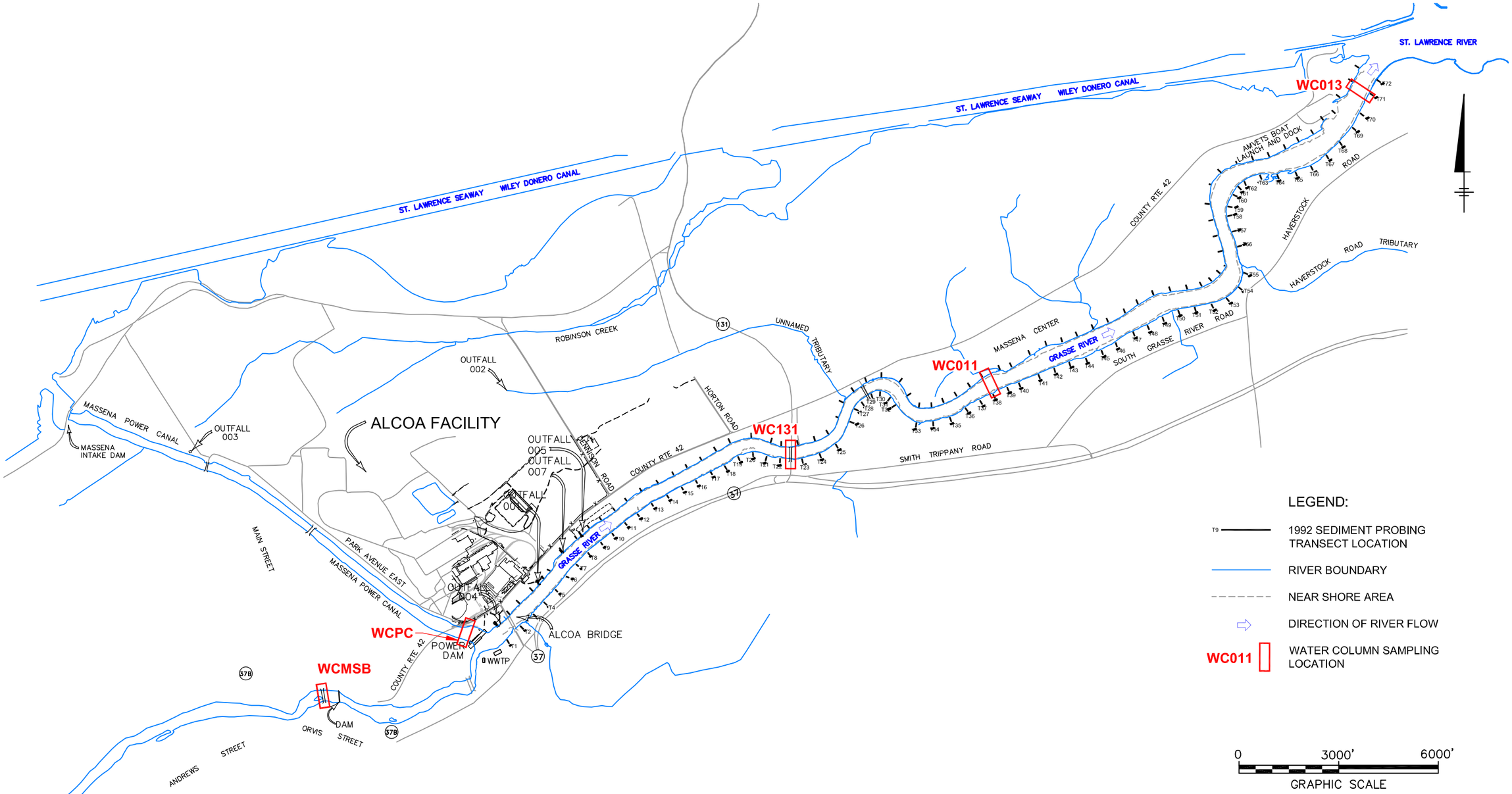


LEGEND:

- T9 — 1992 SEDIMENT PROBING TRANSECT LOCATION
- RIVER BOUNDARY
- NEAR SHORE AREA
- DIRECTION OF RIVER FLOW
- WC011 — WATER COLUMN SAMPLING LOCATION

0 3000' 6000'
GRAPHIC SCALE

NOTES:

1. GRASSE RIVER BASE MAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA). ST. LAWRENCE RIVER WATERLINE GENERATED USING 5/1/01 AERIAL PHOTOGRAPHY.
2. THE ACTUAL WATER COLUMN SAMPLING LOCATION IN THE MASSENA POWER CANAL MAY BE ADJUSTED BASED ON CONDITIONS ENCOUNTERED IN THE FIELD.

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
PRE-DESIGN INVESTIGATION DATA SUMMARY REPORT

BASELINE MONITORING - WATER COLUMN LOCATIONS

ALCOA

FIGURE
7-1

CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: L.POSENAUER PIC/PM/TM: H.VANDEWALKER LYR:ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0010886\0019\00001\DWG\PDI-DSR\10886G71.DWG LAYOUT: 7-1 SAVED: 1/28/2015 3:49 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: C:\LB-PDF PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 1/28/2015 3:49 PM BY: POSENAUER, LISA
XREFS: 10886X02 10886X00 IMAGES: 10886XBL.TIF

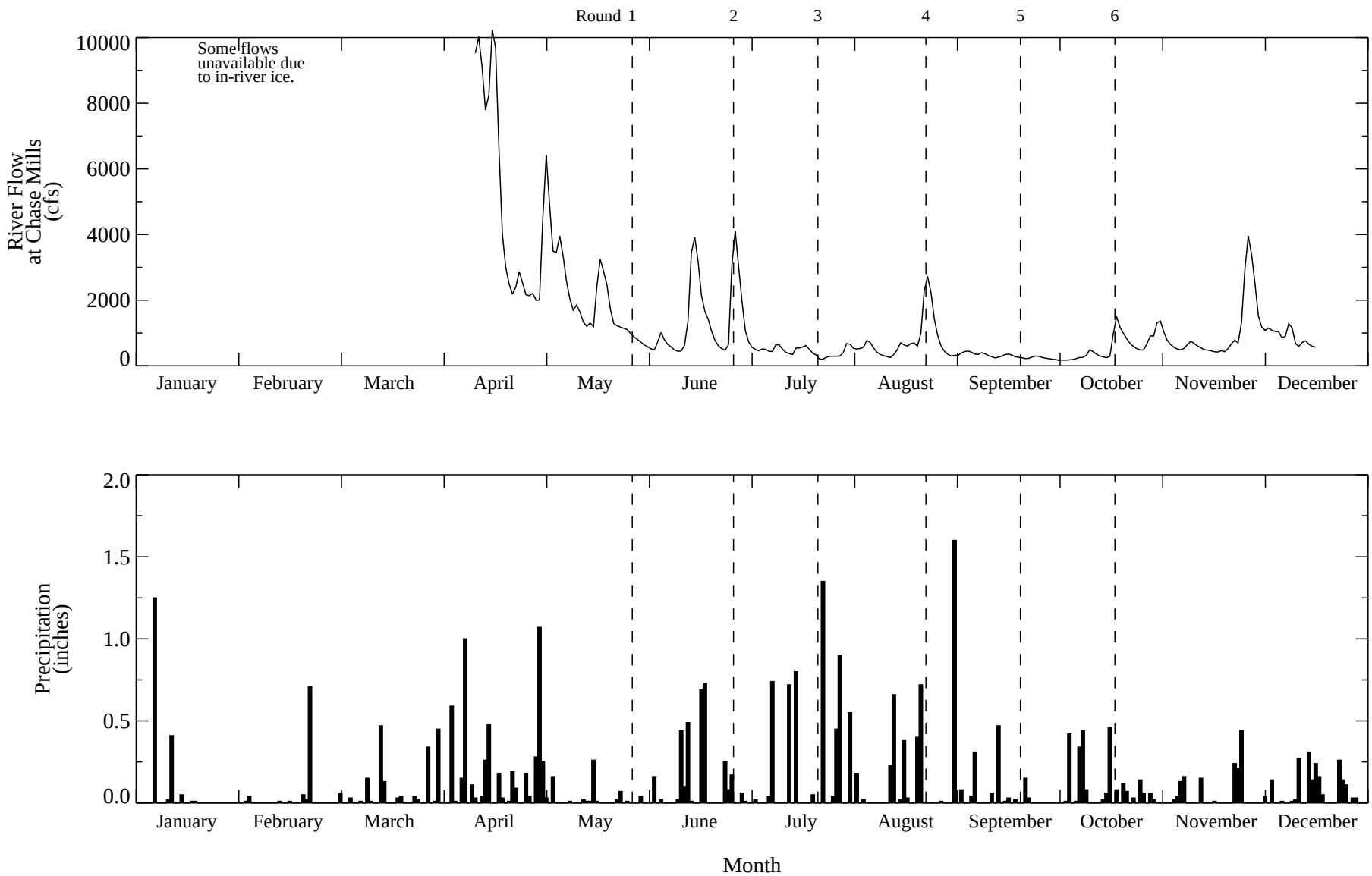


Figure 7-2. Grasse River Flow and Precipitation Information from 2014

Grasse River flow based on daily averages of flow records from the USGS gage at Chase Mills.
Grasse River precipitation measured near Outfall 007.

