 ng/L, 30 ng/L, and 0 ng/L Tri+ at Fort Edward, 1998-2067.

303697

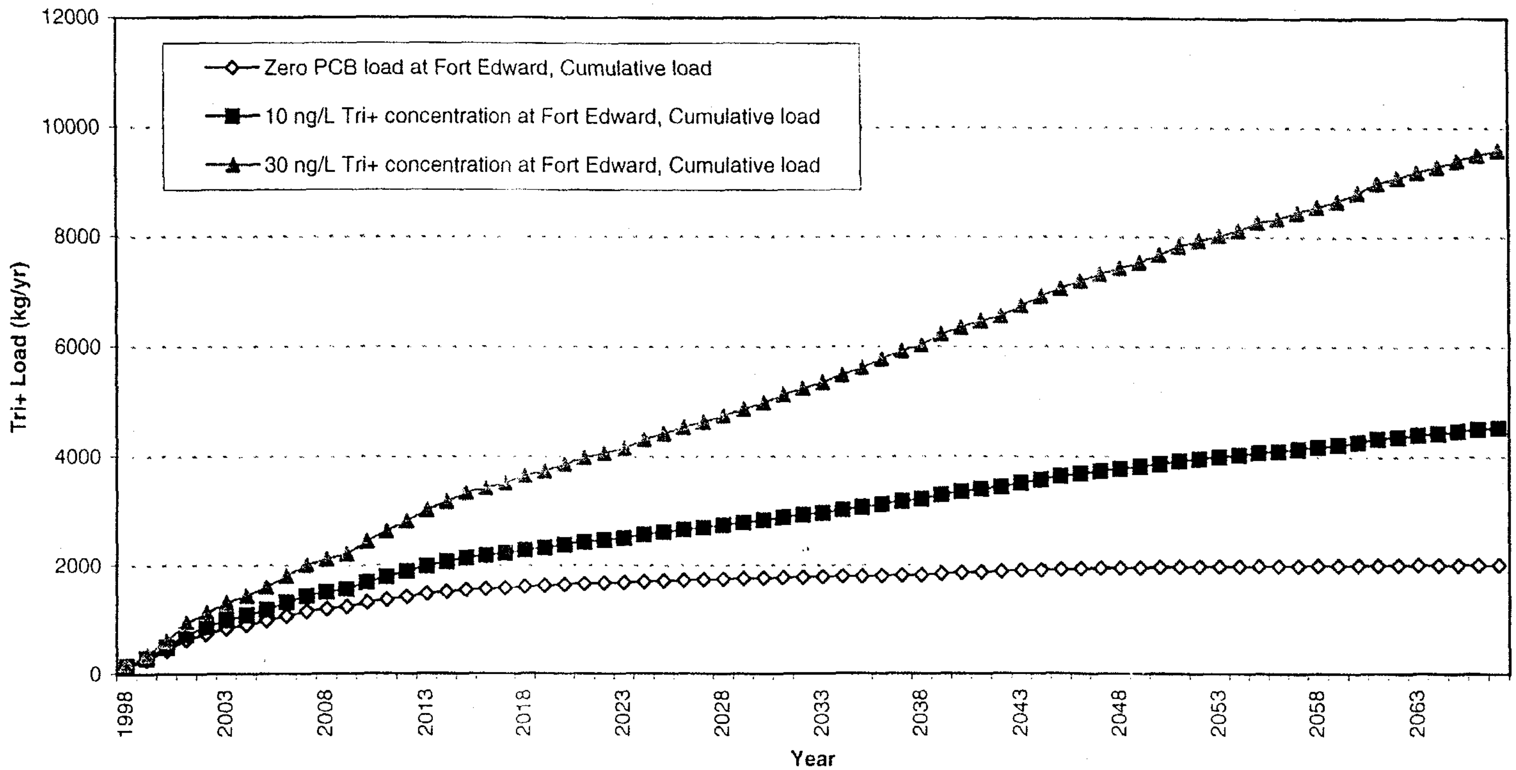


Figure 8-9b. No-Action Forecast Cumulative Annual Tri+ Load to the Lower Hudson River with Constant Upstream Concentrations of 10 ng/L, 30 ng/L, and 0 ng/L Tri+ at Fort Edward, 1998-2067.

303698

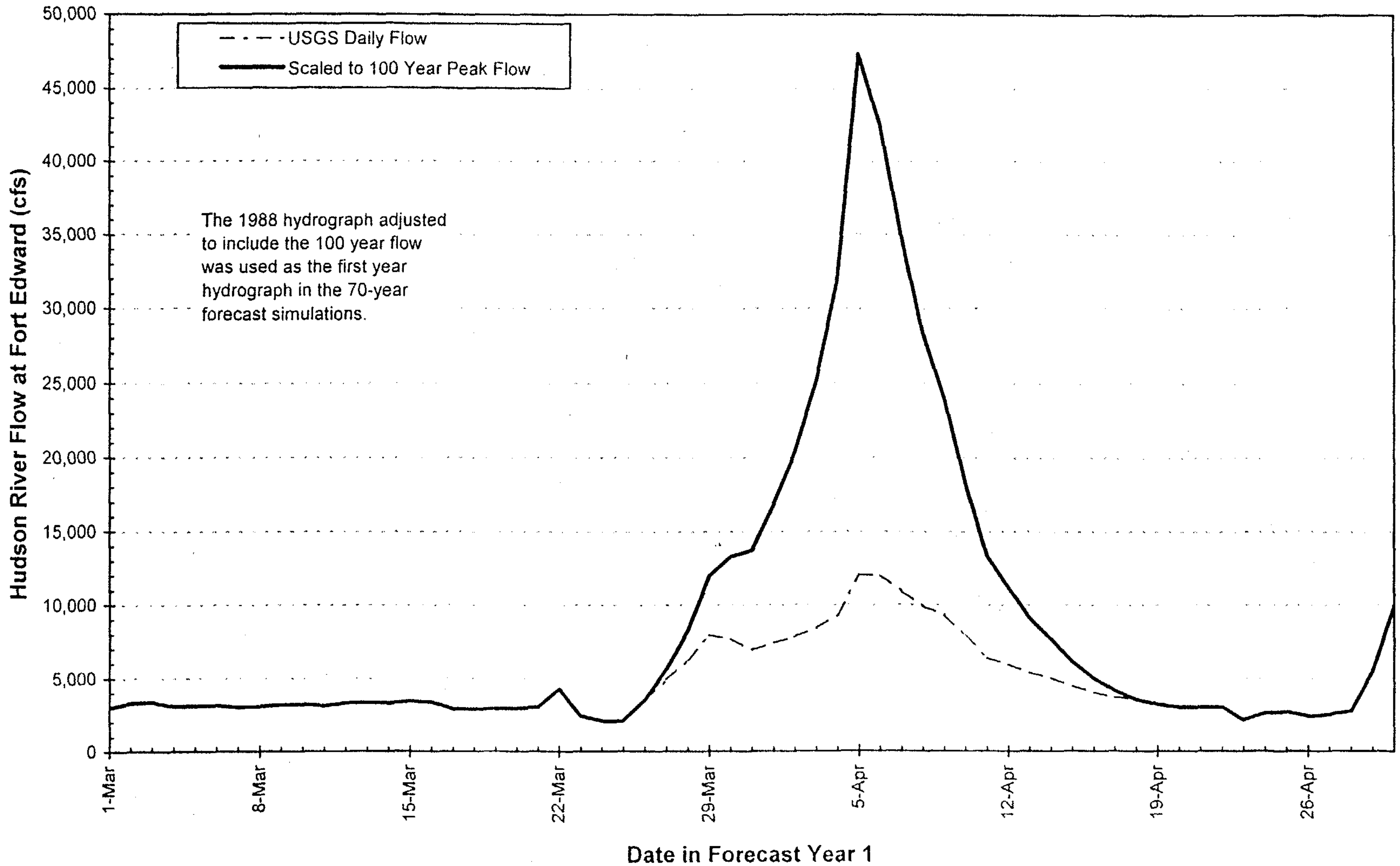


Figure 8-10. Adjustment of the Fort Edward Hydrograph to Include the 100 Year Flow (47,330 cfs).

303699

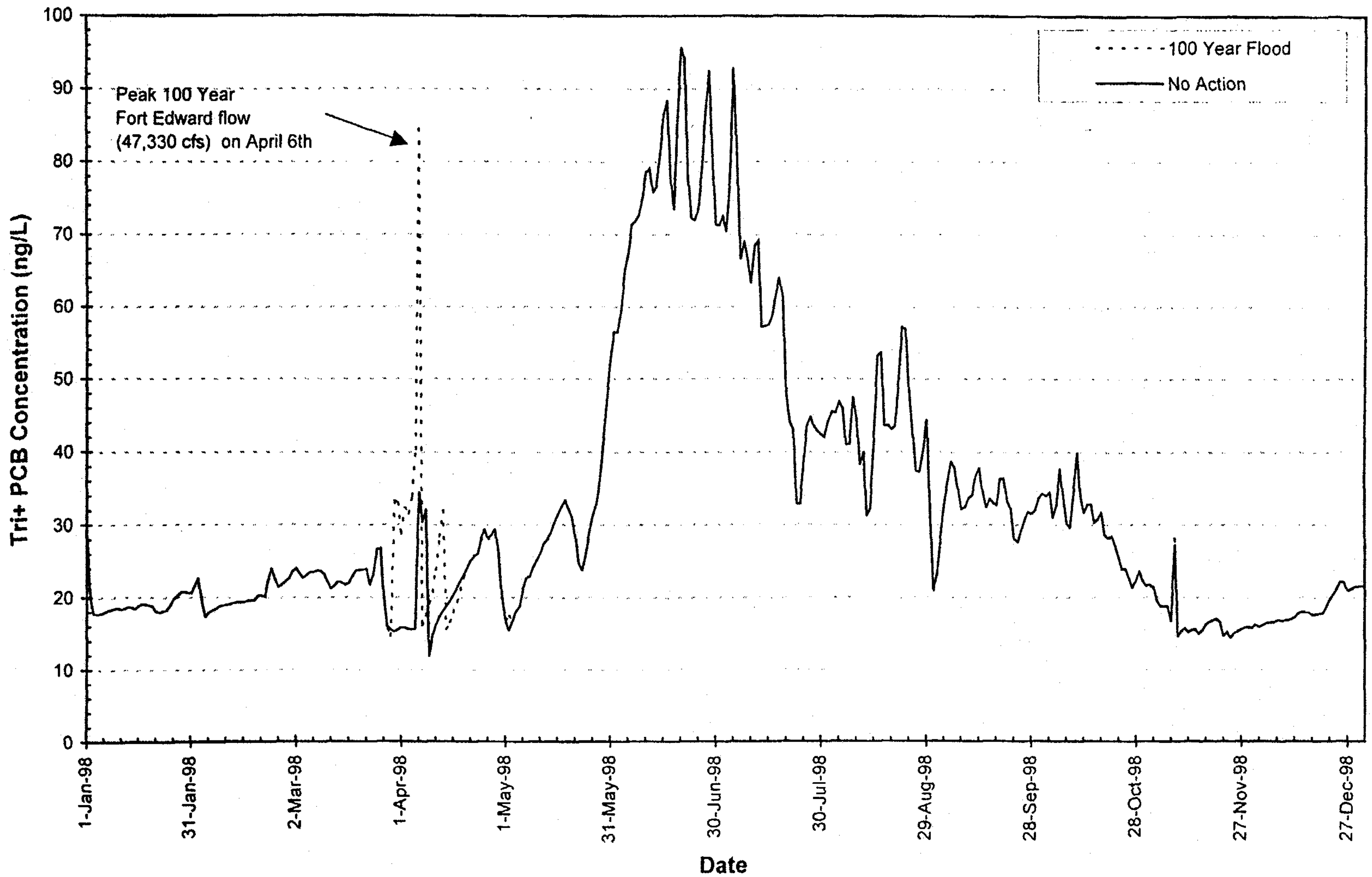


Figure 8-11. Predicted 100 Year Event (3/28 to 4/13) Impact on Tri+ PCB Levels at Thompson Island Dam (West)

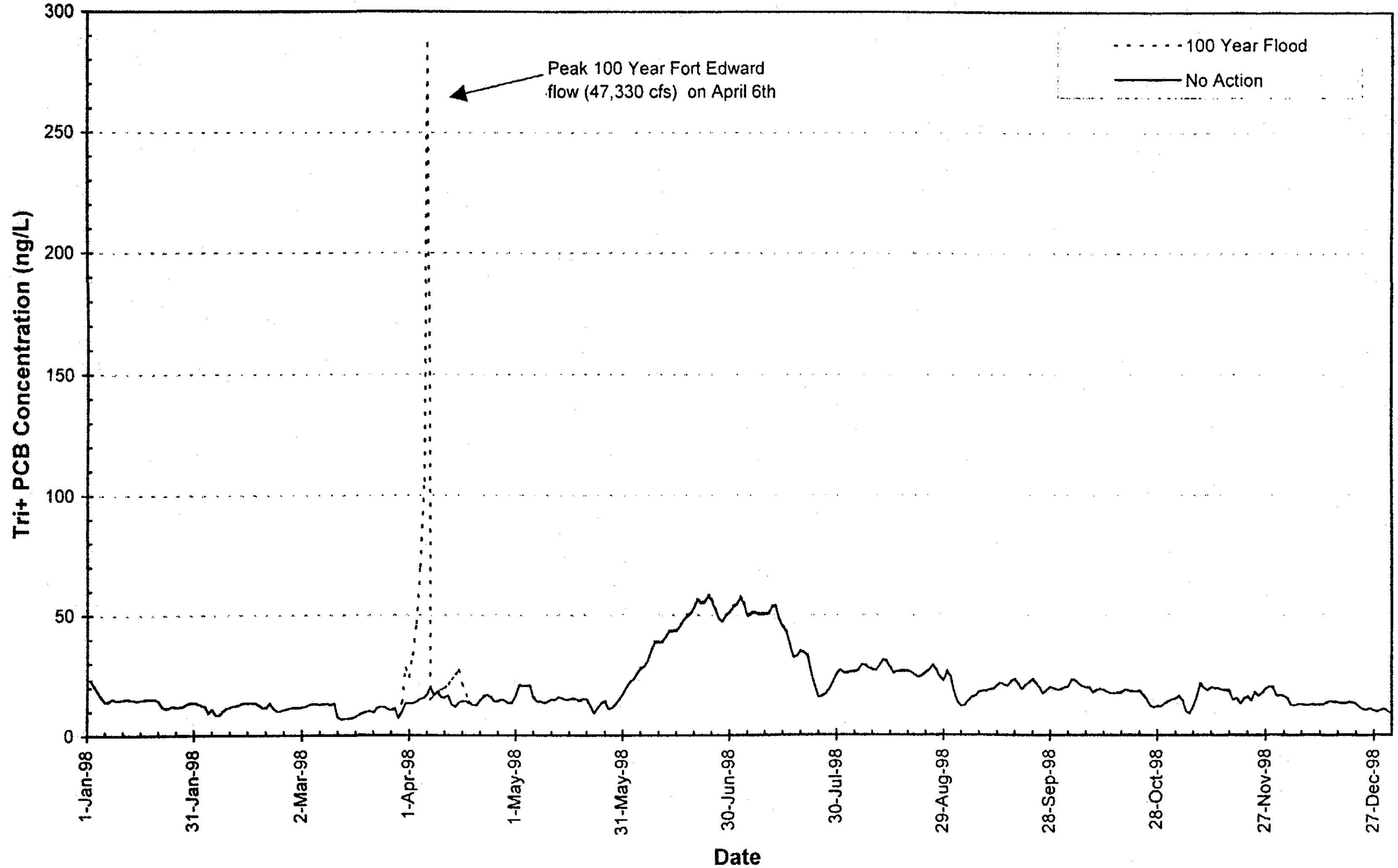


Figure 8-12. Predicted 100 Year Event (3/28 to 4/13) Impact on Tri+ PCB Levels at Federal Dam.

303701

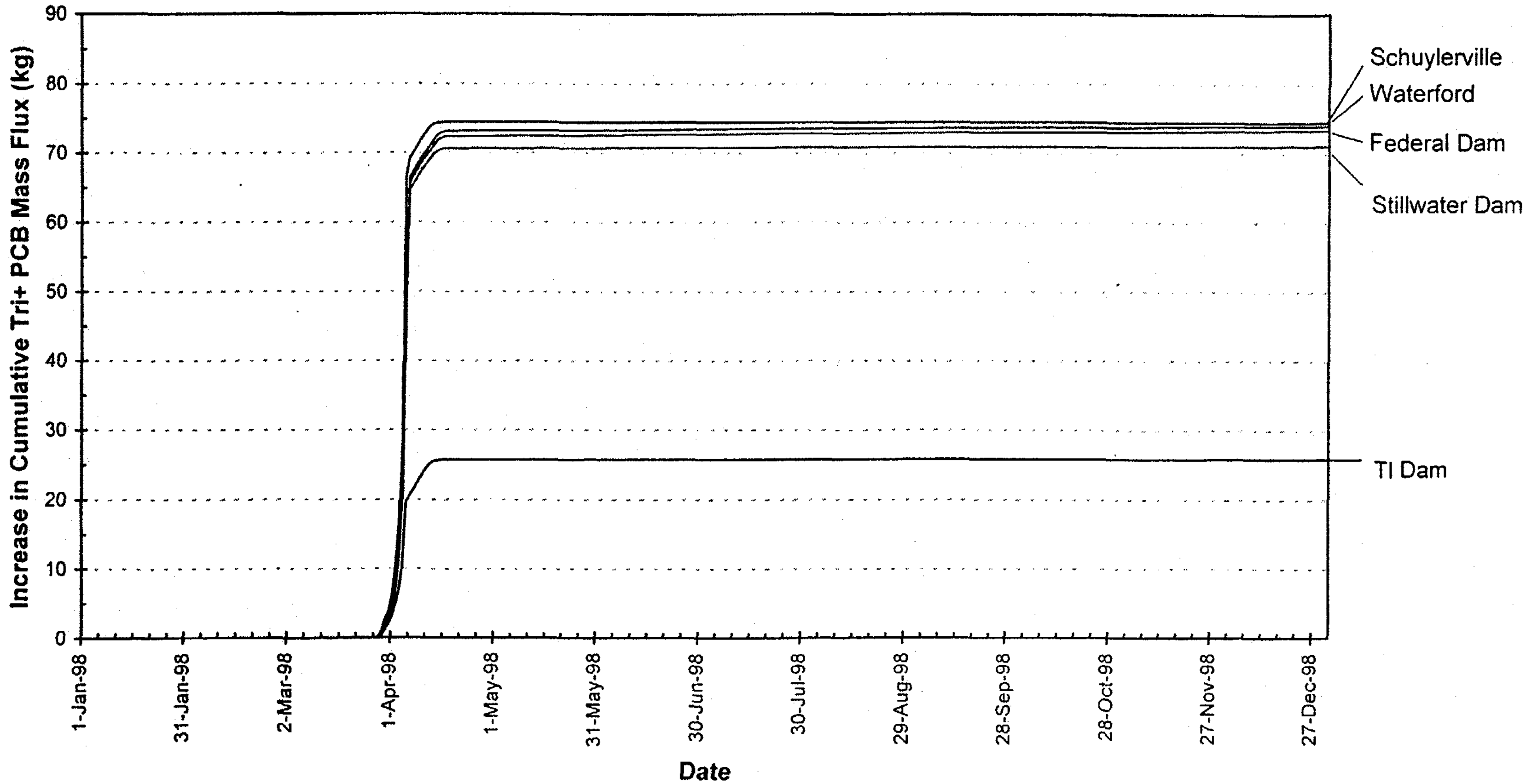


Figure 8-13. Cumulative Net Increase of Tri+ PCB Mass Loading at Various Locations in the Upper Hudson River Due to the 100 Year Flood Event (versus the No Action Scenario).

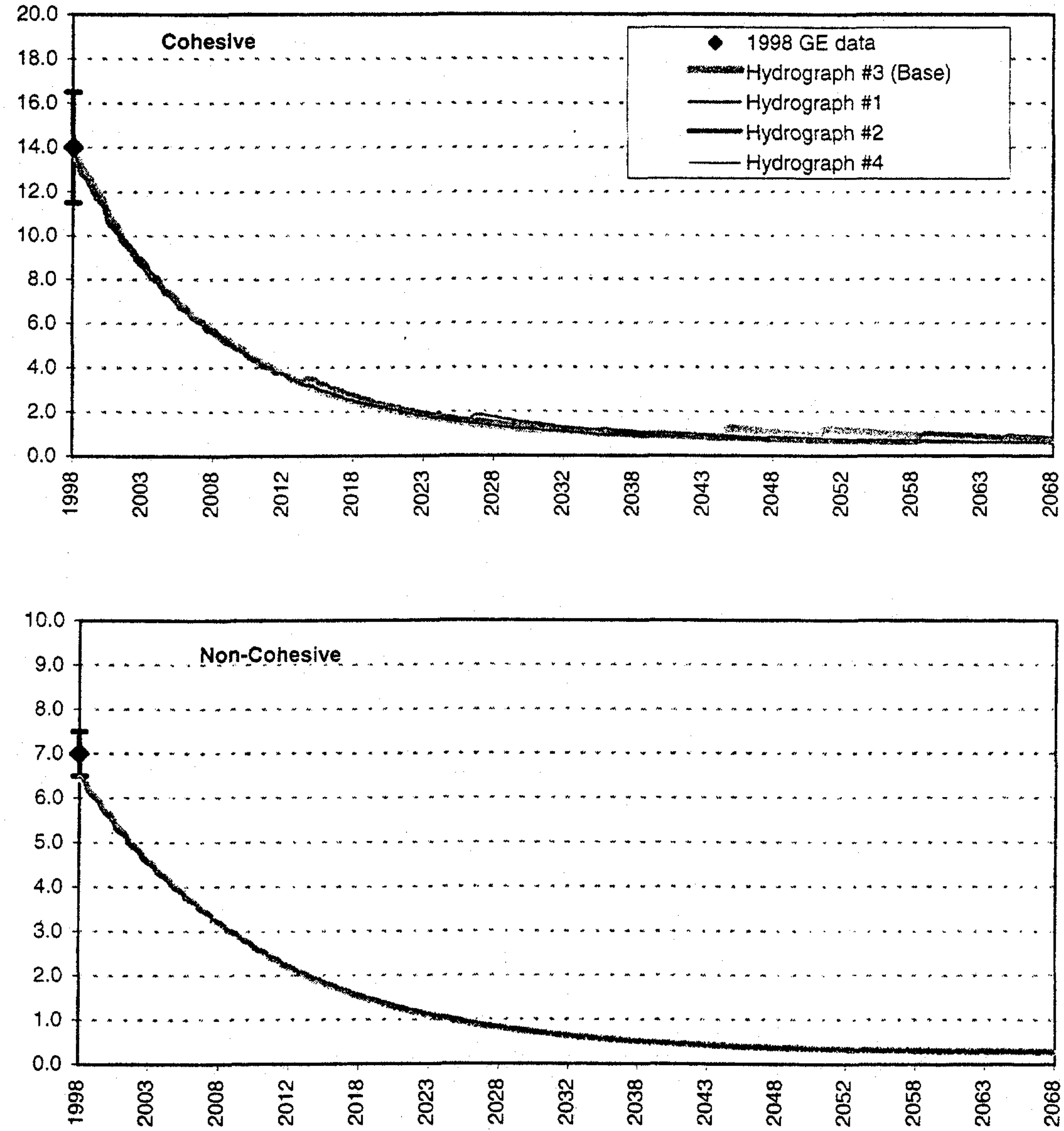


Figure 8-14a. Forecast Sediment Tri+ Concentrations for Thompson Island Pool for Alternative Hydrographs (Constant Upstream Tri+ Concentration of 10 ng/L) at Fort Edward.

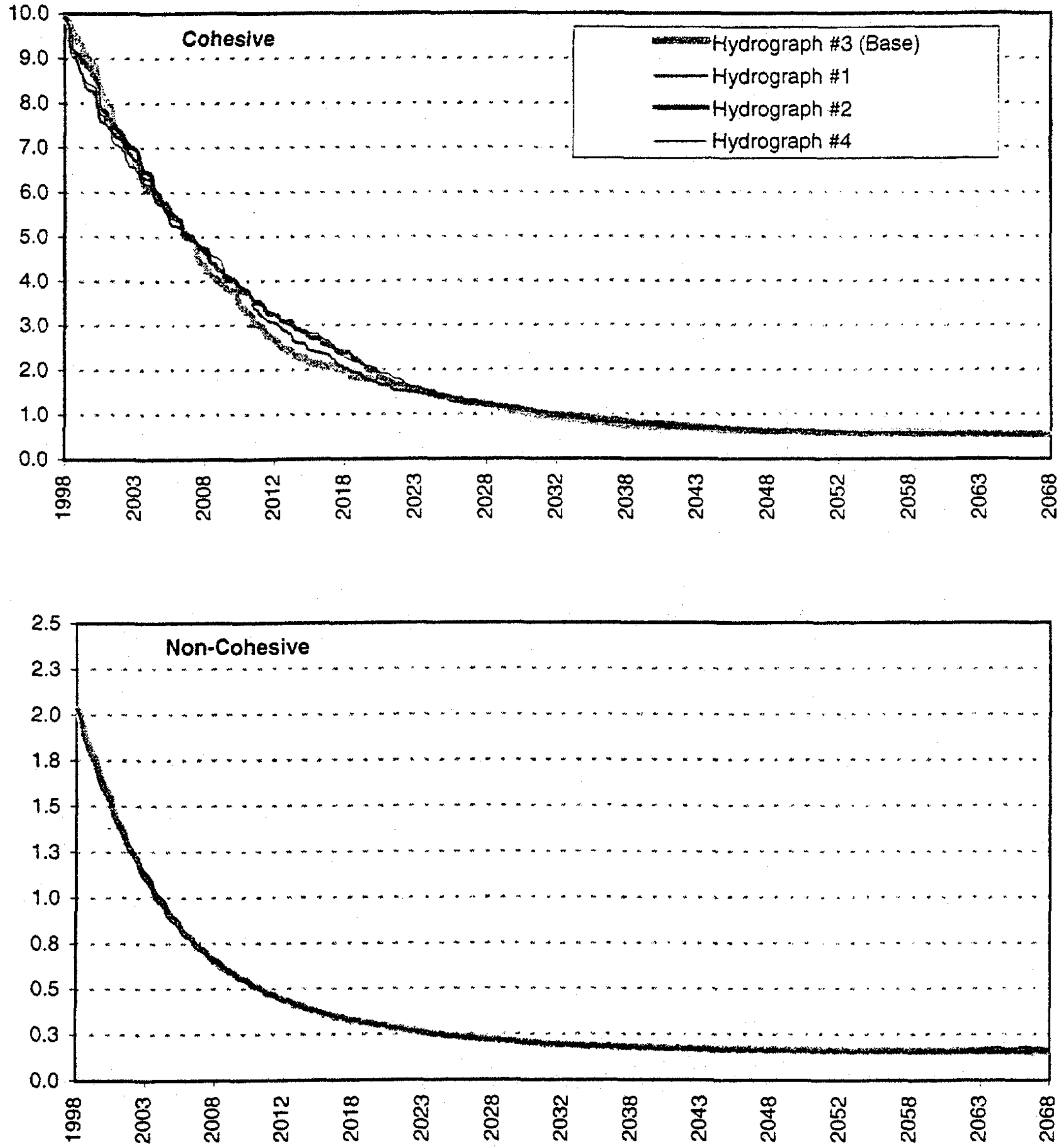


Figure 8-14b. Forecast Sediment Tri+ Concentrations for the Schuylerville Reach for Alternative Hydrographs (Constant Upstream Tri+ Concentration of 10 ng/L) at Fort Edward.

