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HUDSON RIVER PCB REASSESSMENT

COMMUNITY INTERACTION PROGRAM

JOINT LIAISON GROUP MEETING

Latham, New York
November 22, 1993

MINUTES

On Monday, November 22, 1993, a Joint Liaison Group meeting was held as part of EPA's Community Interaction Program for the Hudson River PCBs Reassessment. The meeting was held at the Holiday Inn Express in Latham, New York, and began at 7:00 p.m. Attached to these meeting minutes is a copy of the meeting agenda and the attendance sign-in sheets. (Please note that although their names do not appear on the sheet, both Mark Behan of Behan Communications and Pete Lanahan of General Electric were present at the meeting. The meeting was opened by Ann Rychlenski, EPA Community Relations Coordinator for this project. Ms. Rychlenski introduced Mr. Doug Tomchuk, EPA Remedial Project Manager, and Dr. Ron Sloan from the New York State Department of Environmental Conservation (NYSDEC), Division of Fish and Wildlife. Dr. sloan was guest presenter for the evening.

The meeting was then turned over to Mr. Tomchuk who reported on some of the items from the Hudson River Oversight Committee (HROC) meeting held approximately one month earlier. Since the project has come to be significantly larger than originally anticipated, the Phase 2 investigation will be reported in five different reports. Two of these reports, data quality management and geochemical findings, are due to EPA by the end of March, 1994. The other three reports - human health risk assessment, ecological risk assessment, and modeling - are due during July 1994. The Feasibility Study (FS) Report, as Phase 3, will follow the five Phase 2 reports and is due to EPA in October 1994. Mr. Tomchuk informed the audience that there had been some contractual delays in getting started with the modeling, which impacted the timing of the human and ecological risk assessments.

In response to a question from the audience as to whether there will be a work plan for the FS, Mr. Tomchuk indicated that this is being evaluated but they anticipate using the generic FS format. As to the question of when the FS will start, Mr. Tomchuk stated that the FS is already proceeding, and that Mr. Bruce Fidler of TAMS Consultants, Inc. (TAMS) reported on the progress of this task at the HROC meeting; the Phase 1 report included some of the preliminary screening, but the FS as a whole will not be final until the end of Phase 3.

Ms. Rychlenski informed the audience that minutes from the Scientific and Technical Committee meeting of October 19, and the HROC meeting of October 20, were just mailed to the chairpersons and co-chairpersons of the liaison groups, and would also be put into the project files at the public repositories. She also informed everyone that the last HROC meeting was, and tonight's Joint Liaison Group meeting is being, video- taped and copies of the film will be placed into the public repositories of the more active community groups at the: Poughkeepsie library, Washington County Office Building, and Saratoga Springs library.

A new issue of River Voices is being planned after the New Year; any contributions should be submitted to Ms. Rychlenski by December 29, 1993.

To a question from the audience as to the status of the professional film crew from Texas that was documenting rivers in America, Ms. Rychlenski stated that the producer (Bruce Halford) has promised to get back to her when the film is put together and she will then follow through with a letter to the joint liaison groups. The film is supposed to go to syndication and cable TV during late winter.

In response to an inquiry regarding whether presentations at the upcoming conference in Santa Barbara, California (December 6-8, Interactions Between Water and Sediment) would be taped, Mr. Tomchuk stated that he did not know. Both Gradient Corporation and TAMS (two firms supporting EPA on the RI/FS Reassessment) are presenting papers at this conference, but only one of the papers is presenting any data (the same data presented at the last HROC meeting); the other papers are presenting approaches to what EPA is doing at the site. It is not EPA's intention to present any new data at this conference.

The remainder of the meeting was a presentation given by Dr. Sloan regarding NYSDEC's study of PCBs in fish in the Hudson River. The first part of the presentation was a series of slides including general items such as a graph of % Lipid vs. PCB concentration is pumpkinseed yearling fish; basic PCB chemical structures; general PCB analytical chromatograms: a map showing the study area locations for several different on-going projects, including the long term Hudson River PCB analysis project and the New York marine striped bass project which is influenced by the Hudson River. Sampling points in the Hudson River include: above the Thompson Island dam, Stillwater, Albany-Troy, Catskill, Newburgh, and several lower estuary points. Interest in the fish has centered around the standard fillet or representative portions of the fish that most people would choose to eat.

The remainder, and greater portion, of Dr. Sloan's presentation centered on many overhead projections presenting detailed analytical and statistical summaries of information gathered over the past several years. Copies of these overheads are attached and are self explanatory, although a brief summary of the overheads is attached. Where trends were obvious, Dr. Sloan pointed them out. In some instances trends were not clear or non-existent, and this also was discussed.

During Dr. Sloan's presentation there was an open opportunity for questions and answers. Dr. John Brown of General Electric opened a discussion of pesticide chemistry in the waters of the Hudson, especially Chlordane and DDT/DDE, and its use as a marker for PCB sources.

John Haggard, also of General Electric, presented slides of work currently being performed by GE concerning remediation of the Allen Mills structure including water treatment, sediment removal, and construction generalities. This work is being performed under a state consent order with NYSDEC oversight, and is one of three operable units. The other two operable units include a subsurface investigation at the plant site, and soil removal from the rail car off-loading area. No contaminant removal work is yet being performed in the lower raceway of the Allen Mills structure.

Bill Ports from the NYSDEC gave a brief review of the interim remedial measures at the Allen Mills structure, stating that NYSDEC is pleased with GE's efforts and that work is moving along quickly. A remedial investigation (RI) report of this past summer's activities is expected by December 13, 1993.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, NEW YORK 10278-0012

HUDSON RIVER PCB REASSESSMENT

COMMUNITY INTERACTION PROGRAM

JOINT LIAISION GROUP MEETING
Latham, New York
Monday, November 22, 1993, 7:00 p.m.

A G E N D A

Welcome & Introduction	*Ann Rychlenski, Community Relations Coordinator, U.S. EPA, Region 2*
Project Update	*Doug Tomchuk, Remedial Project Manager, U.S. EPA, Region 2*
Public Participation Update	*Ann Rychlenski*
Guest Presentation: Fish Studies	*Dr. Ron Sloan, NYSDEC*

Questions & Answers

Sign-In Sheet
HUDSON RIVER
JOINT LIAISON GROUP MEETING

NAME	AFFILIATION	ADDRESS	CITY, STATE, ZIPCODE
CARL DEPPE	CEASE	18 THOMAS N HF 12839	
Paul McDowell	New York Farm Bureau	PO Box 992	Glenmont NY 12077
[illegible] Welge	U.S.G.S.	64 Guideboard Rd	Waterford, NY 12188
Lee Coleman	Daily Gazette	Schenectady 2345 MAXON Rd.	Schenectady, N.Y
John Santacrose	Audubon Society of NYS, Inc.	46 Rarick Rd.	Selkirk, NY 12158
Anders Carlson	NYS-DOH	II University Pl. ~~Albany~~	Albany N.Y. 12203
Karl Berger	NYS DEC	50 Wolf Rd Albany 12233	

November 22, 1993

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Sign-In Sheet
HUDSON RIVER
JOINT LIAISON GROUP MEETING

NAME	AFFILIATION	ADDRESS	CITY, STATE, ZIPCODE
Bill Viello	GE	1 Computer Dr S	Albany NY 12205
Karen Rive Murray	U.S. Geological Survey	PO Box 1669	Albany NY, 12201
David Adams	GOVT. LIAISON COMM.	216 STAGE RD	CHARLTON, NY 12019-2017
Roger Moseley	Ag liason	RR1 BOX 270	Buskirk, NY 12028
Judy Schmidt Dean	Chem Cit.		
Eleanor Brown	Citizens Liais. Grp.		
Sharon Ruggi	Env. Liaison Comm.	15 Burgoyne Ave.	Hudson Falls, N.Y. 12839
John Brown	GE Corp. R&D	POB 8 ~~Schenectady Ny 12301~~	Schenectady NY 12301
William Ports	NYSDEC	50 Wolf Rd	Albany NY 12233
James A Kuhlbach	Ag. Group	Kuhlbach Rd.	Greenwich, NY 12083
Tom Borden	Ag Liaison	RD #1 Box 157	Schaghticoke NY 12154
John Haggard	GE	One Computer Drive	Albany NY 12055
Christine Coates	GE	One Computer Drive	Albany NY 12205
Bridget Barclay	Clearwater/Env. Liaison	112 Market St.	Poughkeepsie, NY 12601

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HUDSON RIVER PCB RI/FS REASSESSMENT
COMMUNITY INTERACTION PROGRAM
JOINT LIAISON GROUP MEETING
Latham, New York
November 22, 1993

Summary of Overhead Projections
as presented by
Dr. Ron Sloan, NYSDEC

Overhead No.	Description
1	Basic structures of PCBs; particular interest in Aroclors 1016 and 1242, and 1254.
2	Homolog make-up of different Aroclors; trichlorinated congeners are of interest in Aroclors 1016 and 1242, and tetrachlorinated congeners are of interest in Aroclor 1254.
3	Typical capillary column gas chromatograms of various Aroclors provided by General Electric; Aroclor 1221 used by GE but in minor amounts. Aroclors 1242 and 1254 most pertinent to fish and cover a wide range of PCB results.
4	GE monitoring results of source conditions at Hudson Falls area.
5	Severe [PCB] (Note: [PCB] is symbol for concentrations) increases in fish from 1991 to 1992; in Thompson Pool on either a wet weight or lipid basis, with the exception of large mouth bass due to their predatory nature.
6	Significant increases in [PCB] at Stillwater area, River Mile (RM) 175. Large mouth bass still an anomaly showing an increase on weight basis but a decrease on lipid basis. Sample size is critical; some species show no change but the sample size is small.
7	Waterford area; increase in [PCB] across most fish species; large mouth bass still an anomaly, no significant changes.
8	Albany-Troy area, same increase in [PCB].
9	Control/reference area; not a true control since there are some PCBs as far north as the Feeder Dam above Glens Falls, but [PCB] are low enough and stable enough to show no real changes being observed at this location across all species.
10	Bar chart showing [PCB] factor increases across all species; no samples at Catskill (RM 112) for 1991. Large mouth bass only (no [PCB] change, but large mouth bass not part of this particular sampling plan.

Summary of Overhead Projections
(cont'd.)

11	Minimal discussion of this overhead; increases in [PCB] from 1991 to 1992.
12	Large mouth bass showing Aroclor 1016 to 1254 ratios changing, as in most fish.
13	No significant Aroclor 1016:1254 ratio shift above Catskill since mostly Aroclor 1254. Situation is opposite at Thompson Island Pool; shift to less Aroclor 1016.
14	Bar chart representation of Aroclor ratio shift for all fish from 1991 to 1992, further down river. Aroclor [1254] increases from RM 175 southward, but not seen in Thompson Island Pool.
15	Total [PCB] in pumpkinseed, 1991 to 1992; expected pattern of decreasing [PCB] down river.
16	Yellow perch, decreasing [PCB], but patterns tend to disappear in the "noise" of the data. Possibly due to the more mobile, predatory nature.
17	Total [PCB] in large mouth bass; data still a problem.
18	Large mouth bass, [PCB] relatively stable from 1984 to 1992; long term monitoring station not established until 1984.
19	Stillwater, large mouth bass. Long term monitoring station established in 1977. Rapid response in decreasing [PCB] after ceasing discharges at the Fort Edward and Hudson Falls areas.
20	Catskill, large mouth bass; same initial rapid drop after cessation of GE discharges. Relatively stable from 1980 to 1992-not unexpected. No increase in 1992 as in upper river.
21	Brown bullhead, general decrease in [PCB] beginning in 1986, but increase in 1992 to levels as they were in 1986.
22	Brown bullhead, Stillwater. Rapid decrease in [PCB] after stopping GE discharges; stable for a few years then slight increase in 1992.
23	Brown bullhead, Albany-Troy. Same initial drop off pattern in [PCB], but sample size was not good and confidence intervals were skewed. 1992 levels were similar to those of the early 1980's.
24	White perch (fatty fish), same rapid drop off, then stable with an increase in 1992 after a 1991 low point.
25	Yearling pumpkinseed-very sensitive to population changes, possibly to sampling. Reference location above Glens Falls; relatively stable between 1979 -1989.

Summary of Overhead Projections
(cont'd.)