Data tables: climate, riverflow_chasemills, water_iupac

ARC - C:\Jobs\ALCgra\Analysis\WC\flowrain.pro
Thu Jan 15 10:04:28 2015

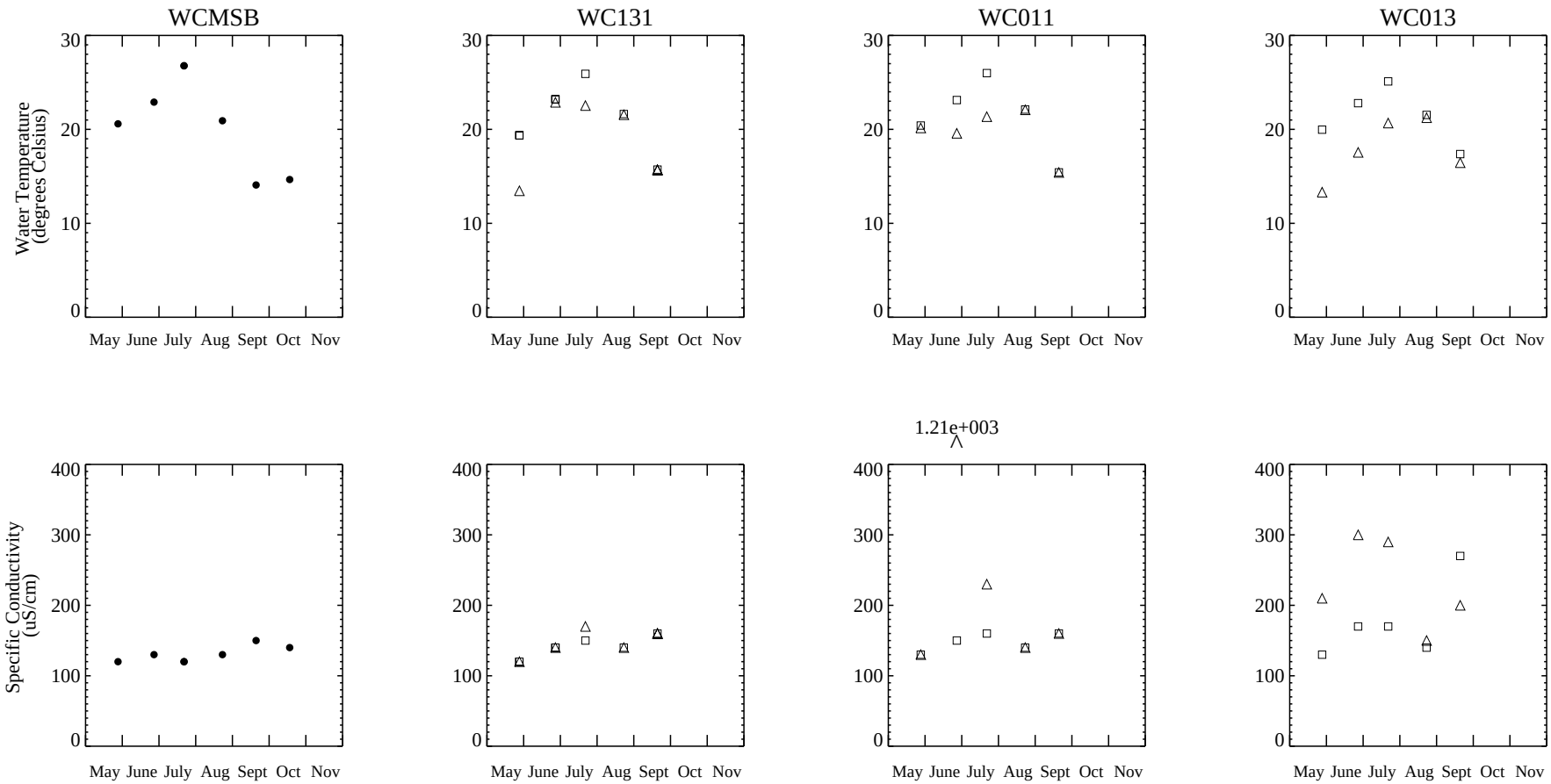


Figure 7-3. Water Temperature and Specific Conductivity Measurements During the 2014 SRS Program

Water quality data is unavailable for Round 6 monitoring at a majority of locations due to an equipment malfunction.

△ 0.2 x Total Water Column Depth
● 0.5 x Total Water Column Depth
□ 0.8 x Total Water Column Depth

Data table: water_iupac

ARC - C:\Jobs\ALCgra\Analysis\WC\temp_vs_jday.pro
Mon Jan 19 20:02:53 2015

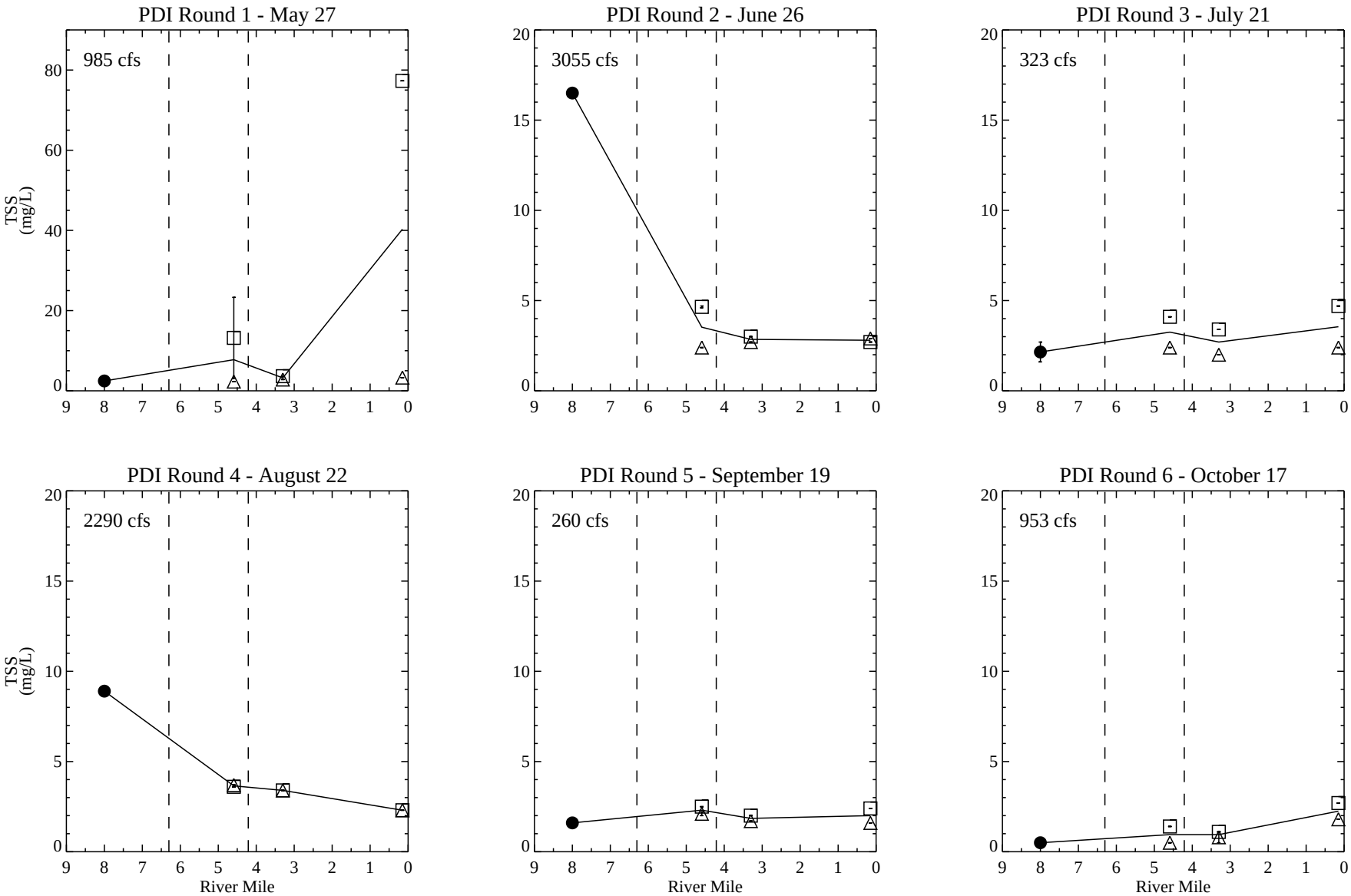


Figure 7-4. Spatial Distribution of TSS Concentrations Measured During the 2014 PDI Program

