

SECTION 3 RESIDENT FISH

3.1 TREND MONITORING SURVEY

3.1.1 Collection Summary

The fall resident fish trend monitoring program was performed between October 14 through 25 to continue observation of annual trends in fish PCB concentrations in the Study Area. Sampling efforts as part of this monitoring program were conducted in the Massena Power Canal and five stretches of the lower Grasse River: Background; Upper; Middle; Lower; and Mouth (**Figure 3-1**). The resident fish species targeted during this program included adult (≥ 25 centimeters [cm]) smallmouth bass (*Micropterus dolomieu*), adult (≥ 25 cm) brown bullhead (*Ameiurus nebulosus*), adult spottail shiner, and young-of-year (YOY) (< 6.5 cm) spottail shiners (*Notropis hudsonius*). Resident fish were collected using a boat-mounted electrofishing unit. All sampling was performed in accordance with the 2002 SRS Work Plan (Alcoa, April 2002a).

Seventeen adult smallmouth bass and 18 brown bullhead were targeted for collection from the Upper, Middle, Lower, and Mouth Stretches of the river. However, targeted fish quantities were not available in three of these stretches as summarized in **Table 3-1**. The lack of smallmouth bass in the Mouth Stretch was attributed to the limited amount of suitable habitat in this stretch. Although vegetation that supported fish in previous years from the Lower and Middle Stretches were still present, numbers of fish were not sufficient to obtain complete samples from these areas. Although the exact reason for the lack of fish in these areas is unknown, an abrupt drop in air temperature from 56 degrees Fahrenheit (°F) in the week prior to sampling to 33 °F during sampling activities, may have driven fish into deeper water, beyond the effective range of the electrofishing unit.

Table 3-1 provides a summary of the number of samples that were targeted and collected within each reach. Adult smallmouth bass and brown bullhead sample collection locations are provided on **Figures 3-1** and **3-2**, respectively.

Spottail shiners were collected from four locations within the Study Area: near Outfall 001; near the Unnamed Tributary; at the mouth of the river; and within the Background Stretch (see **Figure 3-3**). Three adult and three YOY whole-body composite samples were targeted from each location. However, adult spottail shiners were not available in sufficient quantities to complete the targeted composite samples at any location. Three YOY composite samples, ranging from 16 to 45 fish per sample, were collected from each location.

A total of 151 fish samples (not including QA/QC samples) were packaged and shipped to NEA for analysis of PCB Aroclor and lipids in accordance with the 2002 SRS Work Plan (Alcoa, April 2002a): 68 smallmouth bass fillets (skin-on, scales-off); 71 brown bullhead fillets (skin-off); and 12 spottail shiner whole-body composite samples. Following receipt of the PCB Aroclor results, a subset of the fish tissue samples (total of 18 samples) was selected for PCB congener analysis. QA/QC samples consisted of one MS/MSD sample per 20 samples collected; these samples were prepared by the laboratory from submitted fish samples.

3.1.2 Results

PCB (Aroclor) Results

Resident fish data can be found on the CD-ROM in Appendix A in the data tables titled resfish_aro and resfish_pk. PCB results also are listed in **Table 3-2**.

PCB levels in adult smallmouth bass are variable and do not exhibit a distinct spatial trend. Bass from the Upper, Middle, and Lower Stretches contained average PCB concentrations of 5.5, 2.3, and 8.9 milligrams per kilogram wet [mg/kg] (**Figure 3-4, panel A**). The single sample collected in the Mouth Stretch had a wet-weight PCB concentration of 10 mg/kg. Average PCB concentrations of bass samples collected in the Power Canal and from the

Background Stretch were about 0.8 and 0.15² mg/kg wet, respectively. Lipid-normalized PCB levels exhibited similar patterns in the Upper, Middle, and Lower Stretches; average PCB concentrations were 338, 126, and 523 mg/kg lipid, respectively (**Figure 3-4, panel D**). The lipid-based PCB concentration for the sample from the Mouth Stretch was about 304 mg/kg lipid. Average lipid-based PCB levels of samples from the Power Canal and in the Background Stretch were 38 and 14 mg/kg lipid, respectively.

PCB concentrations in adult brown bullhead also are variable and do not show a spatial trend. On a wet-weight basis, bullhead from the Upper, Middle, Lower, and Mouth Stretches had average PCB levels between 2.7, 6.9, 5.3, and 6.0 mg/kg, respectively (**Figure 3-4, panel B**). PCB levels in all brown bullhead samples from the Background Stretch were reported below the detection limit of 0.05 mg/kg. Average lipid-normalized PCB concentrations in the Upper, Middle, Lower, and Mouth Stretches were 131, 215, 255, and 212 mg/kg lipid, respectively (**Figure 3-4, panel E**).

All spottail shiner samples collected in the Background Stretch contained non-detectable levels of PCBs. Shiner collected near Outfall 001, near the Unnamed Tributary, and at the Mouth had average PCB levels of 2.7, 3.7, and 3.1 mg/kg wet, respectively (**Figure 3-4, panel C**). Average lipid-normalized PCB concentrations were comparable among all three locations (91, 108, and 92 mg/kg lipid near Outfall 001, near the Unnamed Tributary, and at the Mouth, respectively) (**Figure 3-4, panel F**).

PCB (Congener) Results

Of the 151 samples analyzed for PCB by Aroclor, 18 also were quantified for PCB congeners. These samples were selected to provide comparisons for the range of PCB levels and lipid contents observed in the data. Comparison of the Aroclor-based and congener-based estimates of total PCB concentration for these samples is provided in **Figure 3-5**.

²PCBs were reported below the detection limit in 3 of 5 samples; non-detect values were set to half the detection limit prior to averaging.

Overall, total PCBs estimated via Aroclor analysis were higher than the congener-based estimates by about 8% (relative percent difference of 12%). However, larger differences between Aroclor and congener estimates were observed for samples with total PCB concentrations above 5 mg/kg wet (relative to those with total PCB levels below 5 mg/kg wet). For samples with total PCBs above 5 mg/kg, Aroclor values averaged about 18% higher than congener values (relative percent difference of 16%); for samples with total PCBs below 5 mg/kg wet, Aroclor values were higher by about 3% (relative percent difference of 9%).

Average PCB homolog distributions for each species in each location are presented in **Figure 3-6**. Average homolog distributions in smallmouth bass were variable, but differences among locations were not evident; the homolog distribution of a sample from one location was within the range of distributions of samples from other locations. For brown bullhead and spottail shiner samples, homolog distributions exhibited less variability (relative to smallmouth bass) and were similar among all locations. On average, over 97 percent of the total PCB concentration in the fish samples was comprised of PCBs with three or more chlorines (tri-through nona-CBs), with mono- and di-CBs comprising the remaining three percent.

Comparison to Historical Trends

Historical trend data for smallmouth bass are presented in **Figure 3-7**. In the Upper Stretch, average lipid-based PCBs in 2002 are the second lowest on record (lowest was observed in 2000); however, overlapping error bars indicate that differences are not statistically significant. Average lipid-based PCBs in 2002 are the lowest on record in the Middle Stretch. Within the Lower Stretch, average lipid-based PCBs exhibit a general increase since 1998 although overlapping error bars indicate differences are not statistically significant. Average lipid-based PCBs in 2002 are almost a factor of four lower than those measured in 1991 in the Power Canal. These differences are significantly significant; however, comparison is limit to two data sets (1991 and 2002).

Historical trend data for brown bullhead are shown in **Figure 3-8**. PCBs levels are variable but exhibit a general decline between 1993 and 2002 at all locations. Average lipid-

normalized PCBs measured in 2002 are the lowest on record for the entire lower river (i.e., Upper, Middle, and Lower Stretches). The differences in PCBs in bullhead from the Lower Stretch are not statistically significant between 1998 and 2002.

Historical trend data for spottail shiner are presented in **Figure 3-9**. As noted previously, no data were available for adult spottail shiner in 2002 since sufficient quantities were not available to satisfy the composite sample size. PCB levels in YOY spottail shiner collected near Outfall 001 in 2002 are similar to those from 2001. The small difference observed between years is not statistically significant.