26	Stillwater, pumpkinseed. Rapid [PCB] decrease, then stable, followed by increasing 1988 to 1989 shift in [PCB]. No data from 1989 to 1992.
27	Albany area, pumpkinseed. This overhead provided basically the same information as the other pumpkinseed overheads and Dr. Sloan intentionally skipped it.
28	Newburgh, yearling pumpkinseed. Same basic information.
29	Large mouth bass, spatial [PCB] trend; 1990 vs. RM. [PCB] decrease down river.
30	Large mouth bass, spatial [PCB] trend; 1991 vs. RM-more evident stepwise decrease in [PCB].
31	Large mouth bass, spatial [PCB] trend; 1992, documented increase in [PCB] between RM 190 and Stillwater, but not below.
32	Large mouth bass, average [PCB] with time and distance; [PCB] at Catskill (RM112) lower than at Stillwater and much lower than Griffin Island.
33	Stillwater, pumpkinseed; Aroclor ratios. Aroclor 1016 predominates at Stillwater 1979 to 1989; beginning to favor Aroclor 1254.
34	Albany, yearling pumpkinseed; Aroclor ratios. Since 1981 or 1982, ratios returning to favoring Aroclors 1016 & 1242. Something going on with source conditions to alter Aroclor 1242 with respect to Aroclor 1254.
35	Newburgh, pumpkinseed. During 1985 to 1991 there is a shift toward favoring Aroclor 1242.
36	Albany, large mouth bass; initially taking Aroclor 1016 out of the system, but then an increase towards an increasing Aroclor [1016].
37	Stillwater, brown bullhead. Relative stability of 1016/1242 ratio between late 1980's and early 1990's, then favoring Aroclor 1242.
38	Albany, brown bullhead; same situation as Stillwater, but sample size problems during 1991-1992.
39	Large mouth bass, spatial ratios - 1990; if the system is expected to first remove Aroclor (most labile), then the system would shift to more highly recalcitrant higher chlorinateds. This was observed.
40	Large mouth bass, spatial ratios - 1991; if the system is expected to first remove Aroclor (most labile), then the system would shift to more highly recalcitrant higher chlorinateds. This was observed, although the favoring of 1254 appears to be reverting back to 1016.

Summary of Overhead Projections
(cont'd.)

41	Large mouth bass, spatial ratios - 1992; @ RM 175 there was a different observed pattern.
42	Lower Hudson River, striped bass-began monitoring in 1978. Need large numbers of fish. No real pattern due to wide variability of [PCB] at all times.
43	Lower Hudson River, striped bass- in 1990 begin to see clear pattern: low, stable [PCB], with decreasing downstream [PCB].
44	Lower Hudson River, striped bass. Aroclor 1254 becomes significant down river between 1988 and 1990, but no good correlation between 1988 and 1990 for fish size, lipid content and [PCB].
45	Stillwater, Aroclor 1221. Highest concentration in 1977, but lower and oscillating since. Dramatic yearly changes.
46	Stillwater, 1992 Season of Collection; 4 species, May and December: pumpkinseed - no increase or change, weight or lipid basis or Aroclor ratios. northern pike - no significant differences brown bullhead- notable changes on lipid basis; none on weight basis. Small mouth bass-no difference.
47	Summary of other species on health advisory list in lower part of river @ Newburgh: 1991, white perch; white catfish; and american eel.
48	Summary of PCB Trends in Fish.

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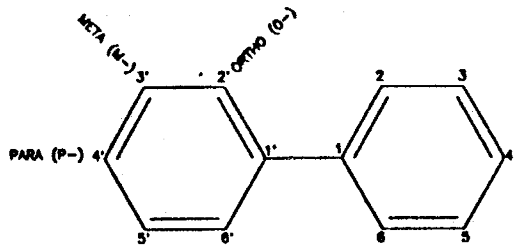
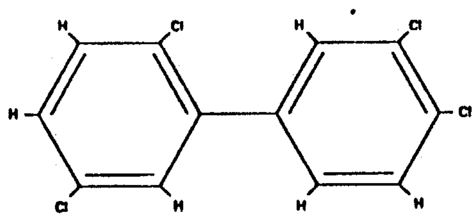
Figure A.2-1
PCB STRUCTURE AND GROUP

GENERIC STRUCTURE:



PCB CONGENER:



3,4,2',5' tetrachlorobiphenyl

PCB Homologue Group	Number of Congeners
Mono–	3
Di–	12
Tri–	24
Tetra–	42
Penta–	46
Hexa–	42
Hepta–	24
Octa–	12
Nona–	3
Deca–	1
Total Congeners	209

Source: Cairns et al. (1986).

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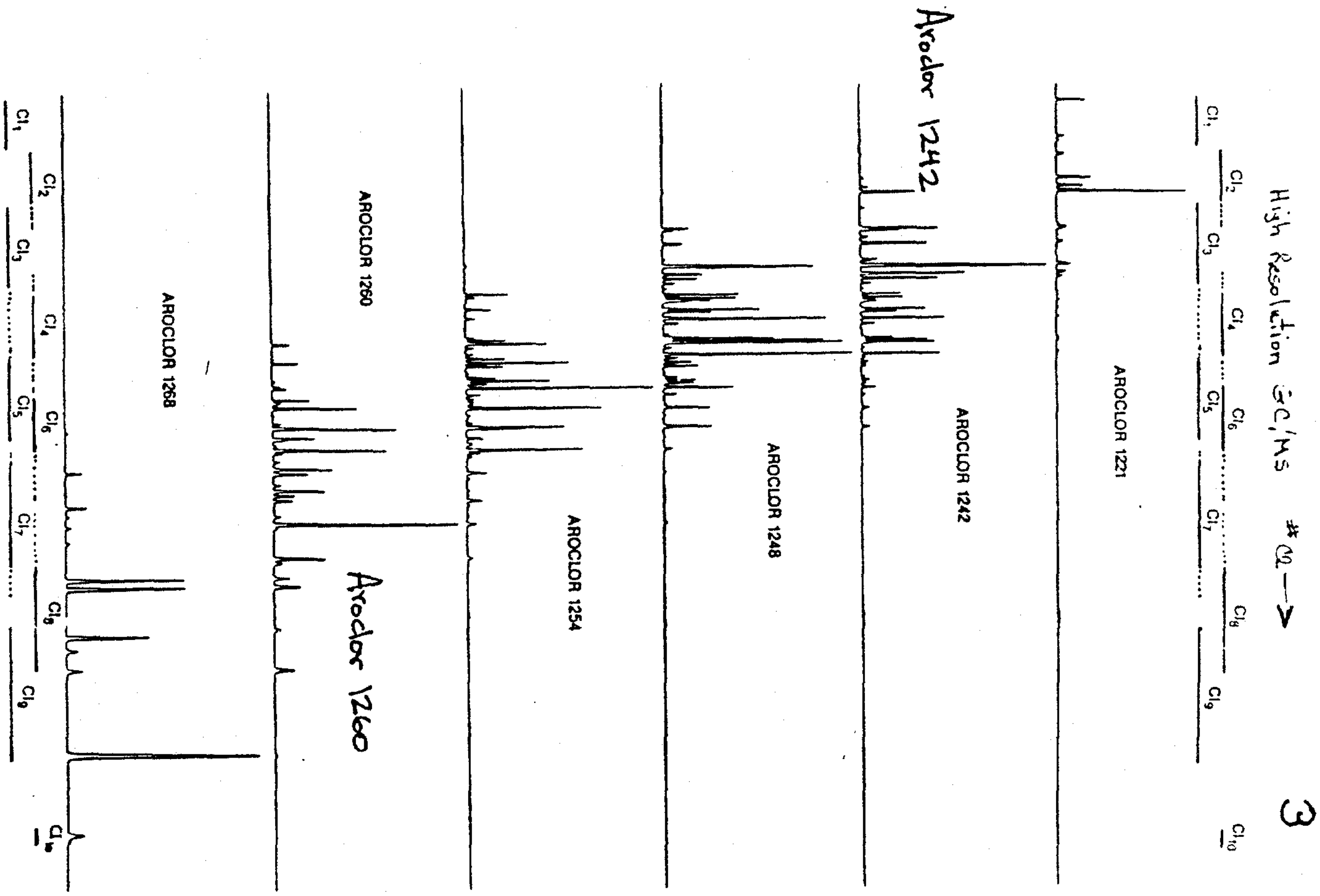
Table A.2-1
Aroclor Mixtures

PCB Homologue Group	Percentage of Group within Mixture – Aroclor Mixture 1016	1221	1242	1254	1260
Biphenyl	<0.1	11	<0.1	<0.1	–
Monochlorobiphenyl	1	51	1	<0.1	–
Dichlorobiphenyl	20	32	16	0.5	–
Trichlorobiphenyl	57	4	49	1	–
Tetrachlorobiphenyl	21	2	25	21	1
Pentachlorobiphenyl	1	<0.5	8	48	12
Hexachlorobiphenyl	<0.1	–	1	23	38
Heptachlorobiphenyl	–	–	<0.1	6	41
Octachlorobiphenyl	–	–	–	–	8
Nonachlorobiphenyl	–	–	–	–	–
Decachlorobiphenyl	–	–	–	–	–

Source: USEPA, "Environmental Transport and Transformation of Polychlorinated Biphenyls." EPA 560/5-83-025. Office of Pesticides and Toxic Substances. Washington, DC (1983).



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General Electric Company - Hudson River Project

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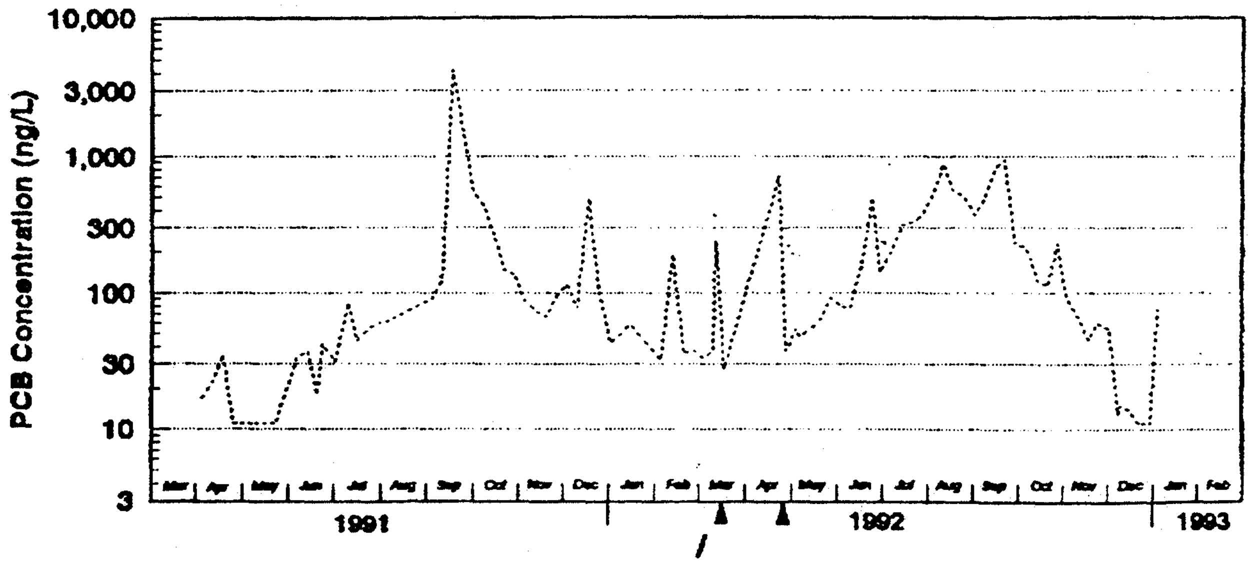
1991-1993 Water Column Monitoring Results



Fort Edward

O'Brien & Gere Engineers
March 2, 1993
BPCB3.DRW

▲ INDICATES HIGH FLOW

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Table 1. One-tailed t-tests for mean PCB concentrations in spring collected fish from the Thompson Island Pool of the Hudson River (RM 190) for 1991 versus 1992.

Species	Analytical basis	Means (ppm) ± standard deviations (number of analyses) 1991	1992	t-value
Brown bullhead	wet	5.27±3.55(20)	18.09±9.55(20)	5.62**
	lipid	491.4±315.6(20)	1399.0±1012.6(20)	3.83**
Black crappie	wet	7.13±5.89 (9)	31.49±12.59 (12)	5.36**
	lipid	1123.6±544.2 (9)	1656.6±571.7 (12)	2.16*
Bluegill	wet	3.55±2.01 (12)	6.43±2.95 (12)	2.79**
	lipid	531.2±294.2 (12)	954.8±598.1 (12)	2.20*
Chain pickerel	wet	0.56±0.19 (5)	5.05±3.70 (11)	2.66**
	lipid	353.2±250.6 (5)	1380.7± 906.6 (11)	2.45*
Largemouth bass	wet	3.87±2.46 (7)	22.46±19.2 (20)	2.52**
	lipid	1578.2± 821.9 (7)	2132.1±1452.0(20)	0.95ns
Northern pike	wet	3.19 (1)	64.7 (1)	--
	lipid	725.0 (1)	3739.9 (1)	--
Pumpkinseed	wet	4.20±2.71 (12)	13.34± 3.47 (12)	7.19**
	lipid	628.6±413.3 (12)	750.1±205.6 (12)	0.91ns
Walleye	wet	5.21±2.75 (7)	30.33±42.04 (4)	1.64ns
	lipid	1008.2± 346.9 (7)	2705.1±2065.3 (4)	2.21*
Yellow perch	wet	6.87±7.61 (12)	12.91± 6.53 (11)	2.03*
	lipid	1141.4± 987.4 (12)	1562.3±1764.0 (11)	0.71ns

ns not significant;P > 0.05
* P < 0.05
** P < 0.01

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Table 2. One-tailed t-tests for mean PCB concentrations in spring collected fish from the Stillwater Pool of the Hudson River (RM 175) for 1991 versus 1992.