Vertical dashed lines represent approximate locations of Outfall 001 (left) and the Unnamed Tributary (right).
Daily average flows indicated in upper left corner. Flows measured at the USGS gage at Chase Mills.
Values below the detection limit set to half the detection limit. Duplicates averaged (error bar represents range).
Data tables: riverflow_ChaseMills, water_iupac

△ 0.2 x Total Water Column Depth
• 0.5 x Total Water Column Depth
□ 0.8 x Total Water Column Depth

ARC - P:\Projects\Alcoa\Grasse_River\Data Analysis\Water\srs\all_rounds_tss_spat.pro
Thu Jan 29 11:18:11 2015

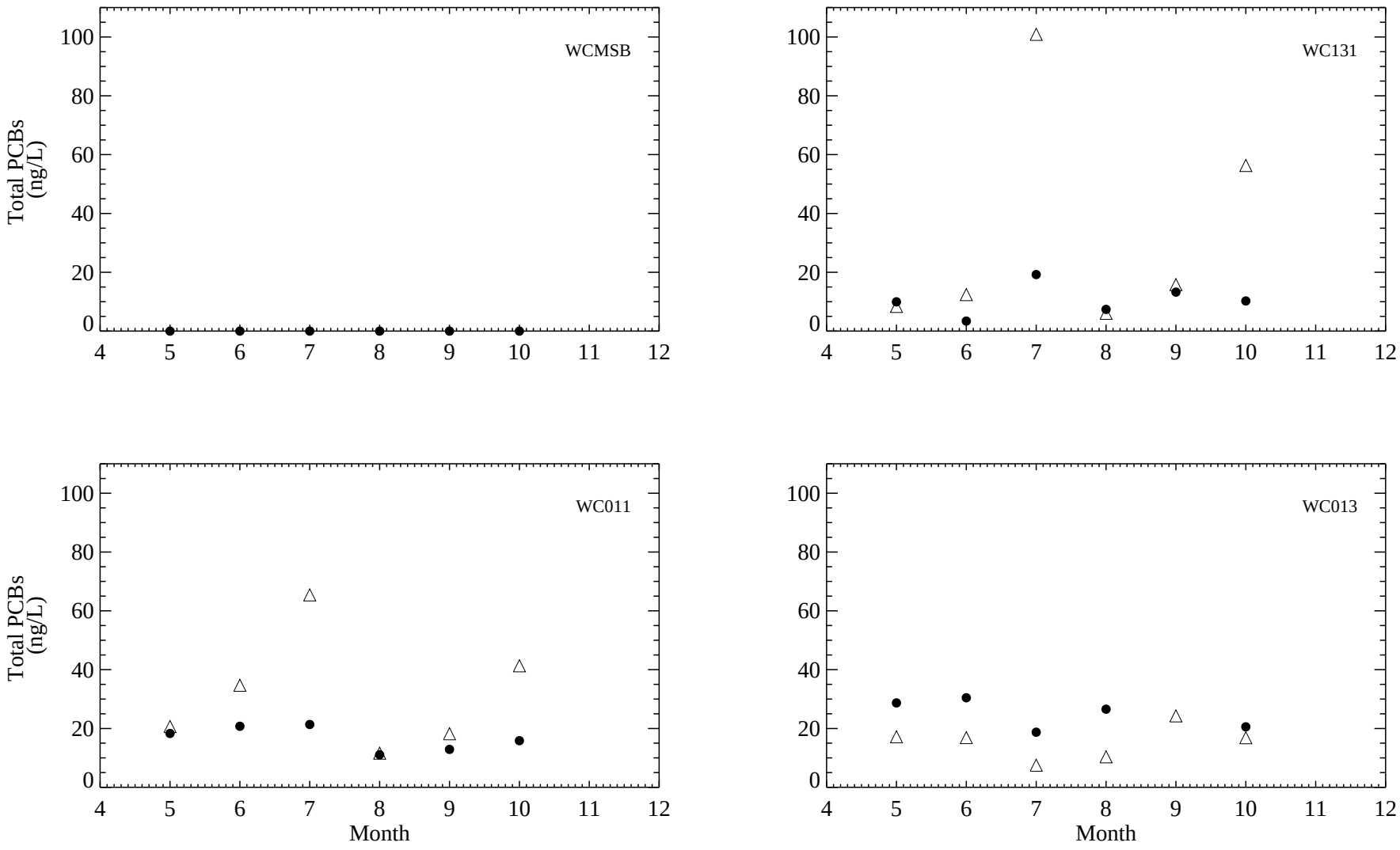


Figure 7-5. Monthly Average PCB Concentrations at Water Column Sampling Locations in 2014

WCMSB samples collected at 0.5 times the total water depth.
Duplicates averaged with original sample.

• 0.2 x Total Water Column Depth
△ 0.8 x Total Water Column Depth

Data table: water_iupac

ARC - P:\Projects\Alcoa\Grasse_River\Data Analysis\Water\srs\monthly_avg_pcb.pro
Thu Jan 29 11:07:30 2015

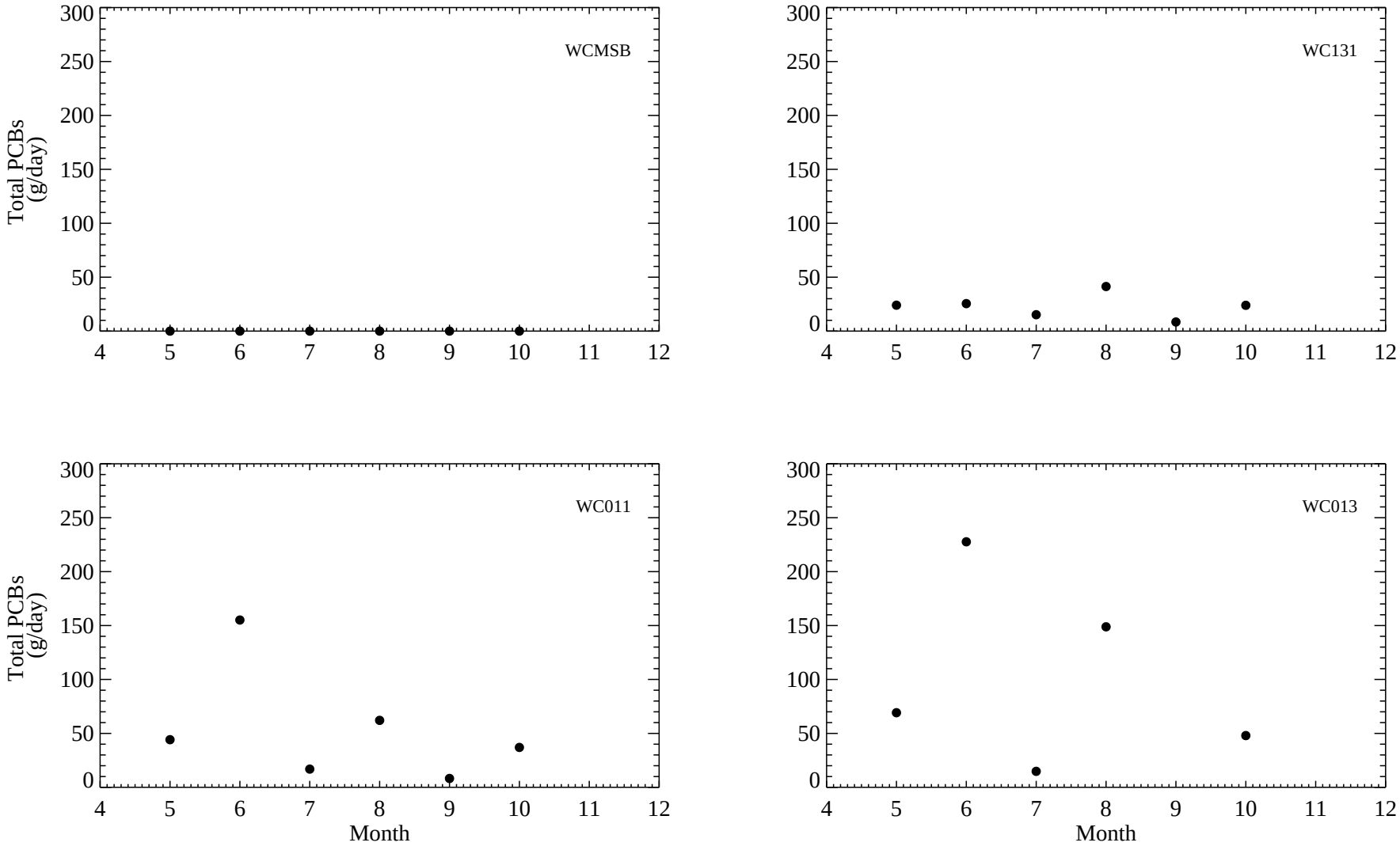


Figure 7-6. Monthly Average PCB Mass Fluxes at Water Column Sampling Locations in 2014

WCMSB samples collected at 0.5 times the total water depth.
Duplicates averaged with original sample.