**GRASSE RIVER STUDY AREA
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**Table 3-1
2002 Supplemental Remedial Studies Program - Summary Report
2002 Resident Fish Collection Summary -
Number of Samples Collected/Number of Samples Targeted**

Resident Fish Species	Grasse River Stretch ¹					
	Background	Upper	Middle	Lower	Mouth	Power Canal
Smallmouth Bass	5/5	17/17	17/17	11/17	1/17	17/17
Brown Bullhead	4/5	18/18	13/18	18/18	18/18	Not targeted

Notes:

1. Collection locations for smallmouth bass and brown bullhead are provided on Figures 3-1 and 3-2, respectively.
2. Targeted YOY spottail shiner samples (3 composites from each location) were collected at all locations (near Outfall 001, near the Unnamed Tributary, at the mouth of the River, and within the Background Stretch - locations provided on Figure 3-3), however, at every location, sufficient quantities of adult spottail shiners were not present.

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Table 3-2
2002 Supplemental Remedial Studies Program - Summary Report
Resident Fish Data
Subset of data tables: resfish_aro and resfish_peak

Sample ID	Species	Location	Length [cm]	Weight [g]	Percent Lipid	Total PCBs [mg/kg wet]	
						Aroclor	Congener
FS1-130-BB	Brown Bullhead	Background Stretch	27.0	283	1.28	-0.06	---
FS1-131-BB	Brown Bullhead	Background Stretch	28.9	342	0.90	-0.05	---
FS1-132-BB	Brown Bullhead	Background Stretch	26.6	299	1.05	-0.05	---
FS1-133-BB	Brown Bullhead	Background Stretch	24.8	213	0.81	-0.05	---
FS2-203-BB	Brown Bullhead	Upper Stretch	26.0	222	0.81	1.40	---
FS2-204-BB	Brown Bullhead	Upper Stretch	29.5	339	1.79	3.84	---
FS2-205-BB	Brown Bullhead	Upper Stretch	26.4	241	1.56	4.36	---
FS2-206-BB	Brown Bullhead	Upper Stretch	31.9	526	2.03	2.28	---
FS2-207-BB	Brown Bullhead	Upper Stretch	32.3	531	3.32	3.26	---
FS2-208-BB	Brown Bullhead	Upper Stretch	23.8	606	4.65	5.29	---
FS2-209-BB	Brown Bullhead	Upper Stretch	32.6	514	2.28	2.03	2.06
FS2-210-BB	Brown Bullhead	Upper Stretch	31.3	454	5.17	4.95	---
FS2-211-BB	Brown Bullhead	Upper Stretch	28.0	317	1.45	1.55	---
FS2-212-BB	Brown Bullhead	Upper Stretch	26.0	221	0.71	1.22	---
FS2-213-BB	Brown Bullhead	Upper Stretch	26.2	247	1.26	2.58	---
FS2-214-BB	Brown Bullhead	Upper Stretch	28.2	303	2.41	4.31	---
FS2-215-BB	Brown Bullhead	Upper Stretch	28.2	330	2.73	1.96	---
FS2-216-BB	Brown Bullhead	Upper Stretch	25.8	271	2.11	2.58	---
FS2-217-BB	Brown Bullhead	Upper Stretch	25.3	204	0.97	-0.05	---
FS2-218-BB	Brown Bullhead	Upper Stretch	27.7	346	1.71	1.53	---
FS2-219-BB	Brown Bullhead	Upper Stretch	26.0	239	0.74	0.77	---
FS2-220-BB	Brown Bullhead	Upper Stretch	28.3	353	3.11	4.13	---
FS3-200-BB	Brown Bullhead	Middle Stretch	28.0	253	1.85	4.19	---
FS3-201-BB	Brown Bullhead	Middle Stretch	27.3	255	1.56	4.55	4.56
FS3-202-BB	Brown Bullhead	Middle Stretch	27.9	321	2.92	3.71	---
FS3-203-BB	Brown Bullhead	Middle Stretch	31.4	491	3.22	8.31	---
FS3-204-BB	Brown Bullhead	Middle Stretch	30.8	473	4.73	10.46	---
FS3-205-BB	Brown Bullhead	Middle Stretch	31.9	423	3.37	7.95	---
FS3-206-BB	Brown Bullhead	Middle Stretch	36.5	685	7.72	12.92	---
FS3-207-BB	Brown Bullhead	Middle Stretch	27.5	298	2.07	3.88	---
FS3-208-BB	Brown Bullhead	Middle Stretch	29.6	384	3.98	9.03	---
FS3-209-BB	Brown Bullhead	Middle Stretch	31.4	445	2.12	5.33	---
FS3-210-BB	Brown Bullhead	Middle Stretch	28.6	334	1.02	2.41	---
FS3-211-BB	Brown Bullhead	Middle Stretch	27.6	290	2.04	2.80	---
FS3-212-BB	Brown Bullhead	Middle Stretch	29.2	329	6.16	14.25	---

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Table 3-2
2002 Supplemental Remedial Studies Program - Summary Report
Resident Fish Data
Subset of data tables: resfish_aro and resfish_peak

Sample ID	Species	Location	Length [cm]	Weight [g]	Percent Lipid	Total PCBs [mg/kg wet] Aroclor	Congener
FS4-166-BB	Brown Bullhead	Lower Stretch	30.0	372	3.28	12.17	---
FS4-167-BB	Brown Bullhead	Lower Stretch	26.0	181	0.69	1.53	---
FS4-168-BB	Brown Bullhead	Lower Stretch	28.1	320	2.35	4.94	---
FS4-169-BB	Brown Bullhead	Lower Stretch	30.3	395	1.37	3.95	---
FS4-170-BB	Brown Bullhead	Lower Stretch	29.7	359	3.06	5.83	---
FS4-171-BB	Brown Bullhead	Lower Stretch	29.3	454	2.30	6.29	---
FS4-172-BB	Brown Bullhead	Lower Stretch	30.2	377	1.58	4.76	---
FS4-173-BB	Brown Bullhead	Lower Stretch	32.4	493	4.89	7.85	6.69
FS4-174-BB	Brown Bullhead	Lower Stretch	29.1	324	1.90	7.19	---
FS4-175-BB	Brown Bullhead	Lower Stretch	27.2	265	1.54	3.97	---
FS4-176-BB	Brown Bullhead	Lower Stretch	30.2	361	4.66	3.71	---
FS4-177-BB	Brown Bullhead	Lower Stretch	32.1	513	2.07	3.83	---
FS4-178-BB	Brown Bullhead	Lower Stretch	29.0	327	1.51	2.41	---
FS4-179-BB	Brown Bullhead	Lower Stretch	28.1	324	3.50	5.36	---
FS4-180-BB	Brown Bullhead	Lower Stretch	29.1	355	2.07	5.74	---
FS4-181-BB	Brown Bullhead	Lower Stretch	32.0	427	1.08	3.95	---
FS4-182-BB	Brown Bullhead	Lower Stretch	25.2	209	0.86	3.38	---
FS4-183-BB	Brown Bullhead	Lower Stretch	28.0	319	2.56	8.17	---
FS5-001-BB	Brown Bullhead	Mouth Stretch	31.1	402	2.64	2.37	---
FS5-002-BB	Brown Bullhead	Mouth Stretch	30.5	366	1.25	6.26	---
FS5-003-BB	Brown Bullhead	Mouth Stretch	31.8	454	3.70	4.86	---
FS5-004-BB	Brown Bullhead	Mouth Stretch	29.0	337	3.33	4.82	---
FS5-005-BB	Brown Bullhead	Mouth Stretch	31.7	475	5.90	6.59	---
FS5-006-BB	Brown Bullhead	Mouth Stretch	30.9	468	3.02	9.99	---
FS5-007-BB	Brown Bullhead	Mouth Stretch	32.0	530	6.52	9.19	---
FS5-008-BB	Brown Bullhead	Mouth Stretch	30.8	425	4.60	3.00	---
FS5-009-BB	Brown Bullhead	Mouth Stretch	31.1	440	2.77	5.13	---
FS5-010-BB	Brown Bullhead	Mouth Stretch	30.6	406	2.44	6.26	---
FS5-011-BB	Brown Bullhead	Mouth Stretch	29.7	393	1.82	3.44	---
FS5-012-BB	Brown Bullhead	Mouth Stretch	28.9	365	1.98	5.46	---
FS5-013-BB	Brown Bullhead	Mouth Stretch	29.8	390	2.28	6.69	---
FS5-014-BB	Brown Bullhead	Mouth Stretch	30.0	389	2.56	4.90	---
FS5-015-BB	Brown Bullhead	Mouth Stretch	32.8	485	6.08	12.94	11.89
FS5-016-BB	Brown Bullhead	Mouth Stretch	29.5	411	2.54	6.46	---
FS5-017-BB	Brown Bullhead	Mouth Stretch	29.9	372	1.75	4.11	---
FS5-018-BB	Brown Bullhead	Mouth Stretch	34.2	554	2.68	5.62	---
FS1-132-SB	Smallmouth Bass	Background Stretch	34.0	513	0.95	0.47	---
FS1-133-SB	Smallmouth Bass	Background Stretch	43.6	1525	1.44	0.22	---
FS1-134-SB	Smallmouth Bass	Background Stretch	37.4	740	1.01	-0.06	---
FS1-135-SB	Smallmouth Bass	Background Stretch	33.2	519	1.56	-0.05	---
FS1-136-SB	Smallmouth Bass	Background Stretch	28.8	339	1.00	-0.05	---