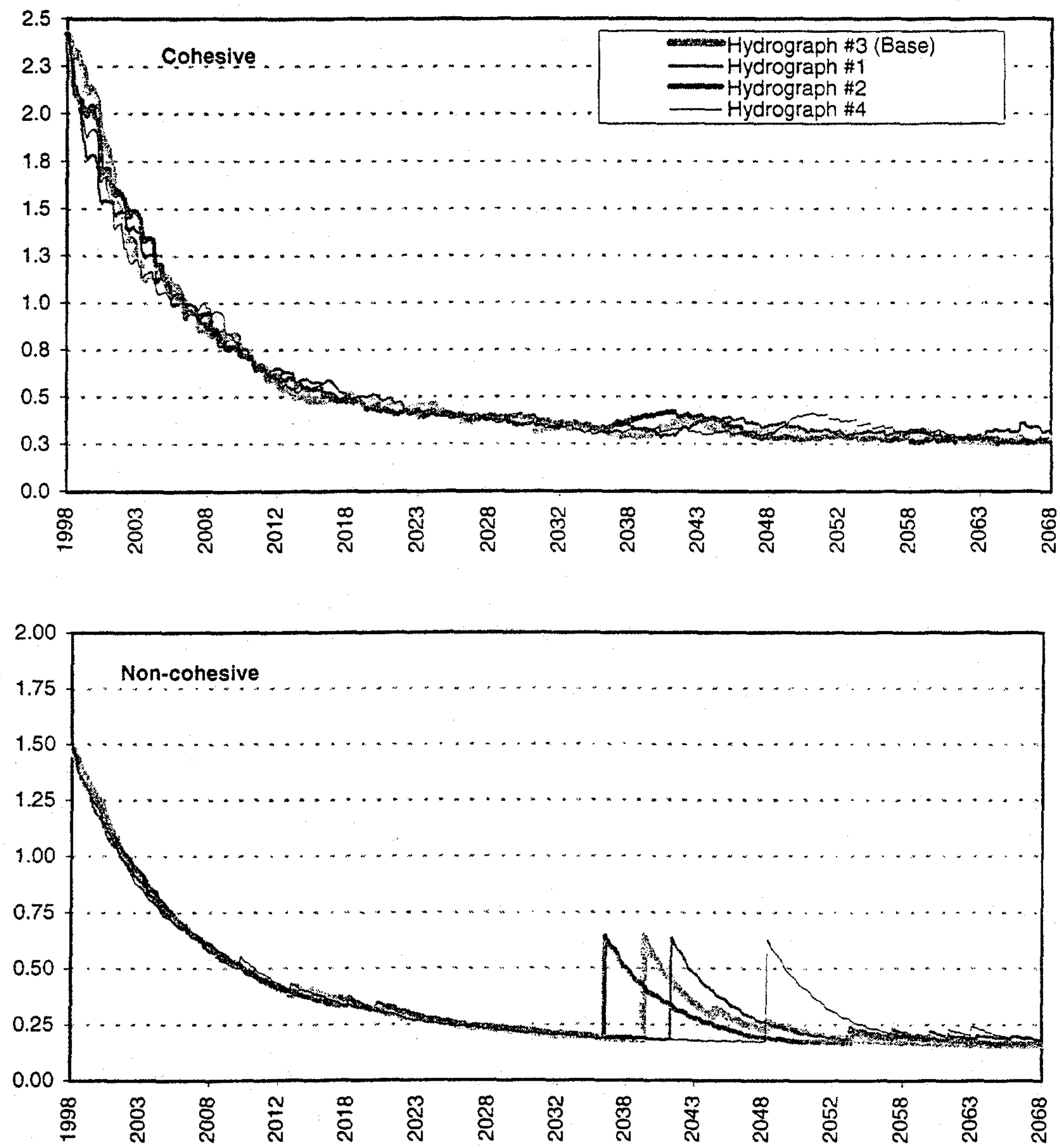
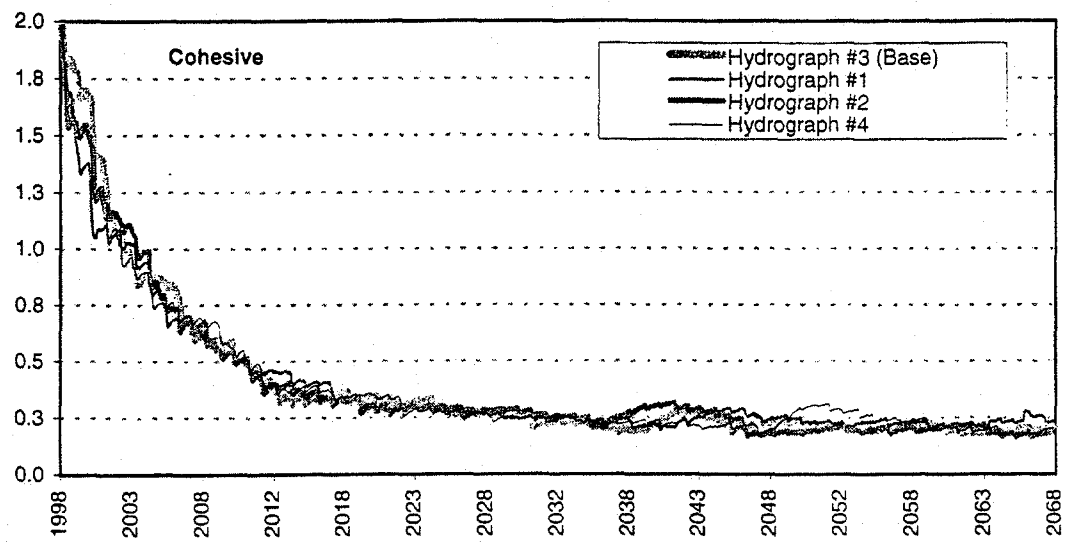


Figure 8-14c. Forecast Sediment Tri+ Concentrations for the Stillwater Reach for Alternative Hydrographs (Constant Upstream Tri+ Concentration of 10 ng/L) at Fort Edward.



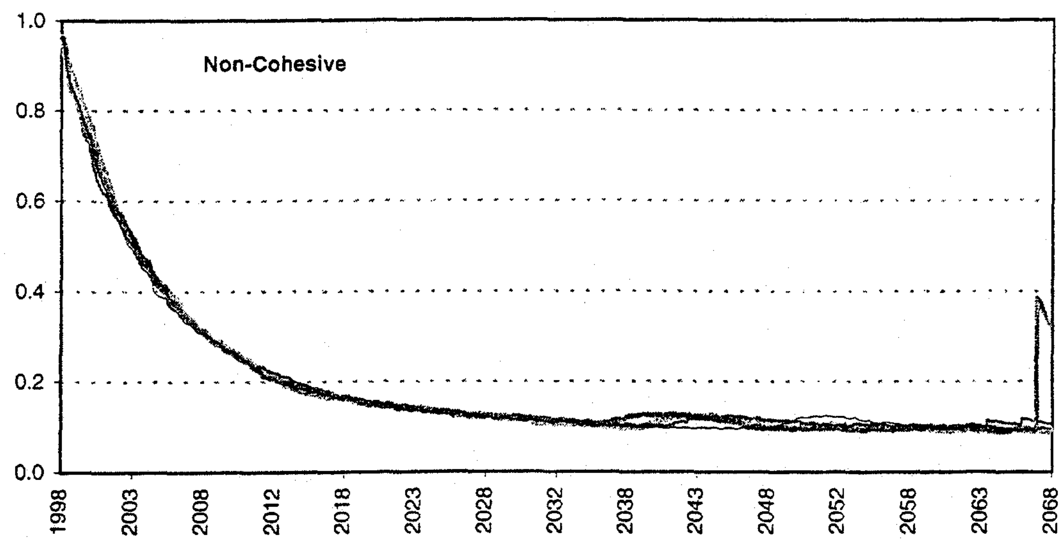


Figure 8-14d. Forecast Sediment Tri+ Concentrations for the Waterford Reach for Alternative Hydrographs (Constant Upstream Tri+ Concentration of 10 ng/L) at Fort Edward.

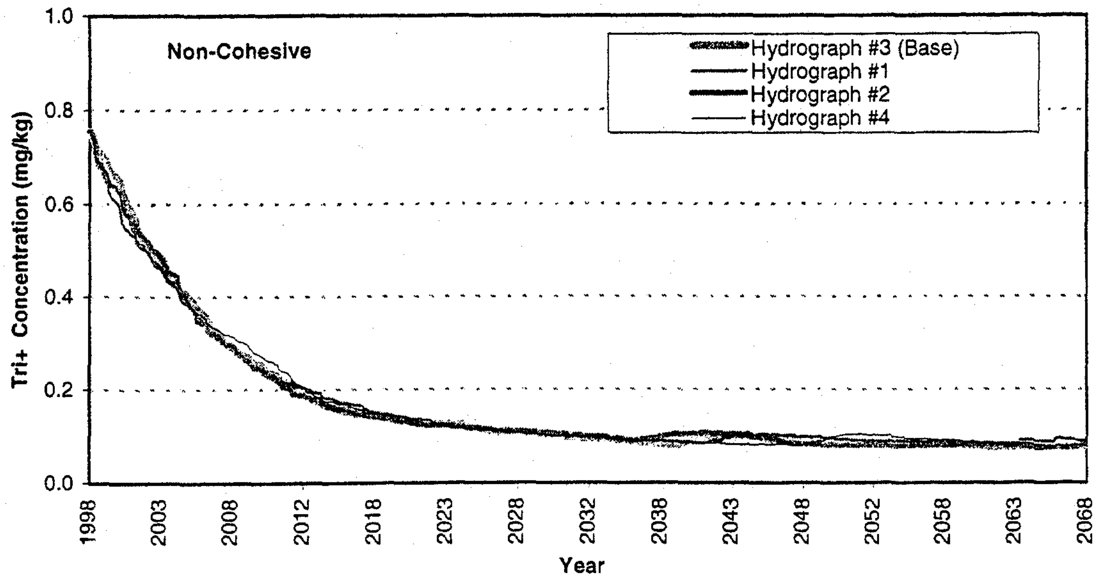


Figure 8-14e. Forecast Sediment Tri+ Concentrations for the Federal Dam Reach for Alternative Hydrographs (Constant Upstream Tri+ Concentration of 10 ng/L) at Fort Edward.

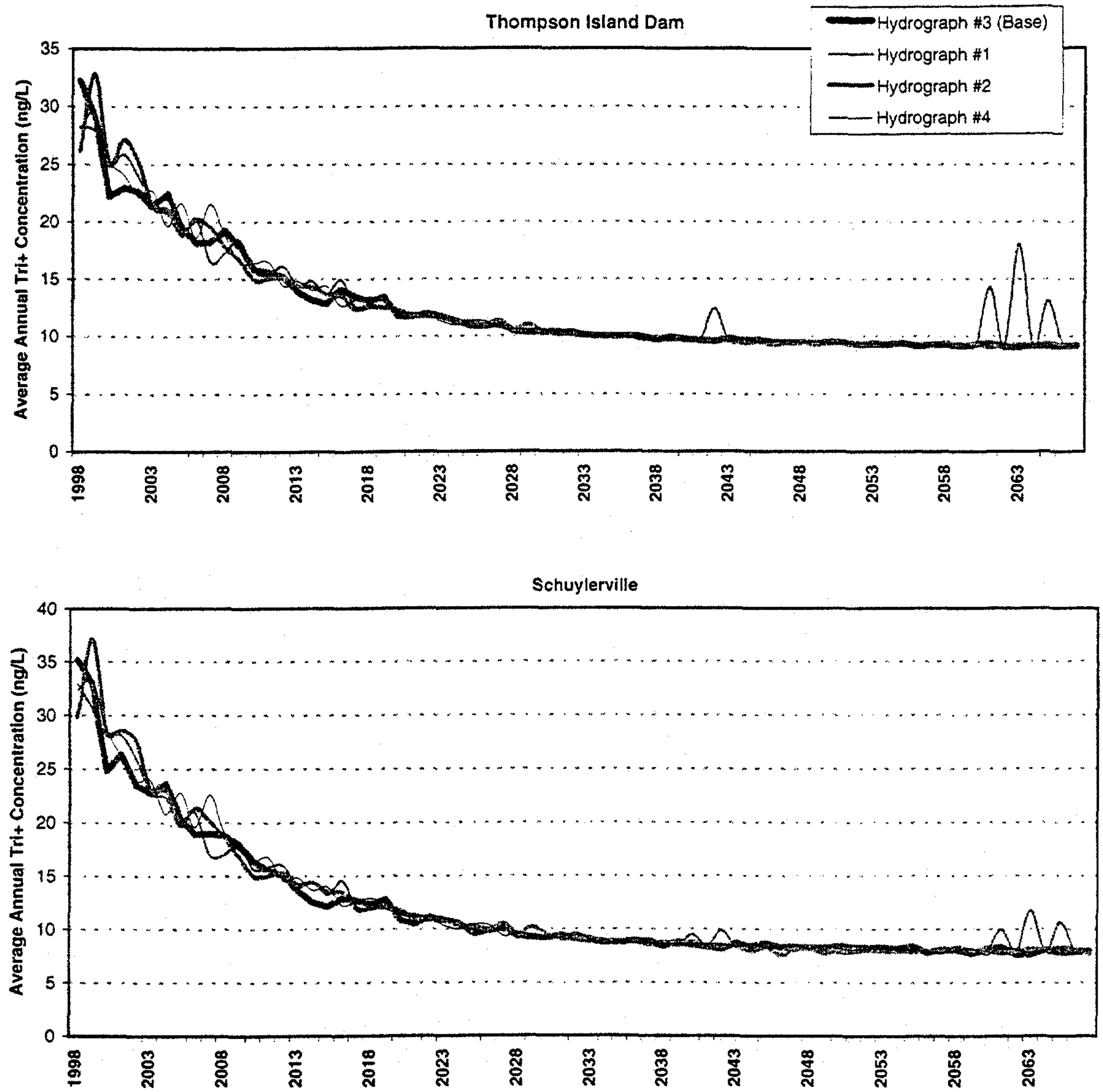


Figure 8-15a. Forecast Annual Average Tri+ Concentrations at Thompson Island Dam and Schuylerville for Alternative Hydrographs (Constant Upstream Tri+ Concentration of 10 ng/L at Fort Edward), 1998-2067.

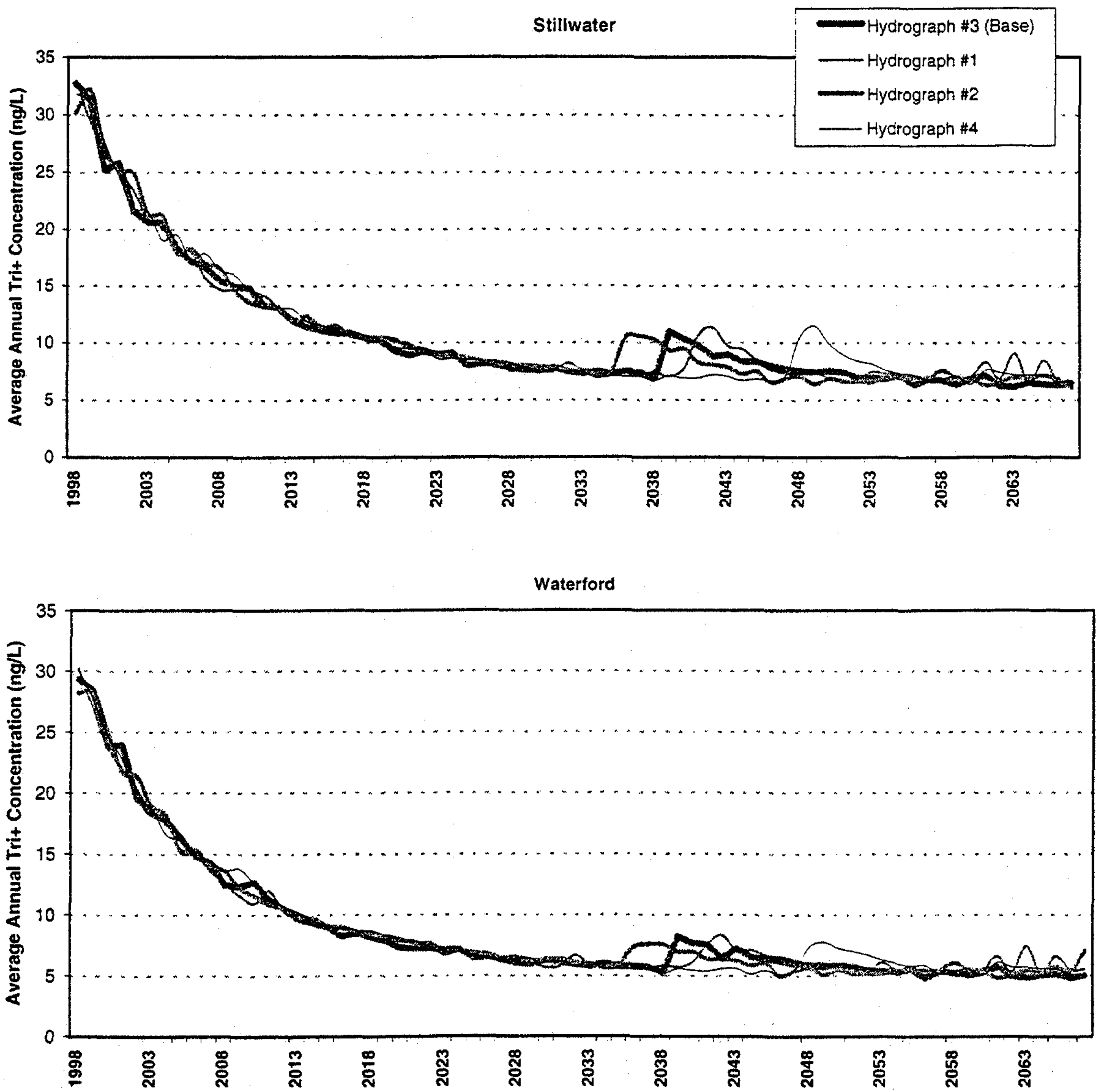


Figure 8-15b. Forecast Annual Average Tri+ Concentrations at Stillwater and Waterford for Alternative Hydrographs (Constant Upstream Tri+ Concentration of 10 ng/L at Fort Edward), 1998-2067.

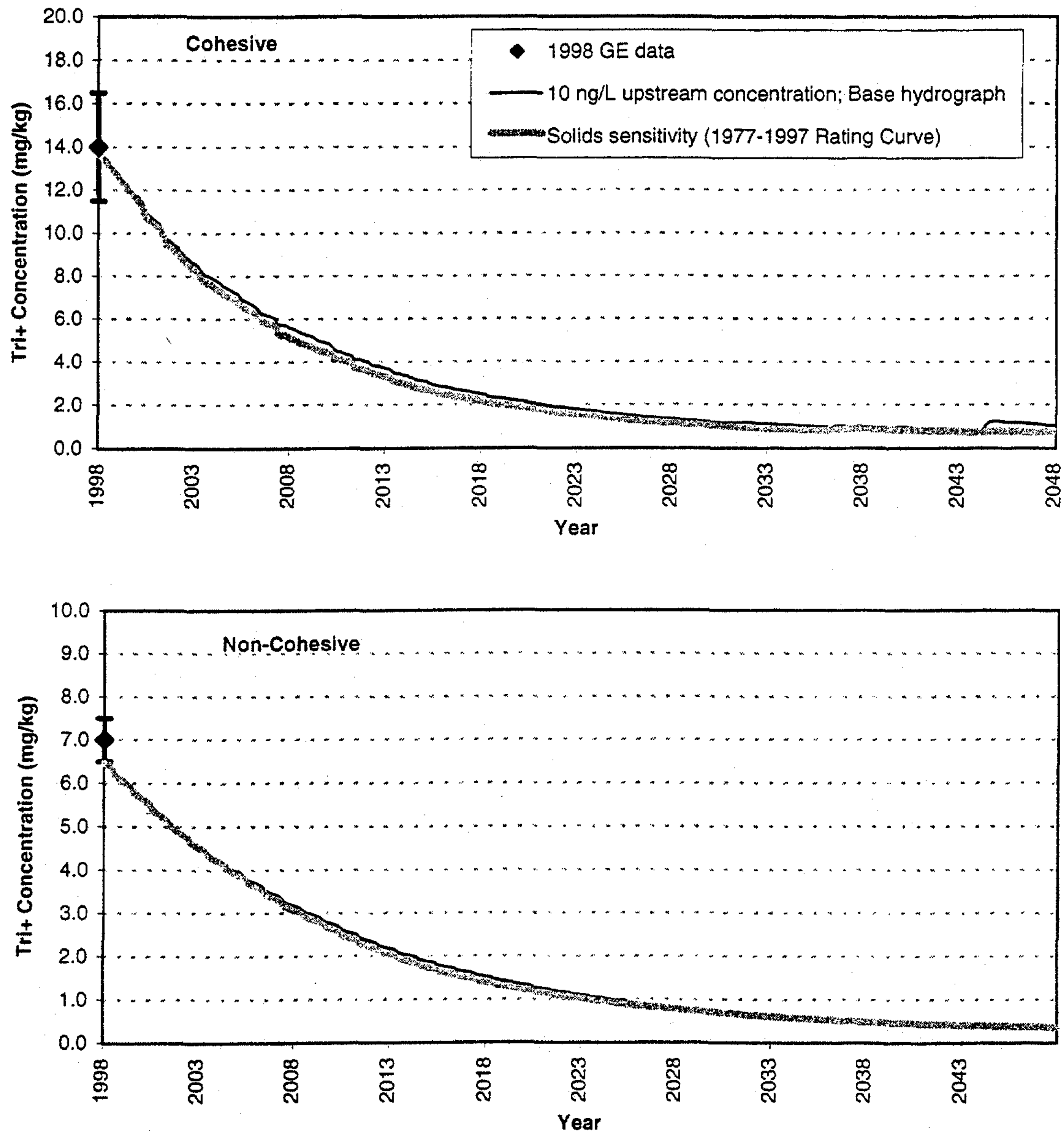
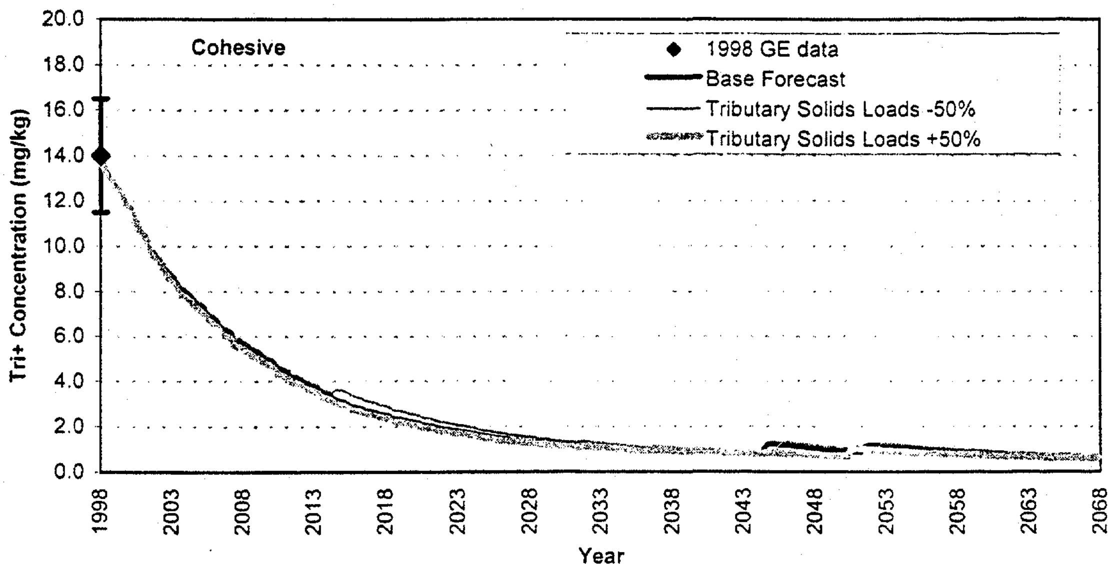


Figure 8-16. Sensitivity of Thompson Island Pool Surface Sediment Tri+ Concentrations to an Alternate Total Suspended Solids Load at Fort Edward, 1998-2047.



