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# Fish Contamination with PCBs in Lake Hartwell

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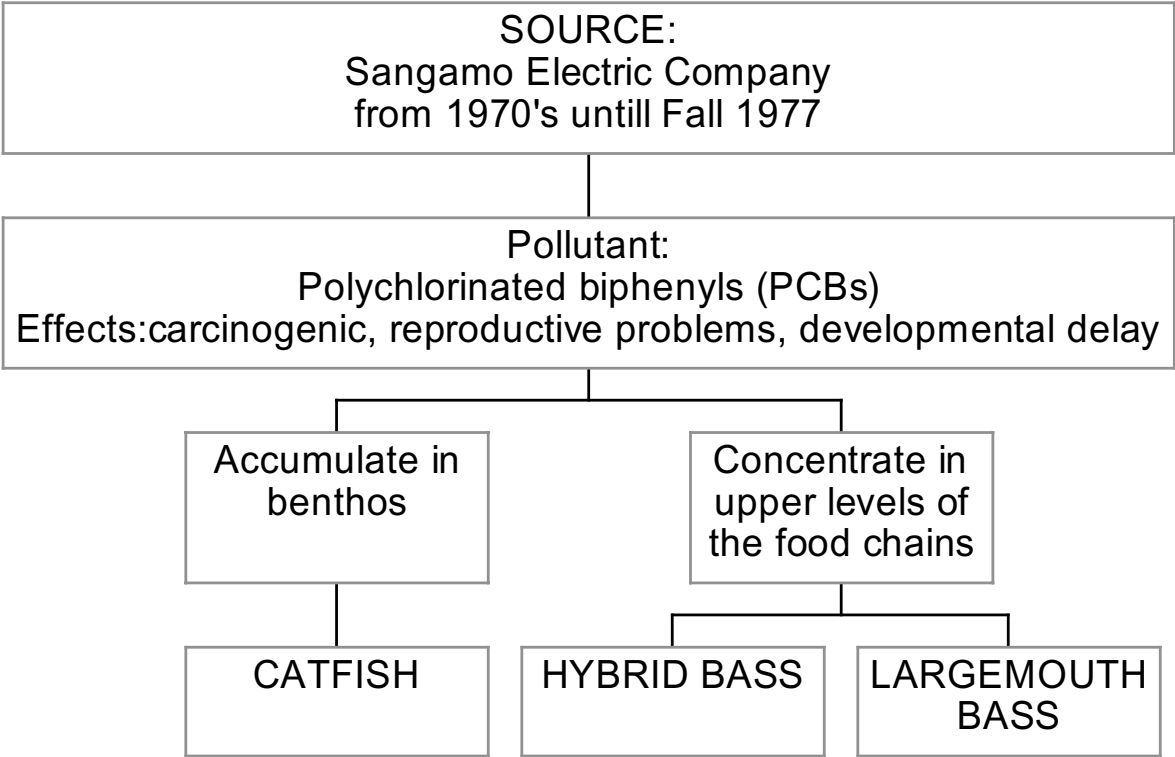
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# Figure 1. Fish Contamination Path



## Figure 2. Fishing Advisory in 1998

### ATTENTION

#### Fish Consumption Advisory- Lake Hartwell

#### SC Department of Health and Environmental Control (SCDHEC)

- All fish from the Seneca River Arm of Lake Hartwell north of SC Highway 24 and 12 Mile Creek should be released and not eaten.
- All fish larger than three (3) pounds taken from the remainder of Lake Hartwell should be released and not eaten.
- Fishing is not prohibited, but SCDHEC advises that these fish not be eaten due to presence of elevated levels of polychlorinated biphenyls (PCBs). Swimming, boating and other water related activities are not restricted by this advisory.

For additional information, contact SCDHEC at:

COLUMBIA    GREENVILLE    ANDERSON

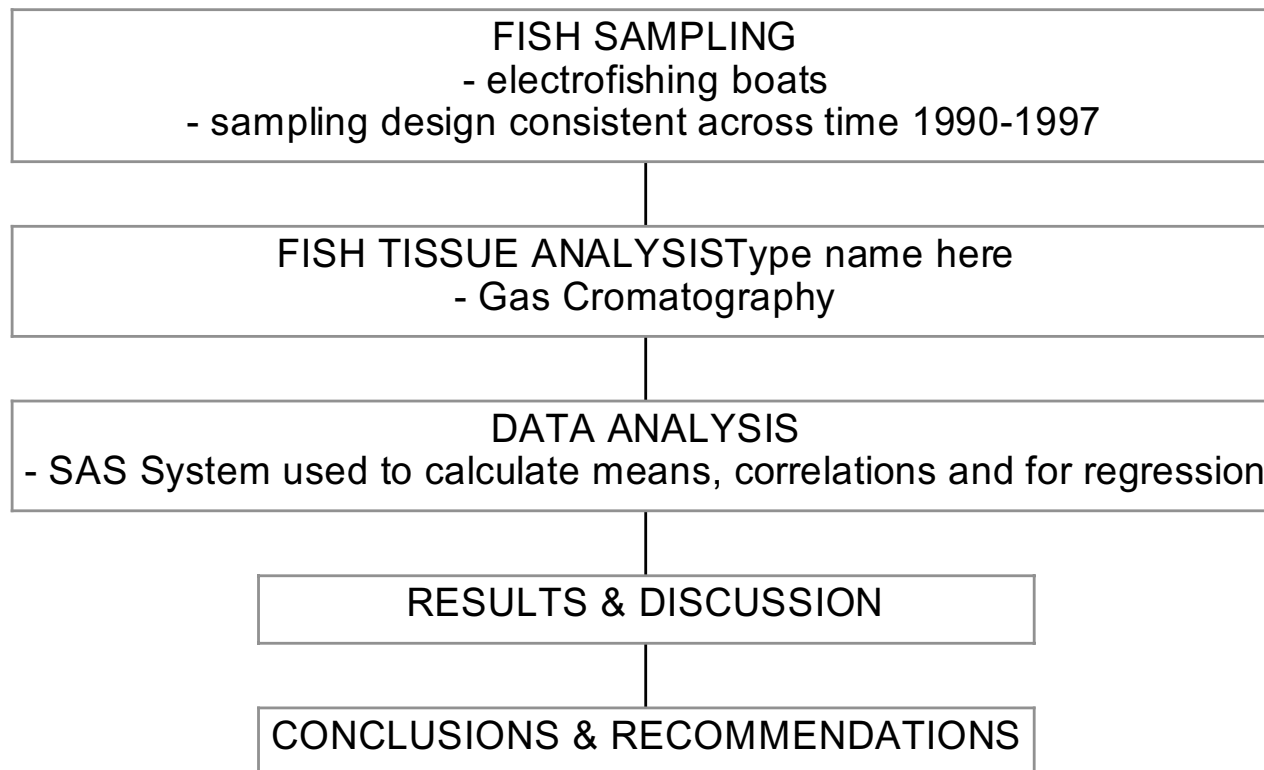
734-5300    242-9850    225-3731

## **Figure 3. Aims and Objectives**

**The purposes of this investigation were:**

- to predict future PCB concentrations, based on recent data;
- to estimate PCB concentration trends as a function of qualitative variables (sex, species, station).

# Figure 4. Methodology



## Figure 5. Best Regression Model

Model: MODEL3					
Dependent Variable: PCBs					
Analysis of Variance					
Source	DF	Sum of squares	Mean square	F Value	Prob>F
Model	5	600.52971	120.10594	7.382	0.0001
Error	668	10869.06257	16.27105		
Corrected total	673	11469.59228			
Root MSE	4.03374	R-square	0.0524		
Dep Mean	3.06984	Adj R-sq	0.0453		
C.V.	131.39914				
Parameter Estimates					
Variable	DF	Parameter estimate	Standard error	T for H0: parameter=0	Prob >  T
INTERCEP	1	63.193295	12.58477892	5.021	0.0001
YEAR	1	-0.551747	0.13300449	-4.148	0.0001
LENGTH	1	-0.022236	0.01006014	-2.210	0.0274
WEIGHT	1	0.008840	0.00363739	2.430	0.0153
PERC_LIP	1	0.175516	0.06304173	2.784	0.0055
W_OVER_L	1	-4.050253	1.83111573	-2.212	0.0273

## Figure 6. Correlations

	<b>PCBs</b>	<b>Year</b>	<b>Length</b>	<b>Weight</b>	<b>lipids %</b>
<b>Year</b>	R = -.078 p = .0071 n = 1177	-	-	-	-
<b>Length</b>	R = .091 p = .0018 n = 1177	R = -.078 p = .0077 n = 1177	-	-	-
<b>Weight</b>	R = .132 p = .0001 n = 1177	R = -.036 p = .2128 n = 1177	R = .868 p = .0001 n = 1177	-	-
<b>% lipids</b>	R = .114 p = .0031 n = 674	R = .203 p = .0001 n = 674	R = .437 p = .0001 n = 674	R = .590 p = .0001 n = 674	-

**Figure 7. Location of Stations and Zones**

<b>STATION</b>	<b>LOCATION</b>	<b>Zone</b>
SV-106	Next point	1
SV-107	Point closest to Schlumberger	1
SV-532	Highway 24	1
SV-535	Below 85	2
SV-641	Tugaloo river	3
SV-642	Dam	2



## Figure 8. PCB Concentrations across Time

Year→ Zone↓	1990	1991	1992	1993	1994	1995	1996	1997
1	8.18	5.34	3.30	3.30	4.24	2.91	4.29	3.67
2	0.69	1.62	0.85	1.68	2.23	2.41	1.85	1.01
3	0.71	1.09	0.58	1.49	2.63	1.25	1.38	1.15

# Figure 9. PCB Concentrations for All Species

Species→ Zone↓	CHC	HYS	LMB	SB	TS
<b>1</b>	2.86	3.70	4.90	4.40	4.58
<b>2</b>	0.63	2.92	0.71	1.96	0.37
<b>3</b>	-	2.75	0.23	-	0.47

# Figure 10. Conclusions

## 1. The best regression model

1.1. The best regression model uses the following variables: year, length of fish, weight of fish, the percentage of lipids contained by fish tissue, and the ratio between weight and length.

1.2. Sex is not a significant predictor.

1.3. Data concerning the other variables should be still collected, in order to be used for other models.

1.4. PCBs are significantly correlated with all the numerical variables: weight, length, percentage of lipids and time.

## 2. Trend

None of the three main species (largemouth bass, hybrid and catfish) is safe for consumption.

## Figure 11. Recommendations

1. Recommendations must be kept in effect; no fish above SC Highway 24 should be eaten, and no fish exceeding three pounds from all over Lake Hartwell should be eaten.
2. New limits have to be established, in order to modify the three pounds limit and account for variation among fish species.
3. The Lake Hartwell monitoring program should be continued in order to collect data on a yearly basis and should be expanded to include data for crappie and striped bass.