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Table 3-2
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Resident Fish Data
Subset of data tables: resfish_aro and resfish_peak

Sample ID	Species	Location	Length [cm]	Weight [g]	Percent Lipid	Total PCBs [mg/kg wet]	Aroclor	Congener
FS2-194-SB	Smallmouth Bass	Upper Stretch	34.6	704	2.70	25.56	---	---
FS2-195-SB	Smallmouth Bass	Upper Stretch	23.9	593	1.49	3.65	---	---
FS2-196-SB	Smallmouth Bass	Upper Stretch	31.5	478	0.66	1.44	---	---
FS2-197-SB	Smallmouth Bass	Upper Stretch	43.4	1164	1.38	8.01	---	---
FS2-198-SB	Smallmouth Bass	Upper Stretch	34.0	721	2.72	1.10	---	---
FS2-199-SB	Smallmouth Bass	Upper Stretch	43.3	1245	1.33	1.62	---	---
FS2-200-SB	Smallmouth Bass	Upper Stretch	33.1	530	0.72	1.47	---	---
FS2-201-SB	Smallmouth Bass	Upper Stretch	38.3	900	2.54	5.81	---	---
FS2-202-SB	Smallmouth Bass	Upper Stretch	40.3	1010	1.52	17.89	15.11	---
FS2-203-SB	Smallmouth Bass	Upper Stretch	36.4	789	1.08	1.68	---	1.87
FS2-204-SB	Smallmouth Bass	Upper Stretch	40.1	1033	2.12	5.33	---	---
FS2-205-SB	Smallmouth Bass	Upper Stretch	37.5	793	1.51	2.86	---	---
FS2-206-SB	Smallmouth Bass	Upper Stretch	42.3	1331	1.82	2.58	---	---
FS2-207-SB	Smallmouth Bass	Upper Stretch	28.0	289	1.09	3.33	---	---
FS2-208-SB	Smallmouth Bass	Upper Stretch	36.9	629	1.27	5.60	---	---
FS2-209-SB	Smallmouth Bass	Upper Stretch	38.1	751	0.66	1.97	---	---
FS2-210-SB	Smallmouth Bass	Upper Stretch	38.5	967	1.88	3.92	---	---
FS3-201-SB	Smallmouth Bass	Middle Stretch	31.8	535	1.87	3.16	---	---
FS3-202-SB	Smallmouth Bass	Middle Stretch	35.9	664	2.02	0.74	---	---
FS3-203-SB	Smallmouth Bass	Middle Stretch	35.1	749	1.60	2.84	---	---
FS3-204-SB	Smallmouth Bass	Middle Stretch	34.2	581	0.74	0.63	---	---
FS3-205-SB	Smallmouth Bass	Middle Stretch	36.1	619	1.61	0.36	---	0.45
FS3-206-SB	Smallmouth Bass	Middle Stretch	40.2	1090	1.72	3.82	---	---
FS3-207-SB	Smallmouth Bass	Middle Stretch	40.3	1037	2.06	2.75	---	---
FS3-208-SB	Smallmouth Bass	Middle Stretch	38.6	826	1.91	3.54	---	---
FS3-209-SB	Smallmouth Bass	Middle Stretch	37.9	857	1.91	0.40	---	---
FS3-210-SB	Smallmouth Bass	Middle Stretch	35.5	716	1.19	2.34	---	---
FS3-211-SB	Smallmouth Bass	Middle Stretch	37.0	797	5.23	5.61	---	---
FS3-212-SB	Smallmouth Bass	Middle Stretch	28.0	336	0.86	0.31	---	---
FS3-213-SB	Smallmouth Bass	Middle Stretch	31.5	499	1.44	0.64	---	---
FS3-214-SB	Smallmouth Bass	Middle Stretch	33.6	600	1.64	4.03	---	3.69
FS3-215-SB	Smallmouth Bass	Middle Stretch	29.2	392	1.46	0.86	---	---
FS3-216-SB	Smallmouth Bass	Middle Stretch	31.5	442	1.15	0.19	---	---
FS3-217-SB	Smallmouth Bass	Middle Stretch	41.7	1132	1.61	6.28	---	---
FS4-169-SB	Smallmouth Bass	Lower Stretch	43.5	1366	3.13	9.14	---	---
FS4-170-SB	Smallmouth Bass	Lower Stretch	42.9	985	0.70	8.83	---	7.22
FS4-171-SB	Smallmouth Bass	Lower Stretch	41.2	1188	1.69	1.76	---	---
FS4-172-SB	Smallmouth Bass	Lower Stretch	39.1	971	2.90	5.89	---	---
FS4-173-SB	Smallmouth Bass	Lower Stretch	35.2	780	2.89	8.83	---	---
FS4-174-SB	Smallmouth Bass	Lower Stretch	30.0	465	1.74	2.95	---	---
FS4-175-SB	Smallmouth Bass	Lower Stretch	28.0	319	0.88	2.17	---	---
FS4-176-SB	Smallmouth Bass	Lower Stretch	40.3	1140	2.80	26.03	---	---
FS4-177-SB	Smallmouth Bass	Lower Stretch	41.4	1185	1.33	24.82	---	18.31
FS4-178-SB	Smallmouth Bass	Lower Stretch	33.0	575	2.38	2.73	---	2.88
FS4-179-SB	Smallmouth Bass	Lower Stretch	29.0	388	1.84	4.82	---	---

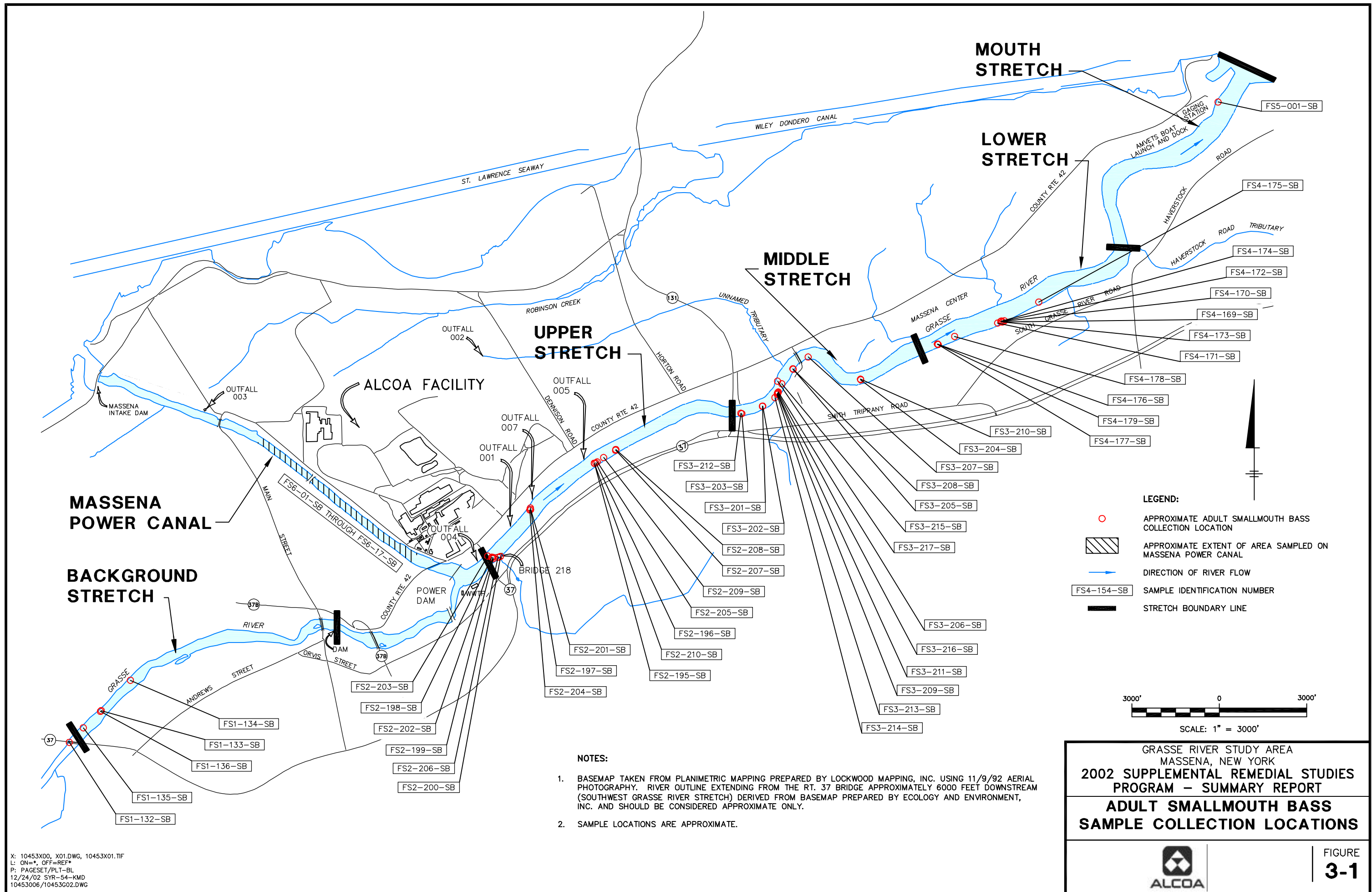
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Table 3-2
2002 Supplemental Remedial Studies Program - Summary Report
Resident Fish Data
Subset of data tables: resfish_aro and resfish_peak