• 0.2 x Total Water Column Depth
△ 0.8 x Total Water Column Depth

Data tables: riverflow_ChaseMills, water_iupac

ARC - P:\Projects\Alcoa\Grasse_River\Data Analysis\Water\srs\monthly_avg_pcb.pro
Thu Jan 29 11:07:30 2015

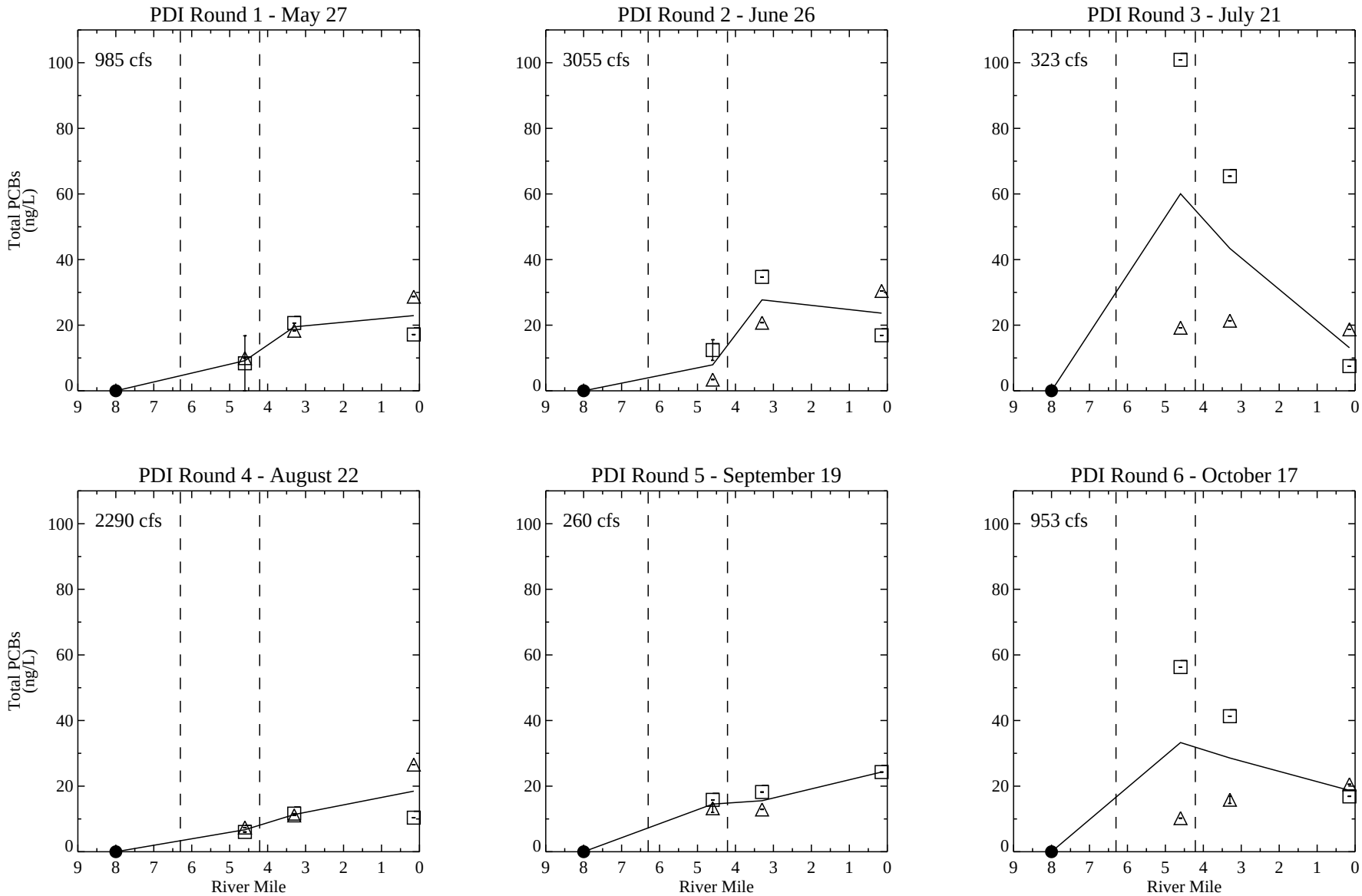


Figure 7-7. Spatial Distribution of Total PCBs in Water Samples Collected During the 2014 PDI Program

Values represent unfiltered water column sample results. Duplicates averaged (error bar represents range).
Vertical dashed lines represent approximate locations of Outfall 001 (left) and the Unnamed Tributary (right).
Estimated daily average flows indicated in upper left corner. Flows measured at the USGS gage at Chase Mills.
Data is unavailable for WC013 (0.2xdepth) from Round 5 as the sample container broke during shipment to the laboratory.
Data tables: riverflow_ChaseMills, water_iupac

△ 0.2 x Total Water Column Depth
• 0.5 x Total Water Column Depth
□ 0.8 x Total Water Column Depth

ARC - P:\Projects\Alcoa\Grasse_River\Data Analysis\Water\srs\all_rounds_tpcb_conc_spat.pro
Thu Jan 29 11:19:40 2015