Species	Analytical basis	Means (ppm) ± standard deviations (number of analyses) 1991	1992	t-value
Brown bullhead	wet	2.74±1.33(20)	9.66±3.42(20)	8.43**
	lipid	166.0± 54.3(20)	275.4± 104.3(20)	4.16**
Black crappie	wet	0.91±0.76(11)	8.63± 5.87 (5)	4.47**
	lipid	304.7±132.8(11)	324.3±122.0 (5)	0.28ns
Bluegill	wet	1.55±0.76 (12)	2.30±1.28 (12)	1.74*
	lipid	246.7± 99.4 (12)	393.1±112.9 (12)	3.37**
Largemouth bass	wet	0.96±0.48 (9)	6.87±3.74 (20)	4.67**
	lipid	650.6±182.8 (9)	458.6± 126.5(20)	-3.29**
Northern pike	wet	3.47±9.50(13)	3.94±0.51(3)	0.08ns
	lipid	421.2±339.8 (13)	723.2±403.5 (3)	1.35ns
Pumpkinseed	wet	1.19±0.48 (12)	5.94± 3.52 (12)	4.63**
	lipid	204.1± 51.7 (12)	476.9±190.1 (12)	4.79**
Yellow perch	wet	0.80±0.31 (12)	4.63± 1.13 (12)	11.28**
	lipid	199.8± 59.5 (12)	522.8± 87.3 (12)	10.59**

ns not significant; P > 0.05
* P < 0.05
** P < 0.01

Table . One-tailed t-tests for mean PCB concentrations in spring collected fish near Waterford on the Hudson River (RM 157) for 1991 versus 1992.

Species	Analytical basis	Means (ppm) ± standard deviations (number of analyses) 1991	1992	t-value
Smallmouth bass	wet	1.16±0.80(19)	4.53±2.77(12)	5.02**
	lipid	390.2±274.5(19)	560.8± 196.8(12)	1.87*
Carp	wet	11.85±6.14(7)	23.08±12.11(4)	2.08*
	lipid	169.8± 84.0(7)	292.4± 40.8 (4)	2.70*
Pumpkinseed	wet	0.43±0.19 (11)	2.56±1.62 (8)	4.36**
	lipid	107.4± 54.8 (11)	295.9±110.4 (8)	4.92**
Rock bass	wet	0.48±0.22 (11)	1.94±2.92 (3)	1.85*
	lipid	154.3± 44.7 (11)	218.8±150.7(3)	1.34ns
Yellow perch	wet	0.47±0.43(3)	1.74±0.95(10)	2.20*
	lipid	73.2± 47.2 (3)	427.6±267.9 (10)	2.21*
Largemouth bass	wet	1.51±1.77 (12)	2.87± 2.44(12)	1.57ns
	lipid	327.2± 229.3(12)	281.2±149.2(12)	-0.58ns
Bluegill	wet	1.62±1.50 (12)	1.46± 1.13 (11)	-0.28ns
	lipid	199.6±101.0 (12)	174.2±104.7 (11)	-0.59ns
White perch	wet	4.11±1.47 (20)	6.31± 4.17 (21)	2.23*
	lipid	163.0± 42.2 (20)	327.6±209.9 (21)	3.44**

ns not significant; $P > 0.05$
* $P < 0.05$
** $P < 0.01$

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Table . One-tailed t-tests for mean PCB concentrations in spring collected fish below Troy on the Hudson River (RM 153) for 1991 versus 1992.

Species	Analytical basis	Means (ppm) ± standard deviations (number of analyses) 1991	1992	t-value
Redbreast sunfish	wet	0.69±0.37 (12)	2.84±2.62 (9)	2.84**
	lipid	123.2±81.0 (12)	270.6±176.2 (9)	2.57**
Smallmouth bass	wet	2.70±3.11 (16)	6.28±3.26 (15)	3.13**
	lipid	373.5±222.9 (16)	394.4±135.1 (15)	0.31ns
Carp	wet	7.09±3.05 (3)	9.28±9.31 (5)	0.39ns
	lipid	67.2±16.1 (3)	81.1±51.1 (5)	0.44ns
Black crappie	wet	0.54±0.69 (5)	2.29±1.28 (10)	2.82**
	lipid	123.6±24.6 (5)	238.7±74.1 (10)	3.33**
White perch	wet	3.27±1.81(20)	7.05±2.06 (20)	6.17**
	lipid	104.2±54.8(20)	296.1±86.5 (20)	8.38**
Pumpkinseed	wet	0.46±0.21 (12)	1.64±0.63 (12)	6.12**
	lipid	87.4±36.0 (12)	126.3±35.8 (12)	2.65**
Rock bass	wet	0.59±0.26 (8)	1.09±0.81 (2)	1.69ns
	lipid	136.5±36.9 (8)	213.1±72.0 (2)	2.26*
Bluegill	wet	0.74±0.46 (9)	1.50±0.95 (11)	2.17*
	lipid	87.1±37.1 (9)	172.6±102.0 (11)	2.38**
Yellow perch	wet	0.53±0.44 (7)	2.78±1.92 (10)	3.01**
	lipid	108.7±49.6 (7)	395.1±257.5 (10)	2.88**
Walleye	wet	2.70±3.05 (2)	4.66±1.12 (2)	0.85ns
	lipid	150.0±75.5 (2)	188.9±66.5 (2)	0.55ns
Largemouth bass	wet	0.50±0.20 (5)	2.29±1.53 (9)	2.55**
	lipid	189.9±40.8 (5)	468.0±410.7 (9)	1.48ns
Northern pike	wet	1.30±1.40 (2)	5.53±1.67 (5)	3.12**
	lipid	334.9±214.9 (2)	267.6±169.2 (5)	-0.45ns
Brown bullhead	wet	0.42±0.26 (4)	3.11±3.02 (2)	2.04ns
	lipid	31.7±14.2 (4)	106.3±3.4 (2)	6.94**

ns not significant; $P > 0.05$ * $P < 0.05$ ** $P < 0.01$

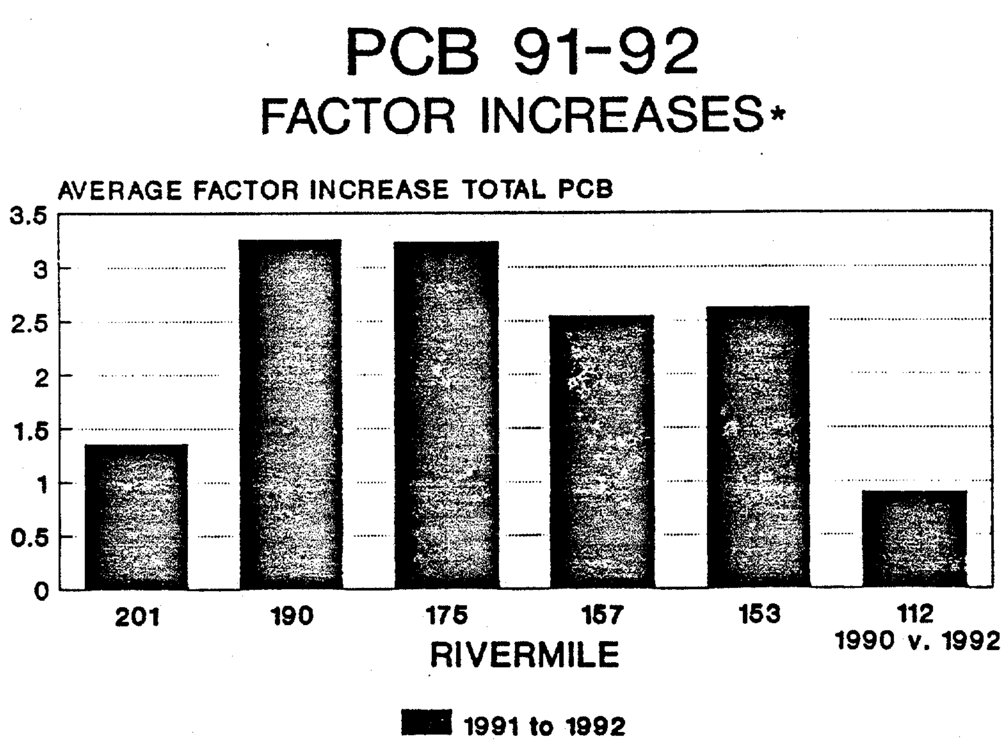
TROY9192.tbl

Table 1. One-tailed t-tests for mean PCB concentrations in spring collected fish from the above the Feeder Dam at Glens Falls in the Hudson River (RM 201) for 1991 versus 1992.

Species	Analytical basis	Means (ppm) ± standard deviations (number of analyses) 1991	1992	t-value
Brown bullhead	wet	0.11±0.08(12)	0.13±0.04(12)	0.79^{ns}
	lipid	14.1±11.0(12)	9.8 ± 4.5(12)	-1.24^{ns}
Black crappie	wet	0.07±0.04 (3)	0.19±0.07 (11)	2.57**
	lipid	22.1± 9.3 (3)	10.1± 3.3 (11)	-3.78**
Yellow perch	wet	0.10±0.04 (12)	0.18±0.18 (11)	1.45^{ns}
	lipid	17.3±7.0 (12)	16.8±12.5 (11)	-0.14^{ns}
Chain pickerel	wet	0.02 (2)	0.03 (6)	--
	lipid	--	--	--
Largemouth bass	wet	0.06±0.04 (2)	0.14±0.08 (12)	1.36^{ns}
	lipid	33.2±28.1 (2)	30.1±14.5 (12)	-0.25^{ns}
Rock bass	wet	0.02 (2)	0.02 (3)	--
	lipid	14.8±0.8 (2)	8.4±2.1 (3)	-4.01**
Pumpkinseed	wet	0.04±0.04 (12)	0.10±0.07 (11)	2.49**
	lipid	9.4±5.9 (12)	9.7 ± 6.2 (11)	0.10^{ns}

^{ns} not significant; $P > 0.05$
* $P < 0.05$
** $P < 0.01$

10



* 1 = no change

11

Table . Average increases in PCB concentrations for spring collected fish from several locations in the Hudson River for the sampling interval between 1991 and 1992.

Rivermile	Location	Factor increases from 1991 to 1992
201	above Feeder Dam	1.36
190	Thompson Island Pool	3.25
175	Stillwater Pool	3.23
160	Waterford	2.55
153	below Troy Dam	2.62
112	Catskill (1990 vs. 1992)	0.90

12

Table . Two-tailed t-tests on several variables including PCB concentrations in largemouth bass from the Catskill area in the Hudson River (RM112) for 1990 versus 1992.

Variable	1990	1992	t-value
Number analyzed	17	10	
Mean total PCB wet weight (ppm)±SD	6.02±3.79	5.85±3.86	0.11^{ns}
Mean total PCB lipid based (ppm)±SD	308.1±167.1	253.2±220.9	0.95^{ns}
Factor of "increase"			0.90
Mean ratio "Aroclor 1016":"Aroclor 1254"± standard deviation	0.46±0.27	1.15±0.31	6.18^{**}
Mean percent lipid±SD	2.22±1.07	2.35±1.47	0.27^{ns}
Length (mm)	420±47	392±31	1.71^{ns}

^{ns} $P > 0.05$
** $P < 0.01$

Table . Changes in the ratio of "Aroclor 1016":"Aroclor 1254" between 1991 and 1992 by spring collection locations for fish from the Hudson River.

		Mean ratio "Aroclor 1016":"1254"± standard deviation (n)		
Rivermile	Location	1991	1992	t-value
201	above Feeder Dam-Glens Falls	0.58±0.34 (48)	0.59±0.67 (72)	0.07[ns]
190	Thompson Island Pool	1.87±0.78 (85)	1.40±0.59 (132)	-5.06**
175	Stillwater Pool	1.54±0.55 (89)	2.46±0.93 (101)	8.15**
157	Waterford	1.10±0.72 (107)	1.75±0.94 (86)	5.46**
153	below Troy Dam	0.85±0.68 (106)	1.63±1.11 (145)	6.43**
112	Catskill	0.46±0.27 (17 - 1990)	1.15±0.31 (10)	6.18**