Sample ID	Species	Location	Length [cm]	Weight [g]	Percent Lipid	Total PCBs [mg/kg wet] Aroclor	Congener
FS5-001-SB	Smallmouth Bass	Mouth Stretch	44.0	1381	3.28	9.97	9.30
FS6-001-SB	Smallmouth Bass	Power Canal	46.1	1359	2.01	1.55	---
FS6-002-SB	Smallmouth Bass	Power Canal	39.0	880	2.22	1.21	---
FS6-003-SB	Smallmouth Bass	Power Canal	36.9	796	4.55	0.95	0.87
FS6-004-SB	Smallmouth Bass	Power Canal	37.1	794	2.19	0.96	---
FS6-005-SB	Smallmouth Bass	Power Canal	36.8	841	3.96	0.98	---
FS6-006-SB	Smallmouth Bass	Power Canal	35.0	699	3.95	0.56	0.54
FS6-007-SB	Smallmouth Bass	Power Canal	37.3	739	1.80	0.86	---
FS6-008-SB	Smallmouth Bass	Power Canal	36.1	647	1.70	1.51	1.24
FS6-009-SB	Smallmouth Bass	Power Canal	34.0	551	1.38	0.69	---
FS6-010-SB	Smallmouth Bass	Power Canal	31.5	506	3.87	0.42	---
FS6-011-SB	Smallmouth Bass	Power Canal	35.0	544	0.85	0.32	---
FS6-012-SB	Smallmouth Bass	Power Canal	33.7	524	1.00	0.20	---
FS6-013-SB	Smallmouth Bass	Power Canal	31.3	482	4.38	0.71	---
FS6-014-SB	Smallmouth Bass	Power Canal	31.4	382	1.75	1.06	---
FS6-015-SB	Smallmouth Bass	Power Canal	30.3	438	1.83	0.29	---
FS6-016-SB	Smallmouth Bass	Power Canal	27.7	293	1.35	0.45	---
FS6-017-SB	Smallmouth Bass	Power Canal	29.2	327	2.05	0.66	---
FS1-025-SS	Spottail Shiner	Background Stretch	3.7 - 5.6	16.4	4.66	-0.05	---
FS1-026-SS	Spottail Shiner	Background Stretch	4.1 - 5.7	16.2	4.38	-0.06	---
FS1-027-SS	Spottail Shiner	Background Stretch	3.7 - 5.9	16.8	4.37	-0.06	---
FS2-039-SS	Spottail Shiner	Near Outfall 001	4.7 - 5.4	16.4	2.82	2.12	2.14
FS2-040-SS	Spottail Shiner	Near Outfall 001	4.8 - 5.9	33.6	3.44	3.66	---
FS2-041-SS	Spottail Shiner	Near Outfall 001	3.3 - 4.6	16.7	2.43	2.20	---
FS3-031-SS	Spottail Shiner	Near Unnamed Tributary	4.6 - 6.4	19.8	4.29	3.85	---
FS3-032-SS	Spottail Shiner	Near Unnamed Tributary	3.4 - 4.5	23.7	3.10	3.52	---
FS3-033-SS	Spottail Shiner	Near Unnamed Tributary	3.8 - 4.5	21.6	2.99	3.60	3.59
FS5-025-SS	Spottail Shiner	At the Mouth	4.7 - 5.5	17.5	4.05	3.40	2.58
FS5-026-SS	Spottail Shiner	At the Mouth	4.5 - 5.4	15.0	2.92	2.83	---
FS5-027-SS	Spottail Shiner	At the Mouth	4.2 - 4.7	23.1	3.29	3.18	---

Notes:

1. Tissue type: brown bullhead - individual fillet, skin-off; smallmouth bass - individual fillet, skin-on, scales-off; spottail shiner - whole body composite
2. Age: brown bullhead and smallmouth bass - adult; spottail shiner - young-of-year
3. Negative numbers indicate the concentration was reported below the detection limit (DL), i.e. -0.051 means the concentration was less than the DL of 0.051 milligrams per kilogram wet weight
4. --- indicates parameter not measured




LEGEND:

- APPROXIMATE ADULT SMALLMOUTH BASS COLLECTION LOCATION
- ▨ APPROXIMATE EXTENT OF AREA SAMPLED ON MASSENA POWER CANAL
- DIRECTION OF RIVER FLOW
- FS4-154-SB SAMPLE IDENTIFICATION NUMBER
- STRETCH BOUNDARY LINE

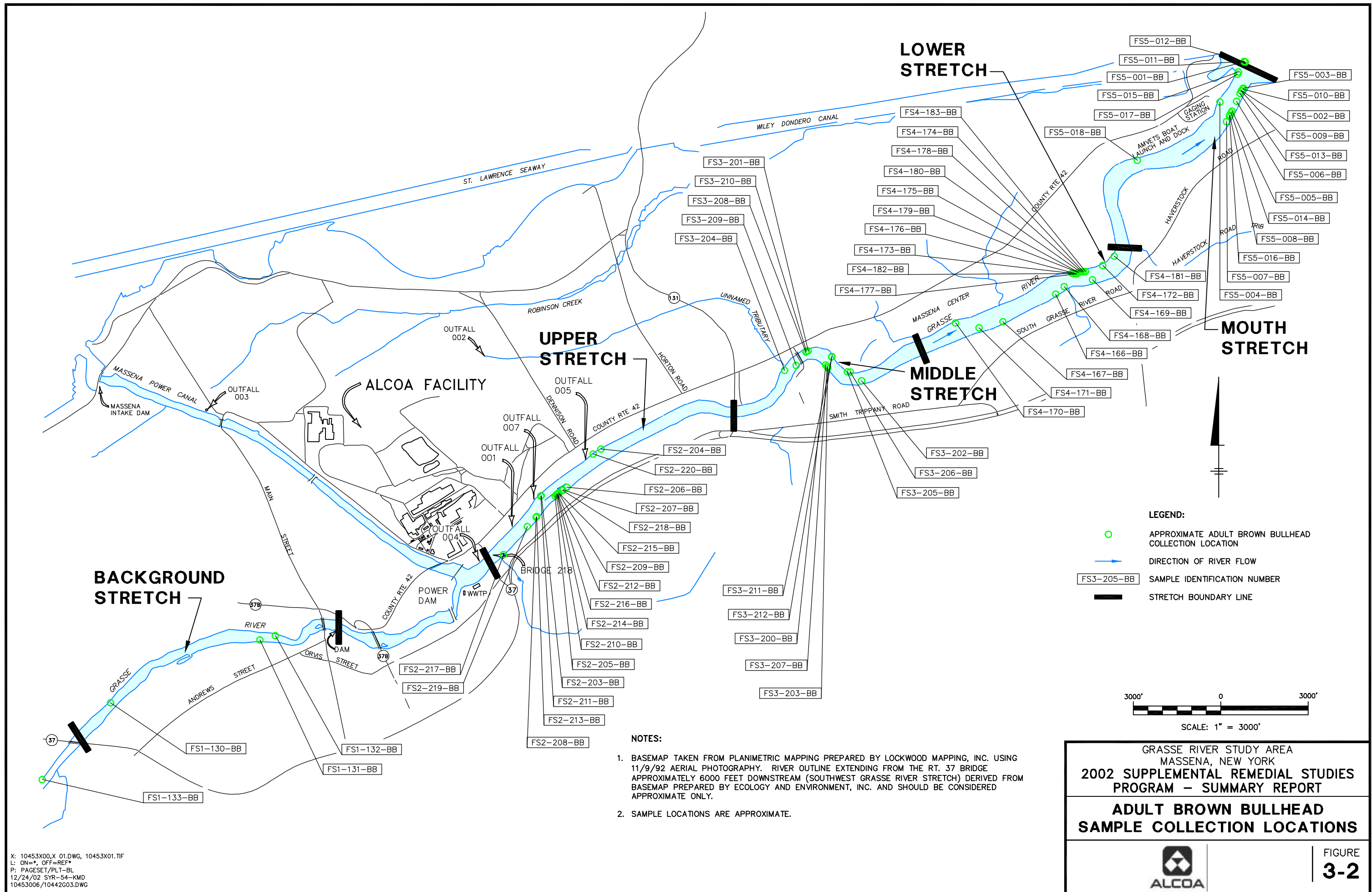
3000' 0 3000'
SCALE: 1" = 3000'