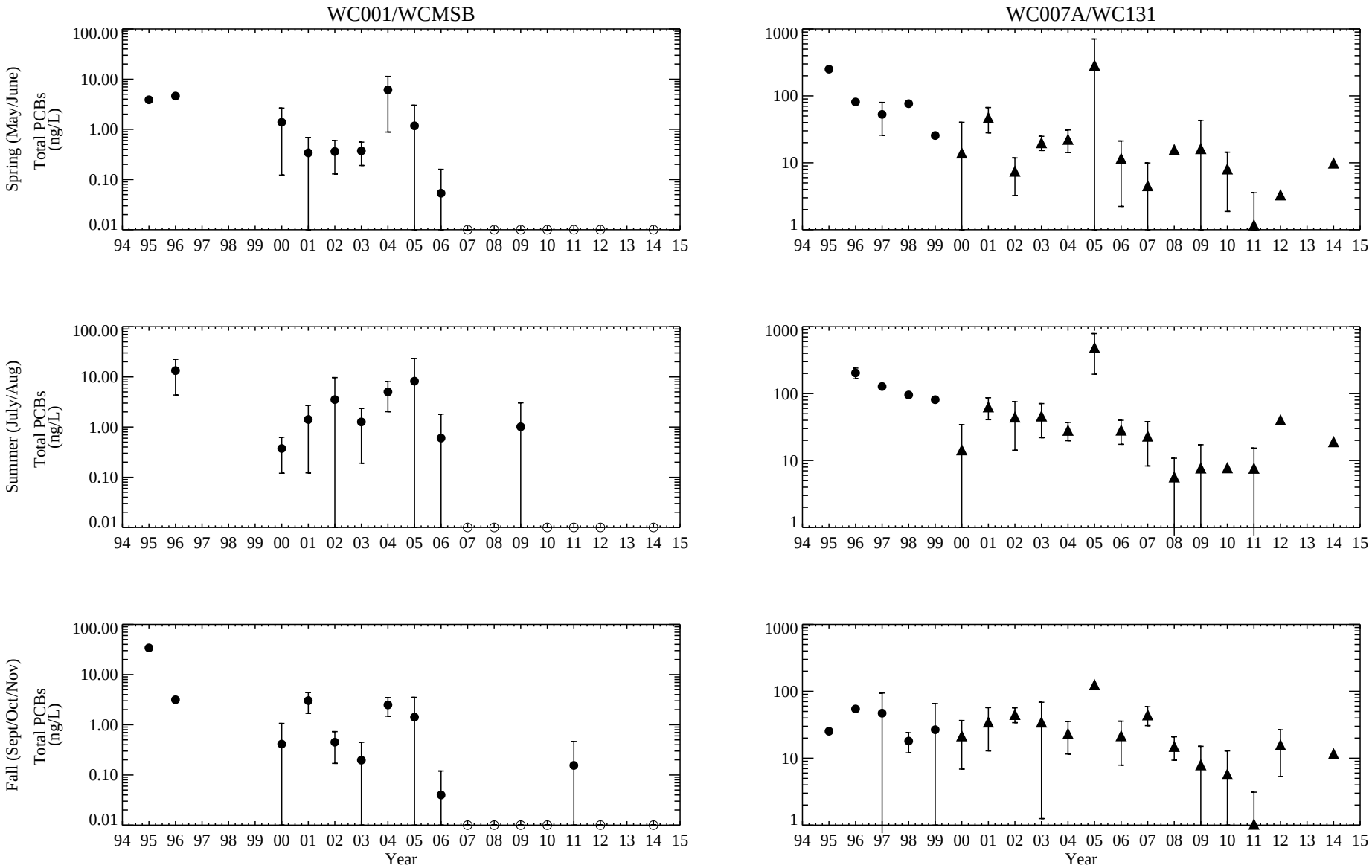


Figure 7-8a. Seasonal Average Water Column PCB Concentrations Measured During Non-Stratified Periods (WC001/WCMSB and WC007A/WC131)

Data represent samples collected when river flow was less than or equal to 2200 cfs. Triangles represent surface samples collected at WC131.
1995 to 1999 data represent composite samples collected during non-stratified periods.
2000 to 2014 data represent surface samples collected at 0.2 times the total water depth to avoid any influence of stratification.
Error bars represent two standard errors of the mean; no error bars shown if sample count is fewer than three.
Duplicates averaged; data collected on same day averaged. Non-detects are plotted at 0.01 ng/L as open circles.

Data tables: riverflow_hist, water_bz, water_peak, water_iupac

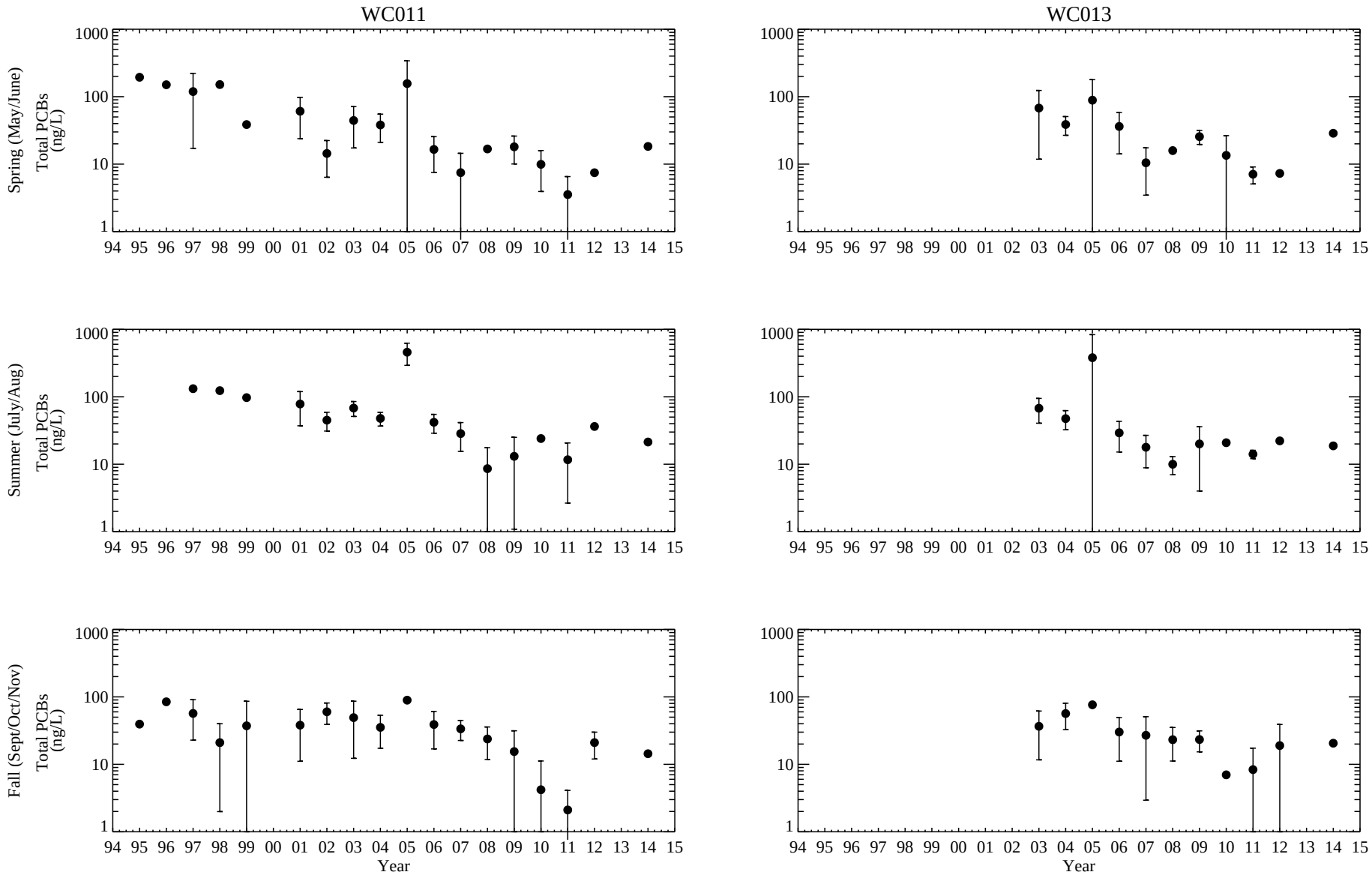


Figure 7-8b. Seasonal Average Water Column PCB Concentrations Measured During Non-Stratified Periods (WC011 and WC013)

Data represent samples collected when river flow was less than or equal to 2200 cfs.
1995 to 1999 data represent composite samples collected during non-stratified periods.
2000 to 2014 data represent surface samples collected at 0.2 times the total water depth to avoid any influence of stratification.
Error bars represent two standard errors of the mean; no error bars shown if sample count is fewer than three.
Duplicates averaged; data collected on same day averaged. Non-detects are plotted at 0.01 ng/L as open circles.