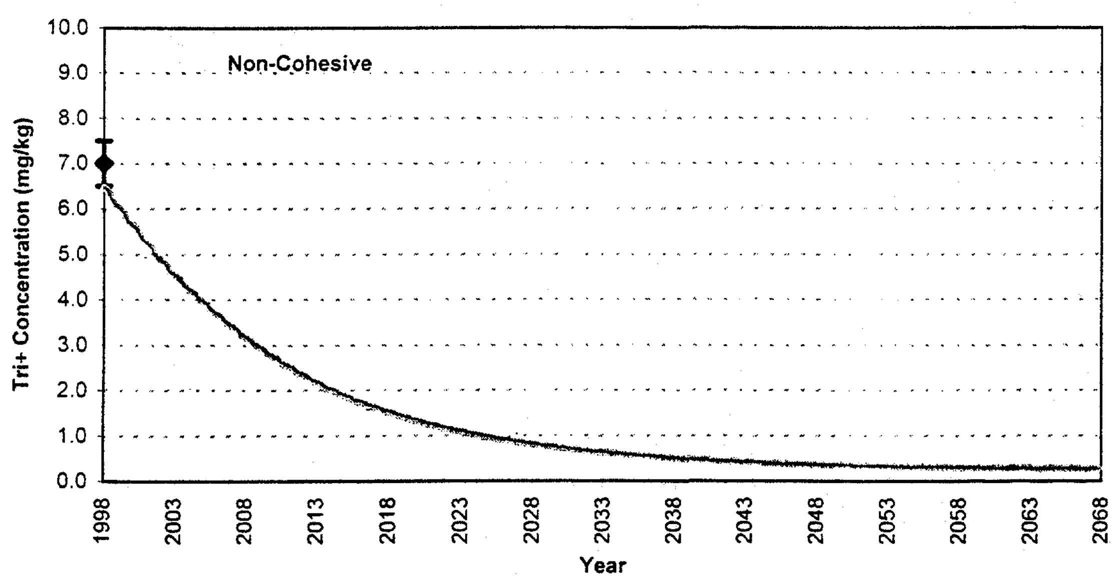


Figure 8-17a. Sensitivity of Thompson Island Pool Surface Sediment Tri+ Concentrations to Changes in External Tributary Solids Loadings, 1998-2067.

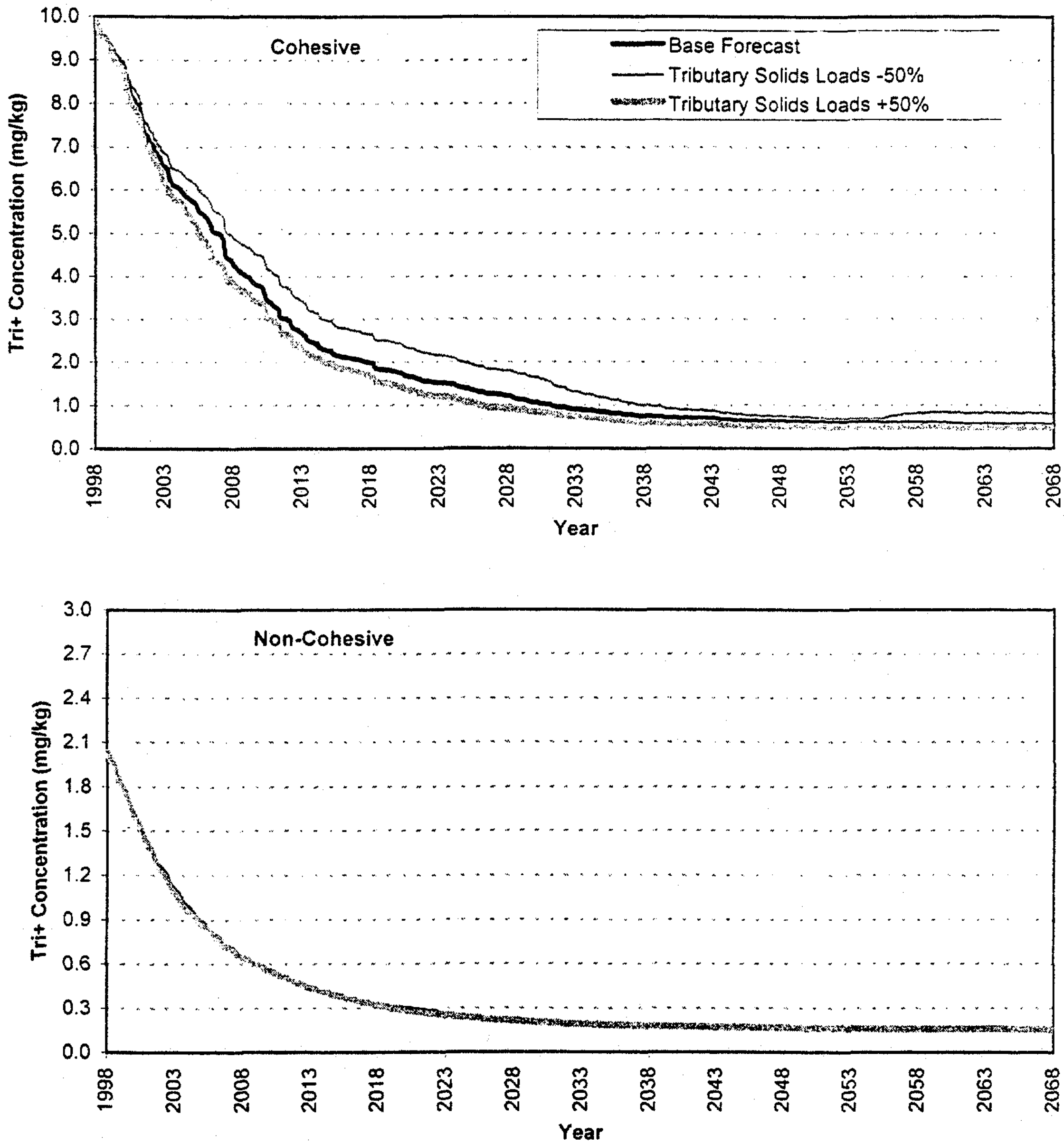


Figure 8-17b. Sensitivity of Thompson Island Dam to Schuylerville Surface Sediment Tri+ Concentrations to Changes in External Tributary Solids Loadings, 1998-2067.

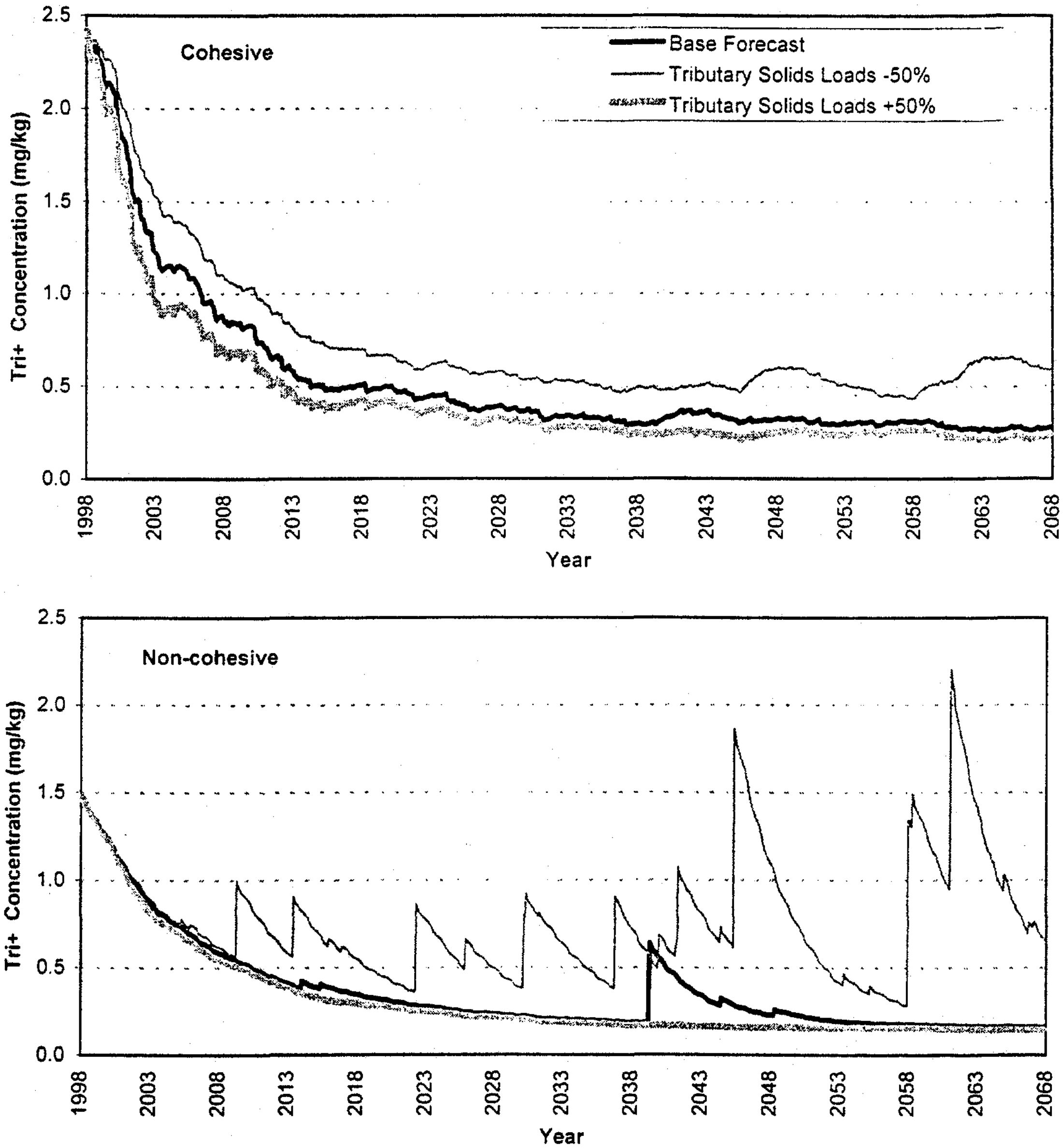


Figure 8-17c. Sensitivity of Schuylerville to Stillwater Surface Sediment Tri+ Concentrations to Changes in External Tributary Solids Loadings, 1998-2067.

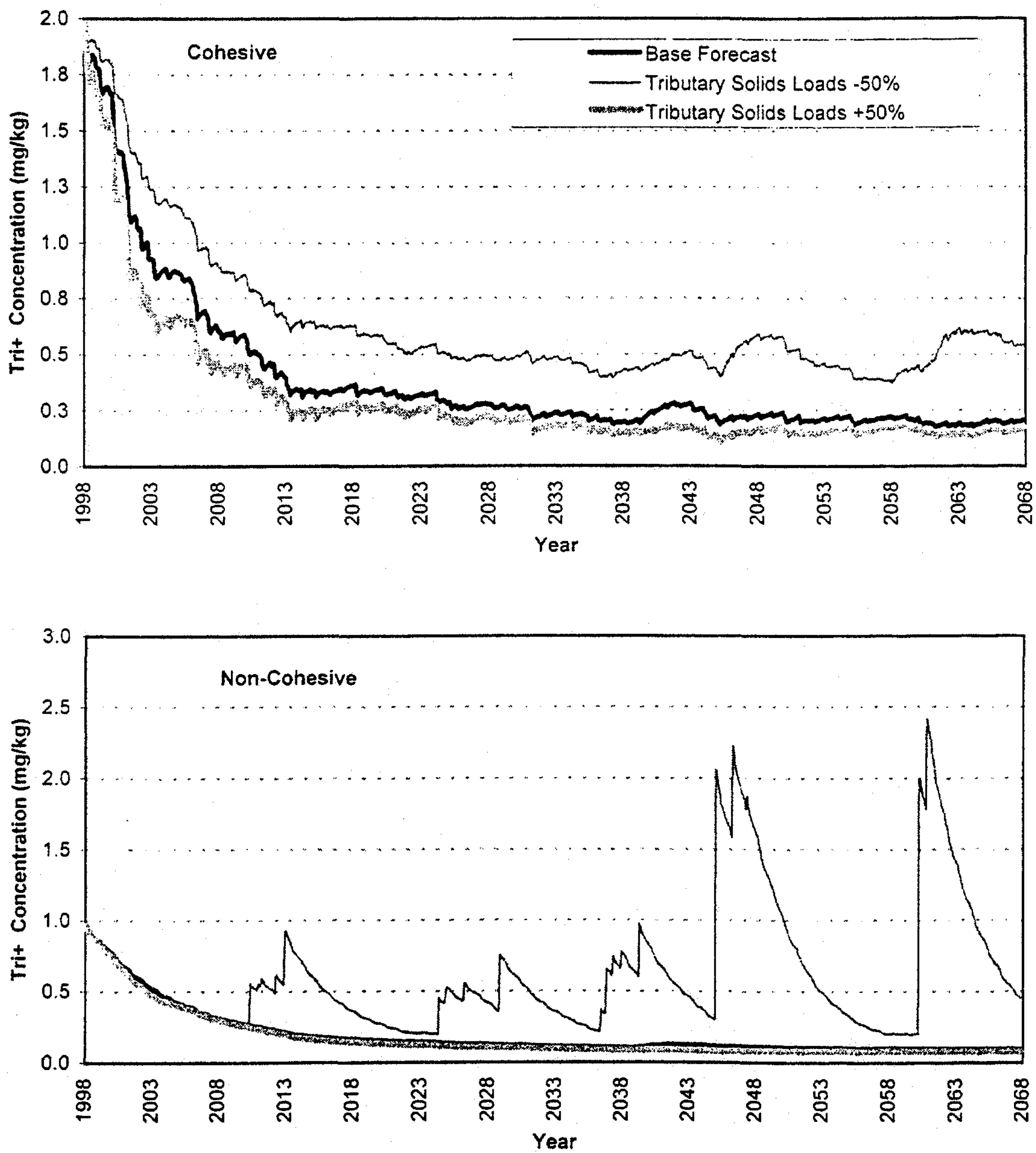


Figure 8-17d. Sensitivity of Stillwater to Waterford Surface Sediment Tri+ Concentrations to Changes in External Tributary Solids Loadings, 1998-2067.

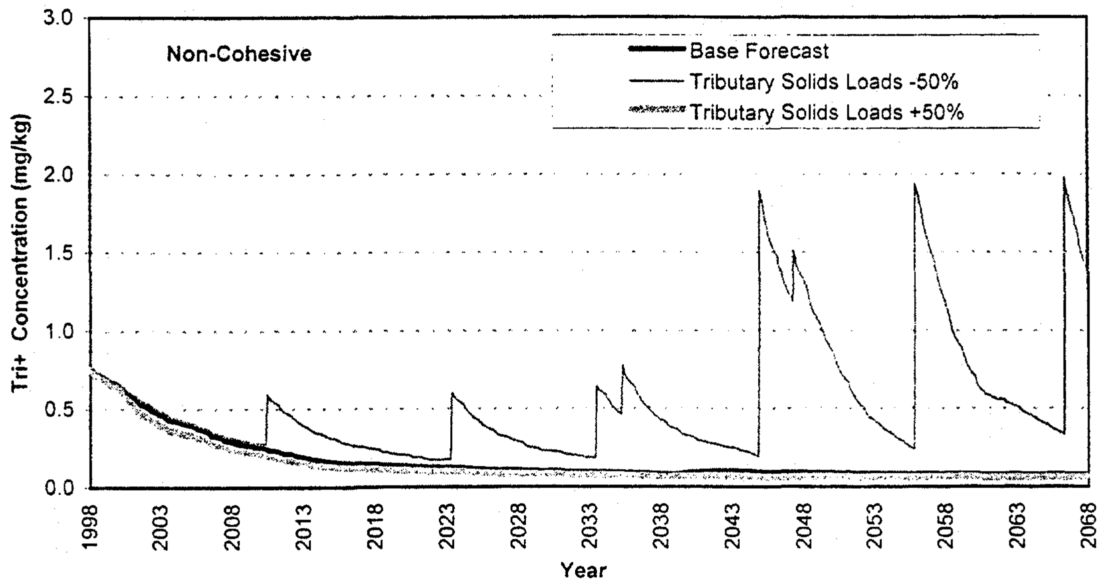
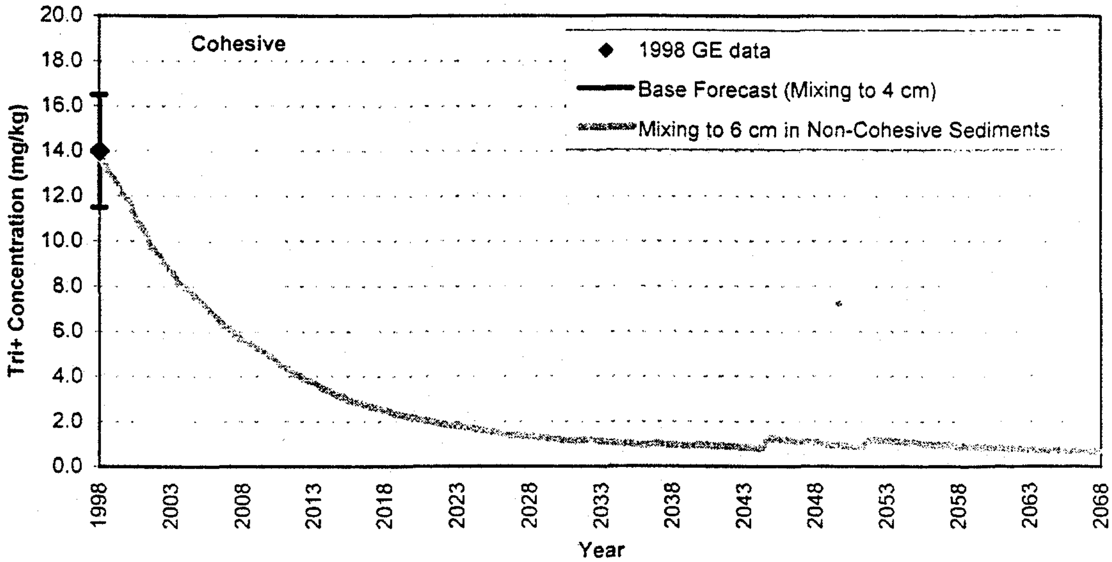


Figure 8-17e. Sensitivity of Waterford to Federal Dam Surface Sediment Tri+ Concentrations to Changes in External Tributary Solids Loadings, 1998-2067.



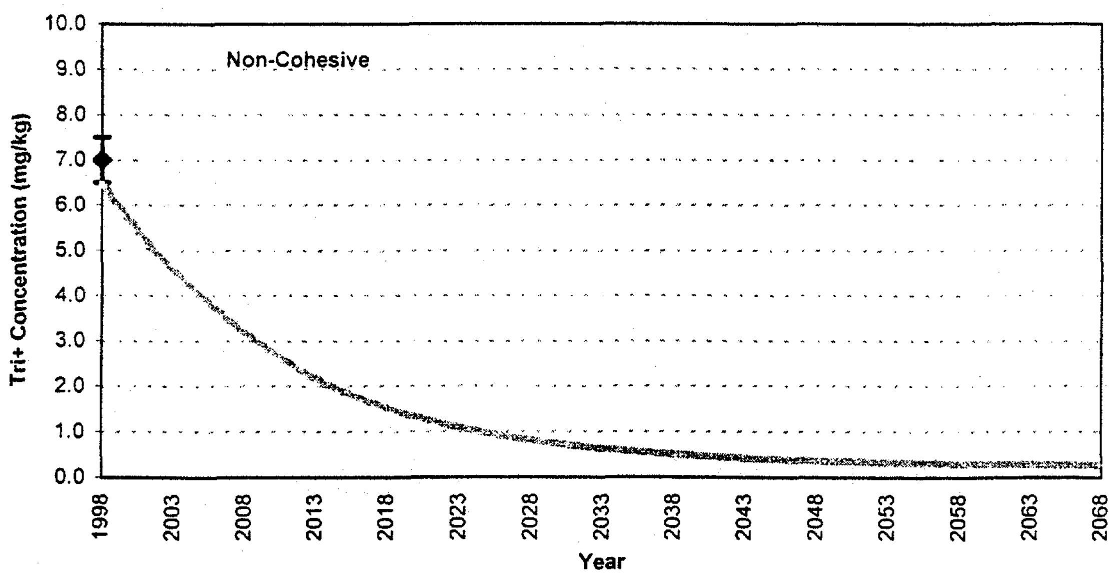


Figure 8-18a. Sensitivity of Thompson Island Pool Surface Sediment Tri+ Concentrations to Enhanced Mixing (top 6 cm) in Non-Cohesive Sediments, 1998-2067.

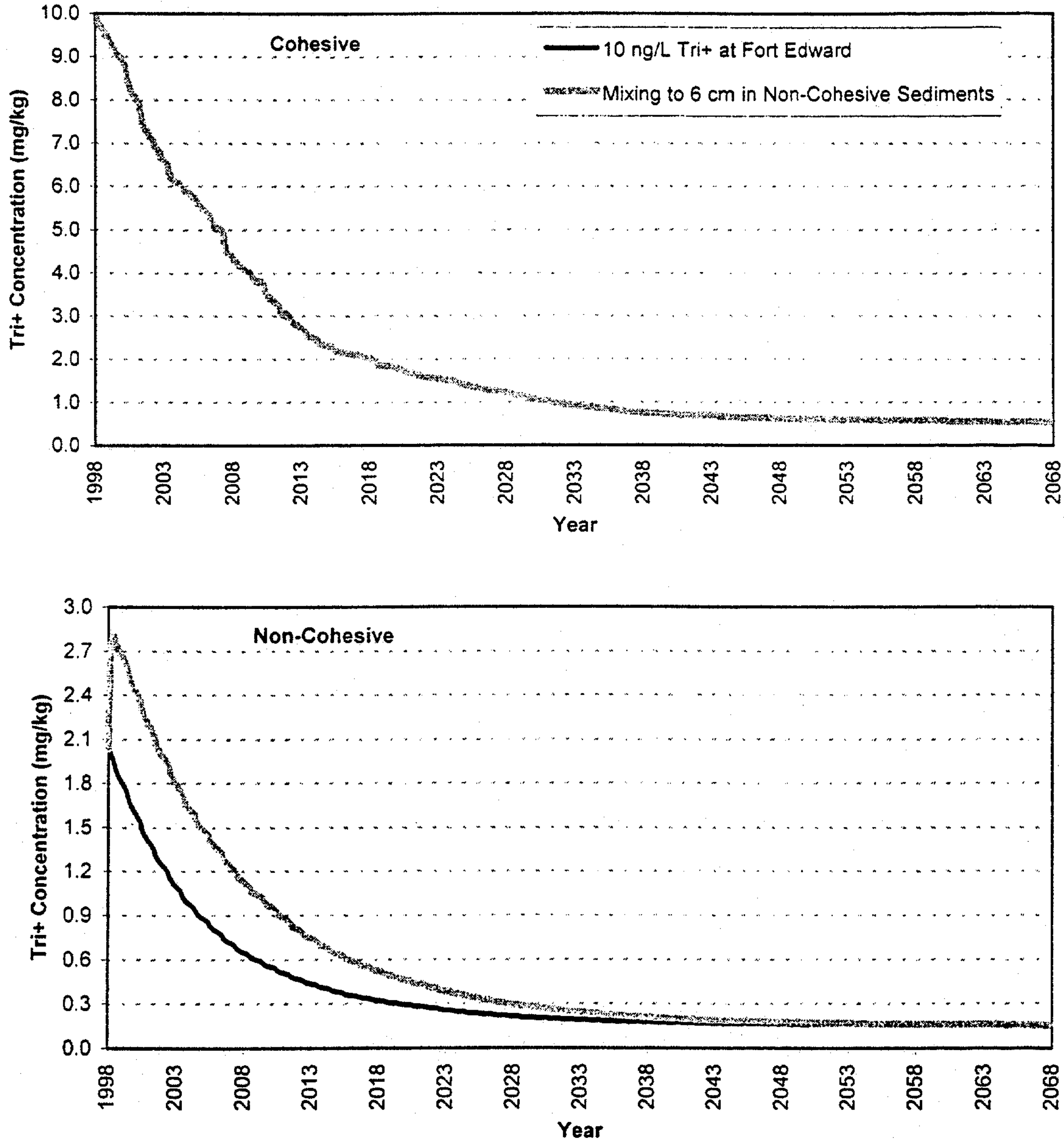


Figure 8-18b. Sensitivity of Thompson Island Dam to Schuylerville Surface Sediment Tri+ Concentrations to Enhanced Mixing (top 6 cm) in Non-Cohesive Sediments, 1998-2067.

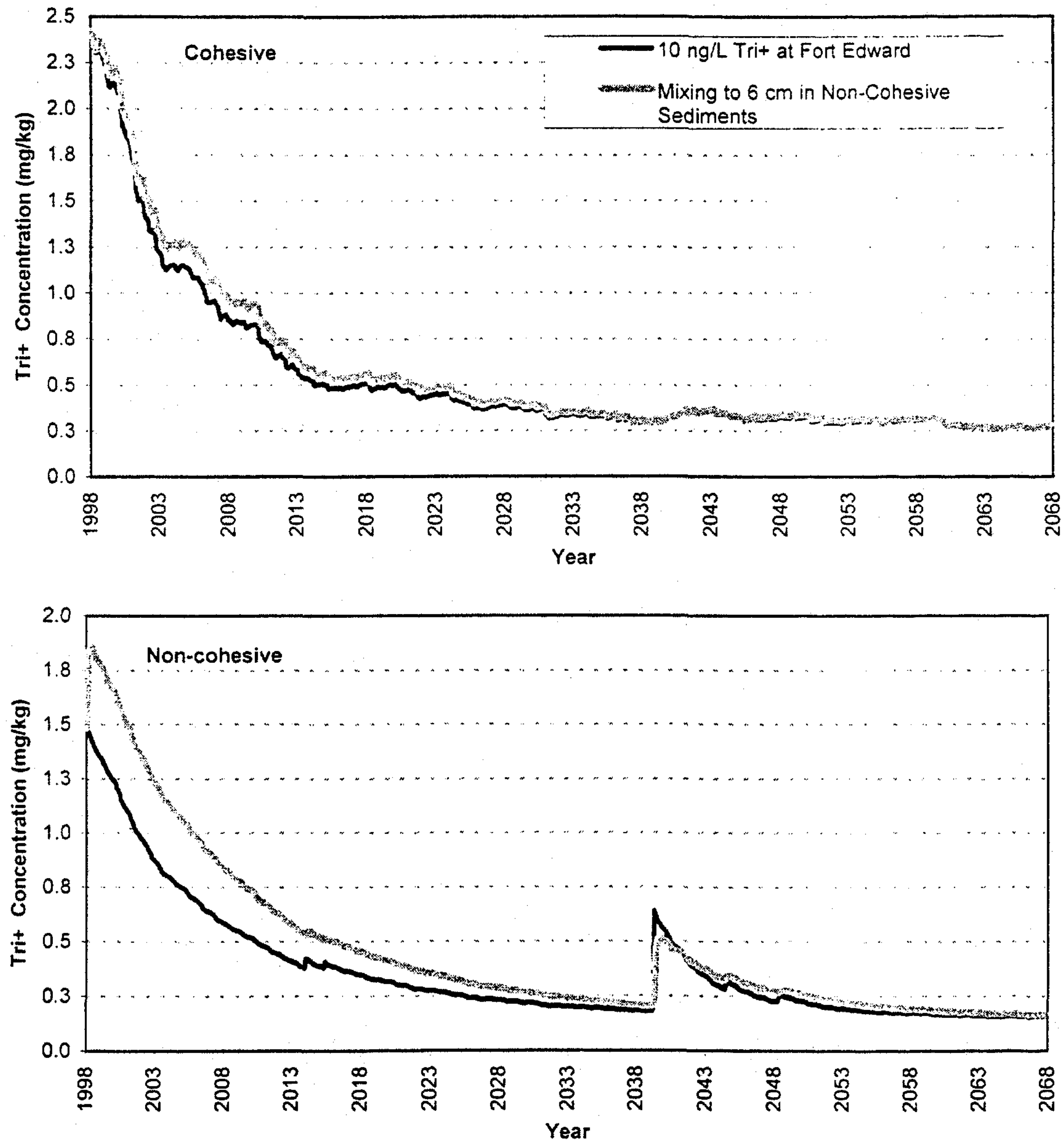


Figure 8-18c. Sensitivity of Schuylerville to Stillwater Surface Sediment Tri+ Concentrations to Enhanced Mixing (top 6 cm) in Non-Cohesive Sediments, 1998-2067.