- NOTES:**
- BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. RIVER OUTLINE EXTENDING FROM THE RT. 37 BRIDGE APPROXIMATELY 6000 FEET DOWNSTREAM (SOUTHWEST GRASSE RIVER STRETCH) DERIVED FROM BASEMAP PREPARED BY ECOLOGY AND ENVIRONMENT, INC. AND SHOULD BE CONSIDERED APPROXIMATE ONLY.
 - SAMPLE LOCATIONS ARE APPROXIMATE.

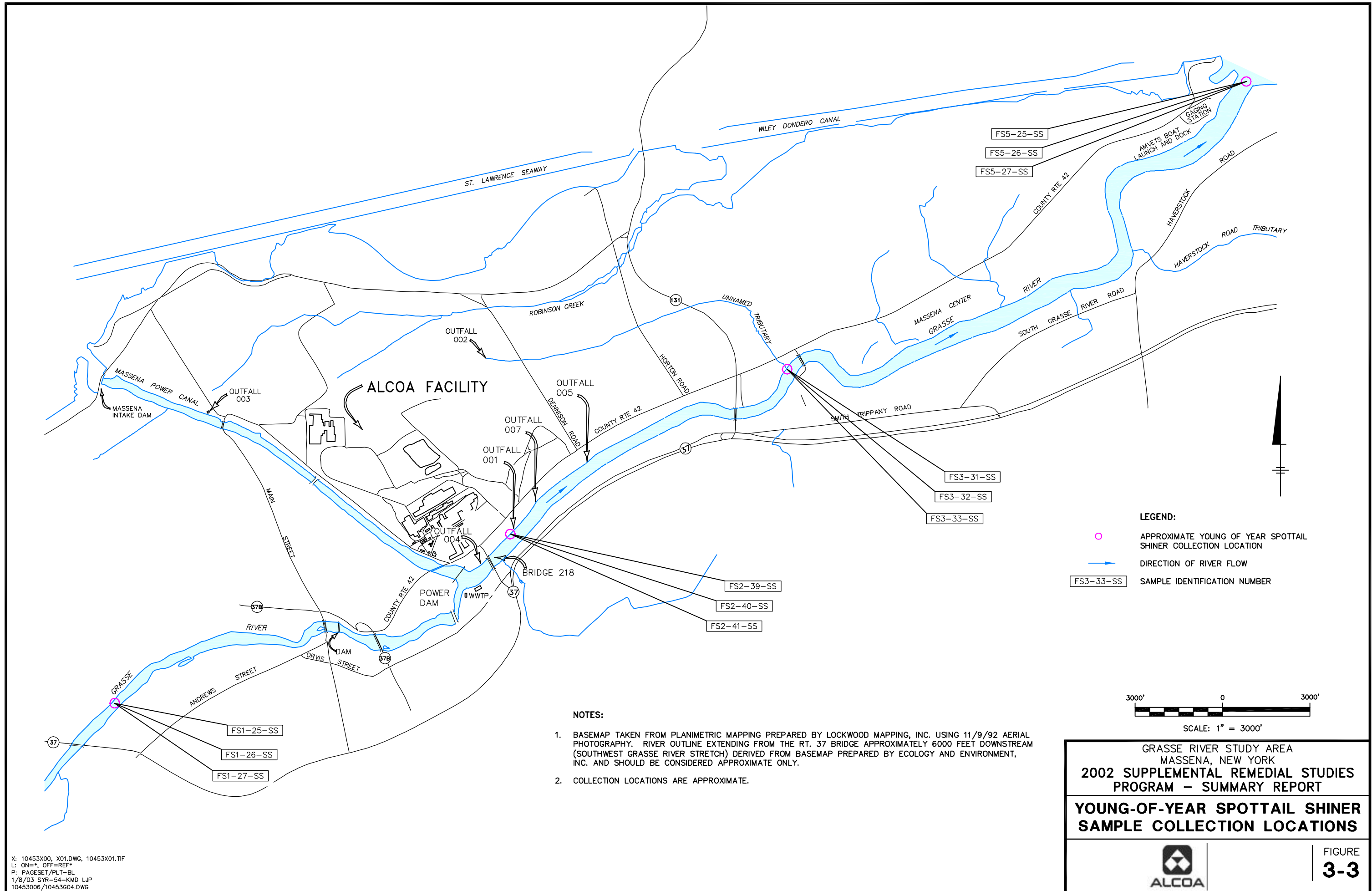
GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
2002 SUPPLEMENTAL REMEDIAL STUDIES PROGRAM – SUMMARY REPORT
ADULT SMALLMOUTH BASS SAMPLE COLLECTION LOCATIONS

 **FIGURE 3-1**

X: 10453X00, X01.DWG, 10453X01.TIF
L: ON=*, OFF=REF*
P: PAGESET/PLT-BL
12/24/02 SYR-54-KMD
10453006/10453002.DWG

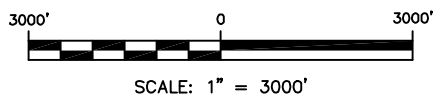


X: 10453X00,X 01.DWG, 10453X01.TIF
 L: ON=*, OFF=REF*
 P: PAGESET/PLT-BL
 12/24/02 SYR-54-KMD
 10453006/10442603.DWG



LEGEND:

- APPROXIMATE YOUNG OF YEAR SPOTTAIL SHINER COLLECTION LOCATION
- DIRECTION OF RIVER FLOW
- FS3-33-SS SAMPLE IDENTIFICATION NUMBER



- NOTES:**
1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. RIVER OUTLINE EXTENDING FROM THE RT. 37 BRIDGE APPROXIMATELY 6000 FEET DOWNSTREAM (SOUTHWEST GRASSE RIVER STRETCH) DERIVED FROM BASEMAP PREPARED BY ECOLOGY AND ENVIRONMENT, INC. AND SHOULD BE CONSIDERED APPROXIMATE ONLY.
 2. COLLECTION LOCATIONS ARE APPROXIMATE.