Data tables: riverflow_hist, water_bz, water_peak, water_iupac

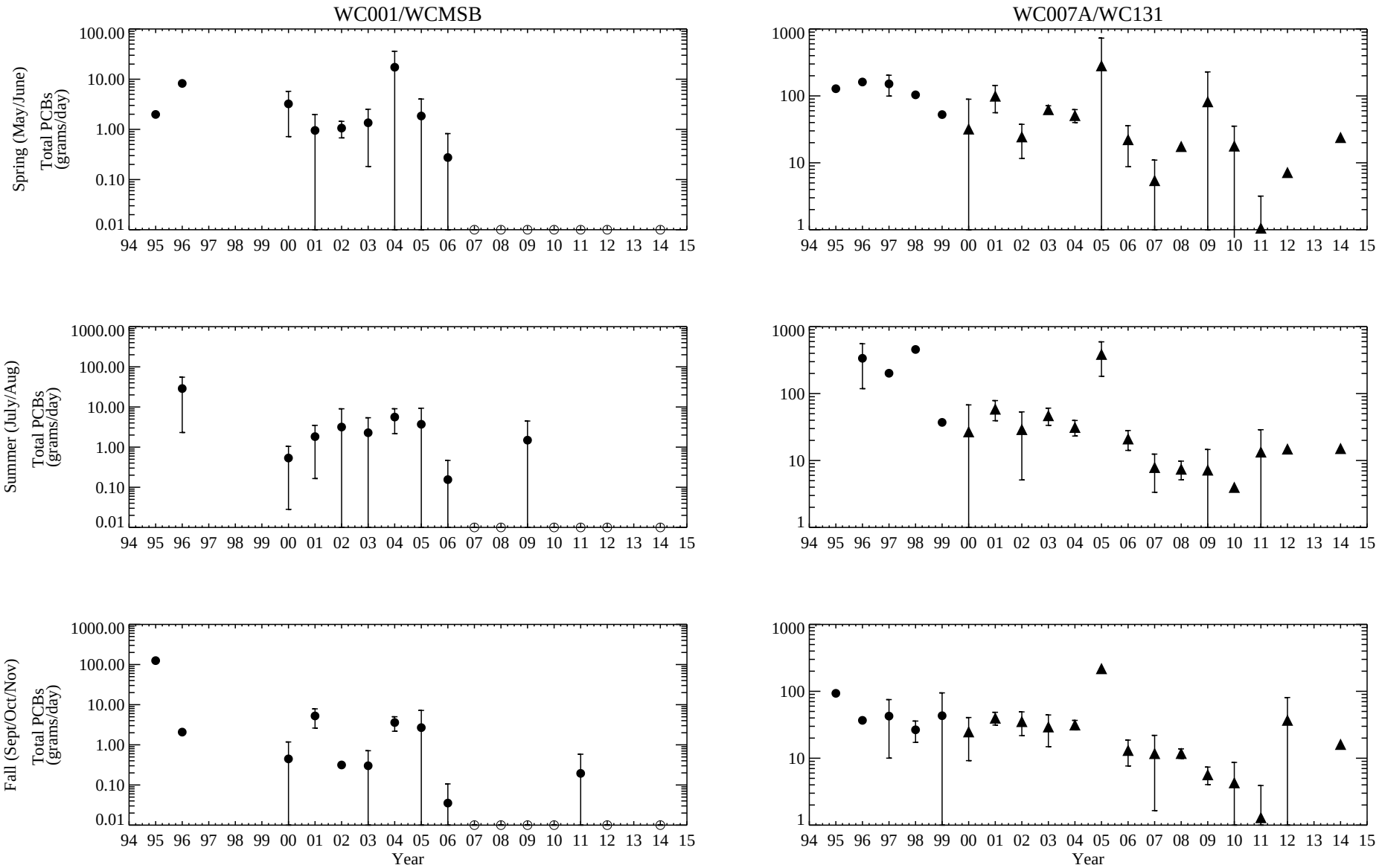


Figure 7-9a. Seasonal Average Water Column PCB Mass Fluxes Measured During Non-Stratified Periods (WC001/WCMSB and WC007A/WC131)

Data represent samples collected when river flow was less than or equal to 2200 cfs. Triangles represent surface samples collected at WC131.
1995 to 1999 data represent composite samples collected during non-stratified periods.
2000 to 2014 data represent surface samples collected at 0.2 times the total water depth to avoid any influence of stratification.
Error bars represent two standard errors of the mean; no error bars shown if sample count is fewer than three.
Duplicates averaged; data collected on same day averaged. Non-detects are plotted at 0.01 grams/day as open circles.

Data tables: riverflow_hist, water_bz, water_peak, water_iupac

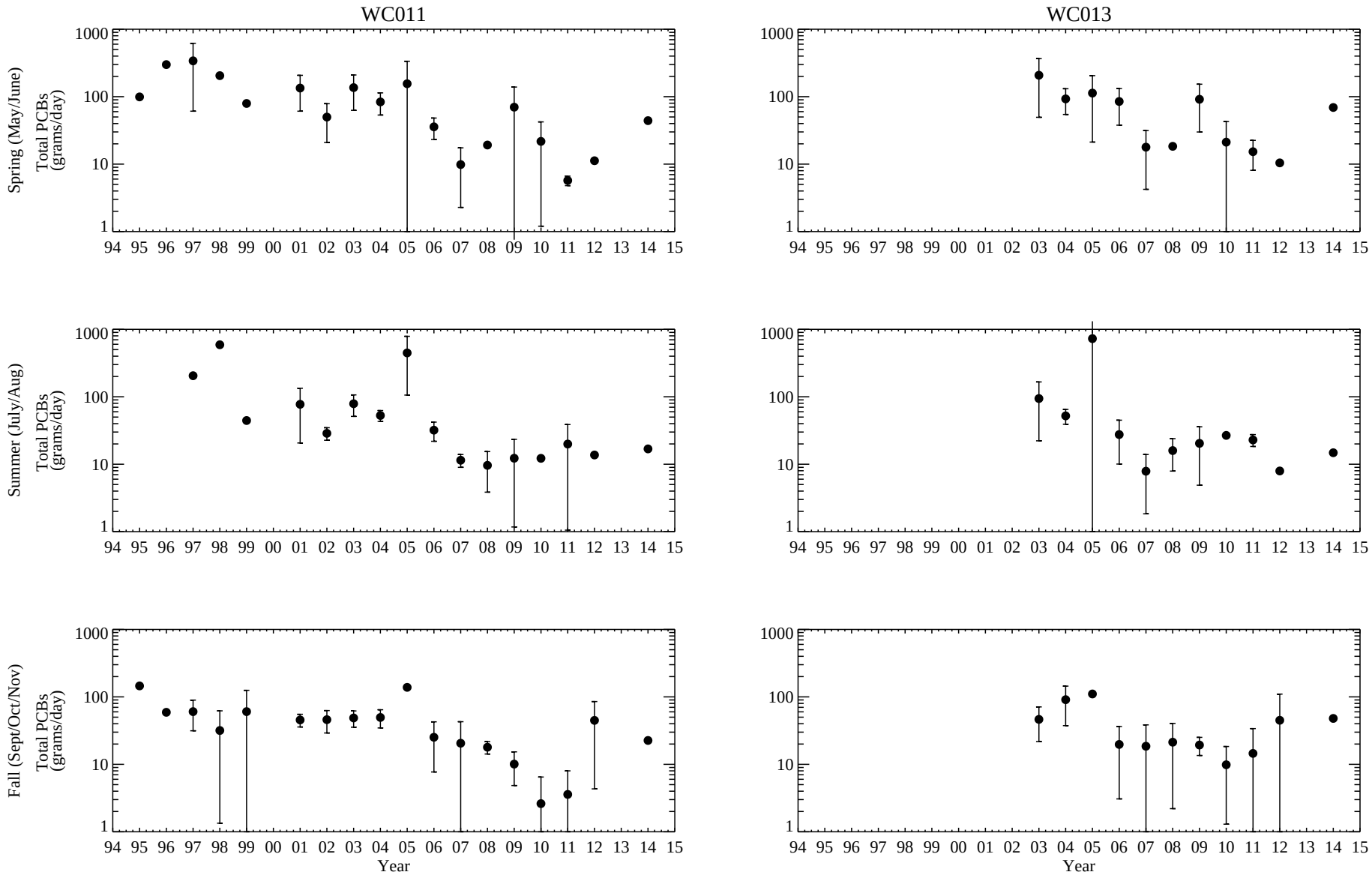
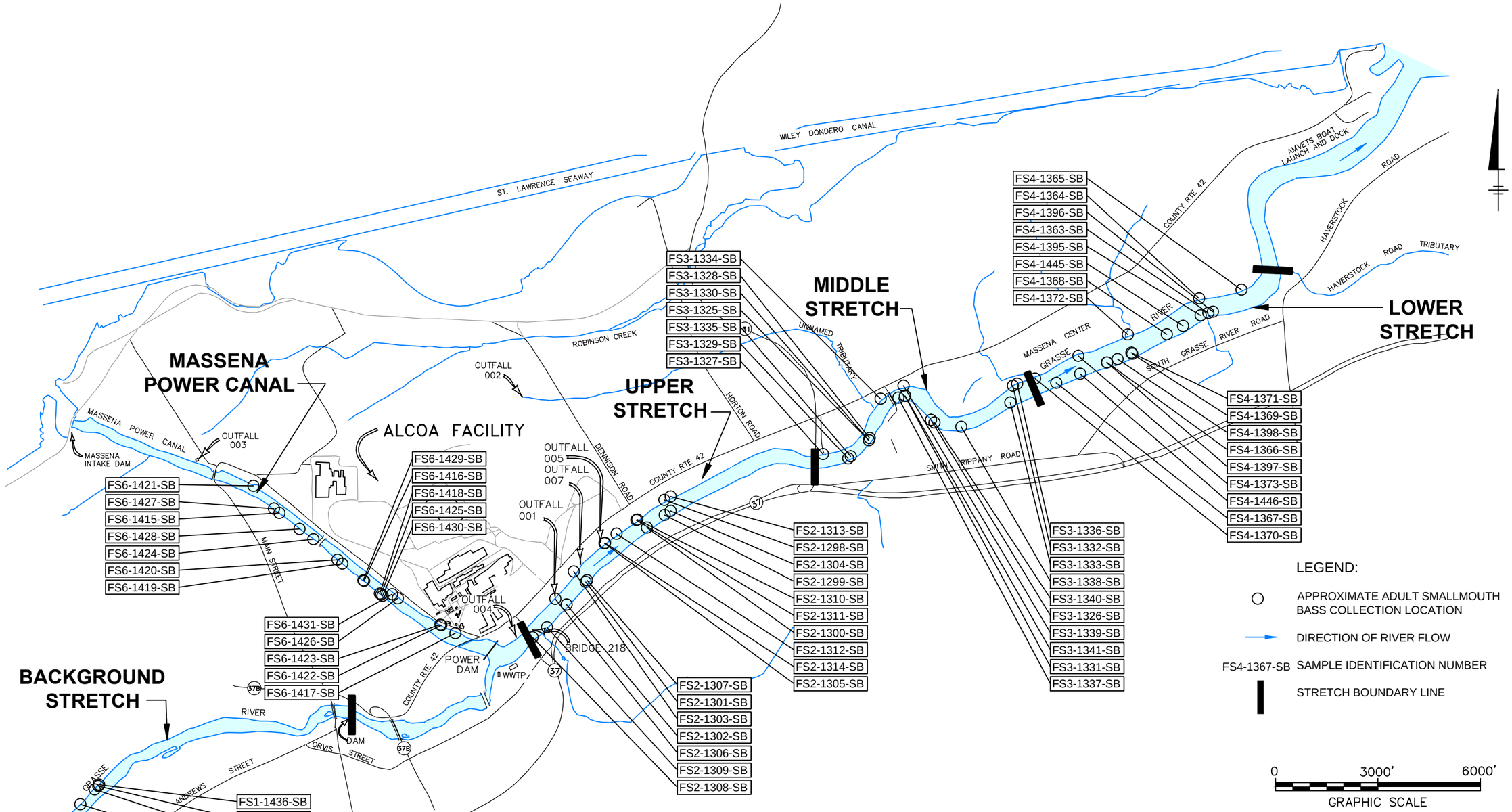