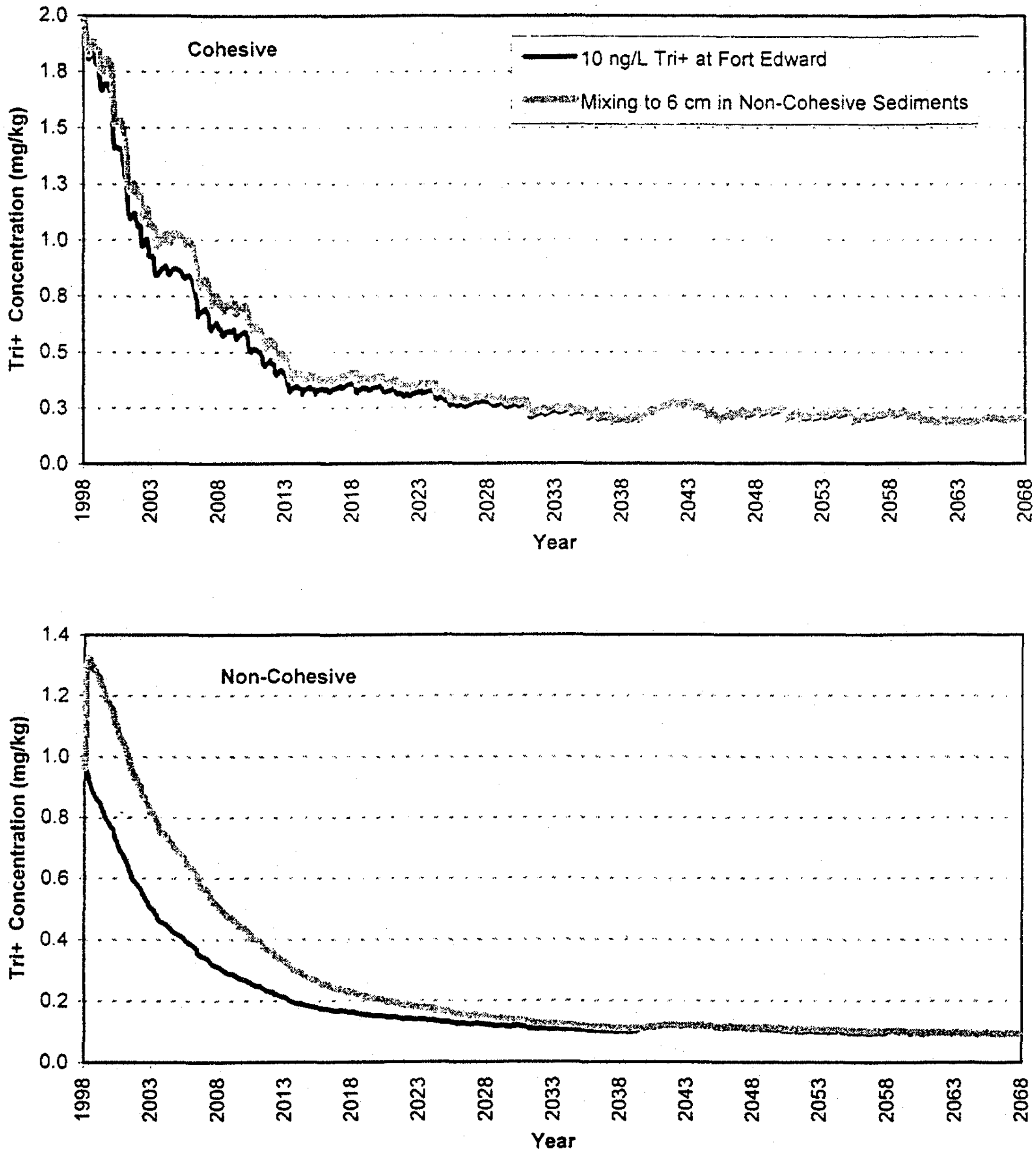


Figure 8-18d. Sensitivity of Stillwater to Waterford Surface Sediment Tri+ Concentrations to Enhanced Mixing (top 6 cm) in Non-Cohesive Sediments, 1998-2067.

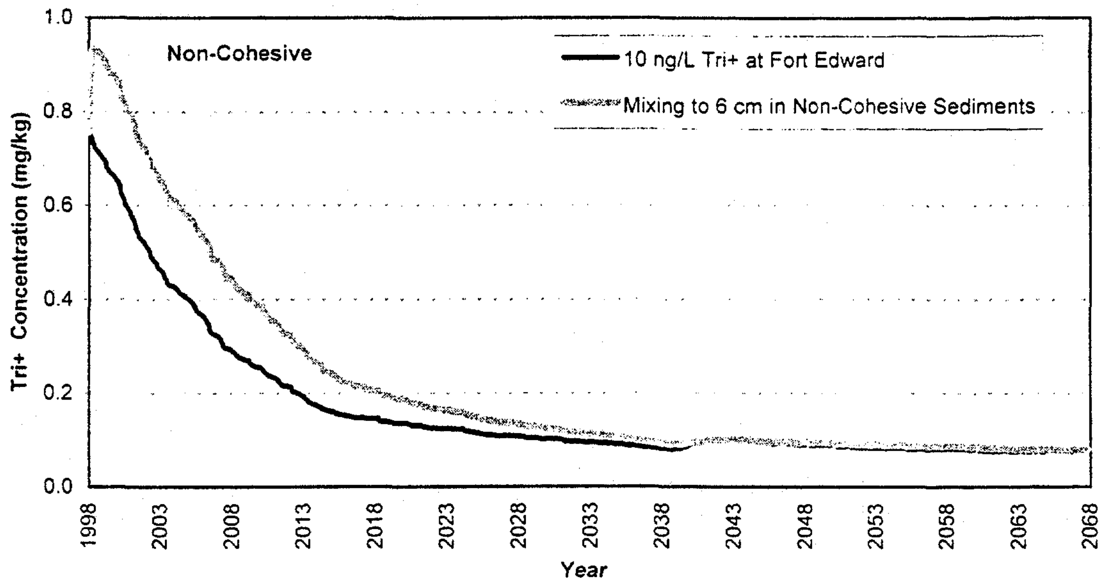


Figure 8-18e. Sensitivity of Waterford to Federal Dam Surface Sediment Tri+ Concentrations to Enhanced Mixing (top 6 cm) in Non-Cohesive Sediments, 1998-2067.

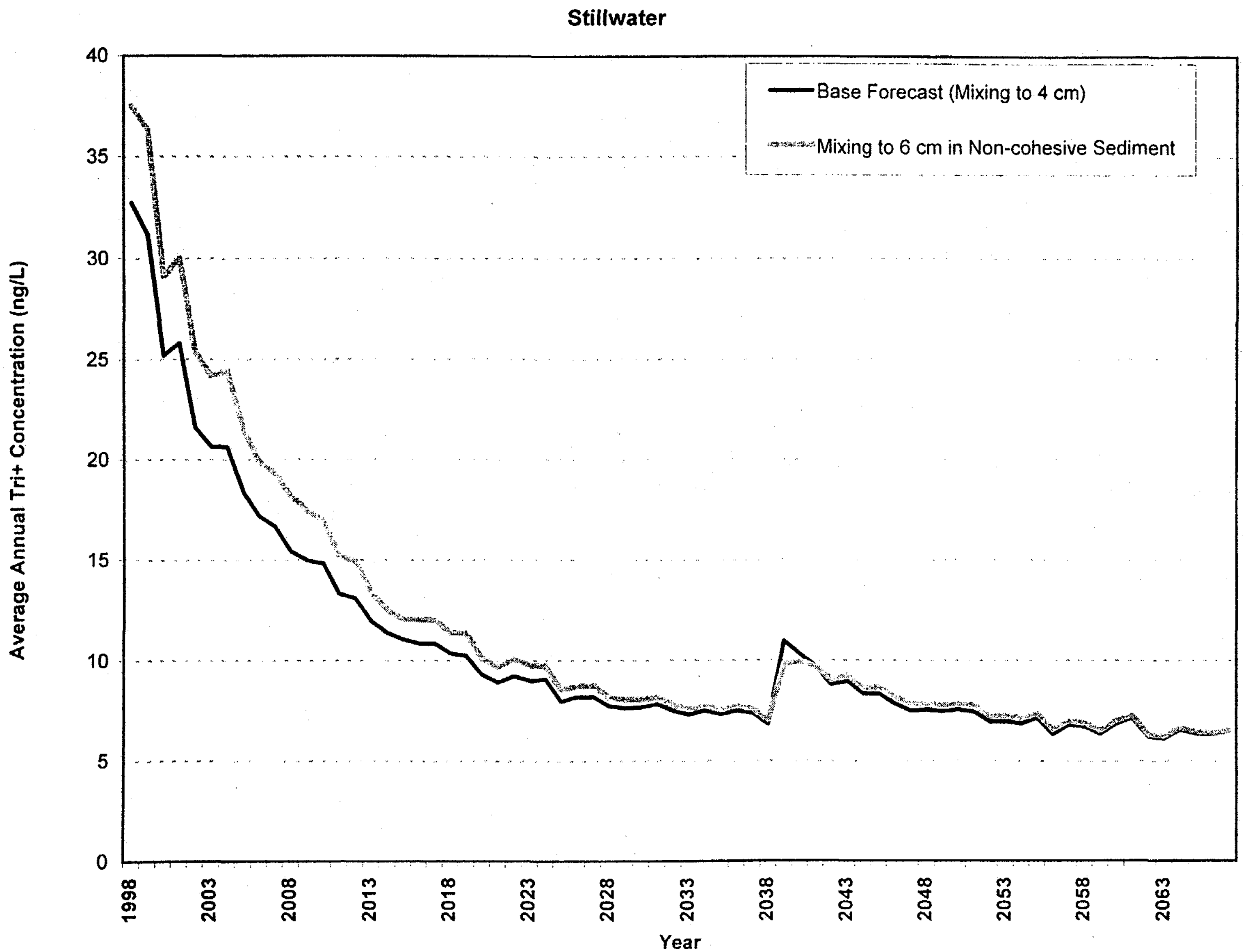


Figure 8-19. Sensitivity of Tri+ Concentrations at Stillwater to Enhanced Mixing (top 6 cm) in Non-cohesive Sediments, 1998-2067.

303721

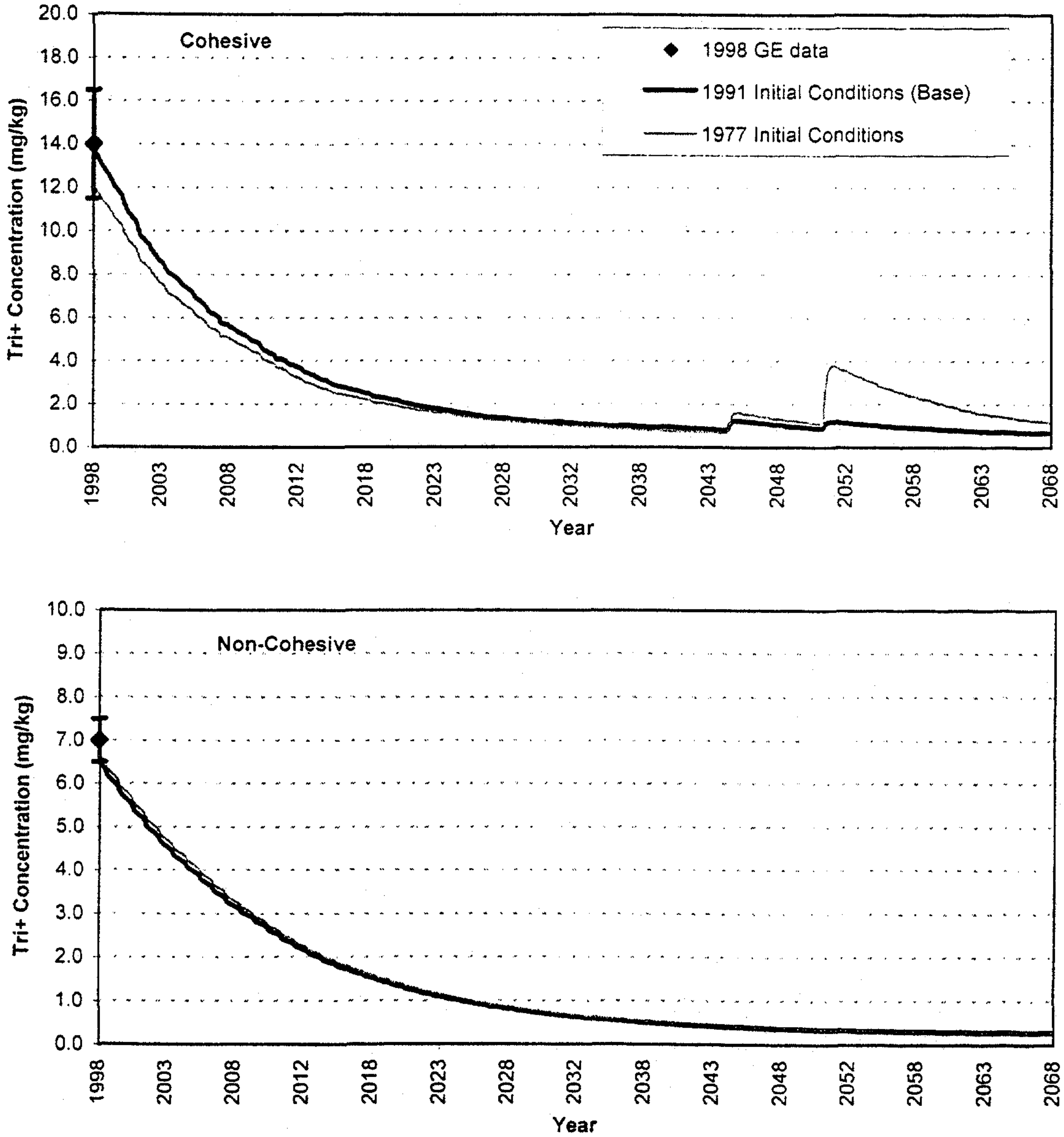


Figure 8-20a. Sensitivity of Thompson Island Pool Surface Sediment Tri+ Concentrations to Specification of Sediment Initial Conditions, 1998-2067.

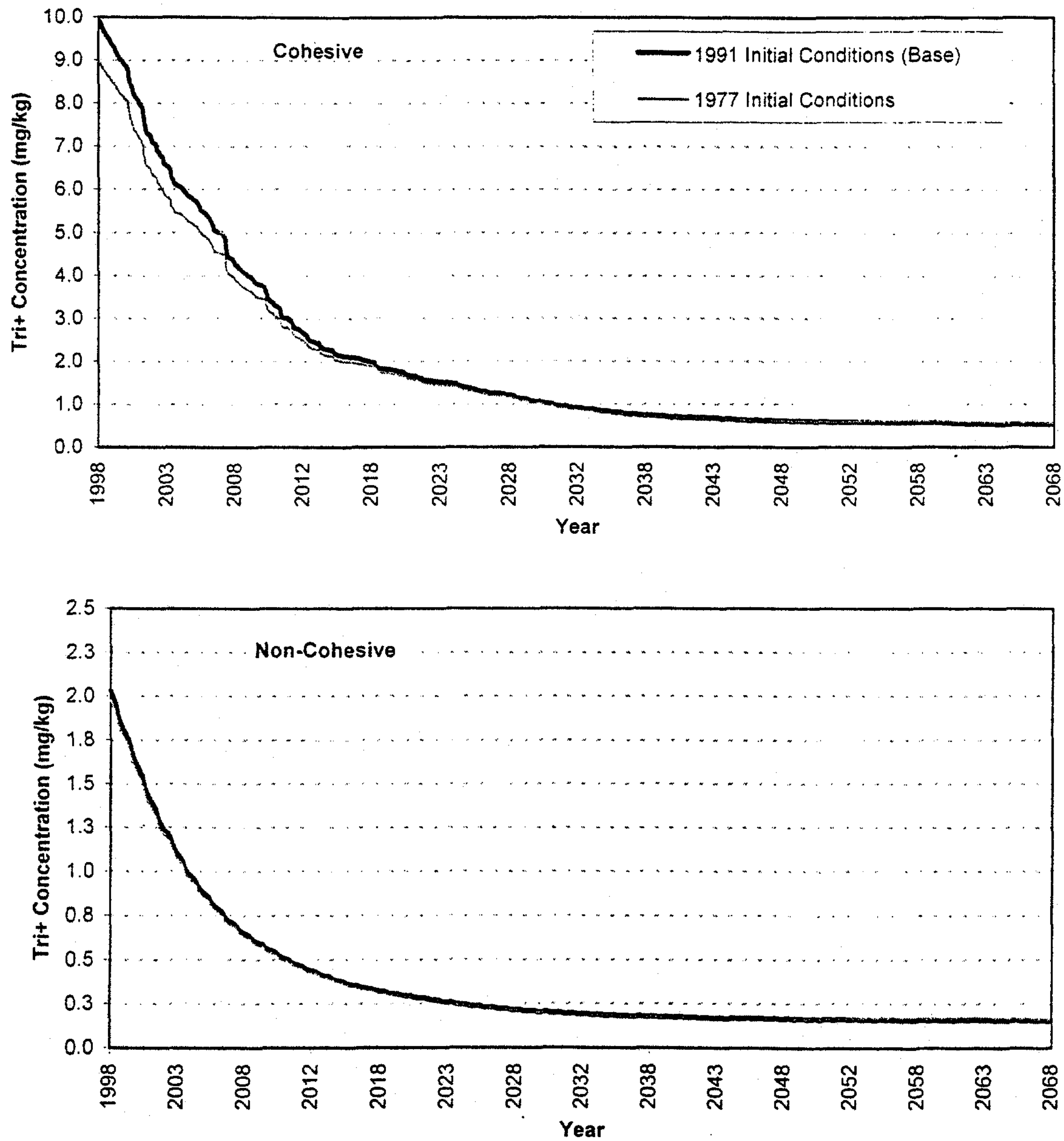


Figure 8-20b. Sensitivity of Schuylerville Reach Surface Sediment Tri+ Concentrations to Specification of Sediment Initial Conditions, 1998-2067.

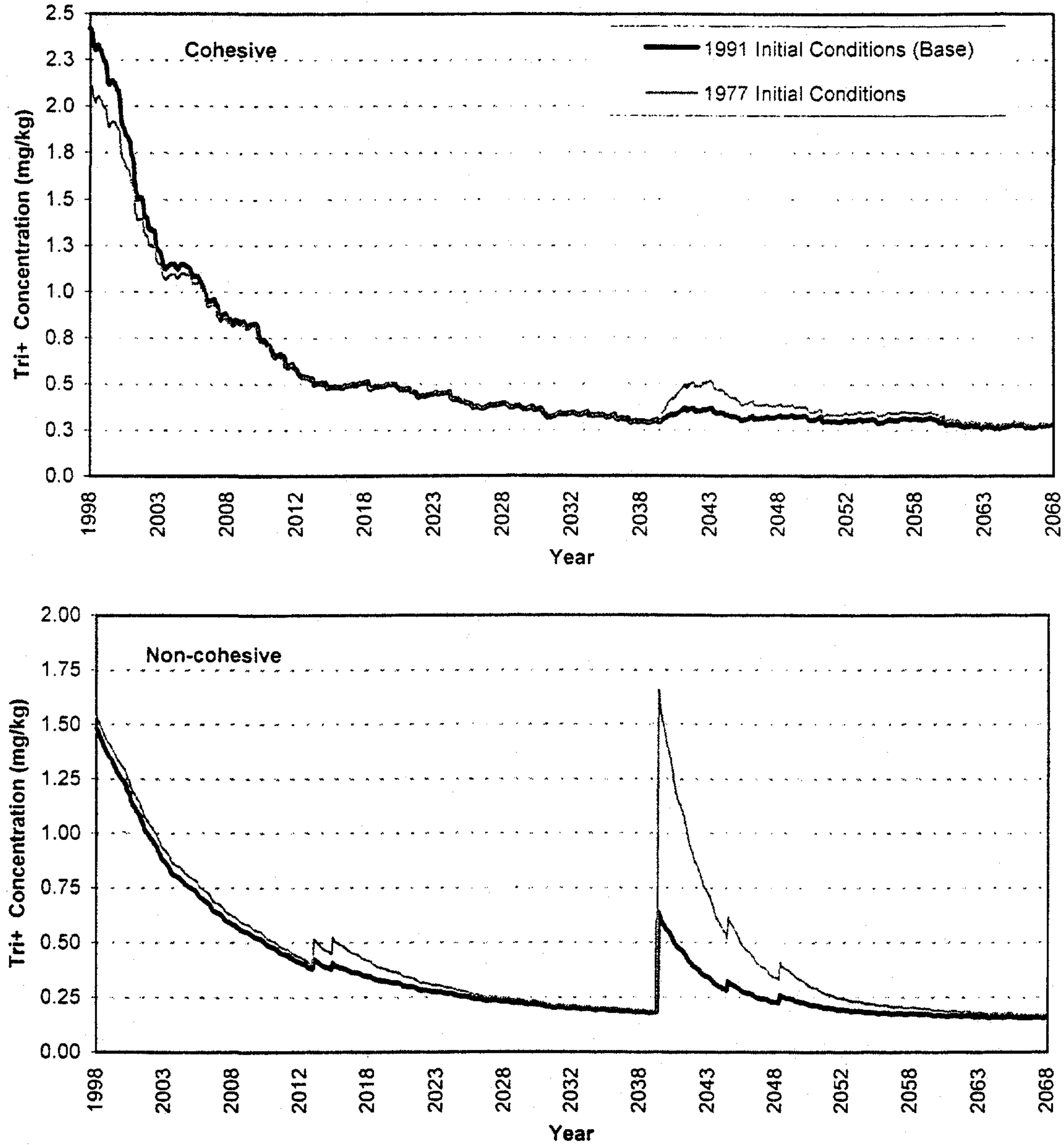


Figure 8-20c. Sensitivity of Stillwater Reach Surface Sediment Tri+ Concentrations to Specification of Sediment Initial Conditions, 1998-2067.

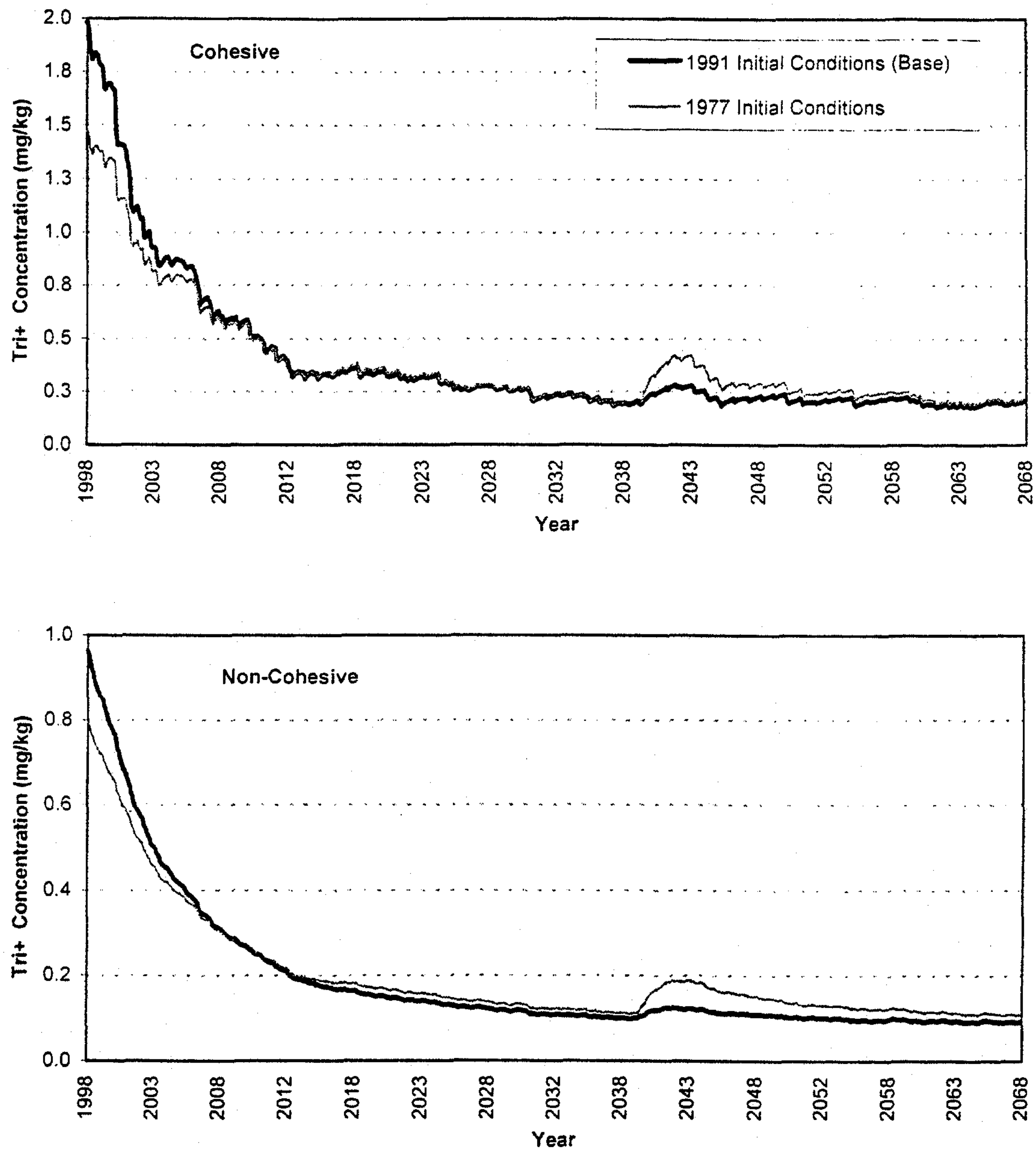


Figure 8-20d. Sensitivity of Waterford Reach Surface Sediment Tri+ Concentrations to Specification of Sediment Initial Conditions, 1998-2067.