GRASSE RIVER STUDY AREA
 MASSENA, NEW YORK
**2002 SUPPLEMENTAL REMEDIAL STUDIES
 PROGRAM – SUMMARY REPORT**
**YOUNG-OF-YEAR SPOTTAIL SHINER
 SAMPLE COLLECTION LOCATIONS**



FIGURE
3-3

X: 10453X00, X01.DWG, 10453X01.TIF
 L: ON=*, OFF=REF*
 P: PAGESET/PLT-BL
 1/8/03 SYR-54-KMD LJP
 10453006/10453G04.DWG

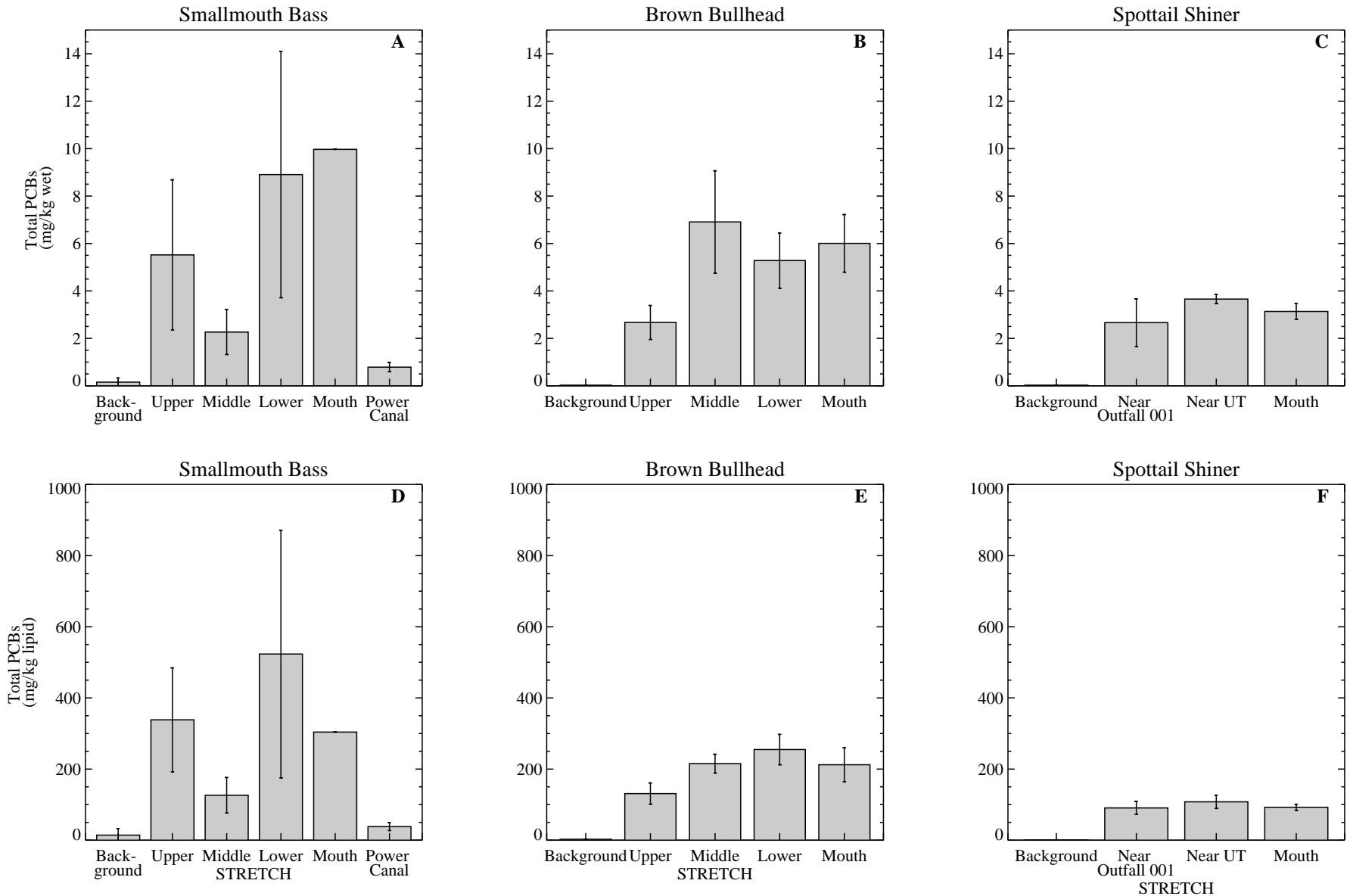


Figure 3-4. Average Aroclor-Based PCB Concentrations in Fish Collected in Fall 2002

Values represent arithmetic averages (+/- 2 standard errors). Non-detect values set to half the detection limit prior to averaging. Smallmouth bass and brown bullhead - adult individual filets; spottail shiner - young-of-year whole body composites

Data table: [resfish_aro](#)

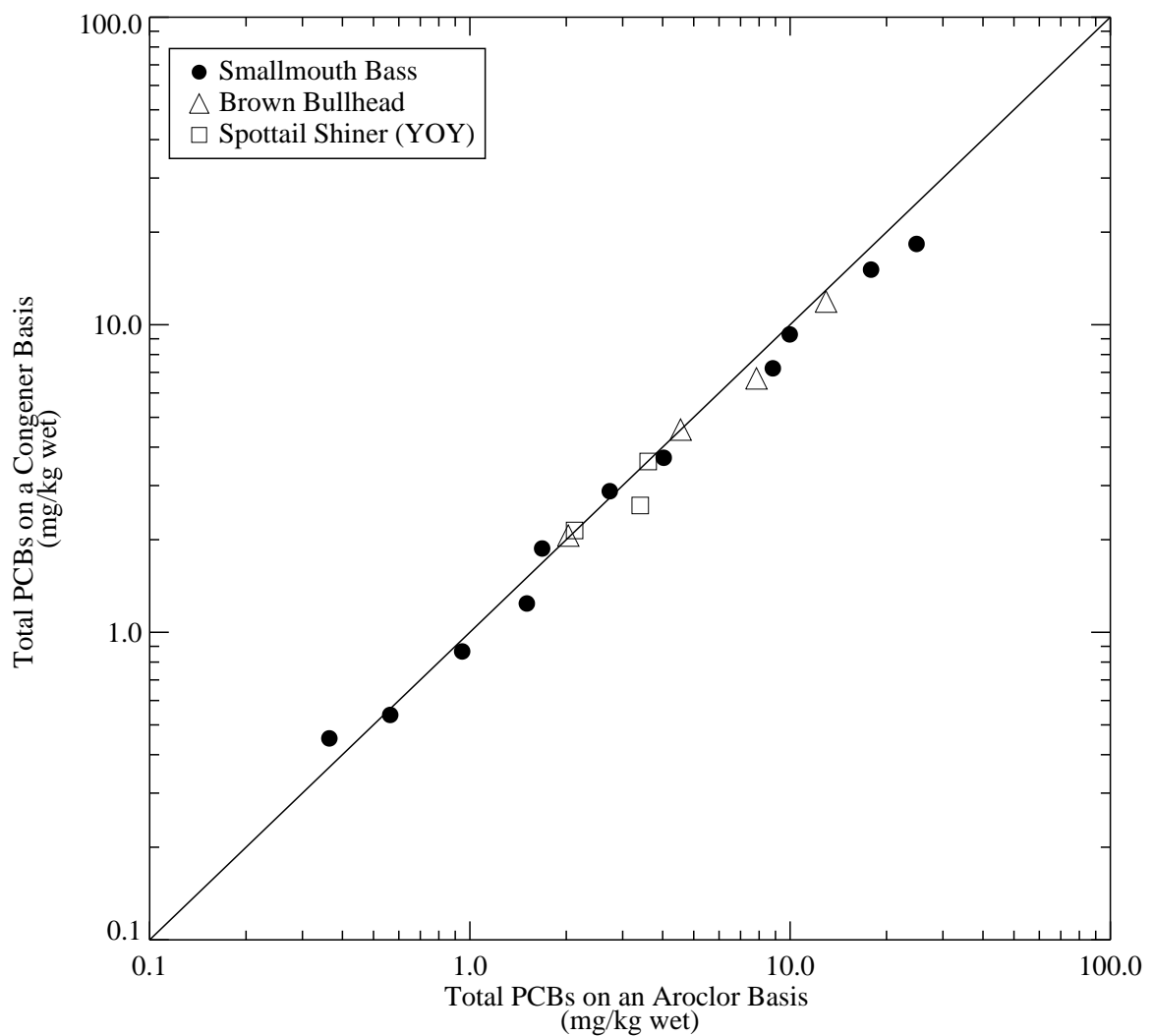


Figure 3-5. Comparison of Resident Fish PCBs Quantified on an Aroclor and Congener Basis

Grasse River Study Area - Supplemental Remedial Studies 2002

Approximately 12% of samples selected for congener analysis based on species, location, and ranges of PCB and lipid content.