ns P > 0.05; two-tailed t-tests
** P < 0.01

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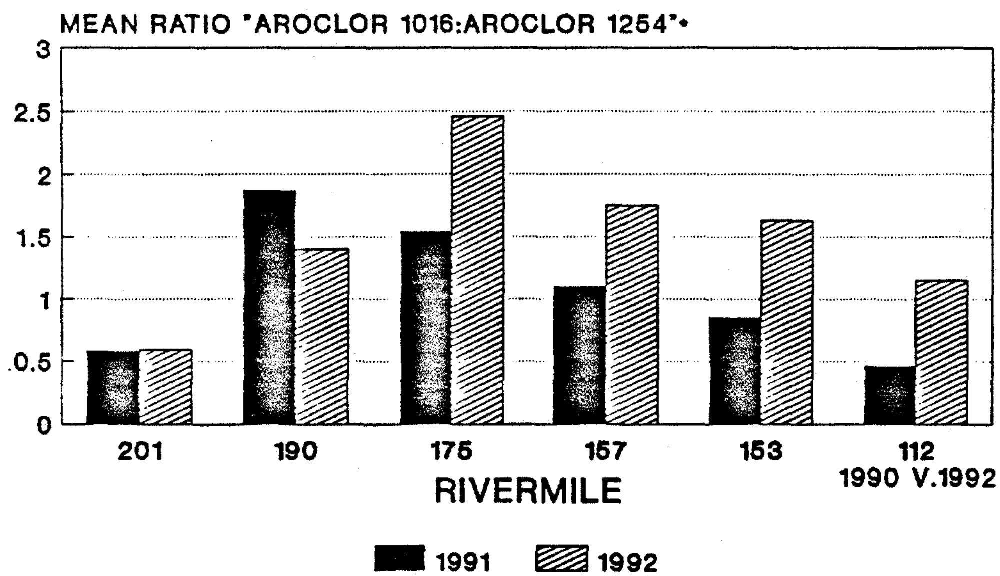
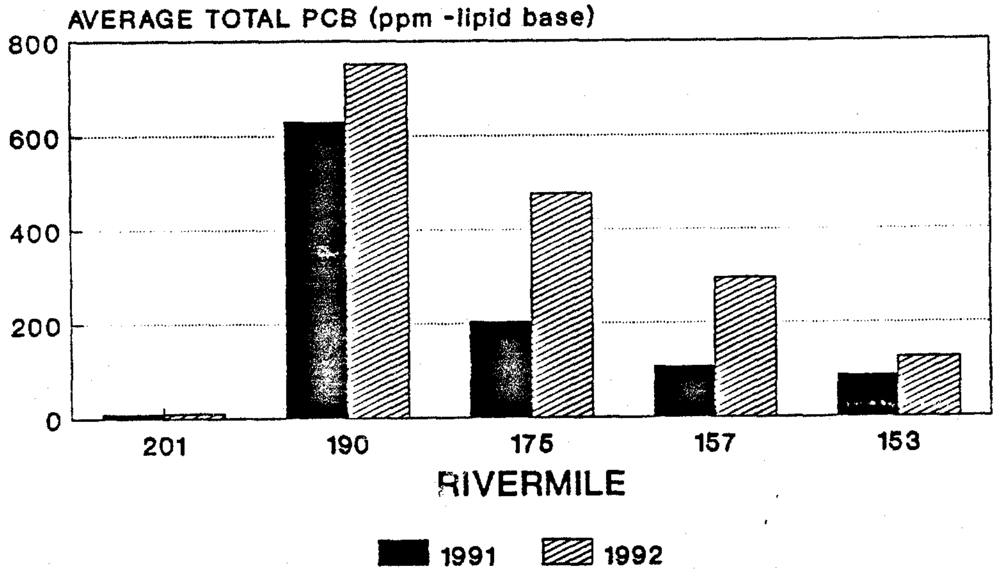
AROCLOR RATIOS
ALL FISH 91-92



* "Ar1016" = "Ar1254" when ratio = 1

PCB 91-92
PUMPKINSEED



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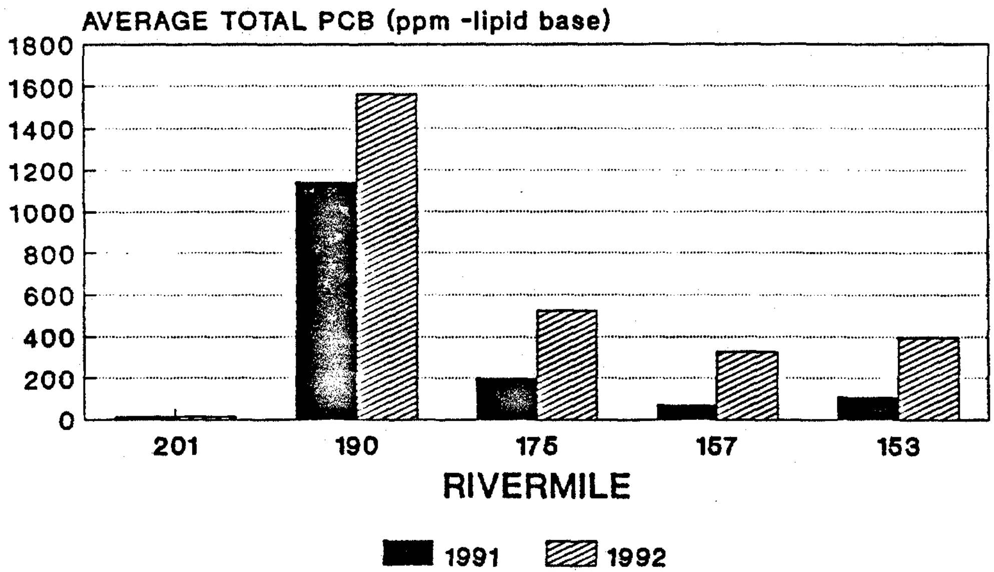
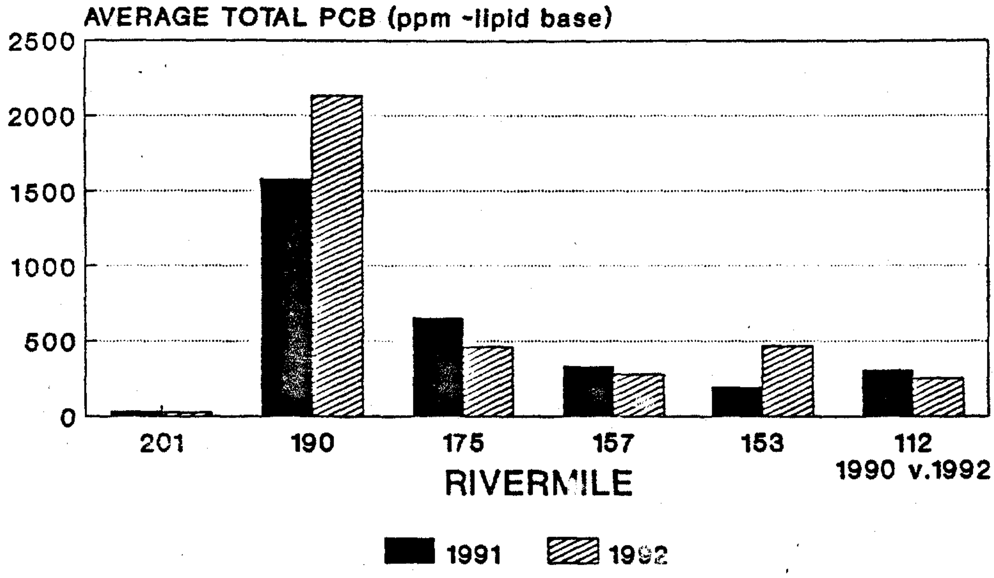
PCB 91-92
YELLOW PERCH



17

PCB 91-92
LARGEMOUTH BASS



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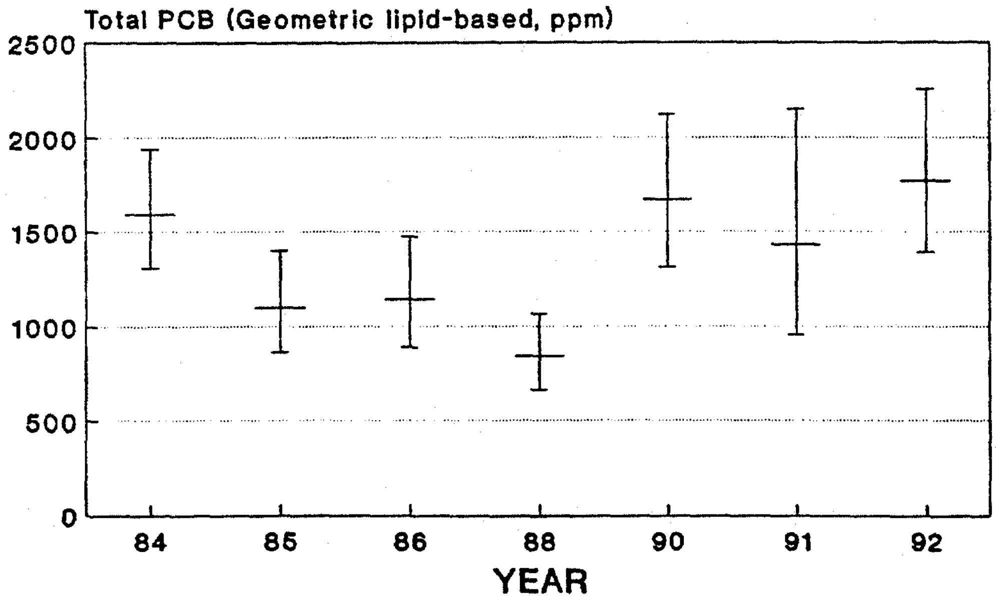
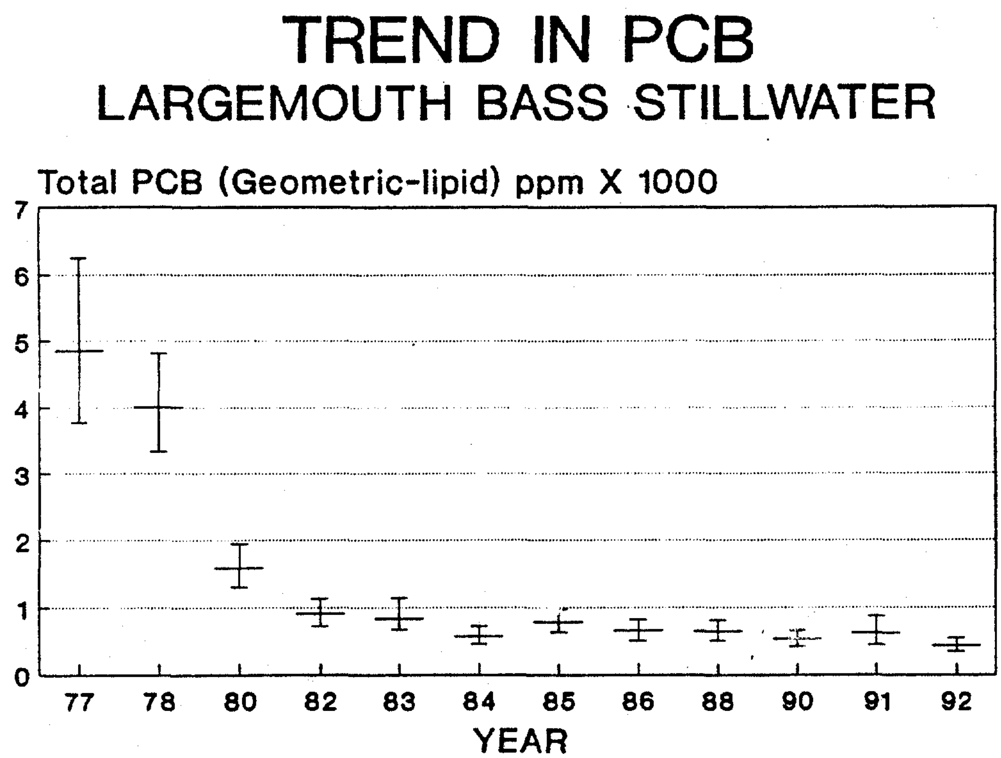
TREND IN PCB
LARGEMOUTH BASS GRIFFIN ISLAND

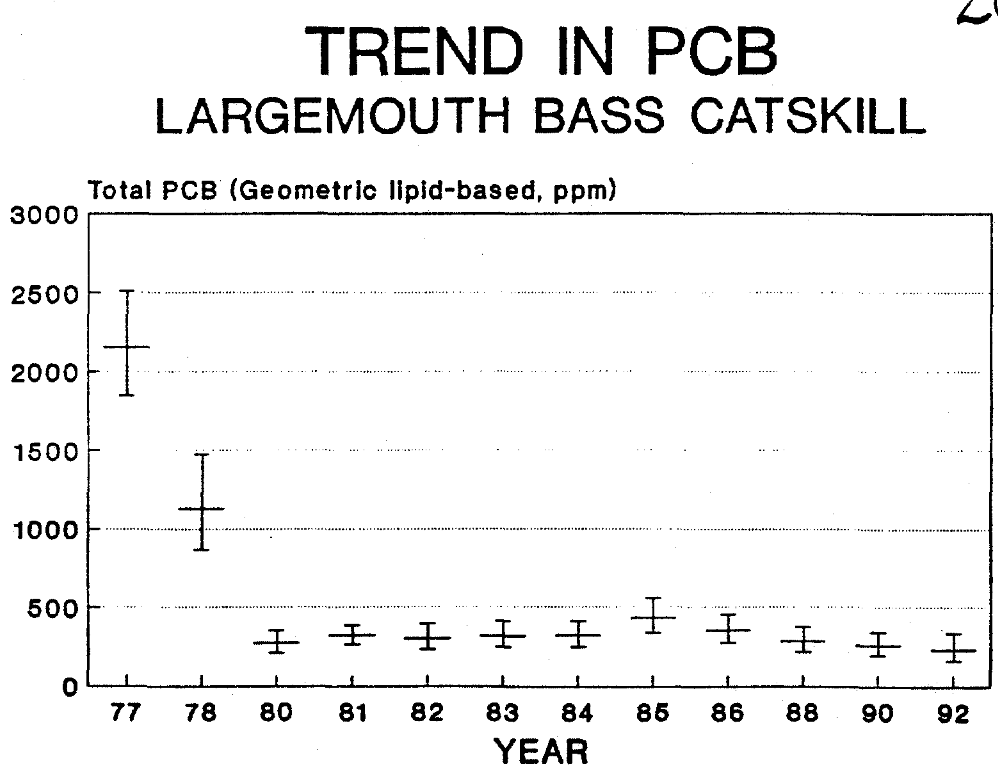


19



TREND IN PCB
LARGEMOUTH BASS STILLWATER
Total PCB (Geometric-lipid) ppm X 1000
7
6
5
4
3
2
1
0
77 78 80 82 83 84 85 86 88 90 91 92
YEAR