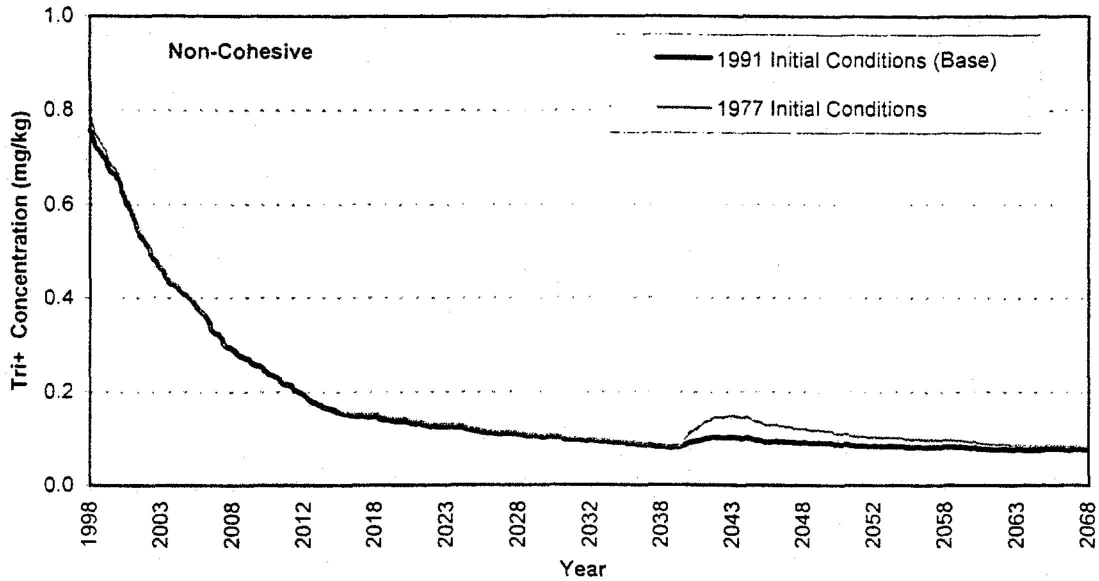
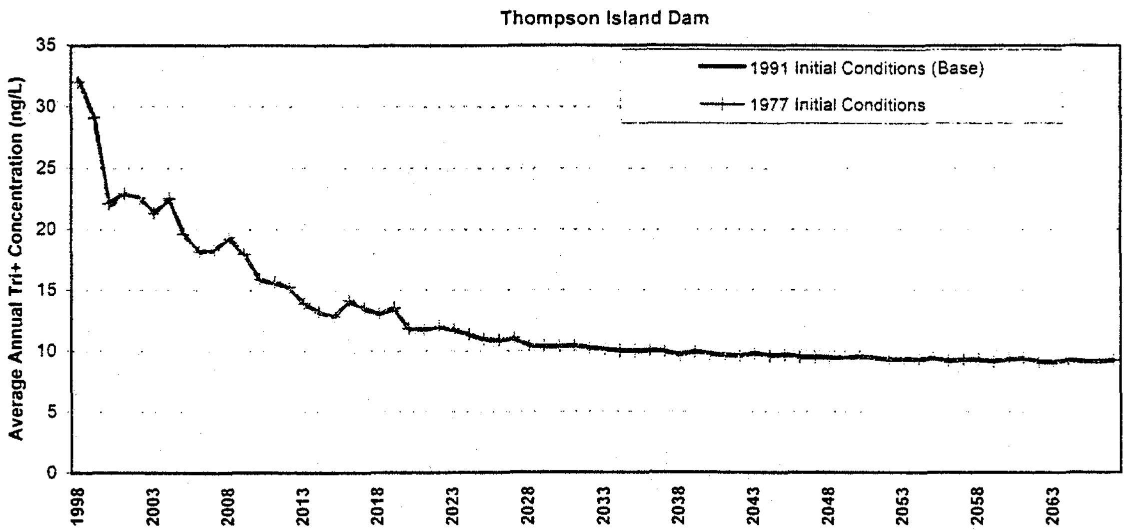


Figure 8-20e. Sensitivity of Federal Dam Reach Surface Sediment Tri+ Concentrations to Specification of Sediment Initial Conditions, 1998-2067.



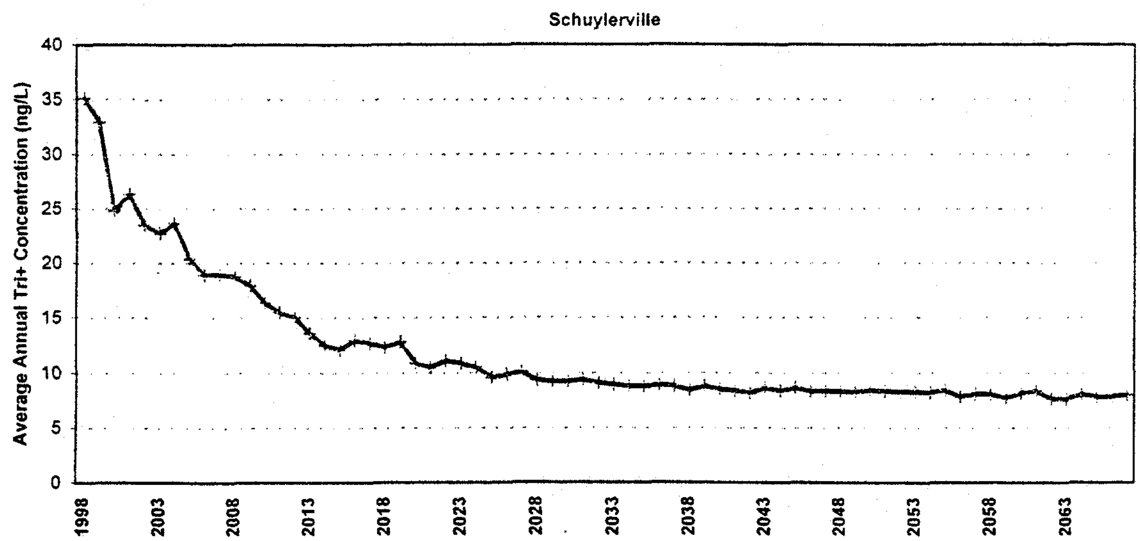
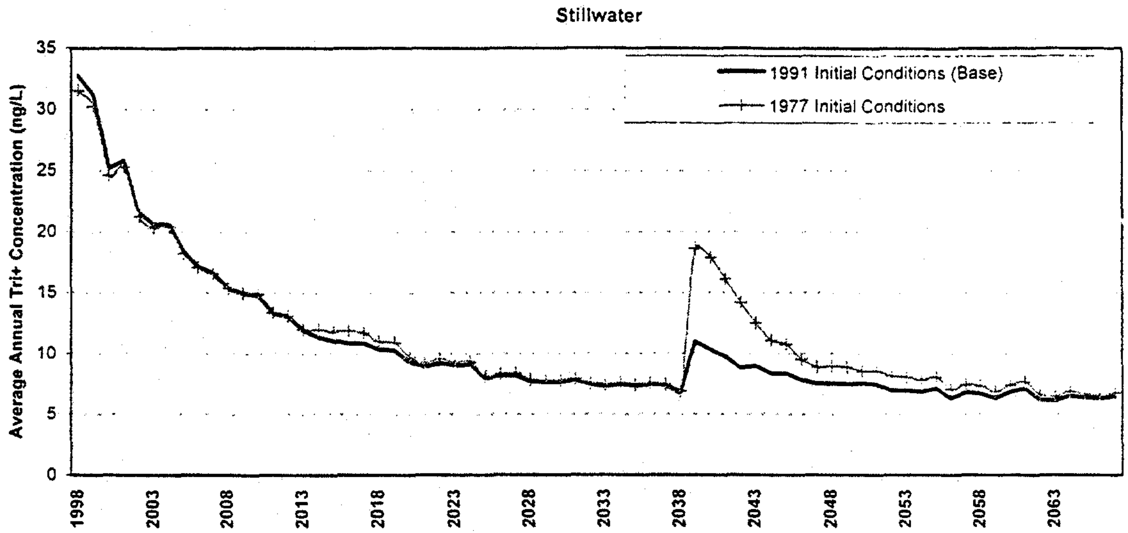


Figure 8-21a. Sensitivity of Forecasted Average Annual Tri+ Concentrations to Specification of Initial Conditions at Thompson Island Dam and Schuylerville, 1998-2067.



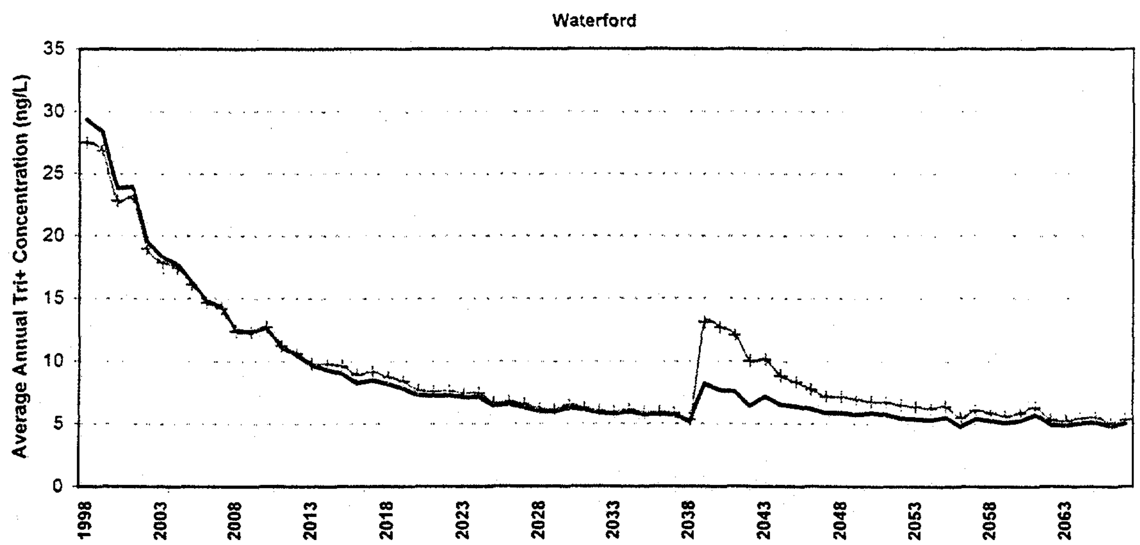


Figure 8-21b. Sensitivity of Forecasted Average Annual Tri+ Concentrations to Specification of Initial Conditions at Stillwater and Waterford, 1998-2067.

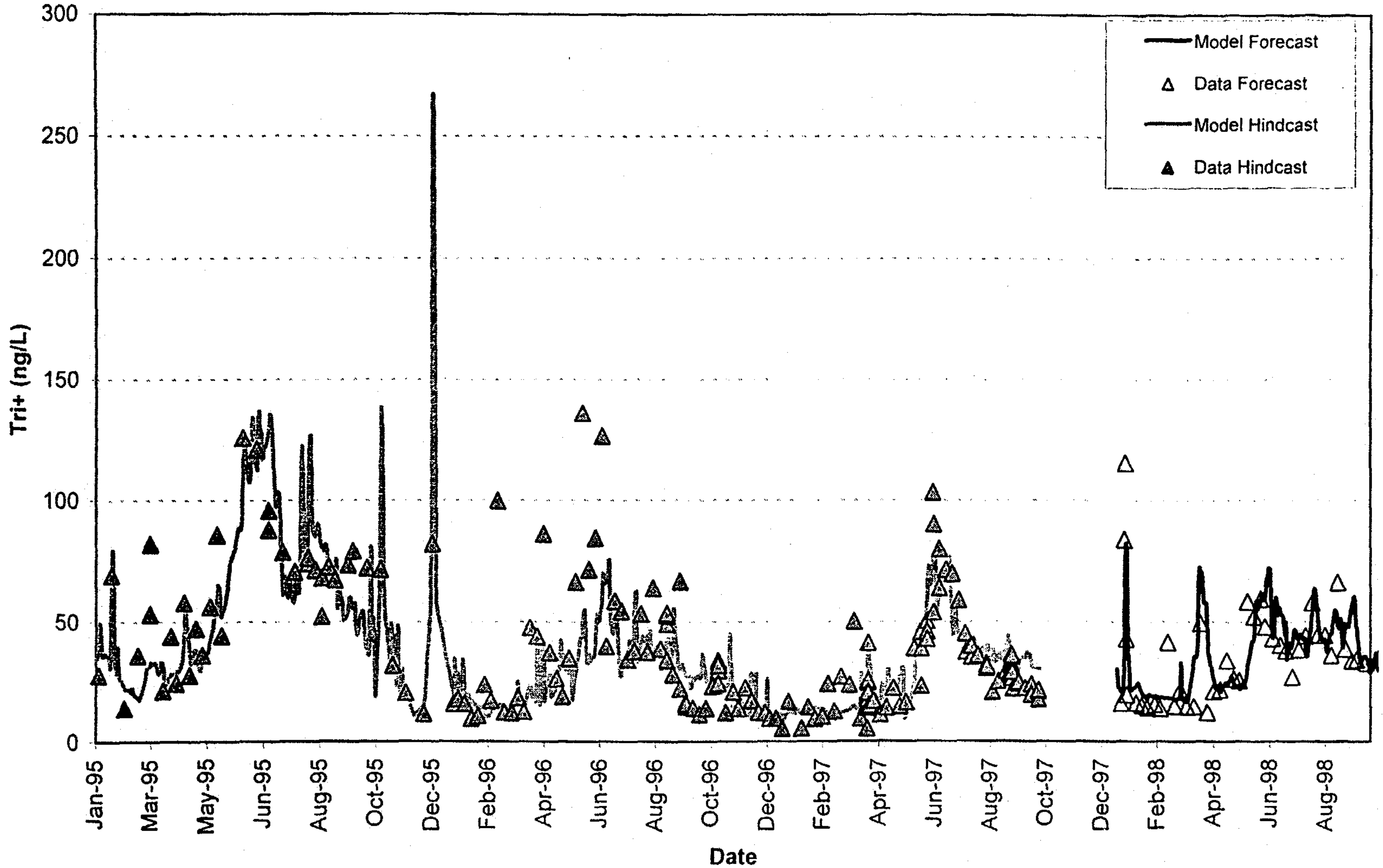


Figure 9-1. HUDTOX Validation: Comparison of Predicted and Observed Thompson Island Dam Tri+ Concentrations.

303729

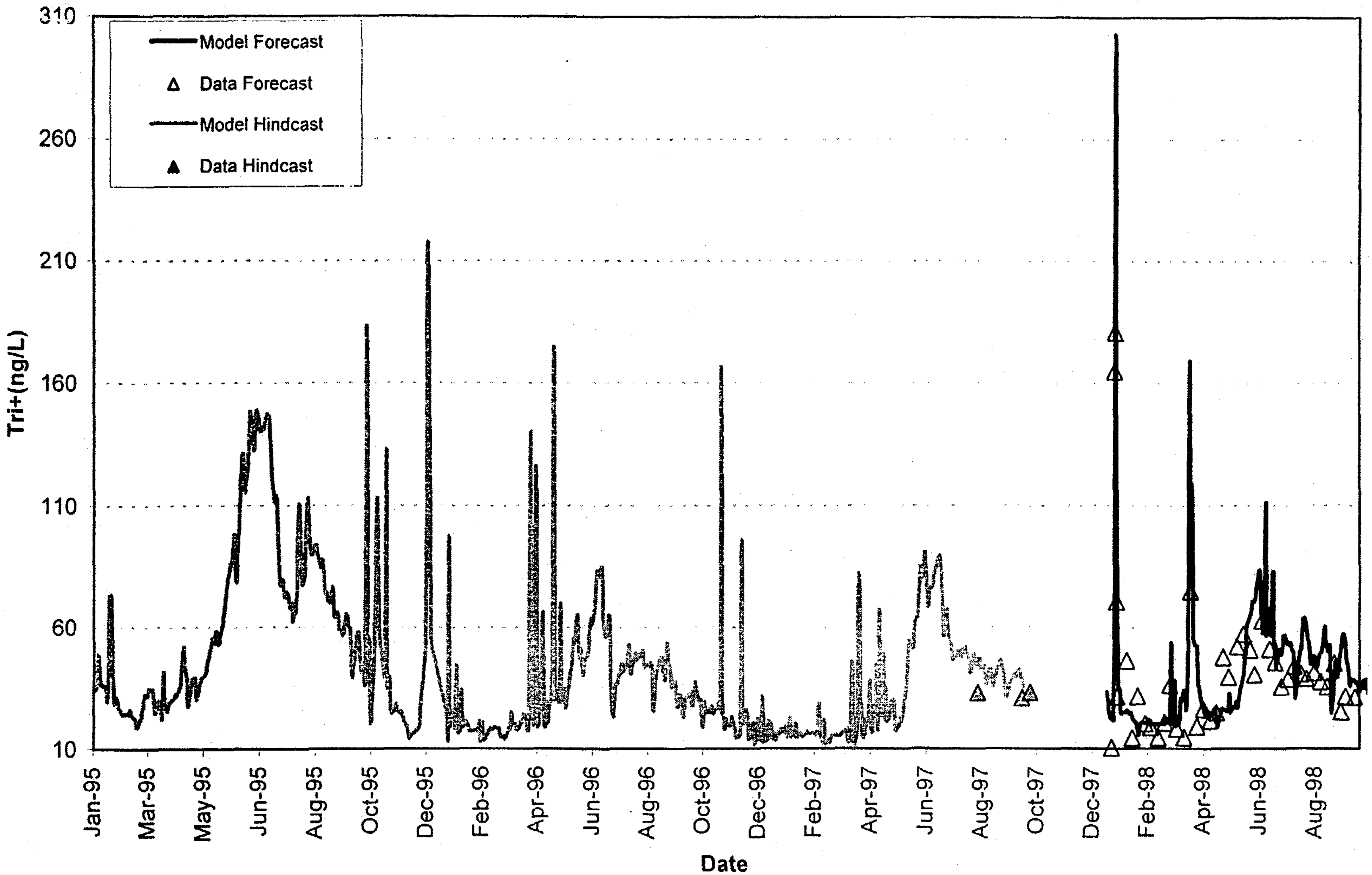


Figure 9-2. HUDTOX Validation: Comparison of Predicted and Observed Schuylerville Tri+ Concentrations.

303730

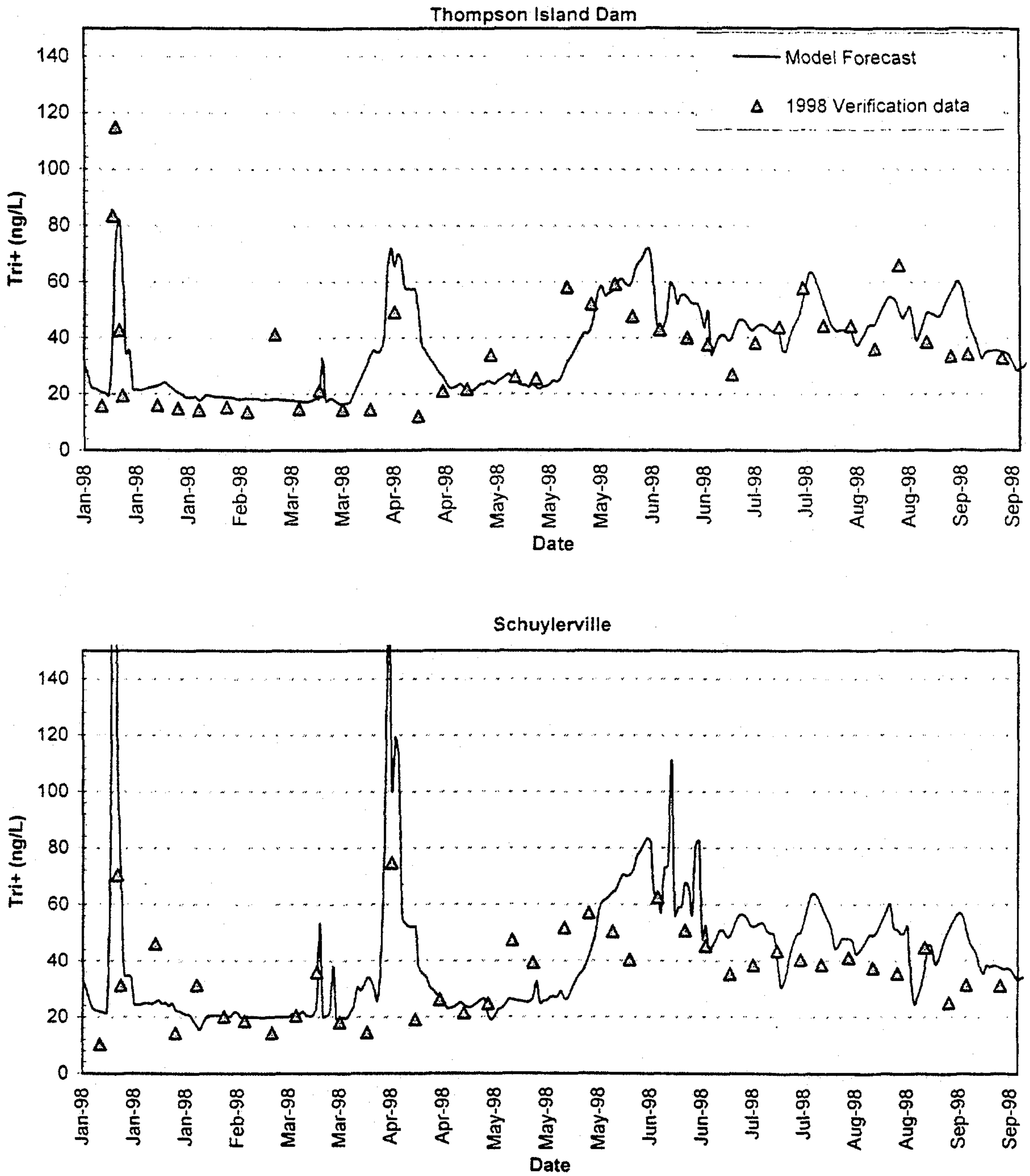


Figure 9-3. HUDTOX Validation: Predicted versus Observed Tri+ Concentrations at Thompson Island Dam and Schuylerville.

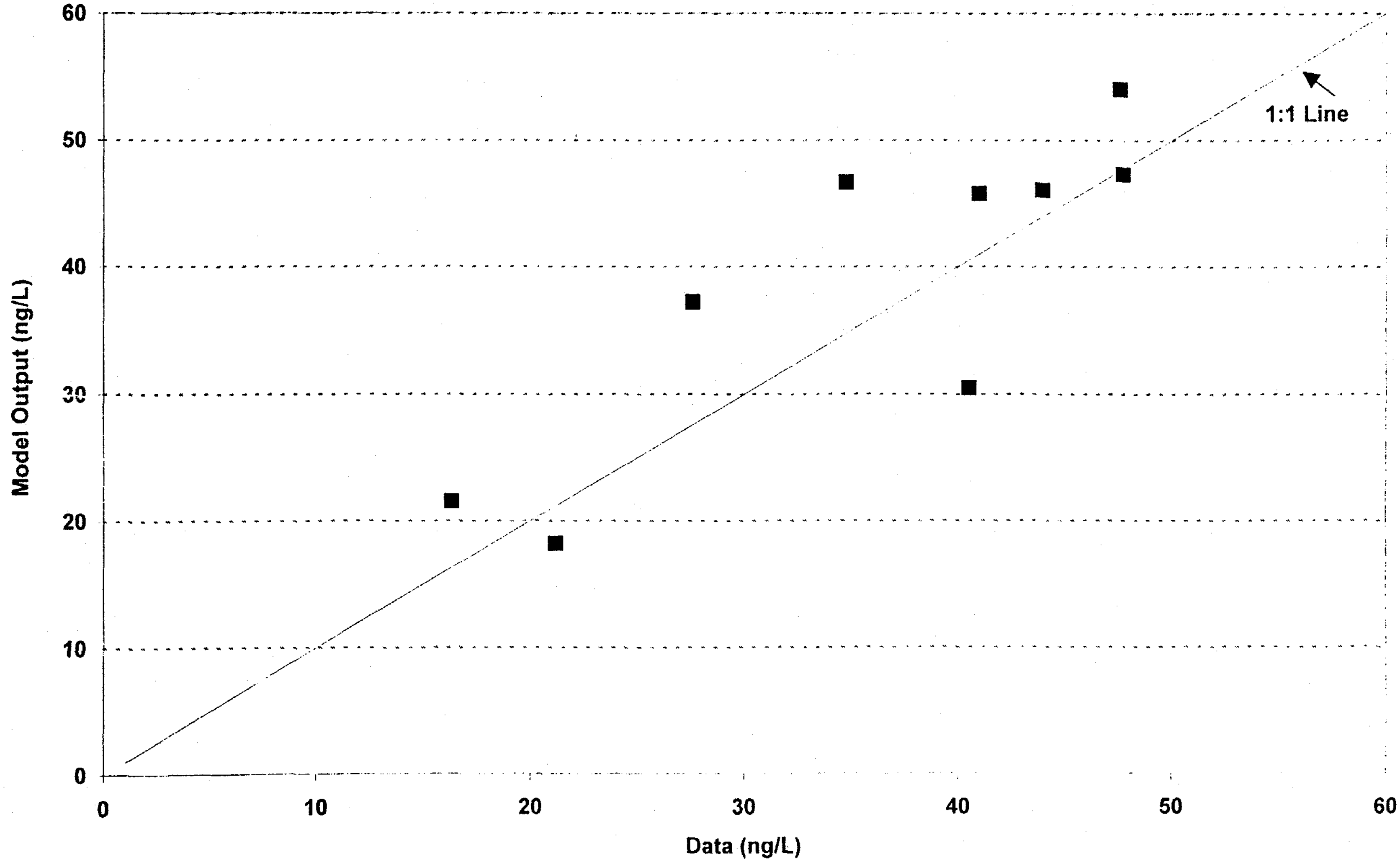


Figure 9-4. Monthly Average Scatter Plots of Observed Data and Model Output at Thompson Island Dam, 1998-1999.