Data tables: resfish_aro, resfish_peak

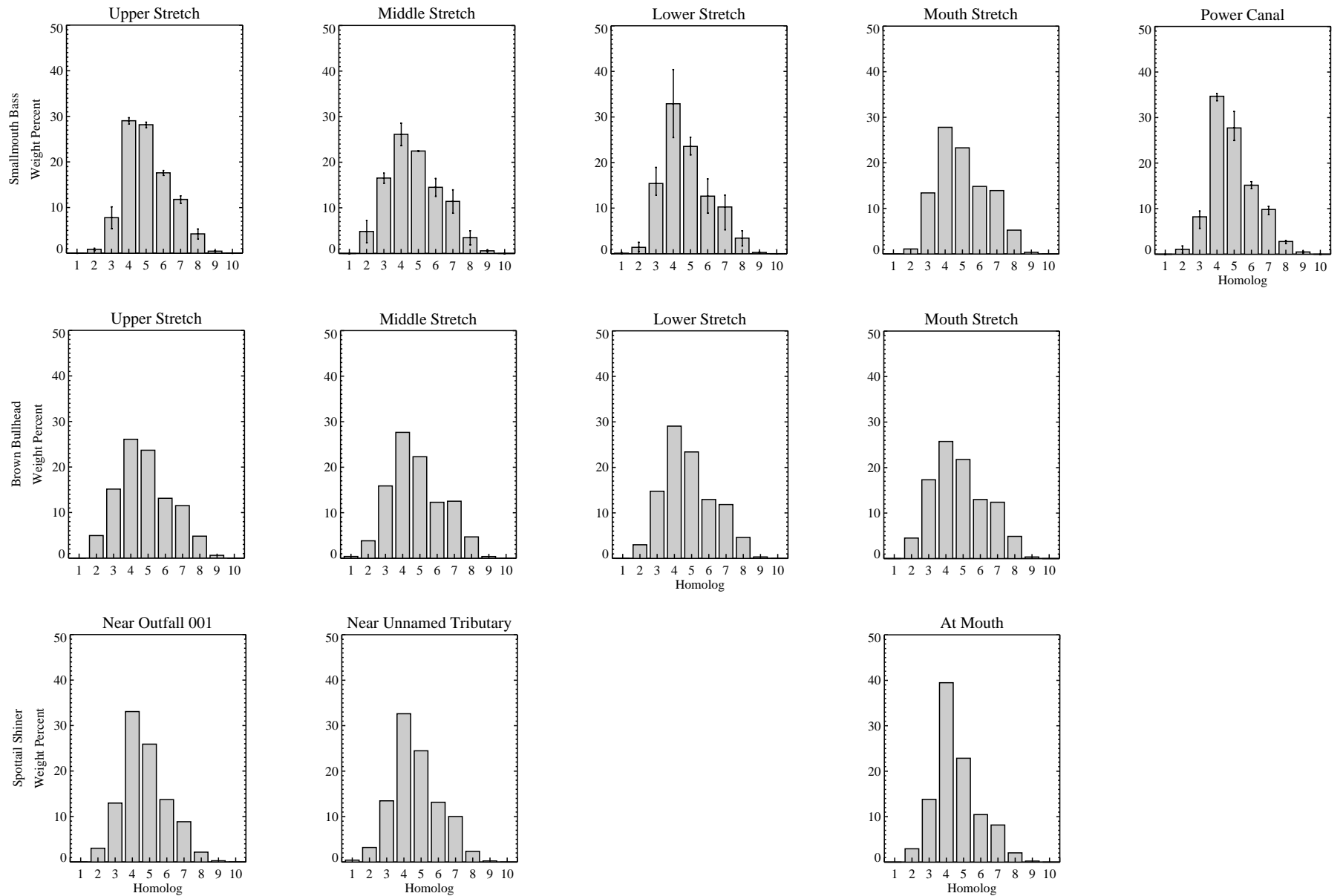


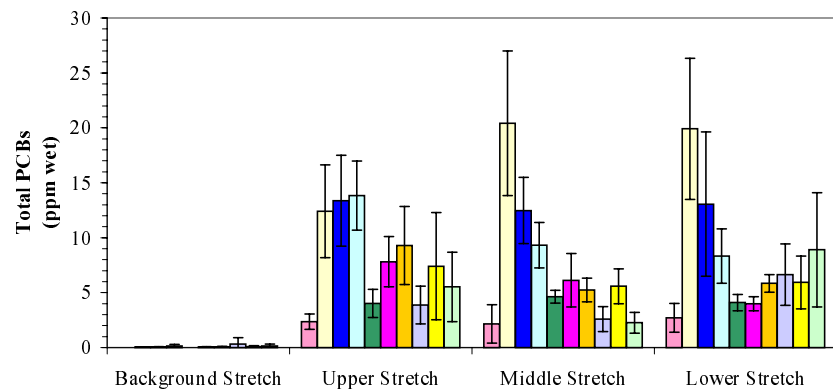
Figure 3-6. PCB Homolog Distributions in Resident Fish Collected in 2002

Grasse River Study Area - Supplemental Remedial Studies

If more than one sample was analyzed, average is plotted and range is represented by error bars.

Data table: resfish_peak

Routine Monitoring Stretches



Power Canal

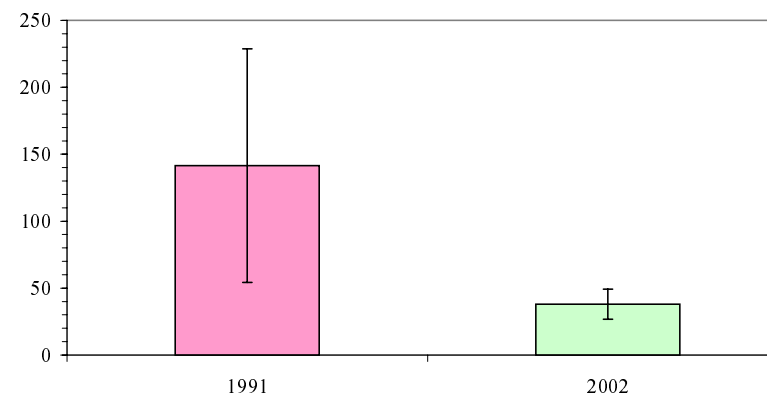
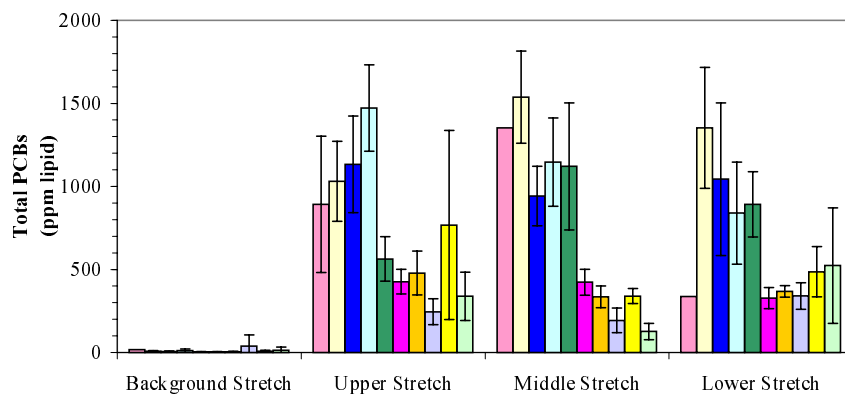
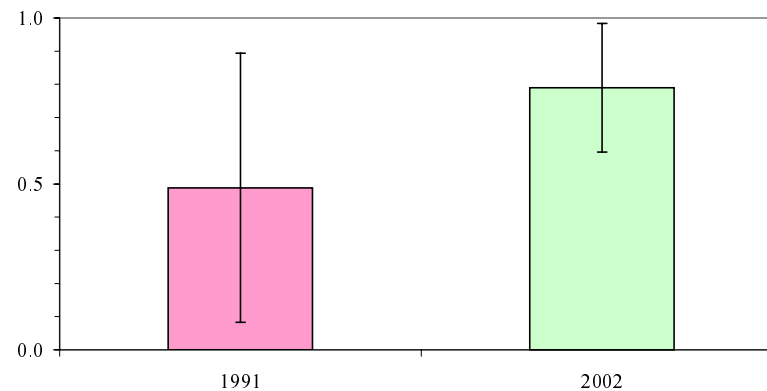


Figure 3-7. Average Aroclor-based PCB Levels in Smallmouth Bass (1991-2002)

Data are arithmetic means \pm two standard errors of the mean.

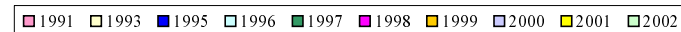
Samples analyzed as individual fillets.

Values below detection set to half the detection limit. If no detection limit reported, 0.05 ppm wet weight assumed.

Error bar not plotted if sample count fewer than three.

Analytical methods employed by the laboratories have changed over time and thus, may affect comparability of these results.