20

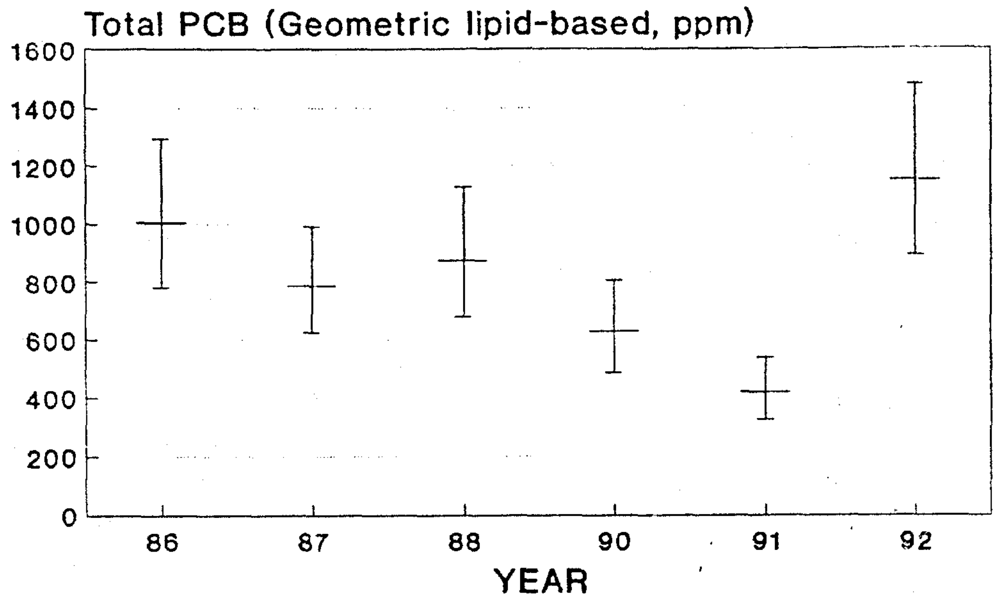


TREND IN PCB
LARGEMOUTH BASS CATSKILL
Total PCB (Geometric lipid-based, ppm)
3000
2500
2000
1500
1000
500
0
77 78 80 81 82 83 84 85 86 88 90 92
YEAR