303732

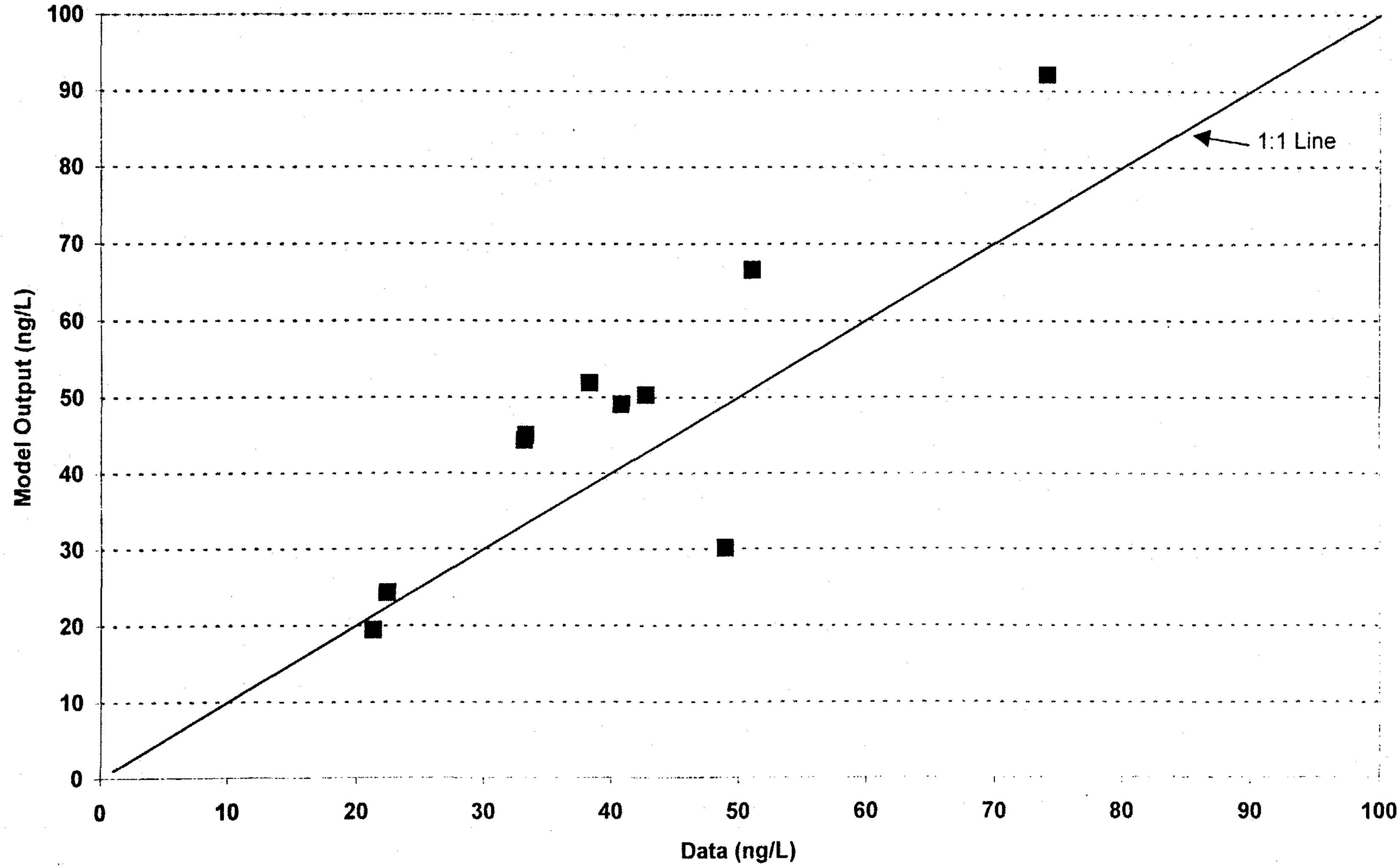


Figure 9-5. Monthly Average Scatter Plots of Observed Data and Model Output at Schuylerville, 1998-1999.

Appendix

APPENDIX A

HUDTOX Exposure Concentrations for Risk Assessments

1. Introduction

The HUDTOX fate and transport model and the FISHRAND bioaccumulation model were developed and refined over a period of years. Concurrent with these modeling efforts, EPA conducted the risk assessments for the Reassessment. Accordingly, in the risk assessments, EPA used modeled concentrations of PCBs in sediment, water and fish from the most updated versions of HUDTOX and FISHRAND that were available at the time. The HUDTOX results that were used in the risk assessments are presented below. The FISHRAND results for the Upper Hudson River that were used in the risk assessments are presented in Appendix B of Book 4.

2. HUDTOX Results Used in the August 1999 Ecological Risk Assessment for the Hudson River (USEPA, 1999)[1]

For the August 1999 Ecological Risk Assessment for the Hudson River, EPA evaluated current and future risks to ecological receptors in the Upper Hudson River for the time period 1993 through 2018, using the calibration and forecast results for total PCBs in water and sediment for 1993-2018, as presented in the May 1999 Baseline Modeling Report (BMR). These were computed from HUDTOX based on initial conditions in sediment specified from the 1991 GE composite data set and a specified PCB concentration of 10 ng/L in the water column at the upstream boundary.

The HUDTOX forecasts for sediment and water that were used in the August 1999 Ecological Risk Assessment (1998 to 2018) are presented in Figures A-1 and A-2, respectively.

3. HUDTOX Results Used in the August 1999 Human Health Risk Assessment for the Upper Hudson River (USEPA, 1999)[2]

For the August 1999 Human Health Risk Assessment for the Upper Hudson River, EPA estimated average and high-end concentrations of PCBs in water and sediment for a 41-year exposure duration from 1999 to 2040 using mean and 95th percentile concentrations

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[1] U.S. Environmental Protection Agency (US EPA). Phase 2 Report – Review Copy. Further Site Characterization and Analysis. Volume 2E – Baseline Ecological Risk Assessment, Hudson River PCBs Reassessment RI/FS. Prepared for US EPA by TAMS Consultants, Inc. and Menzie-Cura & Associates, Inc., US EPA, Region II, New York, New York, August 1999.

[2] U.S. Environmental Protection Agency (US EPA). Phase 2 Report – Review Copy. Further Site Characterization and Analysis. Volume 2F - Human Health Risk Assessment for the Upper Hudson River, Hudson River PCBs Reassessment RI/FS. Prepared for US EPA by Gradient Corporation. US EPA, Region II, New York, New York, August 1999.

of total PCBs in water and sediment for 1999 through 2018, as presented in the May 1999 BMR. These results were computed from HUDTOX based on initial conditions in sediment specified from the 1991 GE composite data set and a specified PCB concentration of 10 ng/L in water at the upstream boundary.

The HUDTOX forecasts for sediment and water that were used in the August 1999 Human Health Risk Assessment for the Upper Hudson River (1999 to 2018) presented in Figures A-1 and A-2, respectively.

4. HUDTOX Results Used in the December 1999 Ecological Risk Assessment for Future Risks in the Lower Hudson River (USEPA, 1999)[3]

In the December 1999 Ecological Risk Assessment for Future Risks in the Lower Hudson River, EPA evaluated risks to ecological receptors in the Lower Hudson River for the time period 1993-2018. To evaluate these risks, EPA used calibration and forecast results for Tri+ PCBs for the Upper Hudson River for 1993-2018. These results were computed from the revised HUDTOX model based on initial conditions in sediment specified from the 1977 data set and a specified PCB concentration of 10 ng/L in water at the upstream boundary.

The HUDTOX forecasts for sediment and water in the Upper Hudson River that were used in the December 1999 Ecological Risk Assessment are compared to the results for this RBMR (as presented in Chapter 8) in Figures A-3 and A-4, respectively. These results subsequently were used as input into the Farley et al. (1999) model to calculate concentrations of PCBs in sediment and water for the Lower Hudson River (see, December 1999 Ecological Risk Assessment for Future Risks in the Lower Hudson River).

5. HUDTOX Results Used in the December 1999 Human Health Risk Assessment for the Mid-Hudson River (USEPA, 1999)[4]

For the December 1999 Human Health Risk Assessment for the Mid-Hudson River, EPA estimated average and high-end concentrations of PCBs in water and sediment for a 41-year exposure duration from 1999 to 2040, using mean and 95th percentile concentrations of Tri+ PCBs in water and sediment for 1999 through 2040. These results were computed from the revised HUDTOX model based on initial conditions in sediment

[3] U.S. Environmental Protection Agency, (US EPA). 1999. Phase 2 Report – Review Copy. Further Site Characterization and Analysis. Volume 2E–A, Ecological Risk Assessment for Future Risks in the Lower Hudson River. Hudson River PCBs Reassessment RI/FS. Prepared by TAMS Consultants, Inc. and Menzie-Cura & Associates, Inc., US EPA, Region II, New York, New York, December 1999.

[4] U.S. Environmental Protection Agency, (US EPA). 1999. Phase 2 Report – Review Copy. Further Site Characterization and Analysis. Volume 2F–A, Human Health Risk Assessment for the Mid-Hudson River. Hudson River PCBs Reassessment RI/FS. Prepared by TAMS Consultants, Inc. and Gradient Corporation, US EPA, Region II, New York, New York, December 1999.

specified from the 1977 data set and a specified PCB concentration of 10 ng/L in water at the upstream boundary.

The HUDTOX forecasts for sediment and water that were used in the December 1999 Human Health Risk Assessment (1999-2040) are compared to the results for this RBMR (as presented in Chapter 8) in Figures A-5 and A-6, respectively.

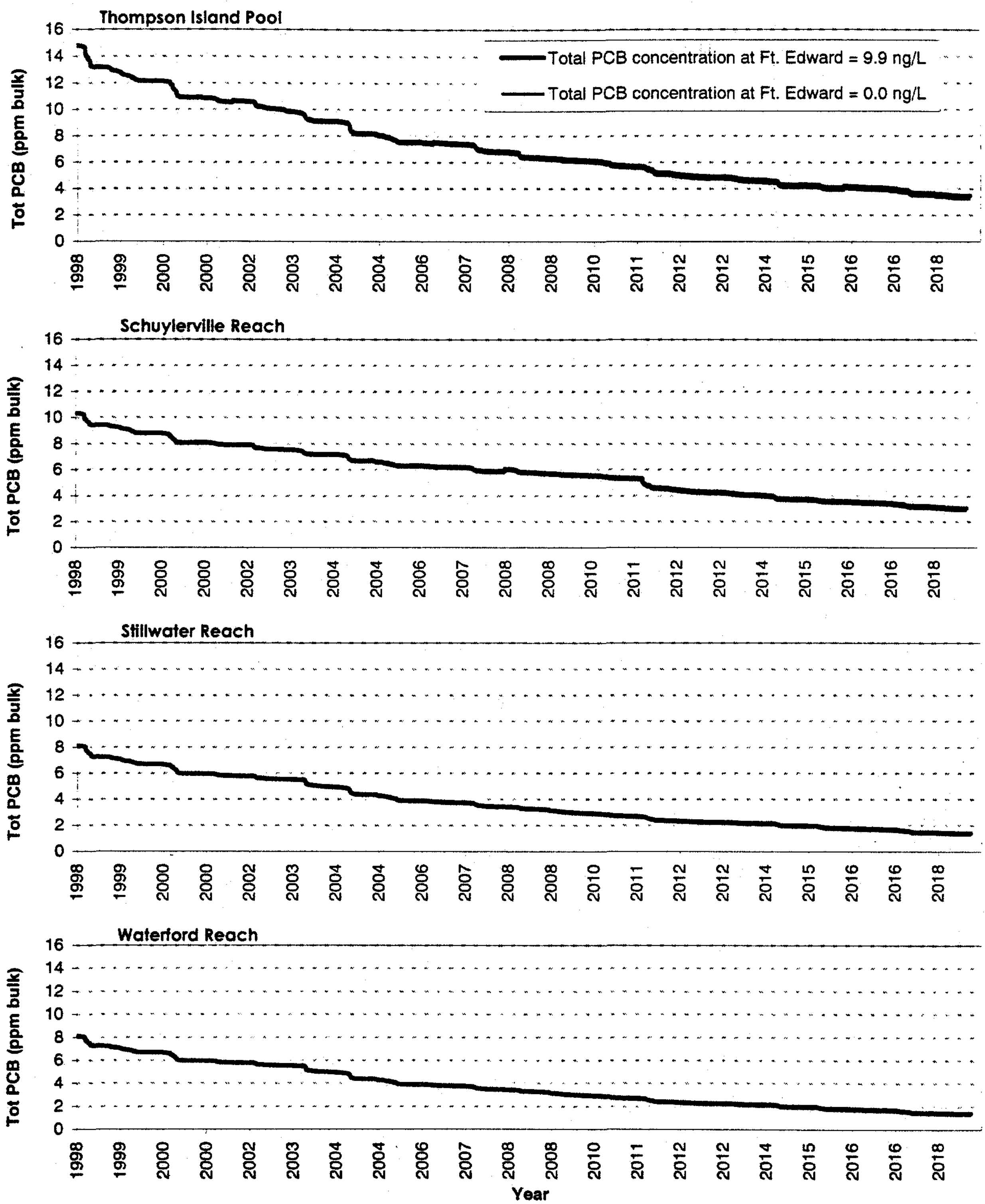
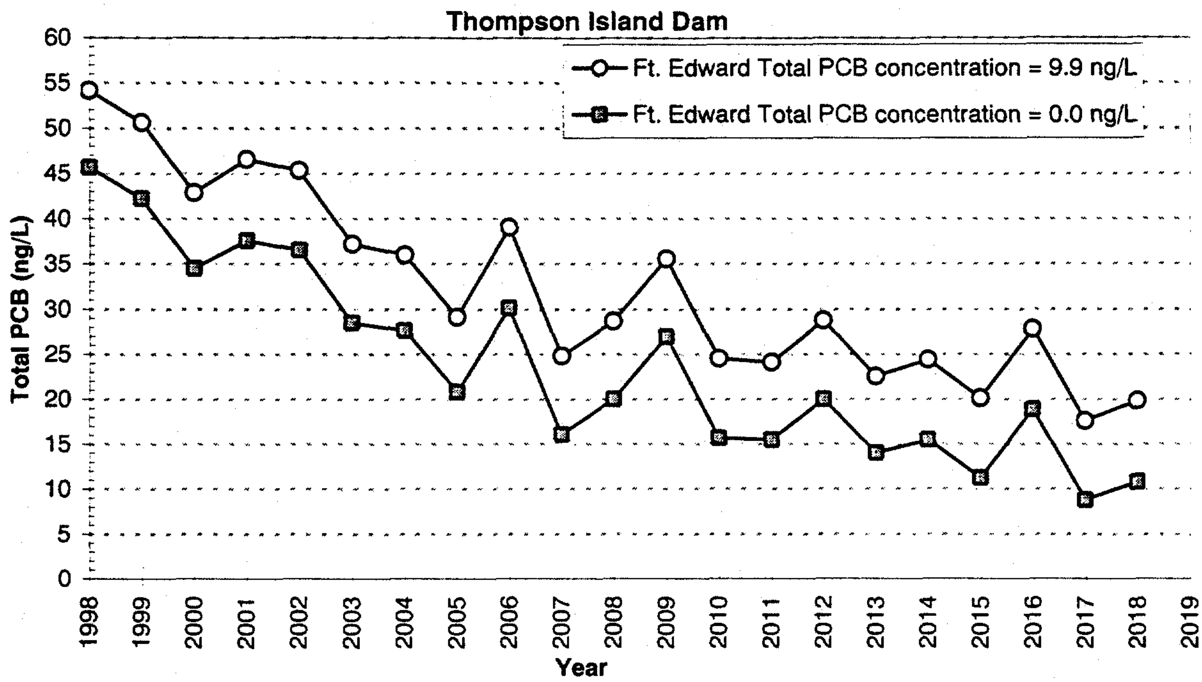


Figure A-1. Predicted Annual Average PCB Sediment Concentration Model Results (May, 1999) Used in the Human Health Risk Assessment for the Upper Hudson River.



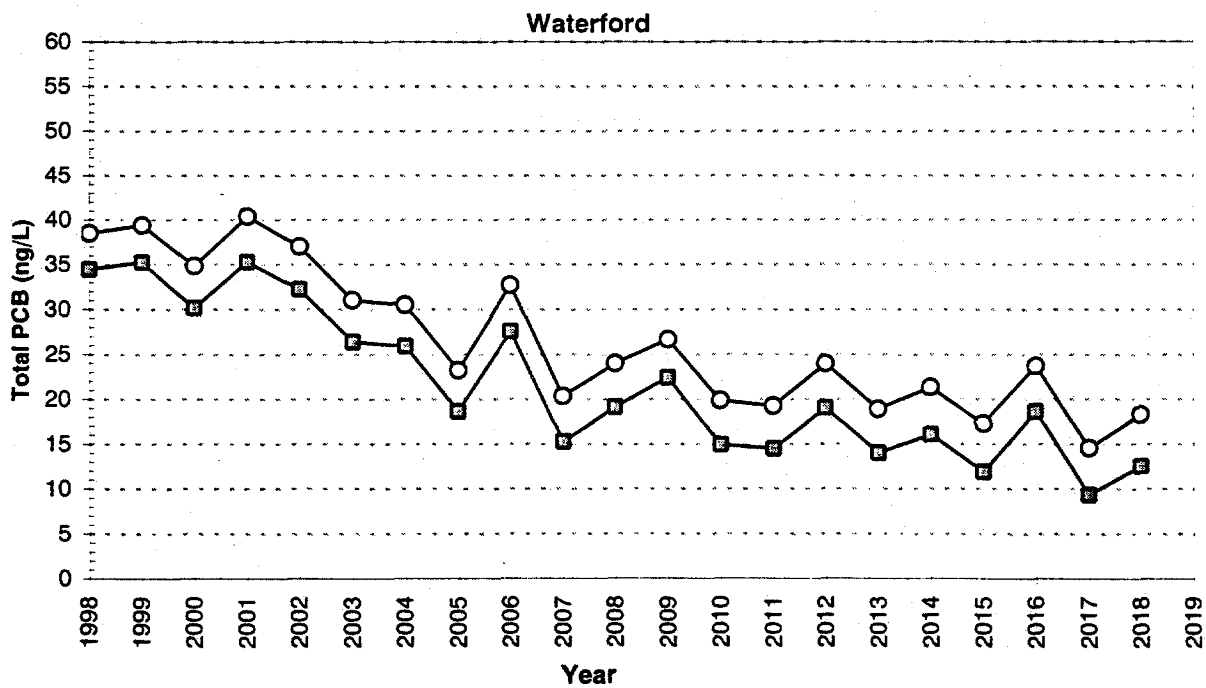


Figure A-2. Predicted Annual Summer Average Water Column PCB Concentration Model Results (May, 1999) Used in Human Health Risk Assessment for the Upper Hudson River.

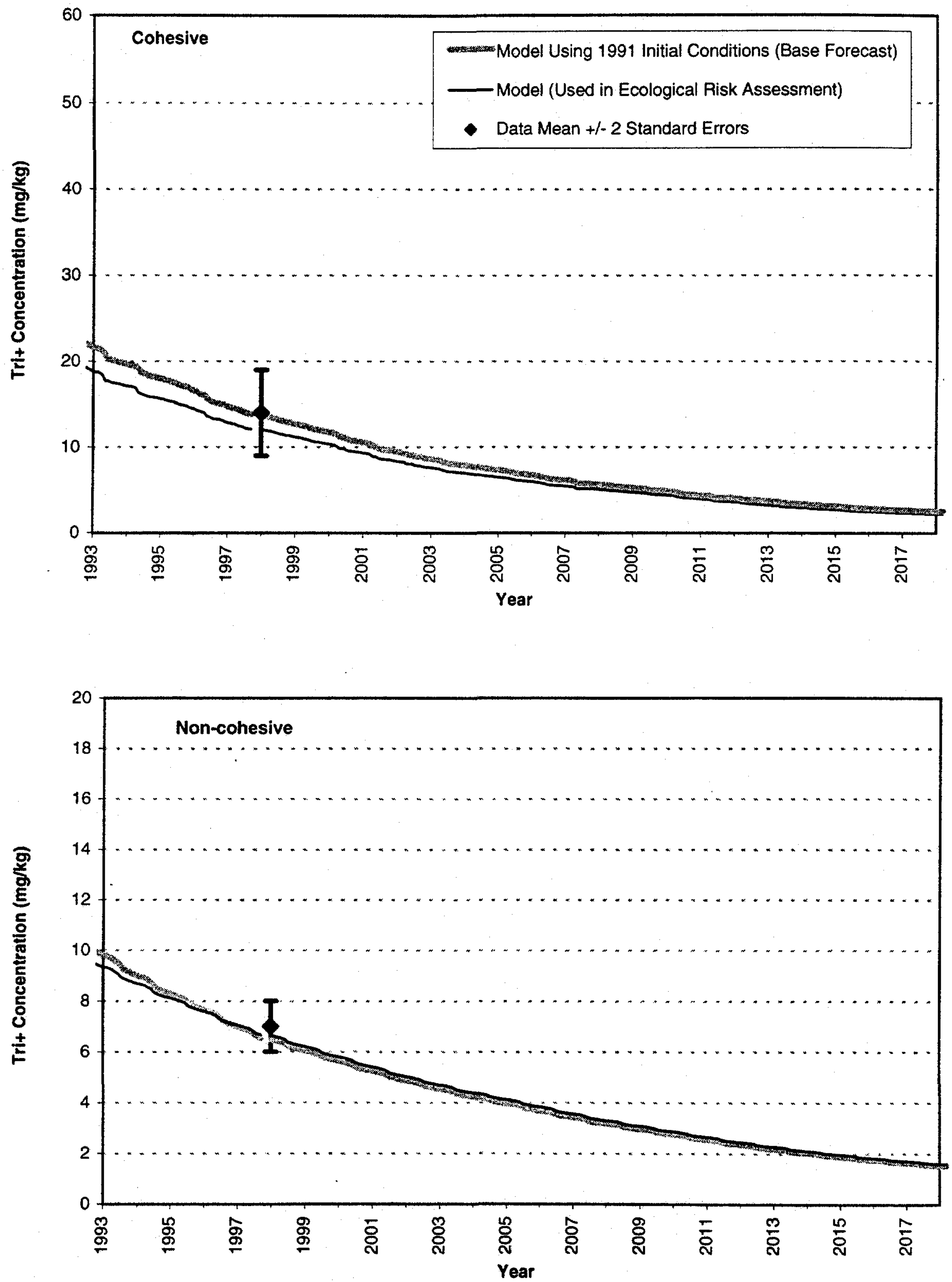


Figure A-3a. Predicted Model Sediment Concentration Results Used in Lower Hudson River Ecological Risk Assessment (Dec., 1999) Compared to Base Model Forecast in Thompson Island Pool, 1993-2018.

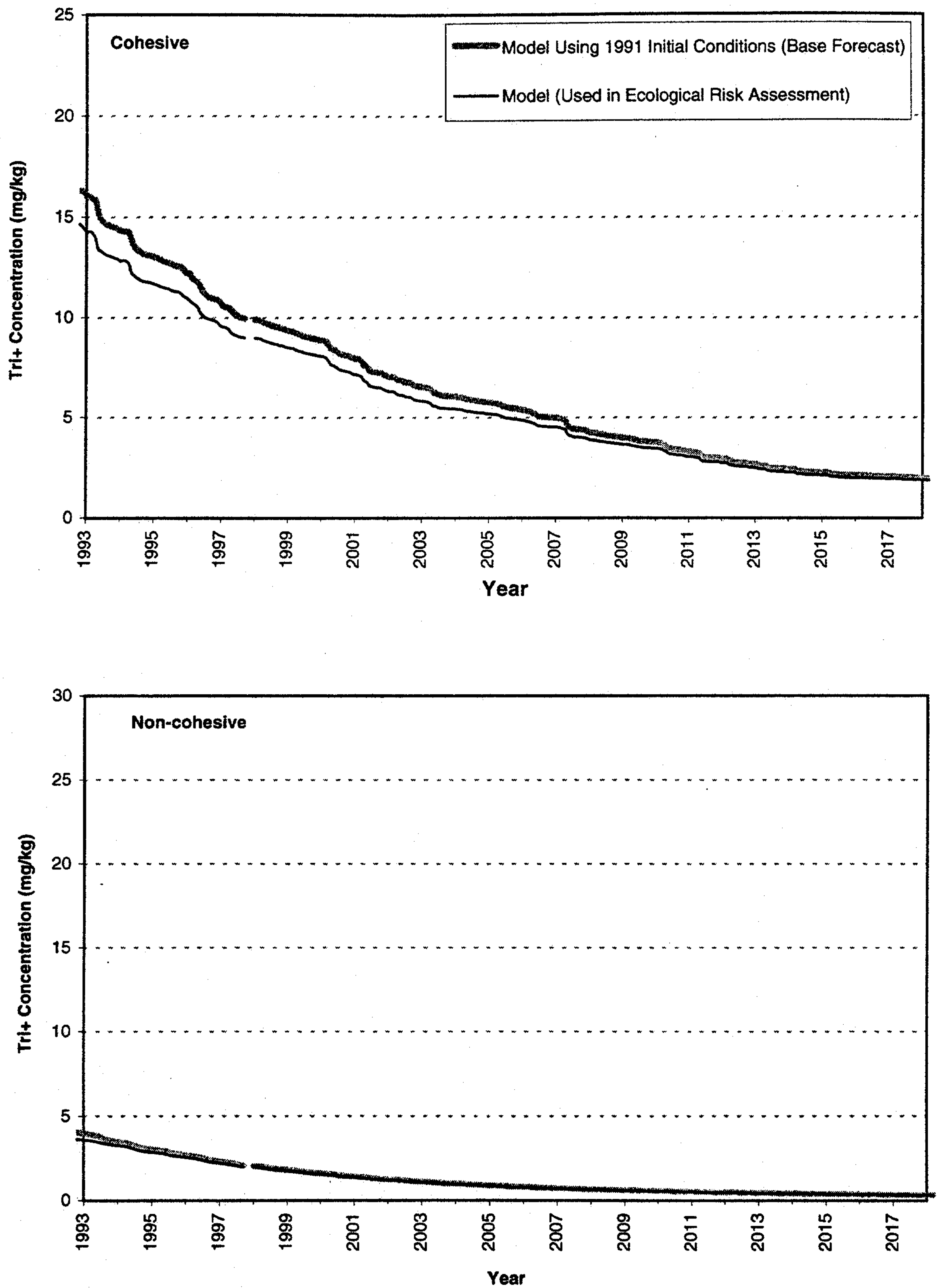


Figure A-3b. Predicted Model Sediment Concentration Results Used in Lower Hudson River Ecological Risk Assessment (Dec., 1999) Compared to Base Model Forecast in the Schuylerville Reach, 1993-2018.