Data table: resfish_aro



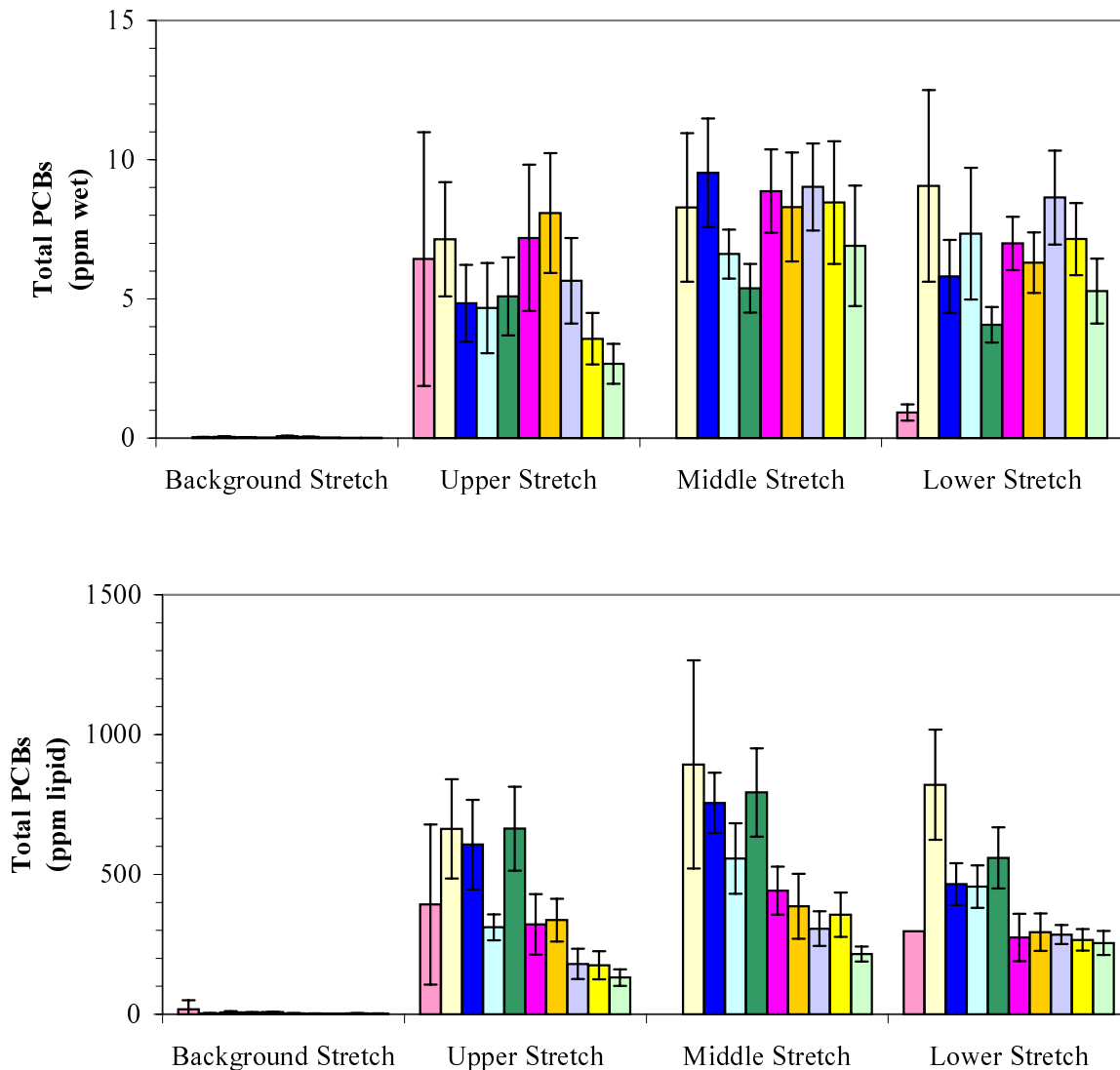


Figure 3-8. Average Aroclor-based PCB Levels in Brown Bullhead (1991-2002)

Data are arithmetic means +/- two standard errors of the mean.

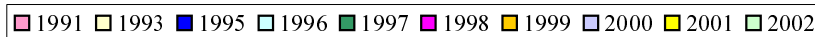
Samples analyzed as individual fillets.

Values below detection set to half the detection limit. If no detection limit reported, 0.05 ppm wet weight assumed.

Error bar not plotted if sample count fewer than three.

Analytical methods employed by the laboratories have changed over time and thus, may affect comparability of these results.

Data table: resfish_aro



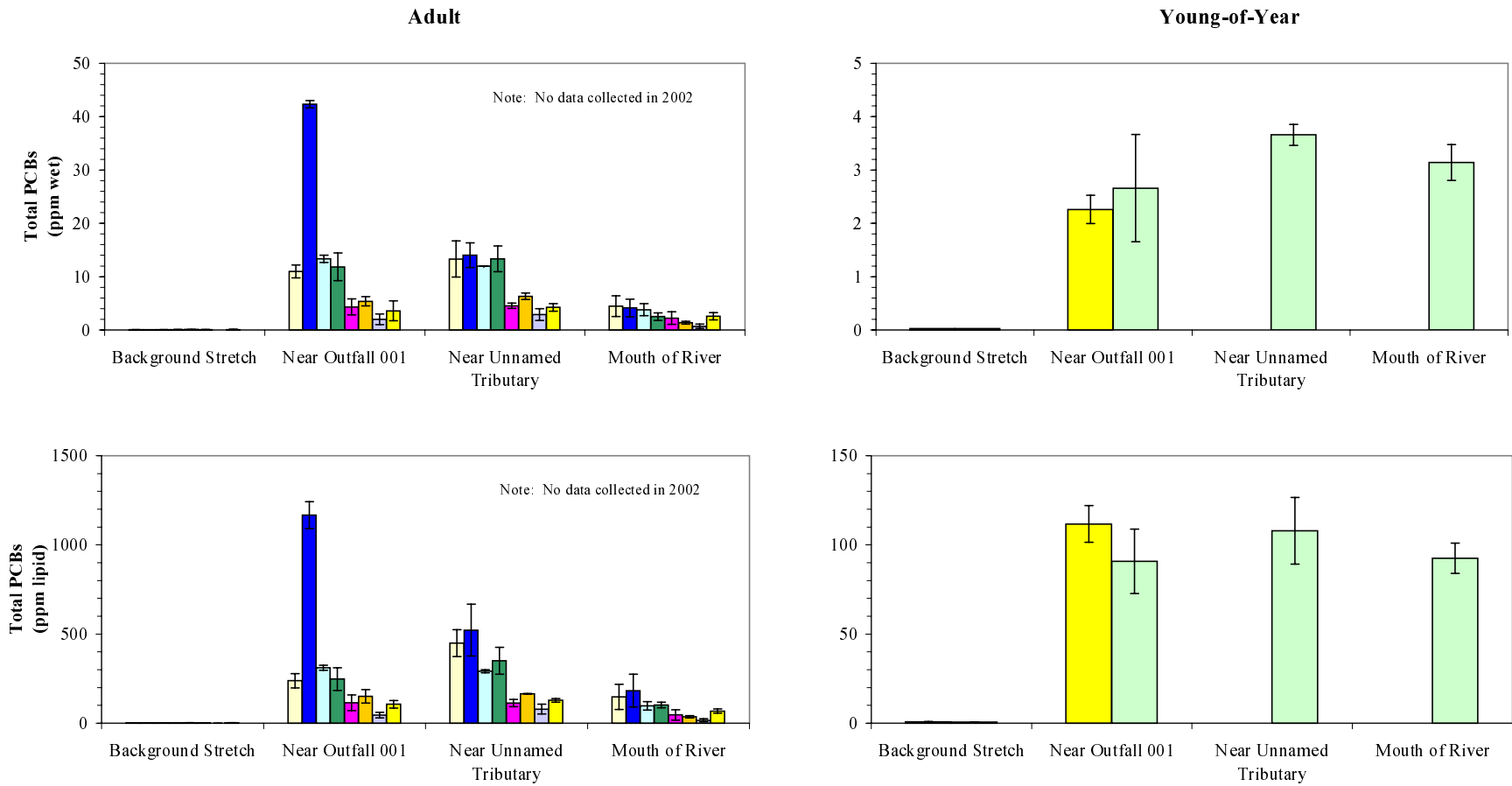


Figure 3-9. Average Aroclor-based PCB Levels in Adult and Young-of-Year Spottail Shiner (1993-2002)

Data are arithmetic means +/- two standard errors of the mean.

Samples analyzed as whole body composites.

Values below detection set to half the detection limit. If no detection limit reported, 0.05 ppm wet weight assumed.

Analytical methods employed by the laboratories have changed over time and thus, may affect comparability of these results.

Data table: resfish_aro