Figure 7-9b. Seasonal Average Water Column PCB Mass Fluxes Measured During Non-Stratified Periods (WC011 and WC013)

Data represent samples collected when river flow was less than or equal to 2200 cfs.
1995 to 1999 data represent composite samples collected during non-stratified periods.
2000 to 2014 data represent surface samples collected at 0.2 times the total water depth to avoid any influence of stratification.
Error bars represent two standard errors of the mean; no error bars shown if sample count is fewer than three.
Duplicates averaged; data collected on same day averaged.

Data tables: riverflow_hist, water_bz, water_peak, water_iupac



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. SAMPLE LOCATIONS ARE APPROXIMATE AND WERE OBTAINED USING A HAND-HELD GPS UNIT WITH A ± 15 FEET HORIZONTAL ACCURACY.

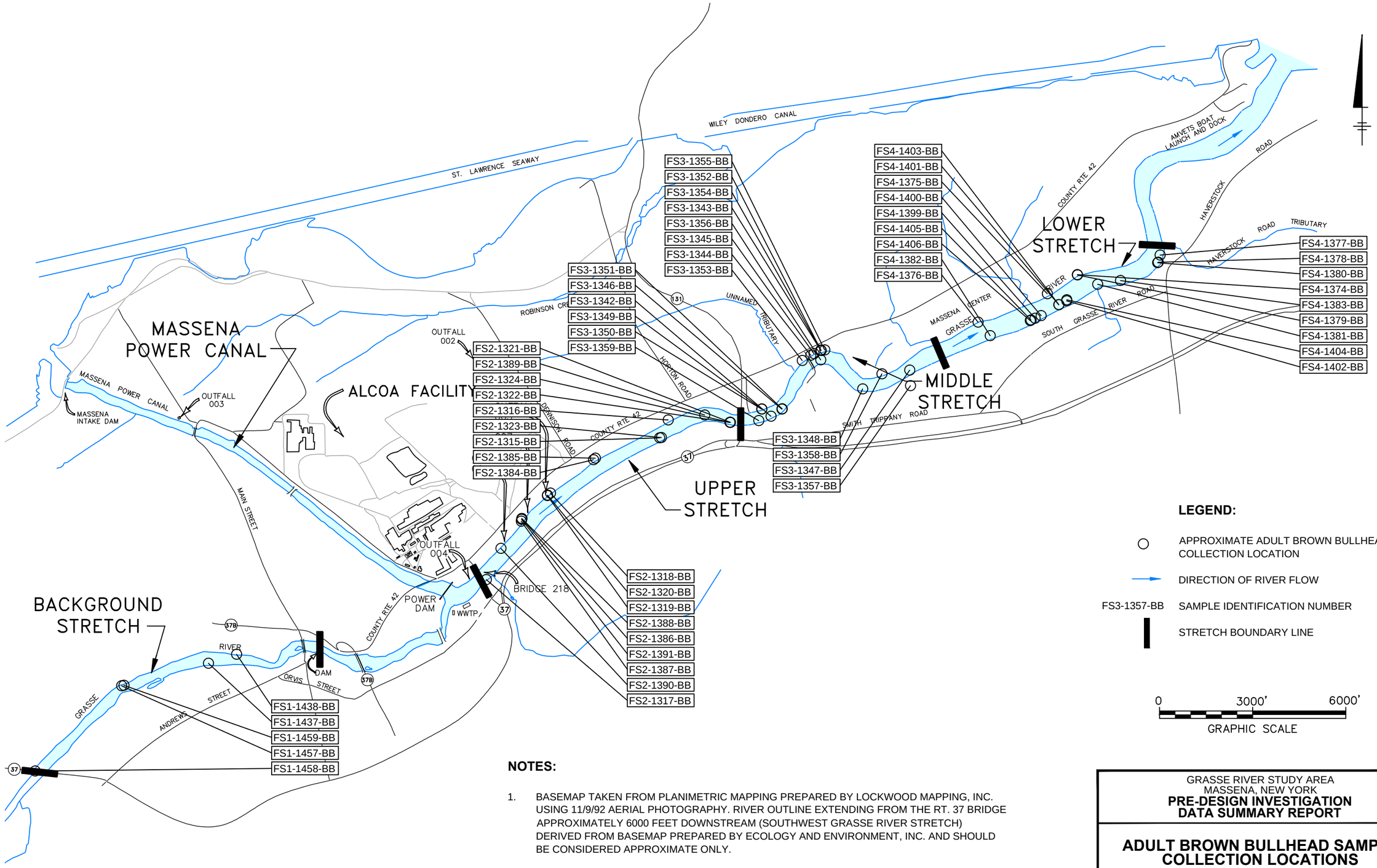
GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
PRE-DESIGN INVESTIGATION DATA SUMMARY REPORT

ADULT SMALLMOUTH BASS SAMPLE COLLECTION LOCATIONS

ALCOA

FIGURE
7-10

CITY: SYRACUSE,NY DIV/GROUP: ENVCAD DB: L.POSENAUER PIC/PM/TM: H.VANDEWALKER LYR:ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0010886\0019\00001\DWG\PDI-DSR\10886G73.DWG LAYOUT: 7-10 SAVED: 3/13/2015 2:41 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: C:\LB-PDF-GMS PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/13/2015 3:04 PM BY: POSENAUER, LISA
XREFS: 10886X01 10886BL IMAGES: 10886X00.TIF



LEGEND:

- ○ APPROXIMATE ADULT BROWN BULLHEAD COLLECTION LOCATION
- → DIRECTION OF RIVER FLOW
- FS3-1357-BB SAMPLE IDENTIFICATION NUMBER
- ▌ STRETCH BOUNDARY LINE

0 3000' 6000'
GRAPHIC SCALE

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. SAMPLE LOCATIONS ARE APPROXIMATE AND WERE OBTAINED USING A HAND-HELD GPS UNIT WITH A ± 15 FEET HORIZONTAL ACCURACY.