TREND IN PCB

21

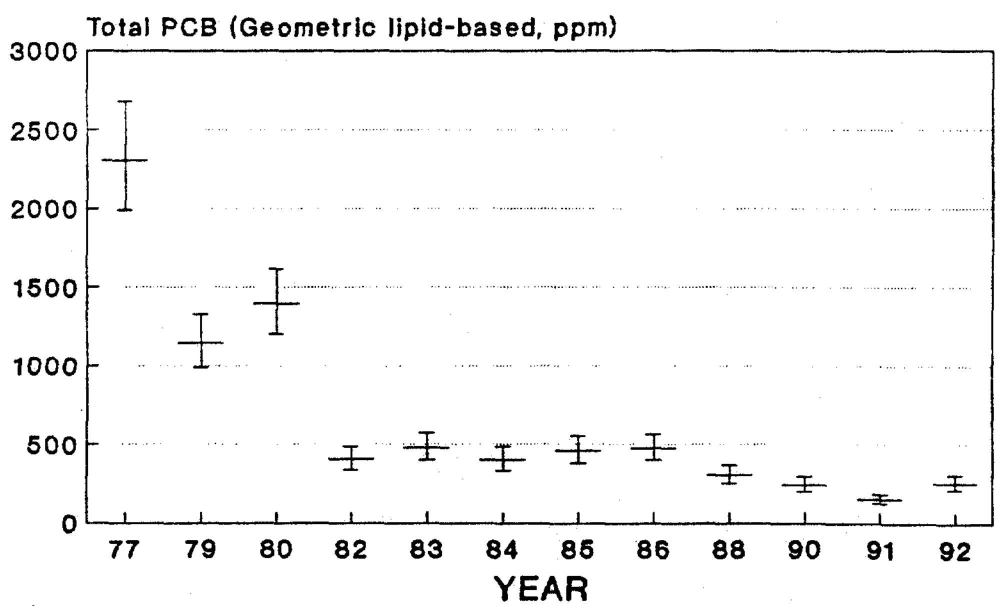
BROWN BULLHEAD GRIFFIN ISLAND



TREND IN PCB

22

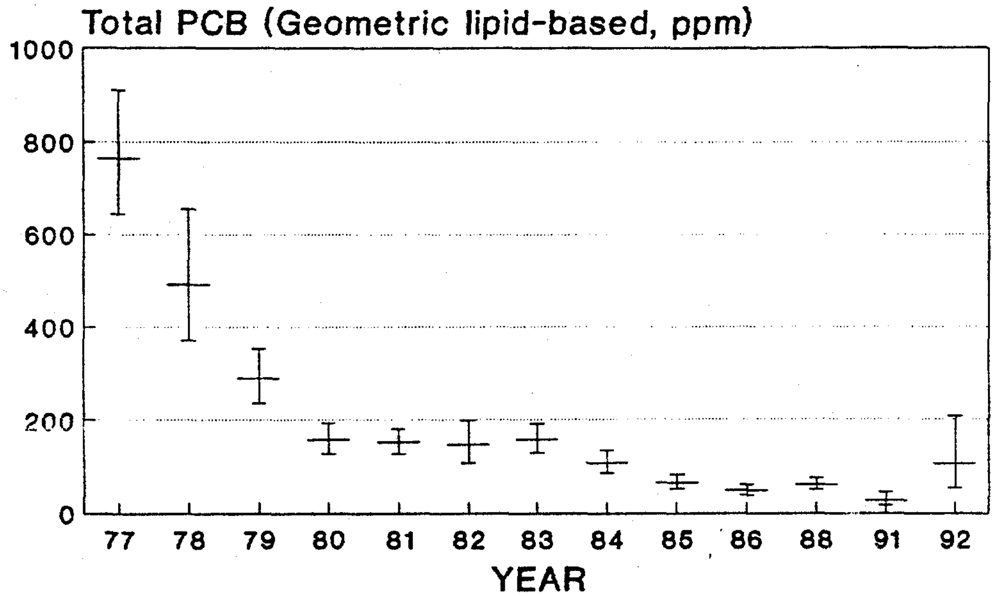
BROWN BULLHEAD STILLWATER



C) Total PCB

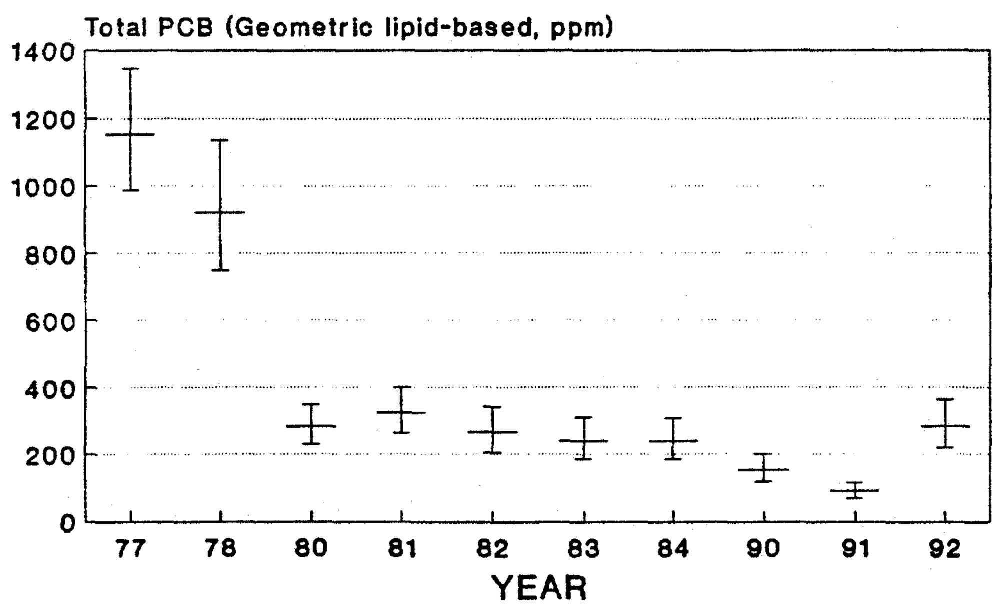
23

TREND IN PCB
BROWN BULLHEAD ALBANY/TROY



24

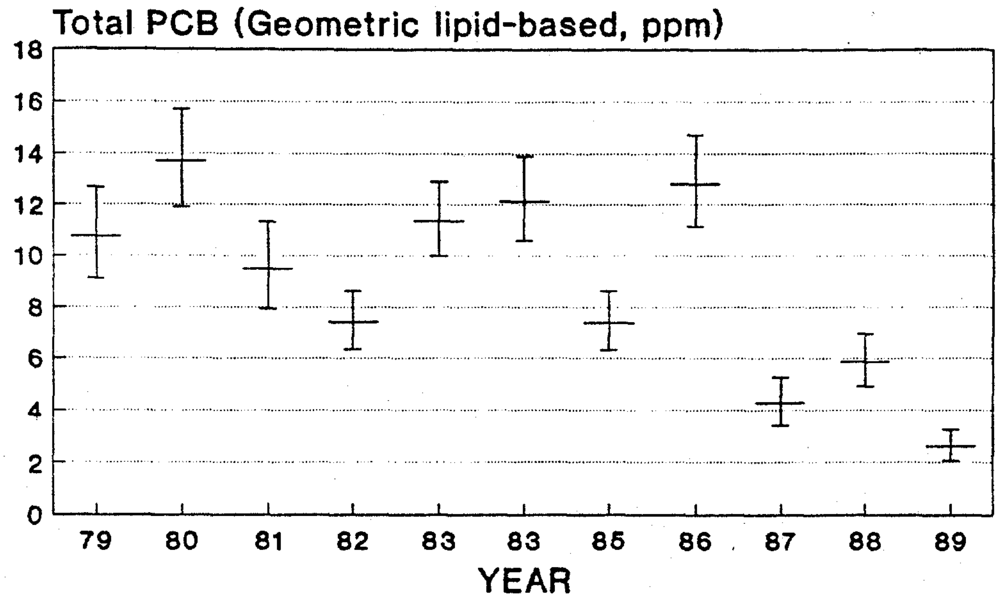
TREND IN PCB
WHITE PERCH ALBANY/TROY



10.9527

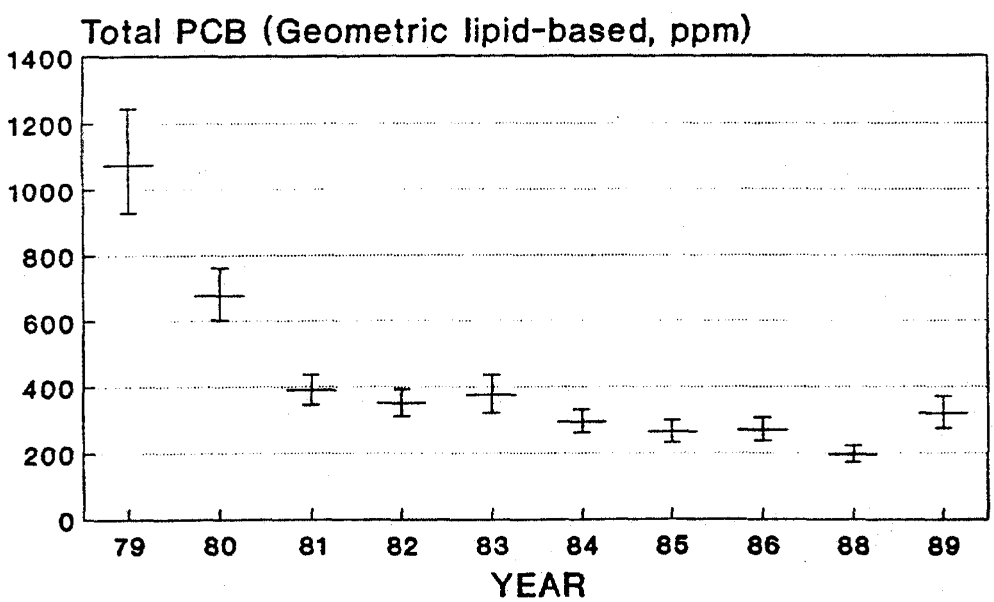
TREND IN PCB
PKSEED 1+ >RM 200

25

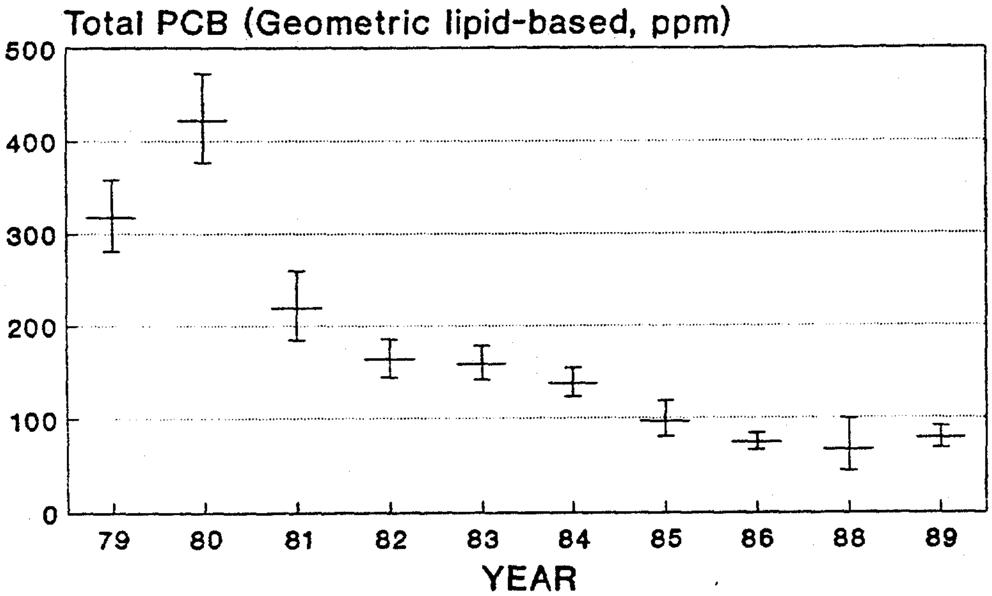


TREND IN PCB
PUMPKINSEED 1+ STILLWATER

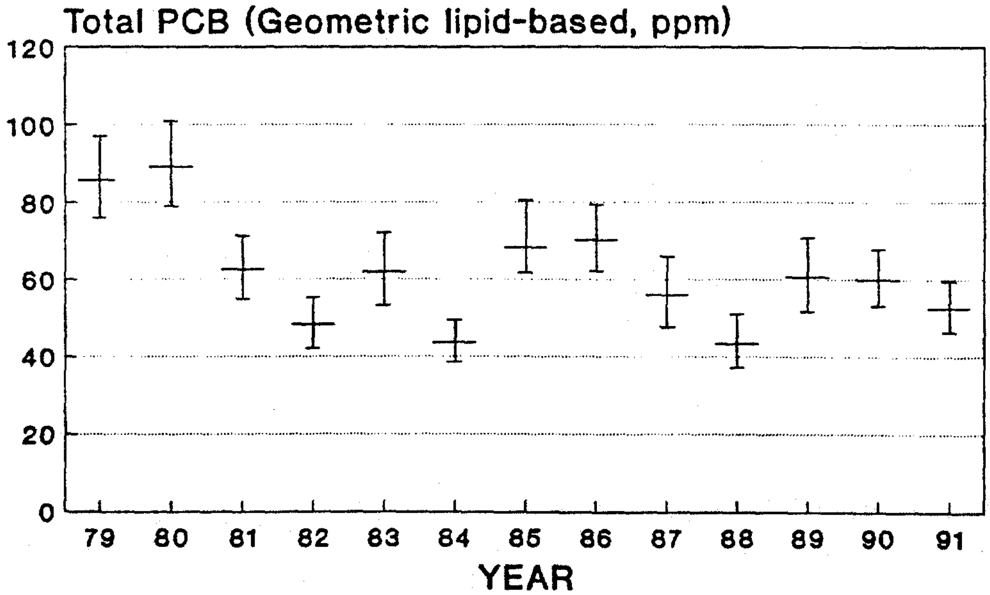
26



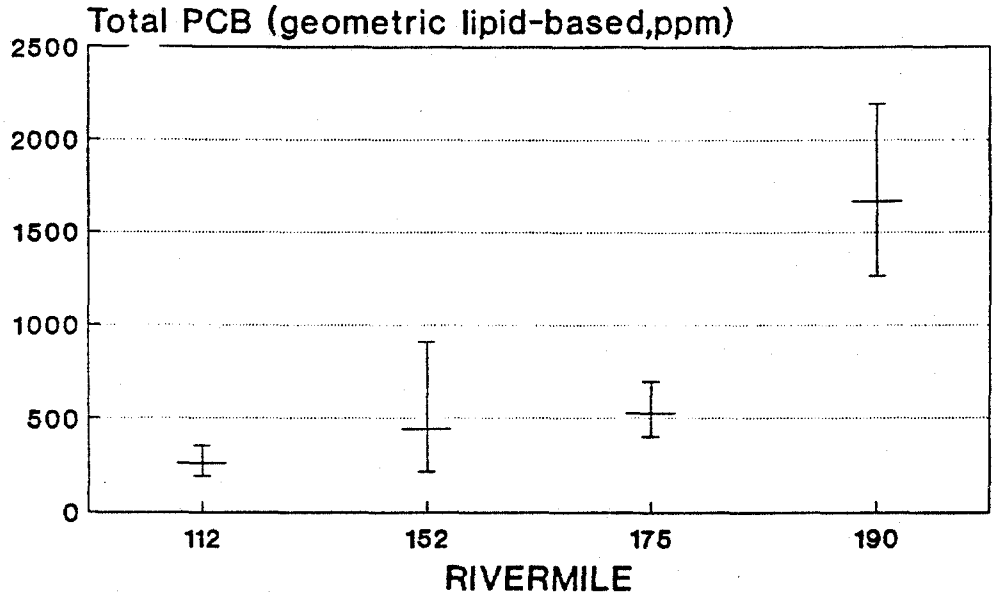
TREND IN PCB
PUMPKINSEED 1+ ALBANY



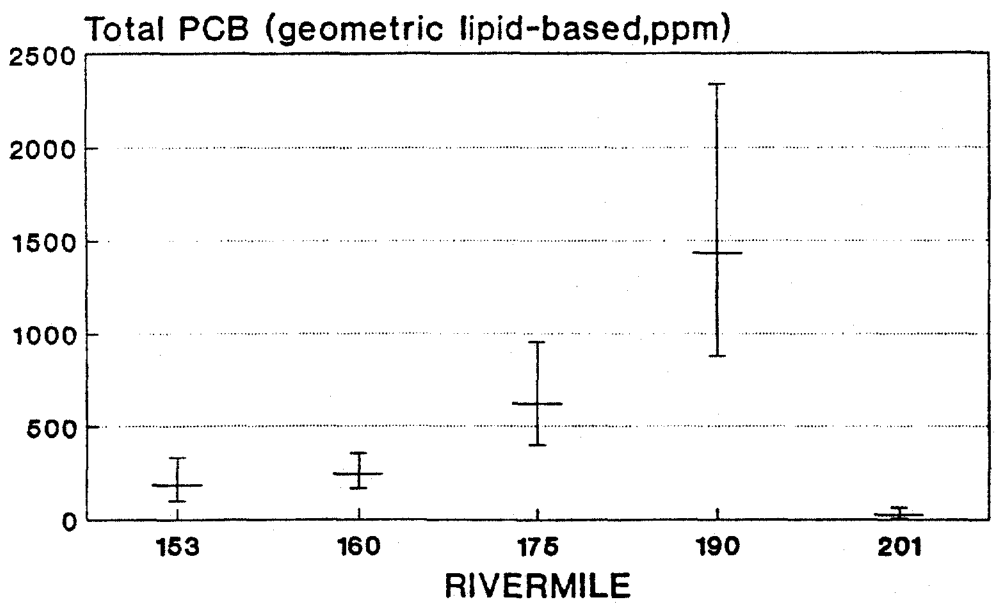
TREND IN PCB
PUMPKINSEED 1+ NEWBURGH



SPATIAL PCB TREND 29
LARGEMOUTH BASS 1990

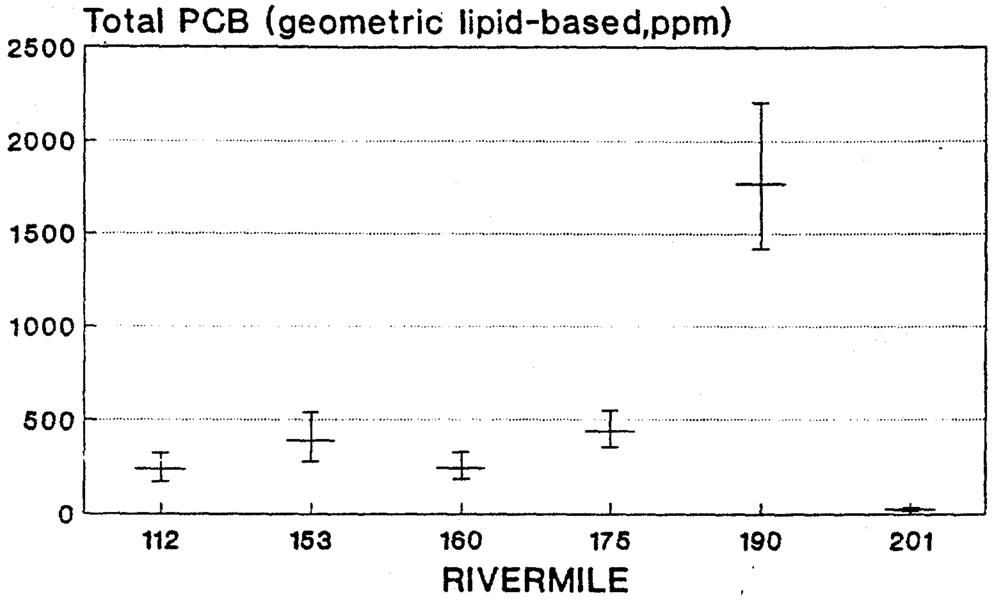


SPATIAL PCB TREND 30
LARGEMOUTH BASS 1991



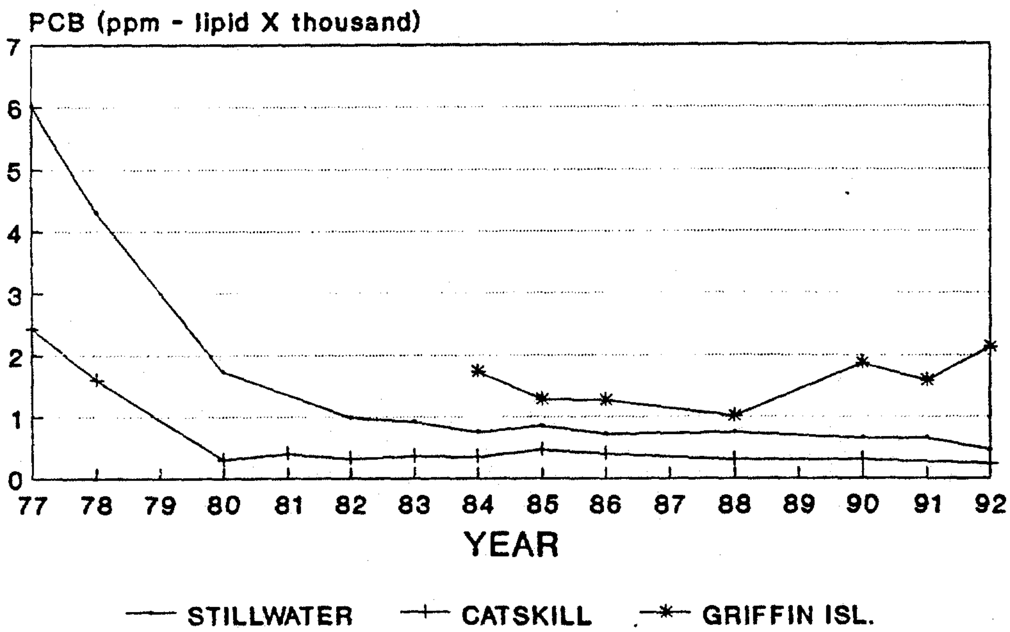
SPATIAL PCB TREND
LARGEMOUTH BASS 1992

31



LARGEMOUTH BASS

32



AROCLOR RATIOS

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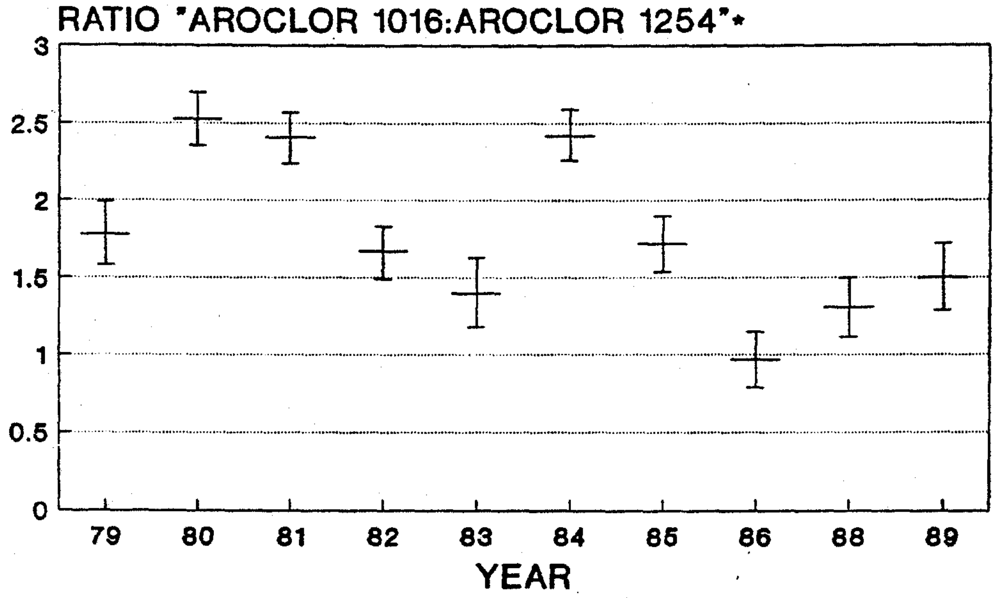
PUMPKINSEED 1+ STILLWATER