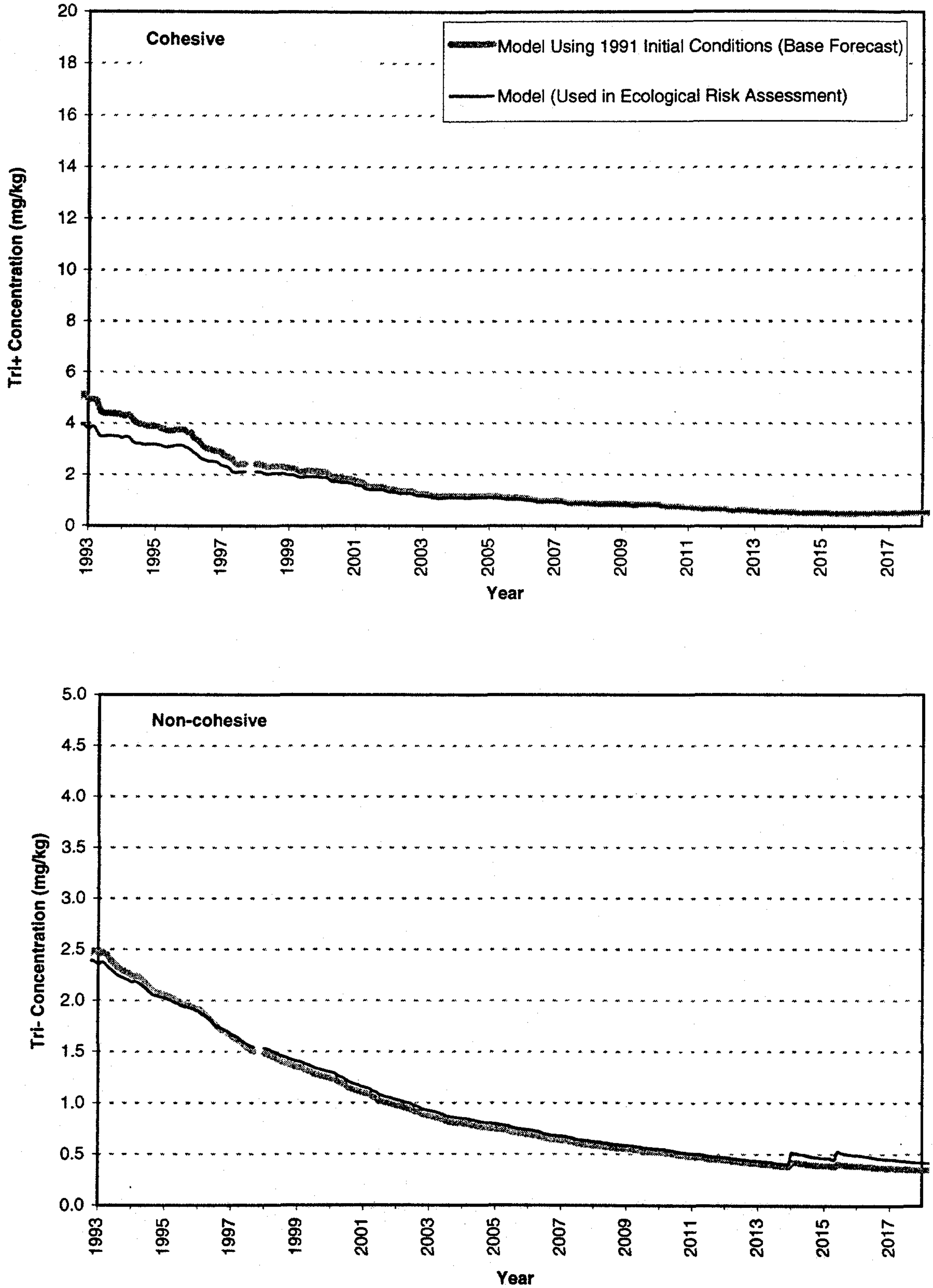


Figure A-3c. Predicted Model Sediment Concentration Results Used in Lower Hudson River Ecological Risk Assessment (Dec., 1999) Compared to Base Model Forecast in the Stillwater Reach, 1993-2018.

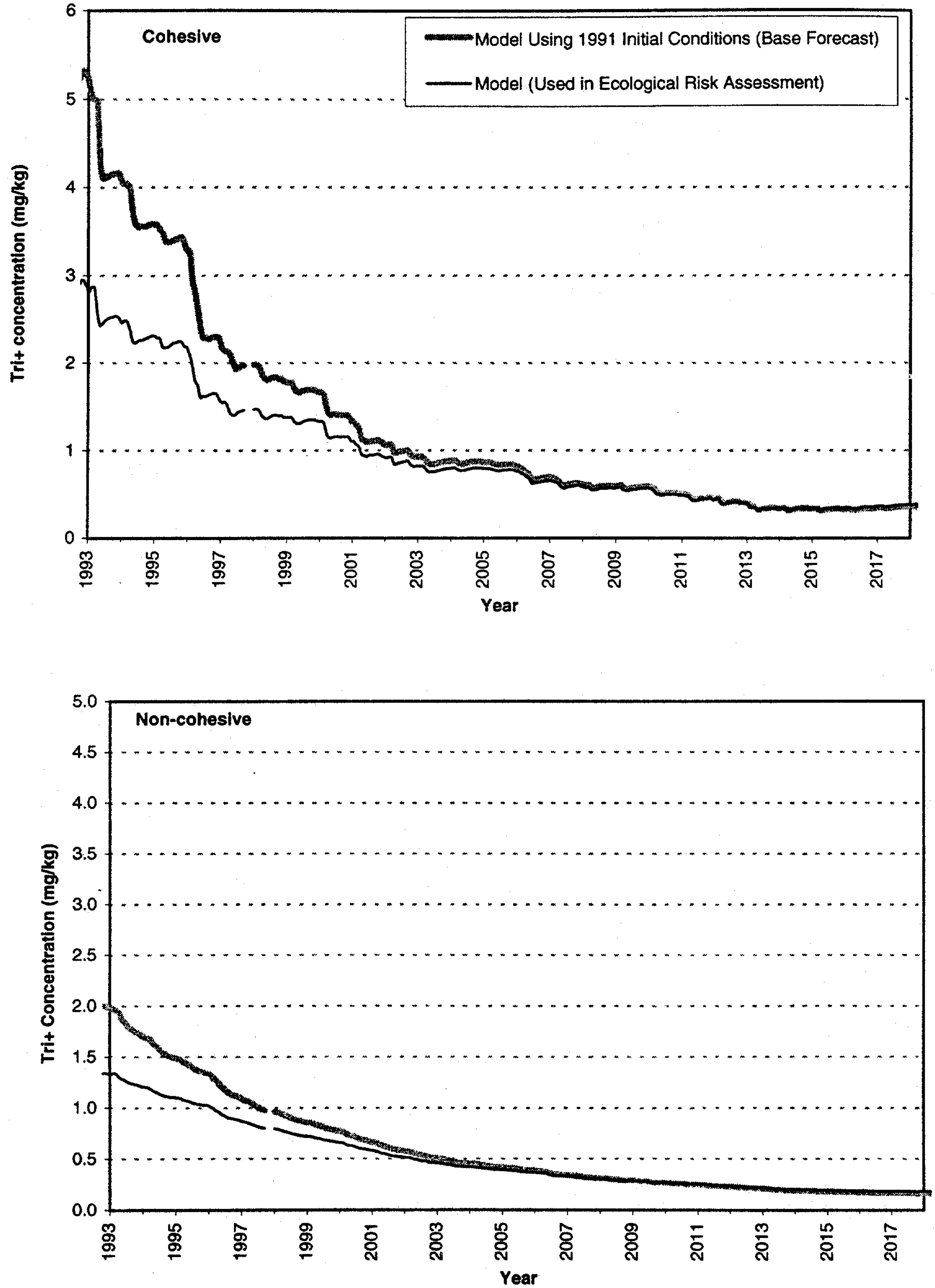


Figure A-3d. Predicted Model Sediment Concentration Results Used in Lower Hudson River Ecological Risk Assessment (Dec., 1999) Compared to Base Model Forecast in the Waterford Reach, 1993-2018.

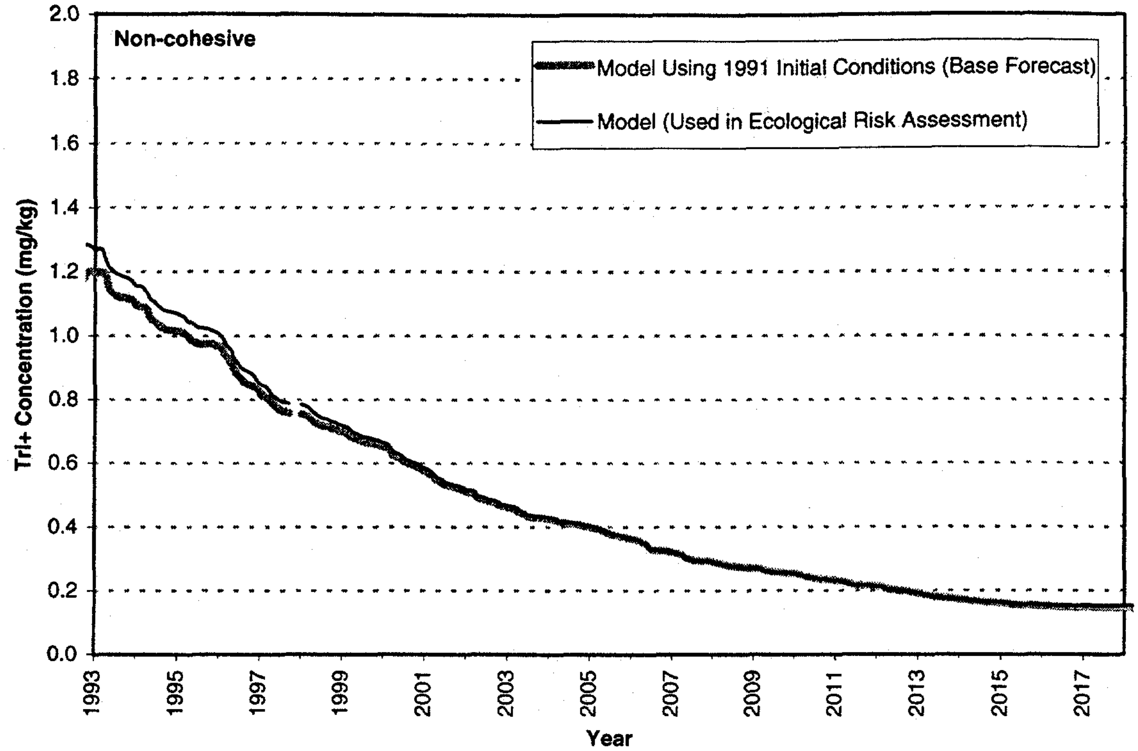
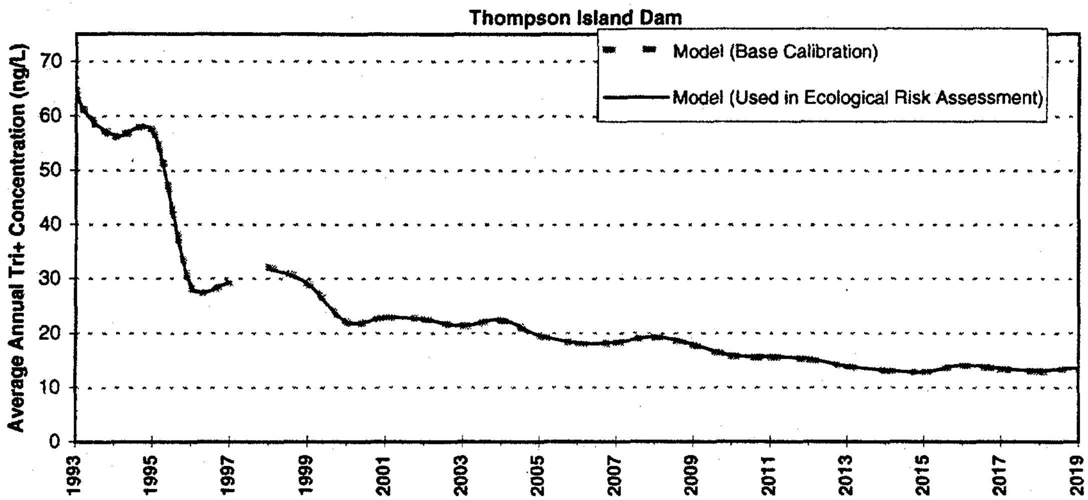


Figure A-3e. Predicted Model Sediment Concentration Results Used in Lower Hudson River Ecological Risk Assessment (Dec., 1999) Compared to Base Model Forecast in the Federal Dam Reach, 1993-2018.



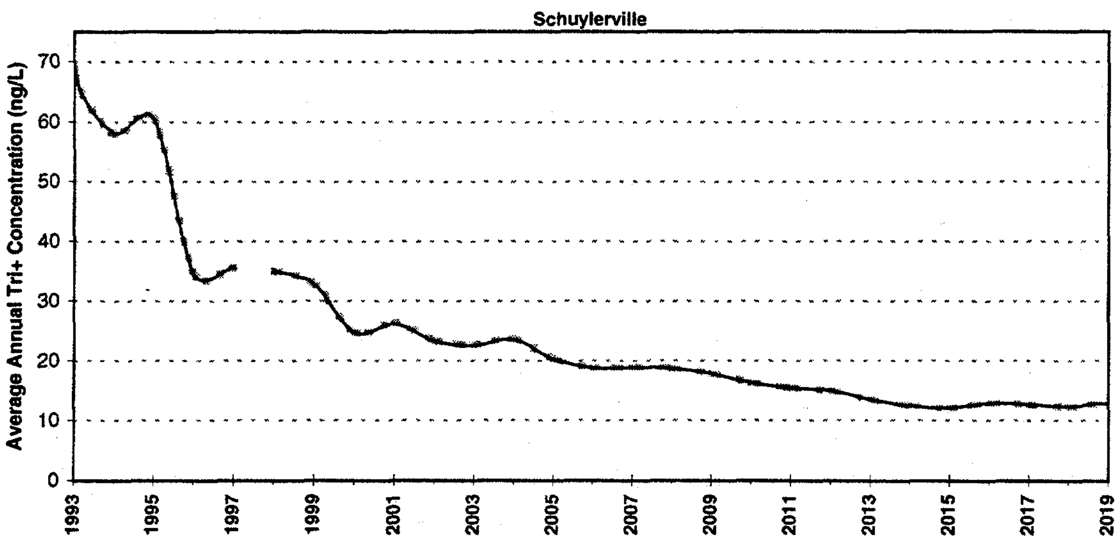
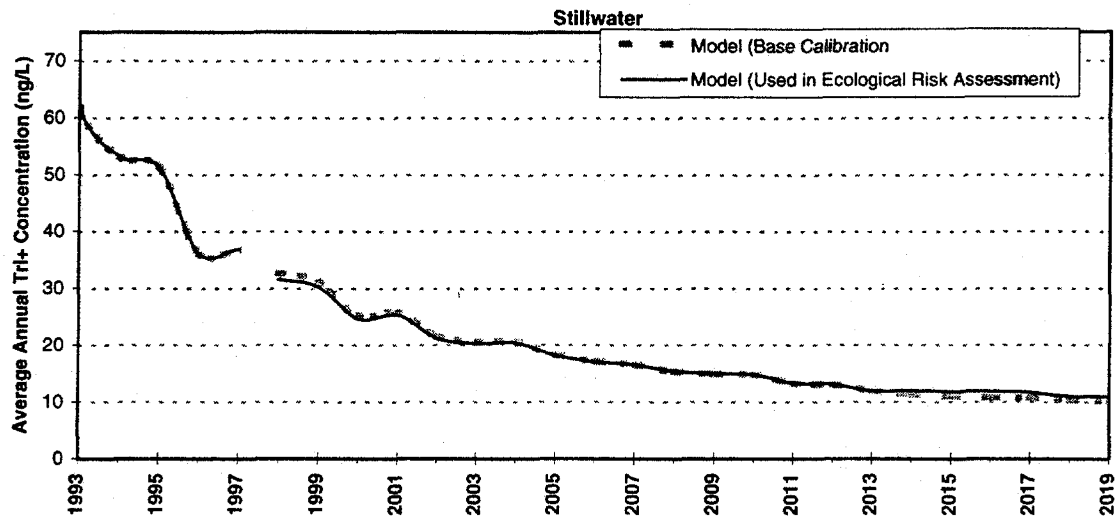


Figure A-4a. Predicted Model Water Column Results Used in Lower Hudson River Ecological Risk Assessment (Dec., 1999) Compared to Base Model Forecast at Thompson Island Dam and Schuylerville, 1993-2018.



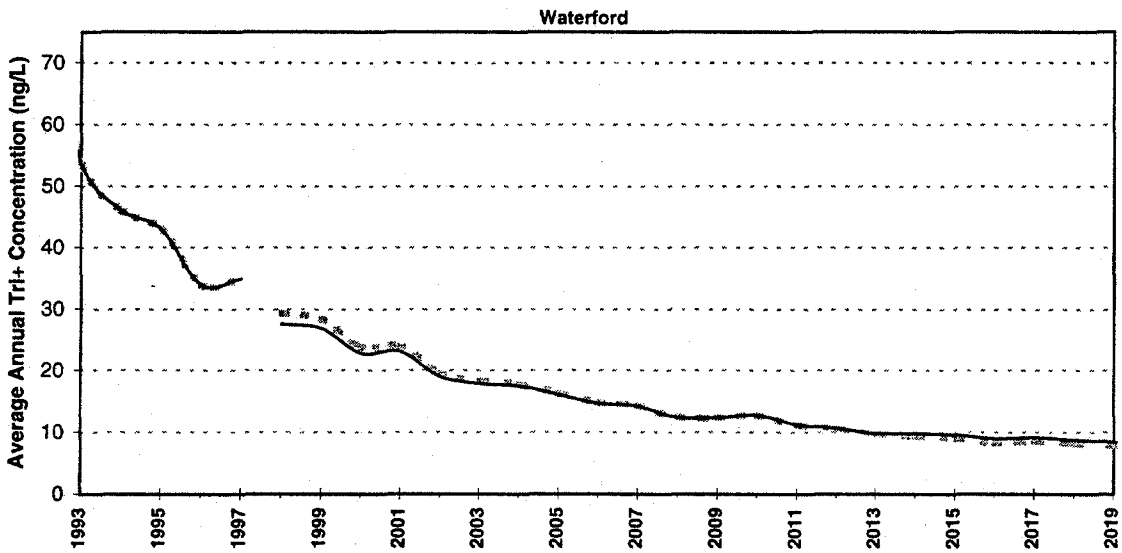
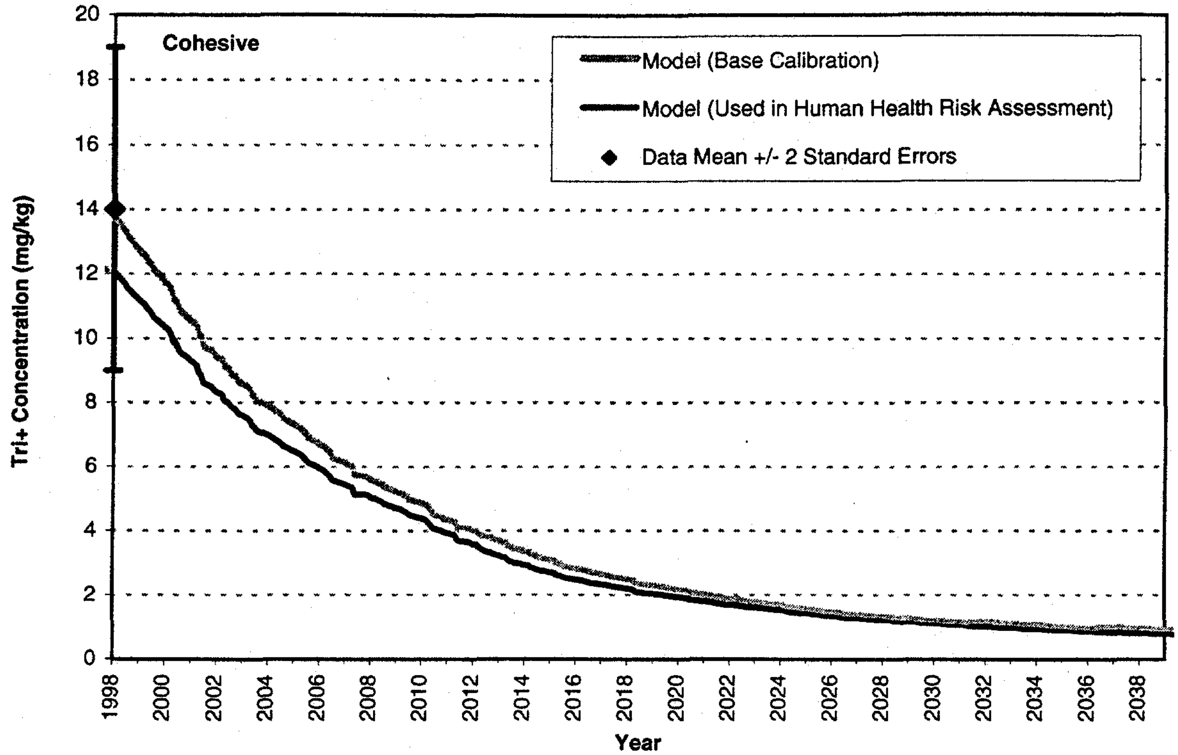


Figure A-4b. Predicted Model Water Column Results Used in Lower Hudson River Ecological Risk Assessment (Dec., 1999) Compared to Base Model Forecast at Stillwater and Waterford, 1993-2018.



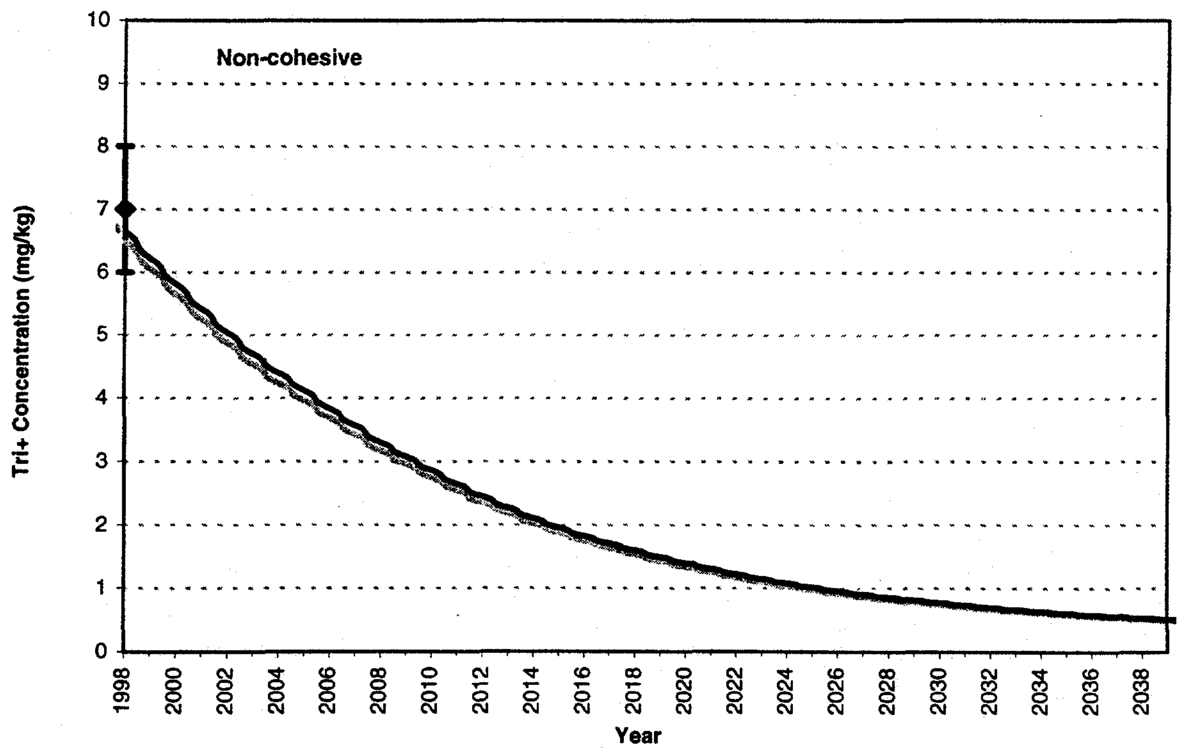
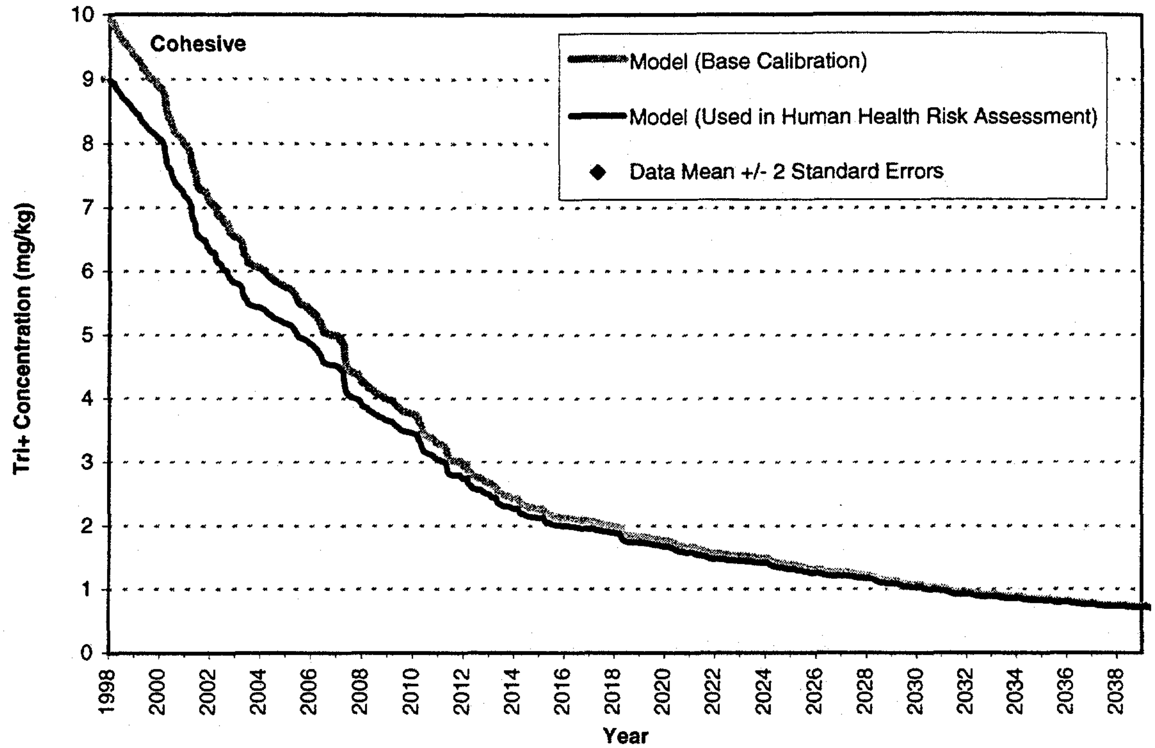


Figure A-5a. Predicted Model Sediment Concentration Results Used in mid-Hudson River Human Health Risk Assessment (Dec., 1999) Compared to Base Model Forecast in Thompson Island Pool, 1998-2038.