*"Ar1016" = "Ar1254" when ratio = 1

AROCLOR RATIOS

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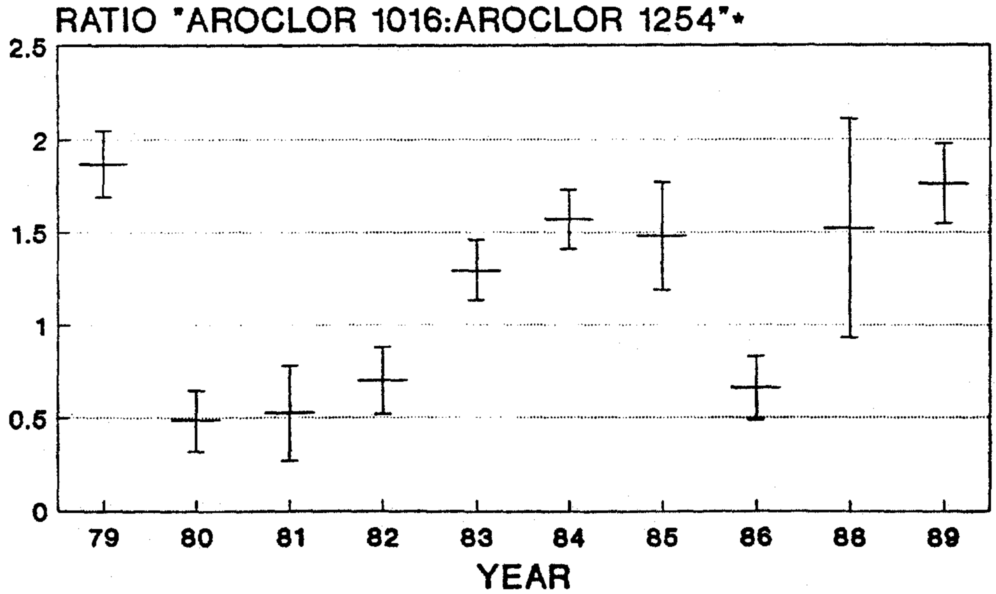
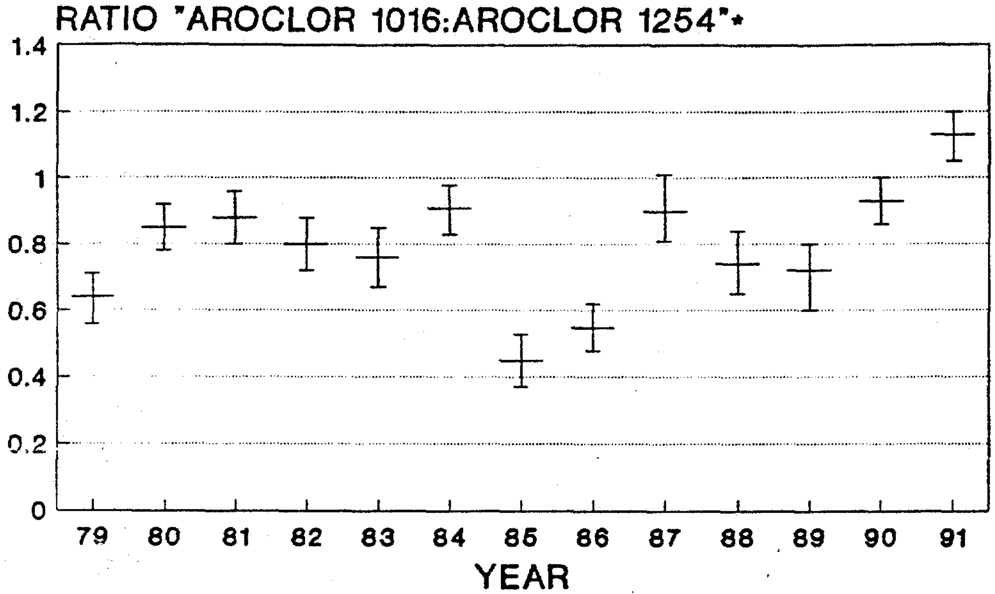
PUMPKINSEED 1+ ALBANY



*"Ar1016" = "Ar1254" when ratio = 1

35

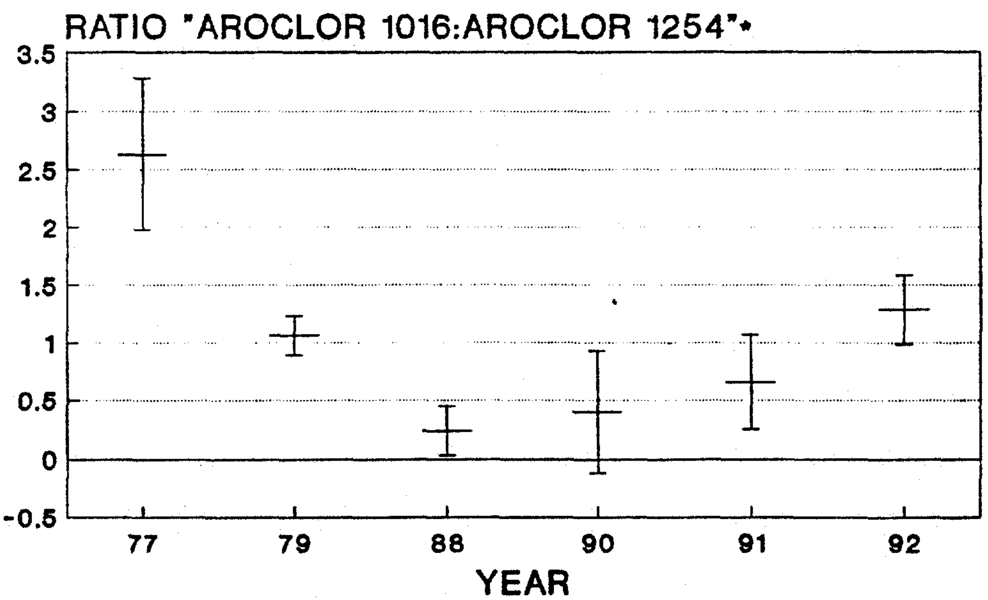
AROCLOR RATIOS
PUMPKINSEED 1+ NEWBURGH



*"Ar1016" = "Ar1254" when ratio = 1

36

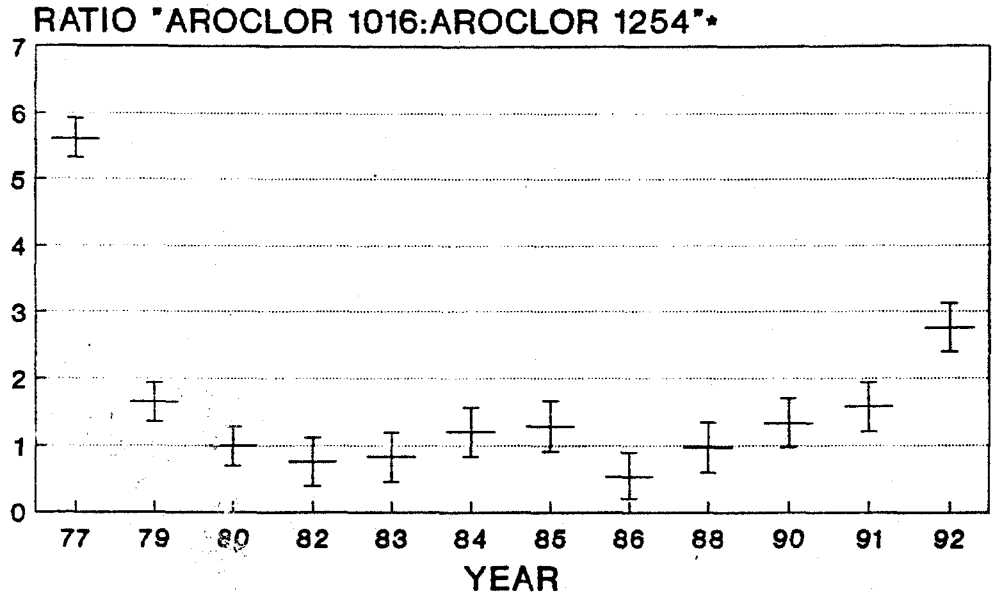
AROCLOR RATIOS
LARGEMOUTH BASS ALBANY



*"Ar1016" = "Ar1254" when ratio = 1

37

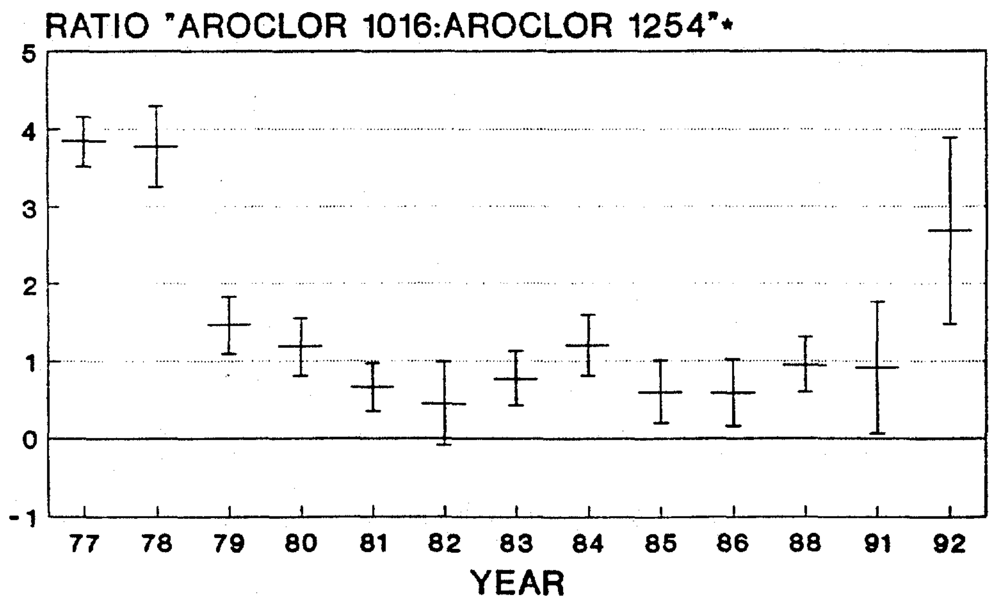
AROCLOR RATIOS
BROWN BULLHEAD STILLWATER



*"Ar1016" = "Ar1254" when ratio = 1

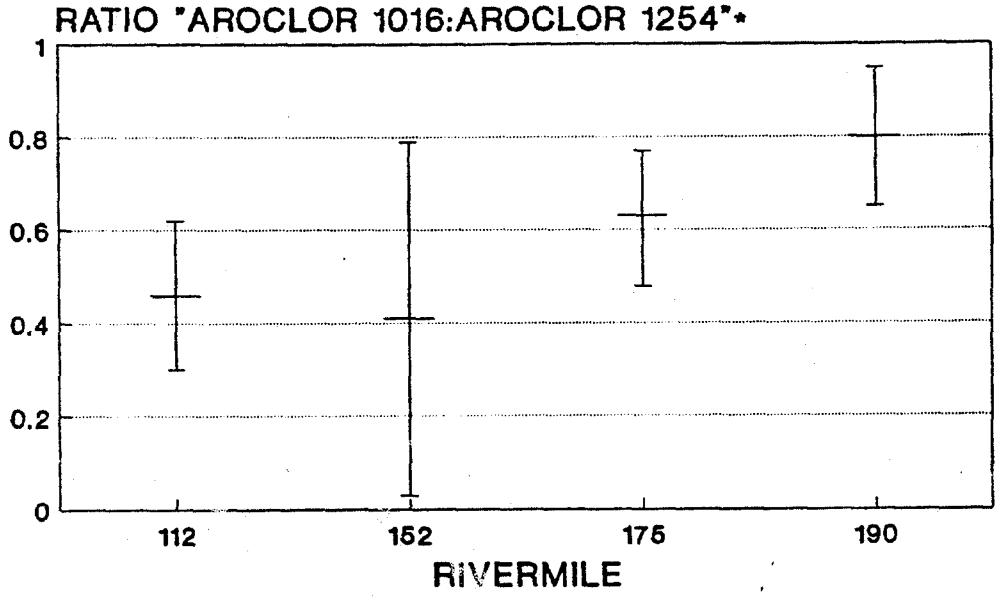
38

AROCLOR RATIOS
BROWN BULLHEAD ALBANY



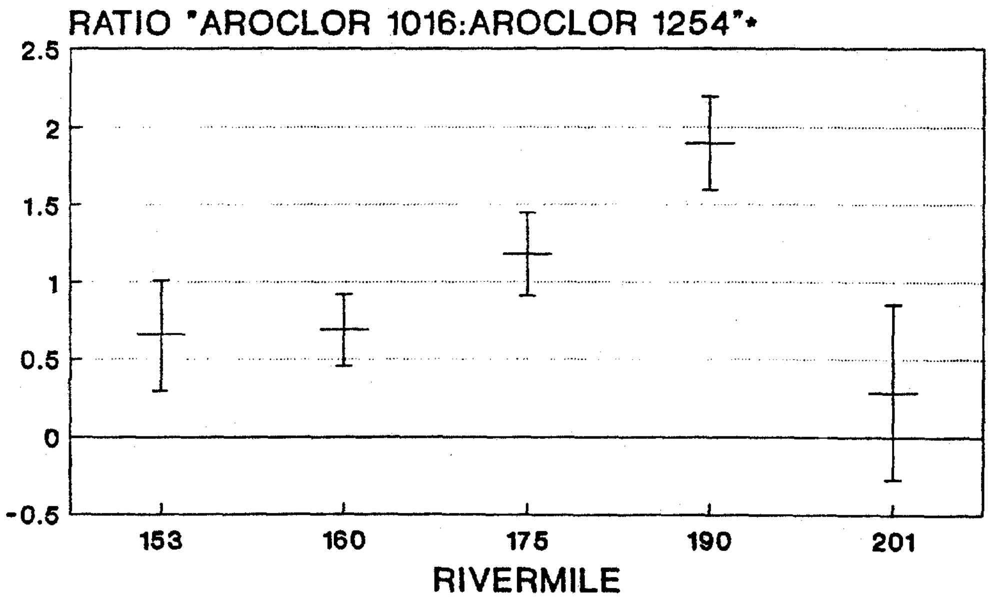
*"Ar1016" = "Ar1254" when ratio = 1

SPATIAL RATIOS 39
LARGEMOUTH BASS 1990



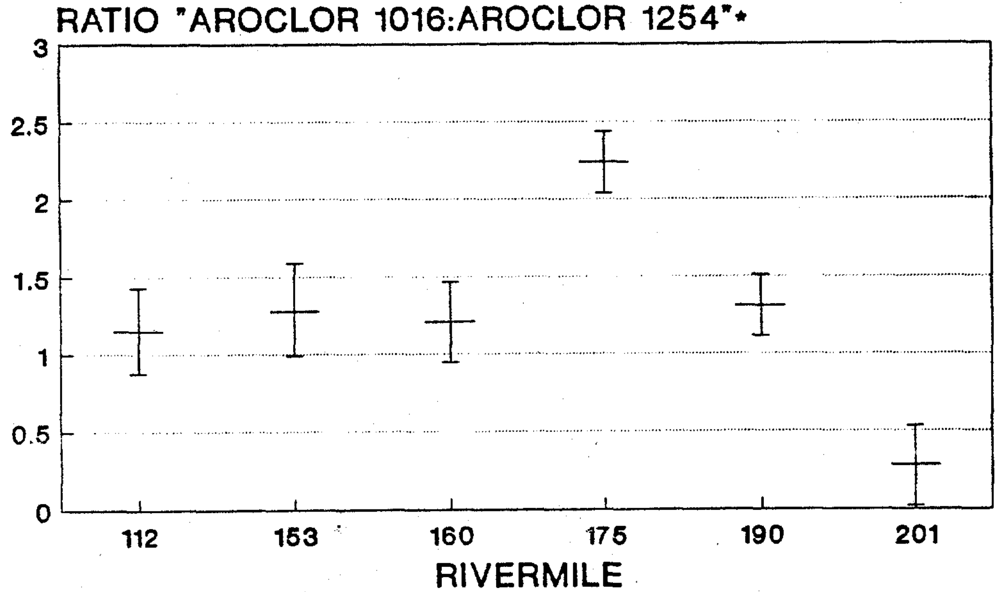
*"Ar1016" = "Ar1254" when ratio = 1

SPATIAL RATIOS 40
LARGEMOUTH BASS 1991



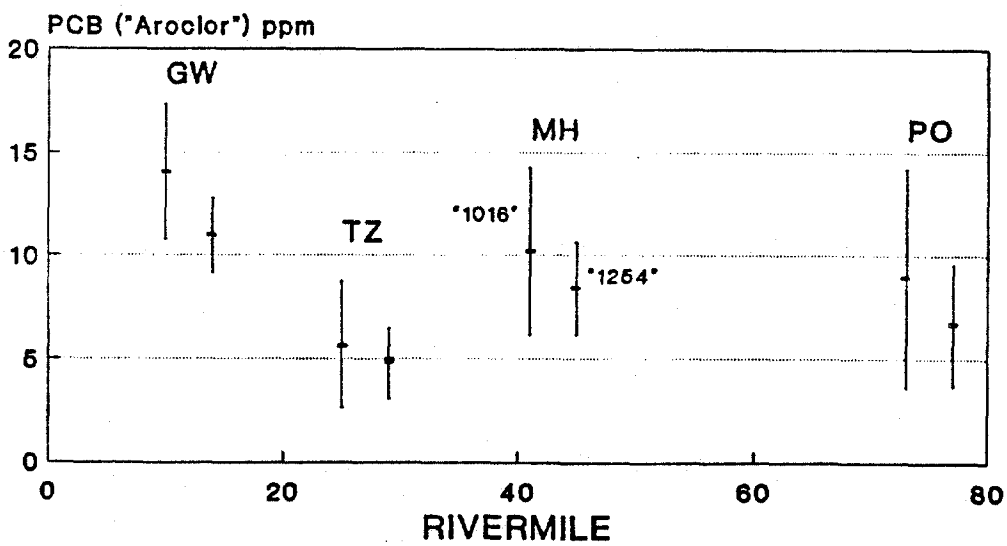
*"Ar1016" = "Ar1254" when ratio = 1

SPATIAL RATIOS 41
LARGEMOUTH BASS 1992



*"Ar1016" = "Ar1254" when ratio = 1

STRIPED BASS 42
LOWER HUDSON RIVER
1978

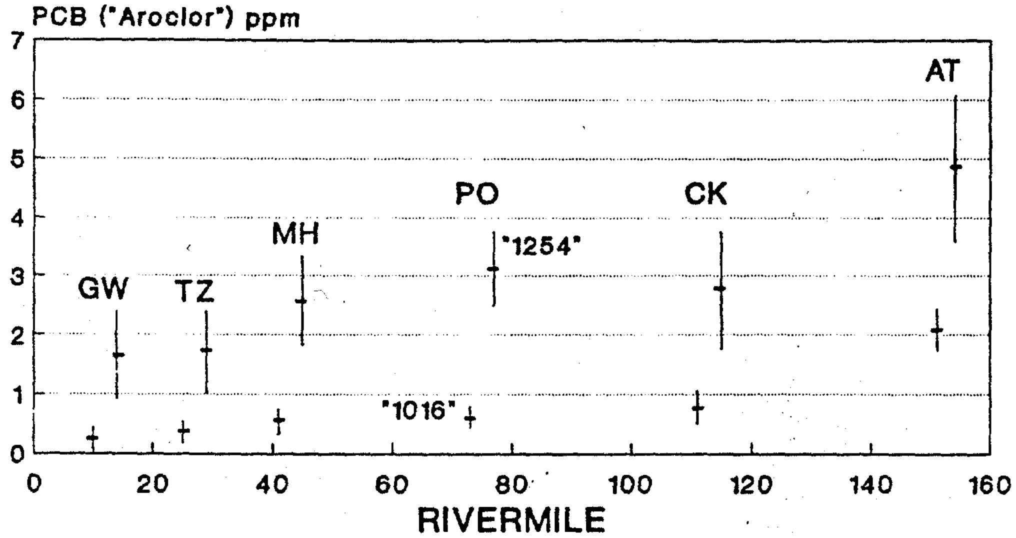


STRIPED BASS

LOWER HUDSON RIVER

1990

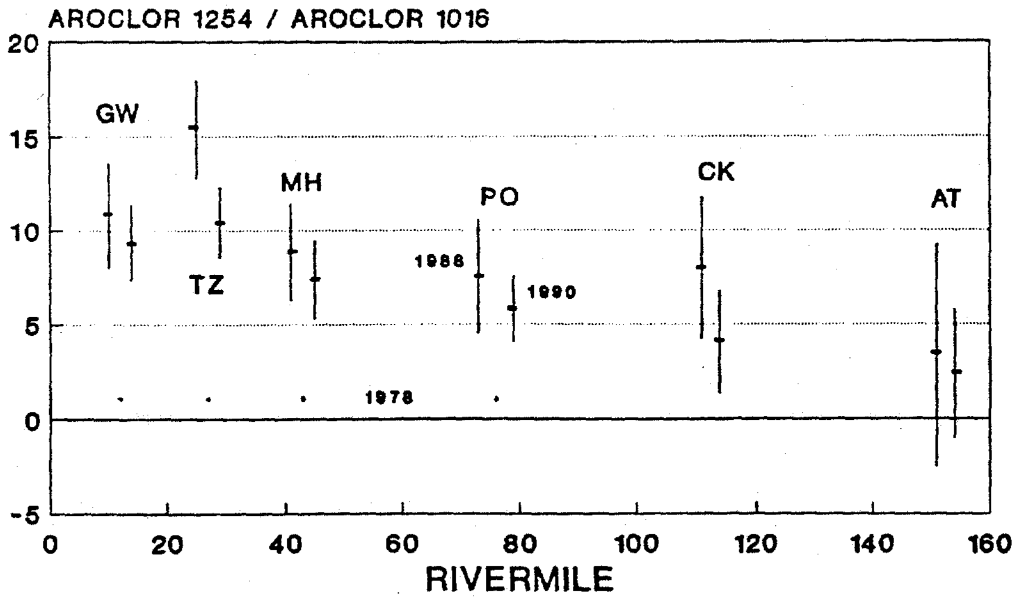
43



STRIPED BASS

LOWER HUDSON RIVER

44



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AROCLOR 1221 STILLWATER
BROWN BULLHEAD BY YEAR

Yr.	No.	Ave.	Minimum	Maximum
77	30	9.56	0.82	31.2
79	30	0.14	<0.10	0.72
80	30	0.25	<0.10	1.73
82	20	1.32	0.13	10.7
83	20	1.21	<0.10	8.79
84	20	0.51	<0.10	4.87
85	19	3.14	<0.10	26.3
86	23	0.26	<0.10	1.3
88	20	2.24	0.08	21.4
90	20	0.04	<0.05	0.17

Concentrations in ppm wet weight

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Table . Comparisons for several variables between spring (May) and fall (December) collections of fish from the Stillwater pool in the Hudson River RM 175 in 1992.

Species	Variable	May Mean±SD	December Mean±SD	t-value
Pumpkinseed	No. analyzed	12	5	
	PCB wet (ppm)	5.94±3.52	7.01±3.96	0.55^{ns}
	PCB lipid (ppm)	476.9±190.1	646.1±116.8	1.83^{ns}
	Ratio "16/54"	2.66±1.05	3.10±1.23	0.76^{ns}
	Length (mm)	210±10	193±33	1.63^{ns}
Brown bullhead	No. analyzed	20	4	
	PCB wet (ppm)	9.66±3.42	8.07±1.83	0.89^{ns}
	PCB lipid (ppm)	275.4±104.3	1027.7±608.1	5.62^{**}
	Ratio "16/54"	2.76±1.34	2.04±0.92	-1.03^{ns}
	Length (mm)	338±16	298.2	-2.30^{*}
	Lipid (%)	4.06±1.99	1.03±0.70	-2.96^{**}
Smallmouth bass	No. analyzed	5	6	
	PCB wet (ppm)	9.93±2.58	10.93±6.08	0.33^{ns}
	PCB lipid (ppm)	813.3±222.4	1002.7±267.7	1.25^{ns}
	Ratio "16/54"	2.01±0.48	2.25±0.67	1.45^{ns}
	Length (mm)	364±38	362±34	0.09^{ns}
Northern pike	No. analyzed	3	8	
	PCB wet (ppm)	3.94±0.51	10.93±1.86	0.22^{ns}
	PCB lipid (ppm)	723.2±403.5	1214.3±282.1	2.32^{*}
	Ratio "16/54"	2.07±0.66	2.34±0.55	0.70^{ns}
	Length	577±140	504±94	-1.01^{ns}

^{ns} P > 0.05; two-tailed t-tests
* P < 0.05
** P < 0.01

Table . Results of PCB analyses from 1991 collections near Newburgh in the Hudson River of white catfish, white perch and American eel.

Variable	White catfish	White perch	American eel
No. analyzed	21	13	22
Total PCB (ppm wet weight)	3.94±1.55	2.91±0.69	4.51±3.04
"Aroclor 1254"	2.74±1.21	1.65±0.34	3.30±2.18
"Aroclor 1016"	1.20±0.46	1.26±0.38	1.21±0.92
PCB (ppm - lipid based)	130.1±77.4	99.9±14.8	65.4±27.0
Lipid (%)	3.58±1.66	3.01±0.93	8.11±5.42
Length (mm)	338±51	173±19	588±95

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SUMMARY
PCB TRENDS IN FISH

- SIGNIFICANT INCREASES FROM 1991 - 1992 GRIFFIN ISLAND (RM 190) TO ALBANY (RM 153)
- PCB COMPOSITION SHIFTS ALSO SIGNIFCANT AS FAR SOUTH AS CATSKILL (RM 112)
- ADDITIONAL 1992 AND 1993 DATA ANTICIPATED - STRIPED BASS, RESIDENT SPECIES, 1+ PKSD
- PCB CONCENTRATIONS RELATIVELY STABLE SINCE 1980, SOME DECLINES WERE APPARENT THRU 1991
- DOWNSTREAM GRADIENTS EVIDENT THRU TIME FOR BOTH PCB CONCENTRATIONS AND AROCLOR COMPOSITION
- STABILITY AND INCREASES RELATED TO, AT LEAST IN PART, SOURCE CONDITION IN VICINITY OF BAKERS FALLS