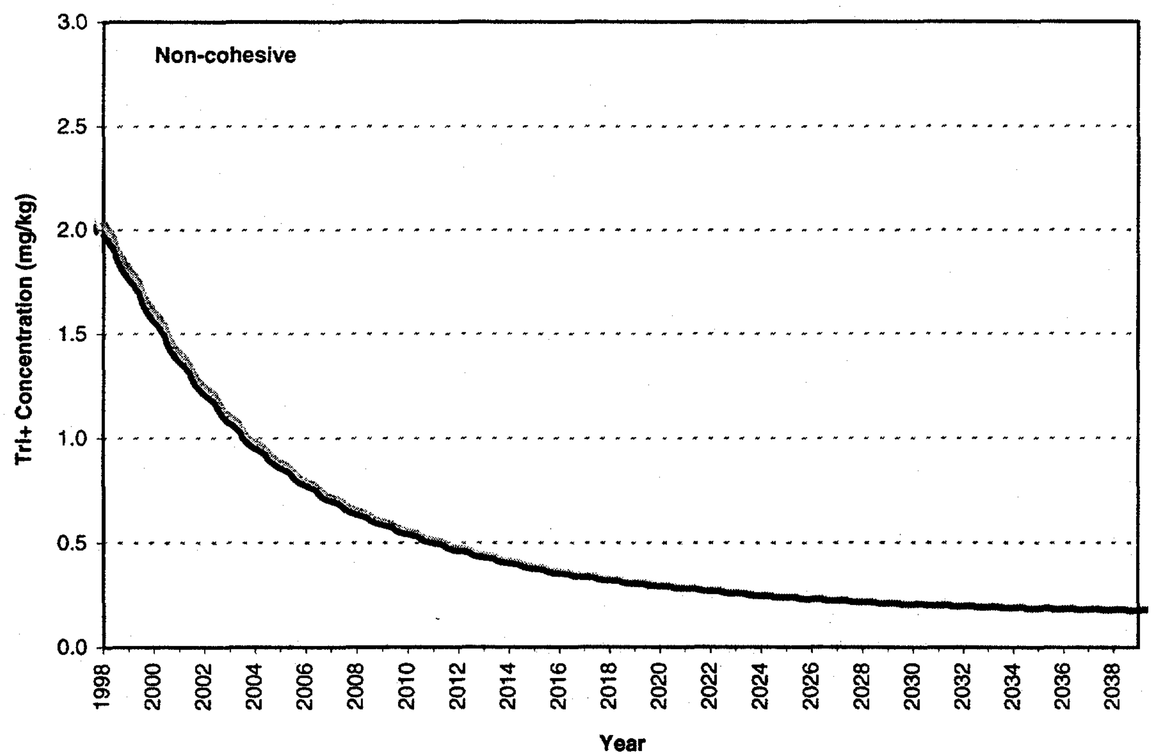
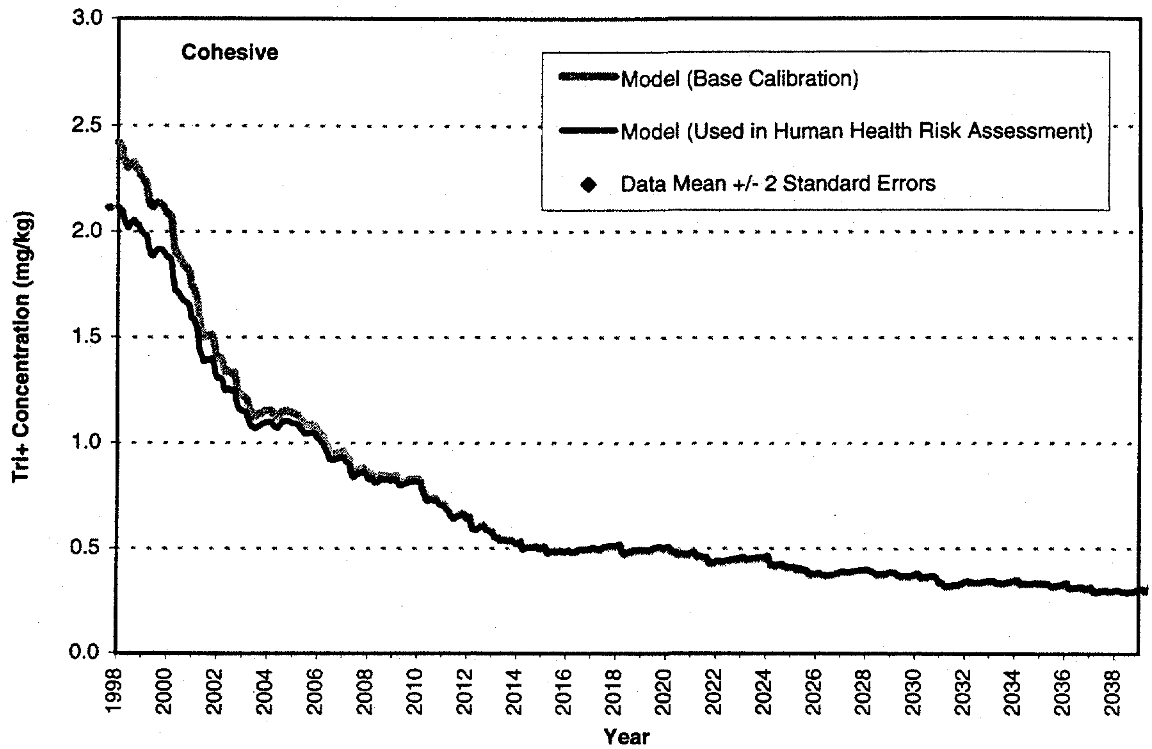


Figure A-5b. Predicted Model Sediment Concentration Results Used in mid-Hudson River Human Health Risk Assessment (Dec., 1999) Compared to Base Model Forecast in the Schuylerville Reach, 1998-2038.



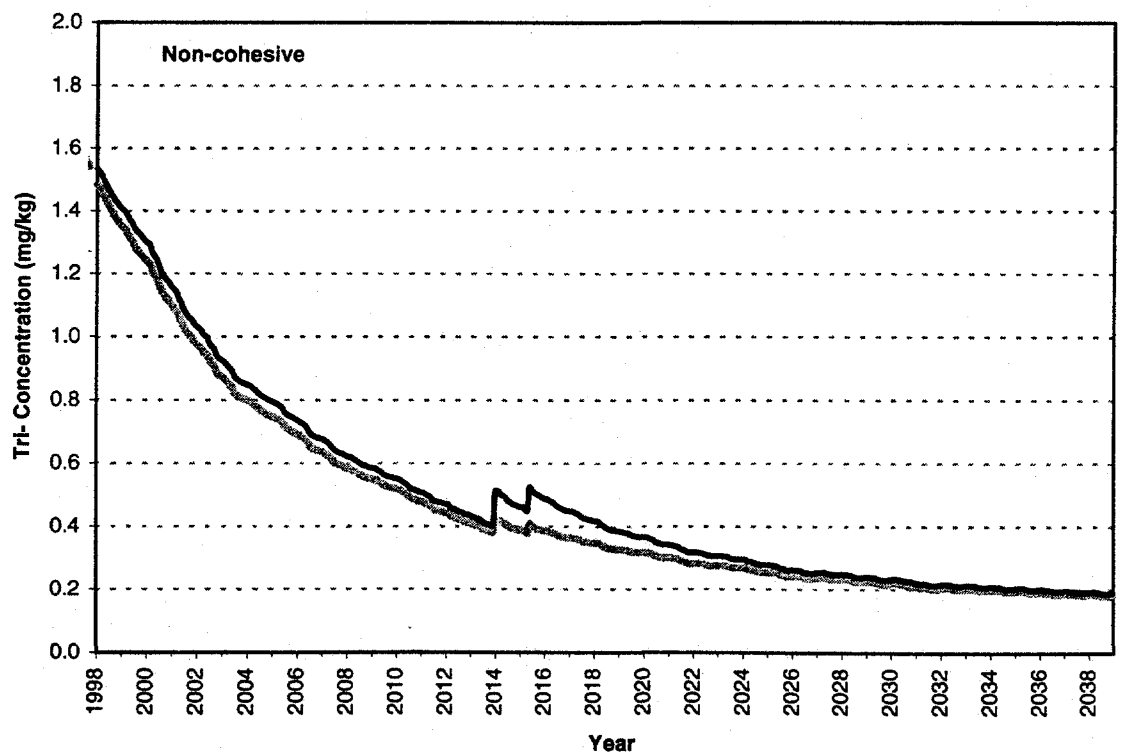
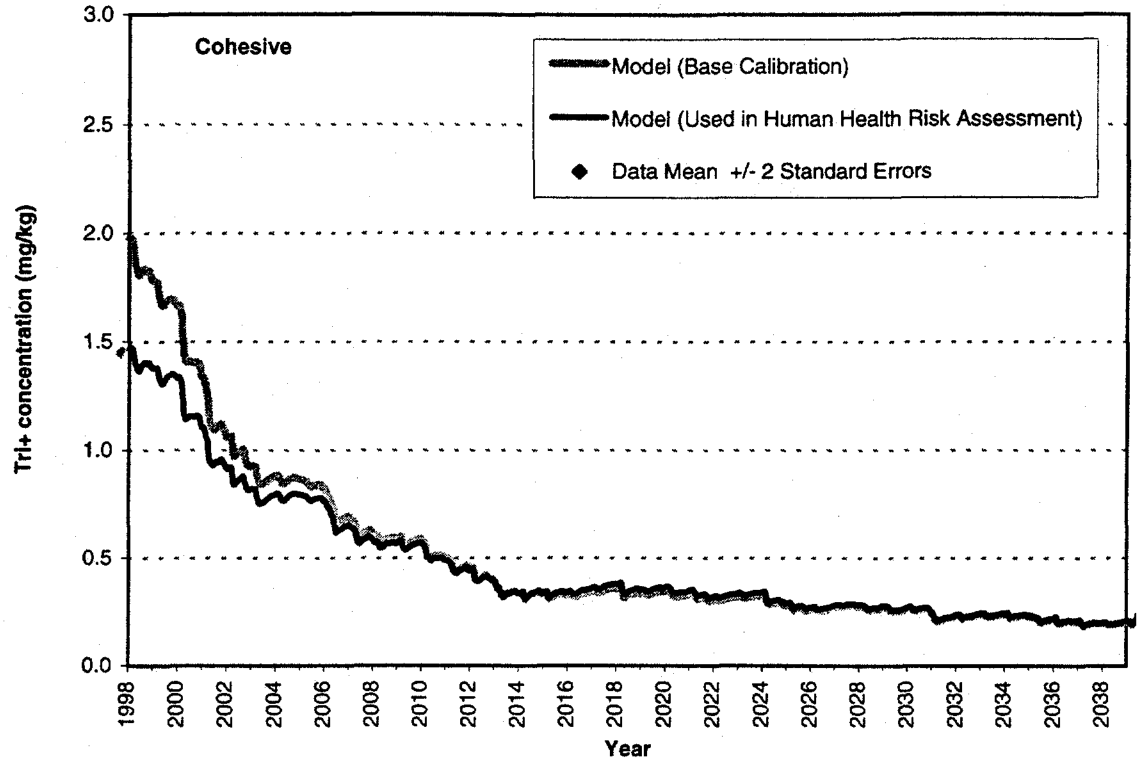


Figure A-5c. Predicted Model Sediment Concentration Results Used in mid-Hudson River Human Health Risk Assessment (Dec., 1999) Compared to Base Model Forecast in the Stillwater Reach, 1998-2038.



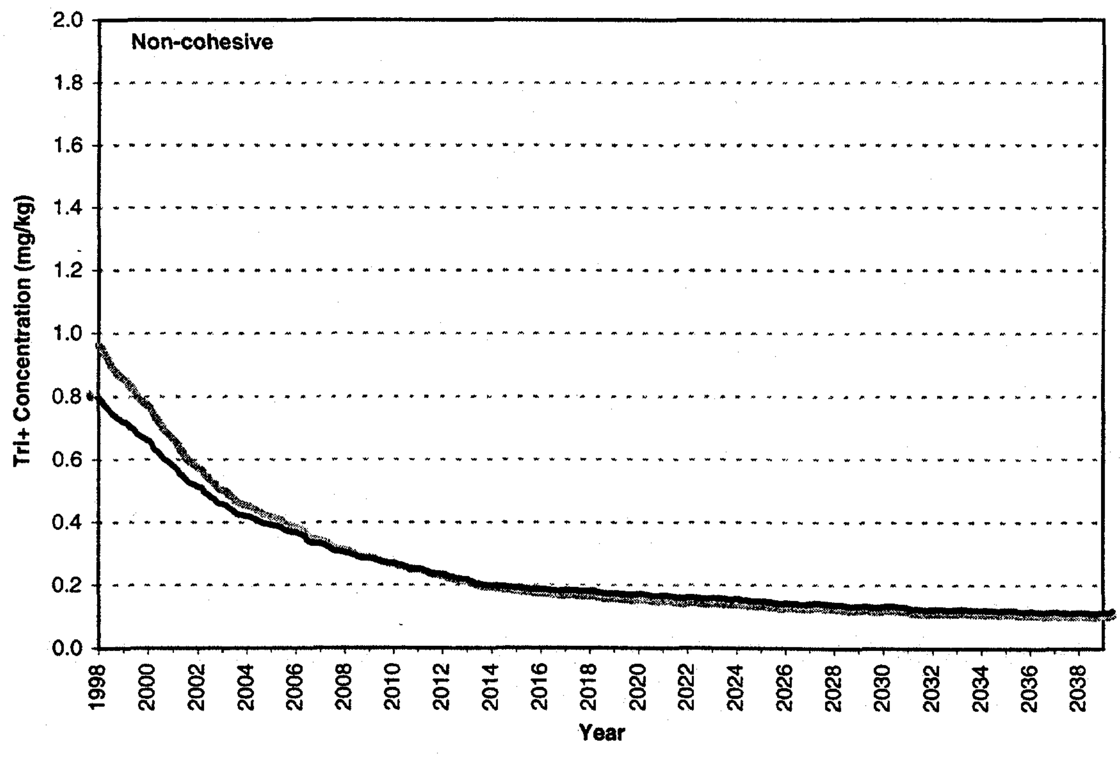


Figure A-5d. Predicted Model Sediment Concentration Results Used in mid-Hudson River Human Health Risk Assessment (Dec., 1999) Compared to Base Model Forecast in the Waterford Reach, 1998-2038.

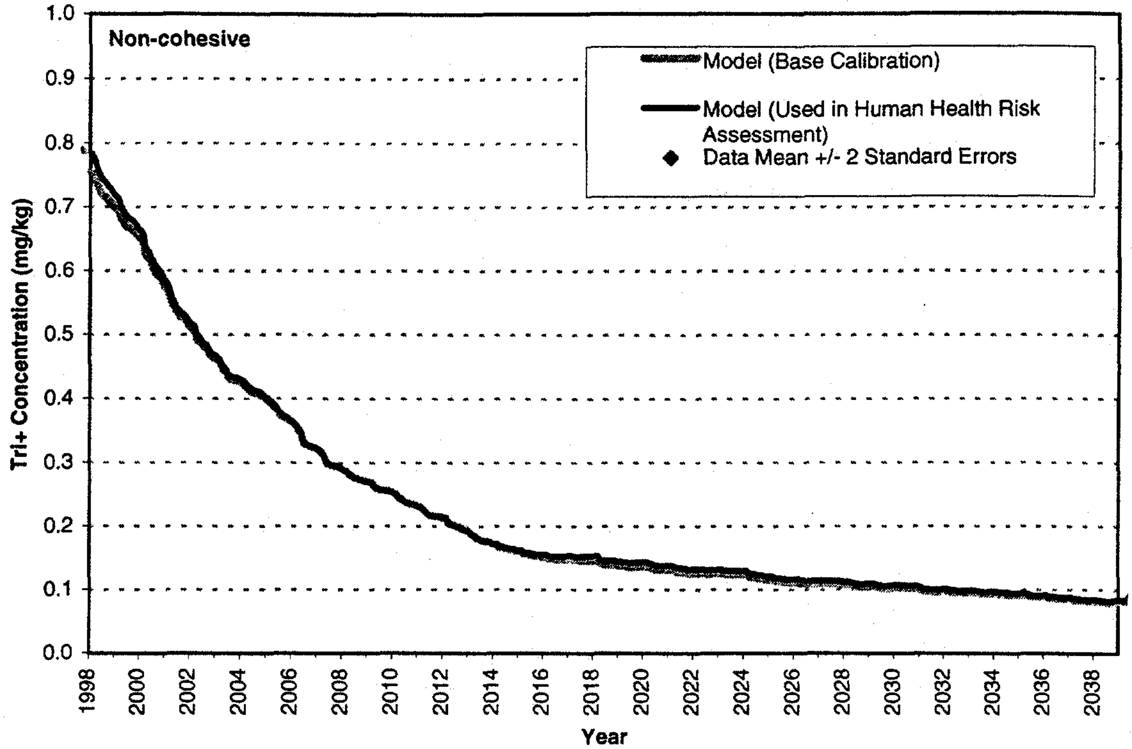
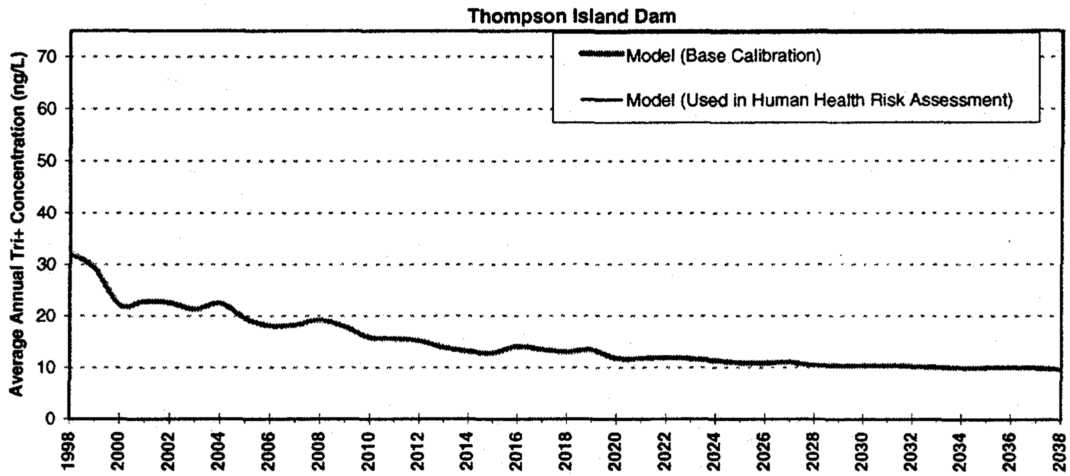


Figure A-5e. Predicted Model Sediment Concentration Results Used in mid-Hudson River Human Health Risk Assessment (Dec., 1999) Compared to Base Model Forecast in the Federal Dam Reach, 1998-2038.



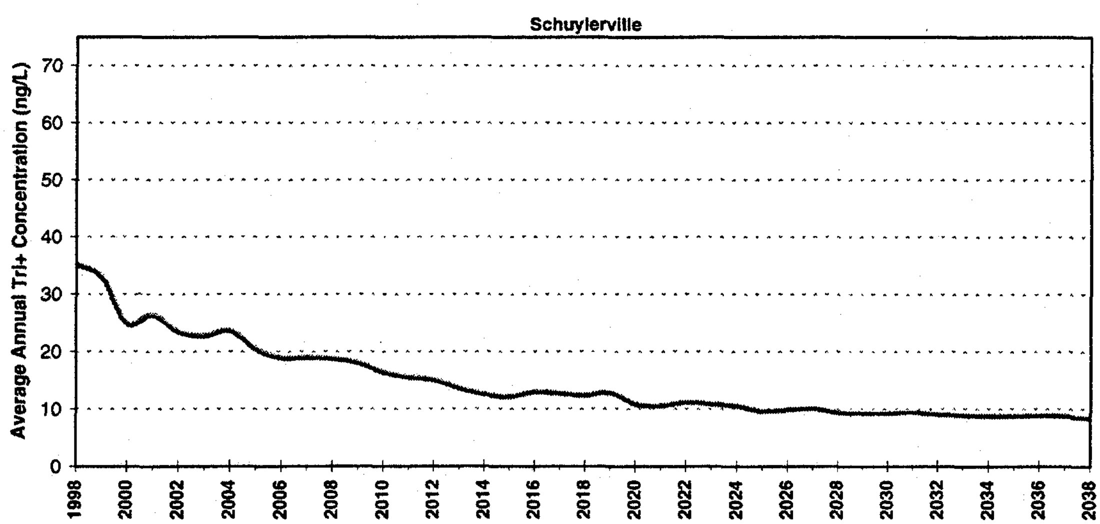
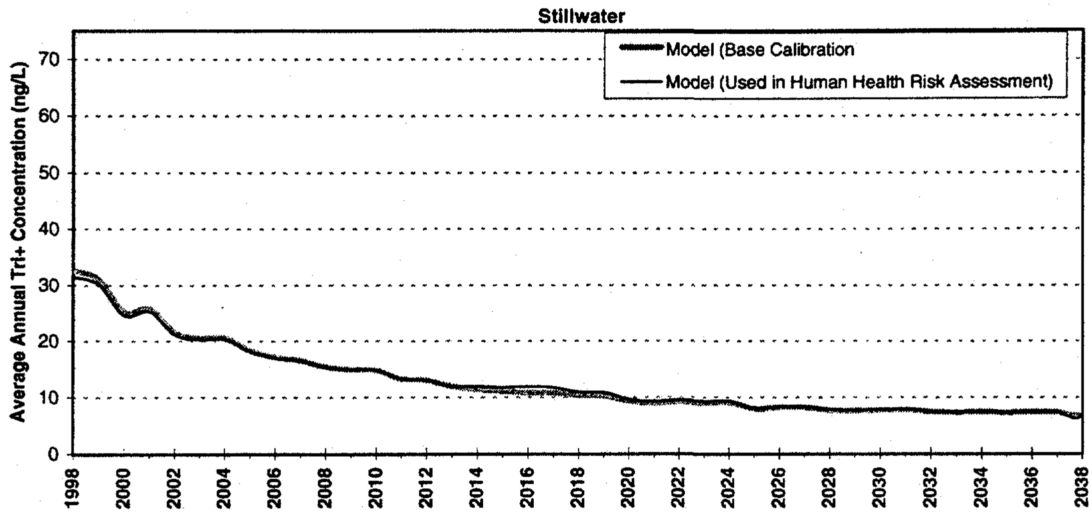


Figure A-6a. Predicted Model Water Column Results Used in mid-Hudson River Human Health Risk Assessment (Dec., 1999) Compared to Base Model Forecast at Thompson Island Dam and Schuylerville, 1998-2038.



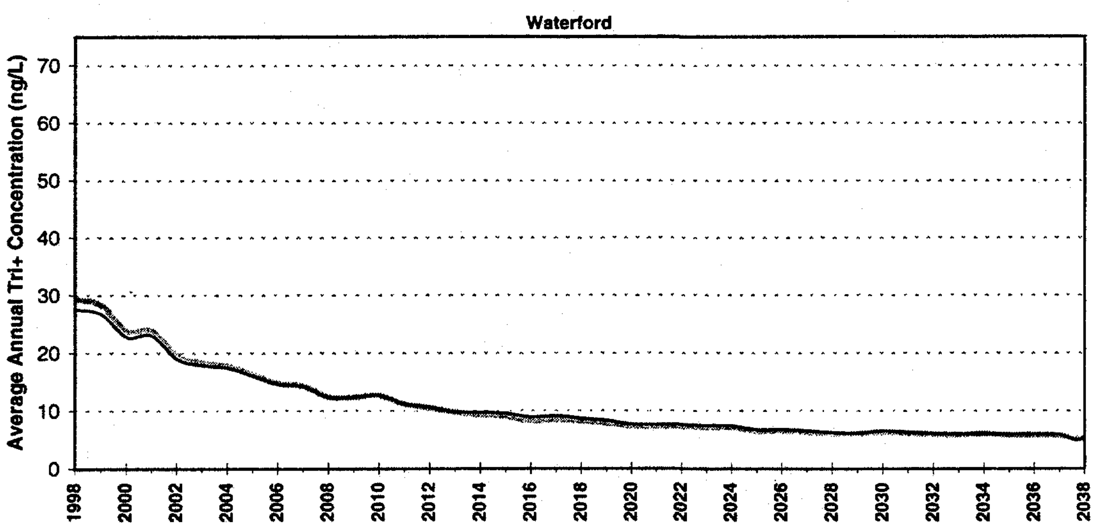


Figure A-6b. Predicted Model Water Column Results Used in mid-Hudson River Human Health Risk Assessment (Dec., 1999) Compared to Base Model Forecast at Stillwater and Waterford, 1998-2038.