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
PRE-DESIGN INVESTIGATION DATA SUMMARY REPORT

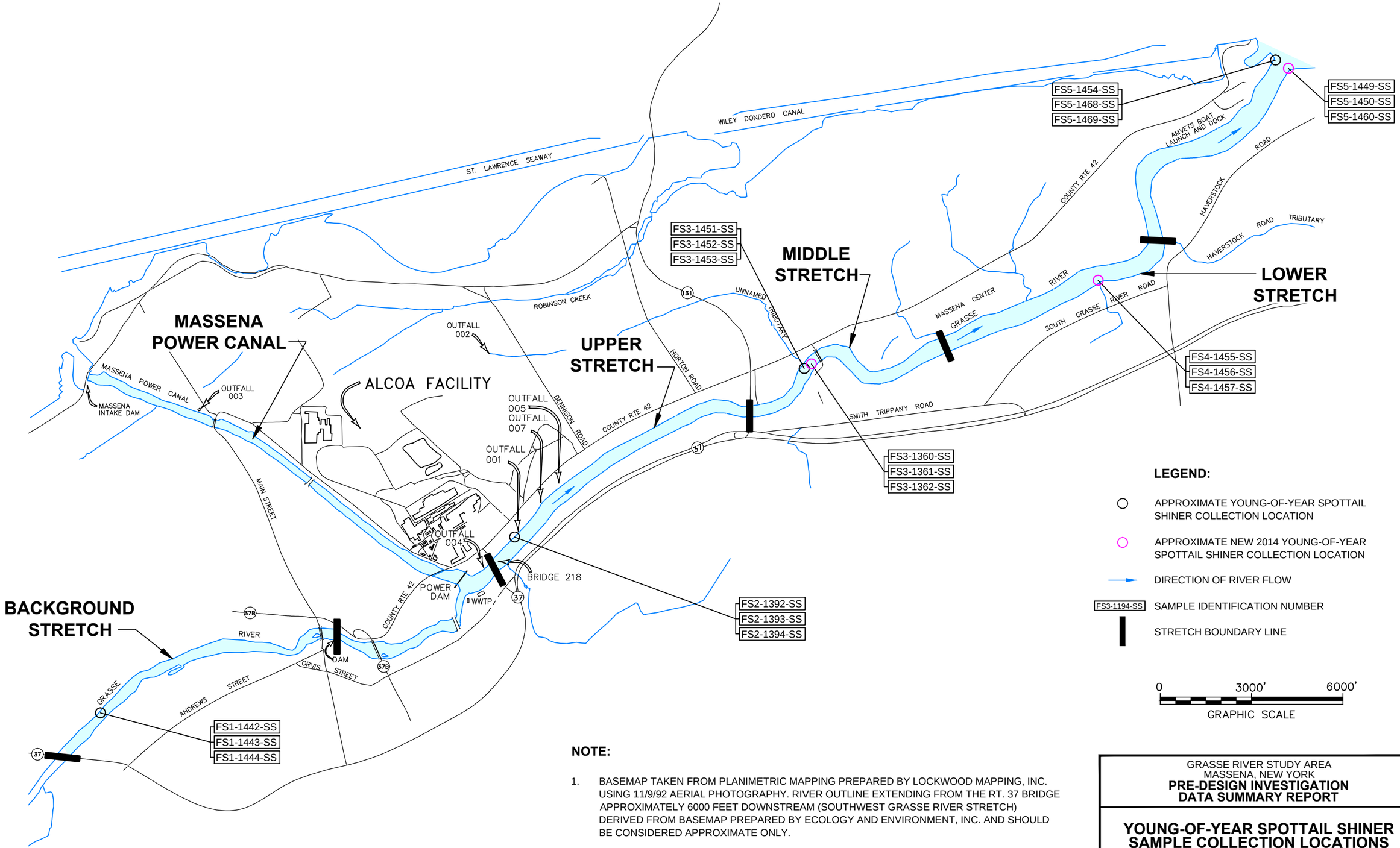
ADULT BROWN BULLHEAD SAMPLE COLLECTION LOCATIONS

ALCOA

FIGURE
7-11

CITY: SYRACUSE, NY DIVGROUP: ENVCAD DB: L.POSENAUER PICPM/TM: H.VANDEWALKER LYR:ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0010886\00190\0001\DWG\PD\-DSR10886G74.DWG LAYOUT: 7-11 SAVED: 3/13/2015 2:41 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: C-LB-PDF-GMS PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/13/2015 3:04 PM BY: POSENAUER, LISA
XREFS: 10886X01 10886X00 IMAGES: 10886XBL.TIF

CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: L.POSENAUER PIC/PM/TM: H.VANDEWALKER LYR:ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0010886\0019\00001\DWG\PD\-DSR10886G75.DWG LAYOUT: 7-12 SAVED: 3/25/2015 10:04 AM ACADVER: 19.1S (LMS TECH) PAGESETUP: C-LB-PDF-GMS PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/25/2015 10:05 AM BY: POSENAUER, LISA
XREFS: 10886X01 10886X02 IMAGES: 10886X00.TIF



NOTE:

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.

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
PRE-DESIGN INVESTIGATION
DATA SUMMARY REPORT

YOUNG-OF-YEAR SPOTTAIL SHINER SAMPLE COLLECTION LOCATIONS

ALCOA

FIGURE
7-12

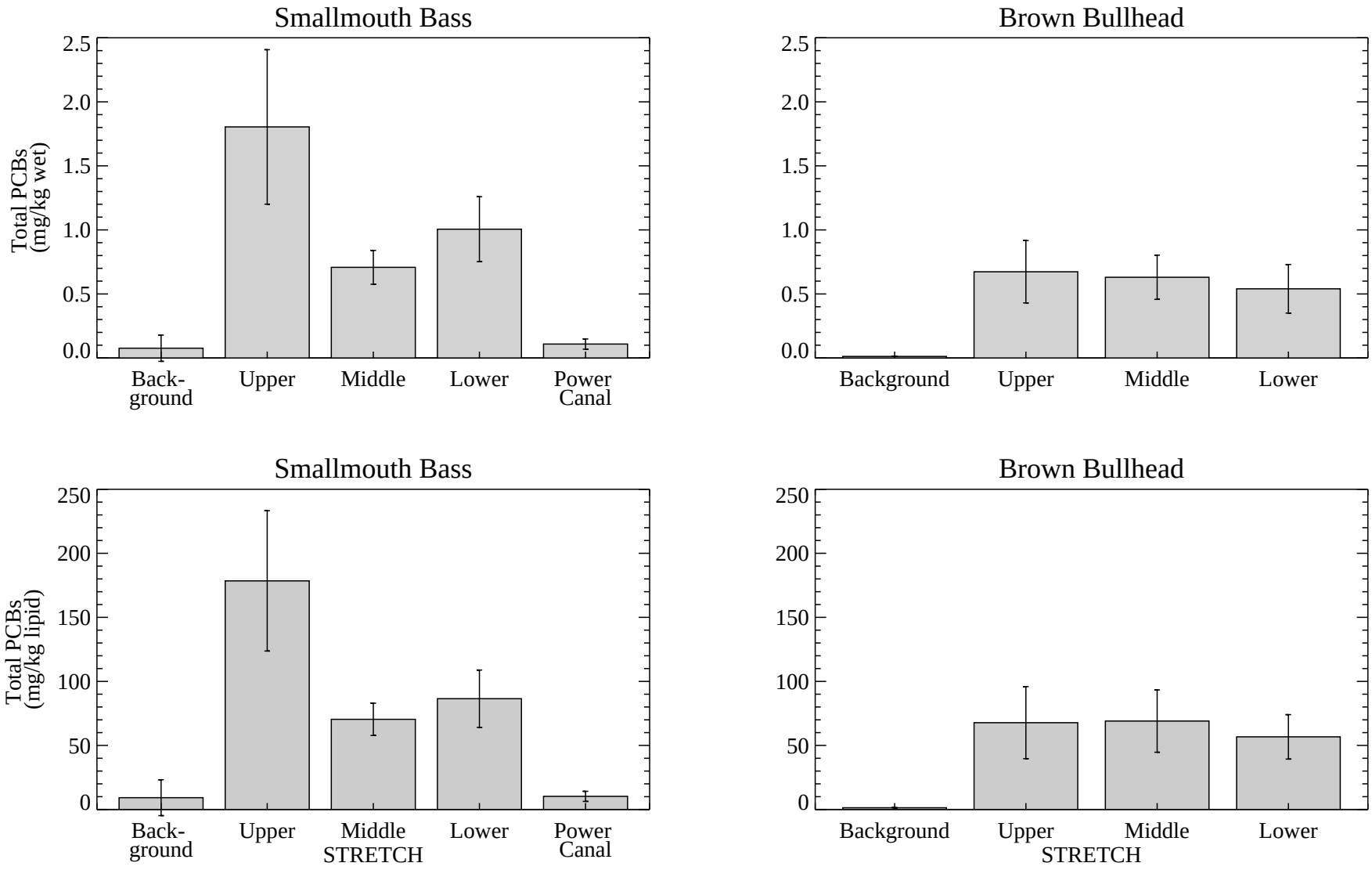


Figure 7-13. Average Aroclor-Based PCB Concentrations in Smallmouth Bass and Brown Bullhead Collected in Fall 2014
Values represent arithmetic averages (+/- 2 standard errors). Non-detect values set to half the detection limit prior to averaging. Locations where all samples were non-detect are shown as white bars.

Data table: resfish_aro

ARC - P:\Projects\Alcoa\Grasse_River\Data Analysis\ResFish\IDL\fall14\resfish_barplot_by_survey.pro
Fri Mar 20 16:04:51 2015

Smallmouth Bass

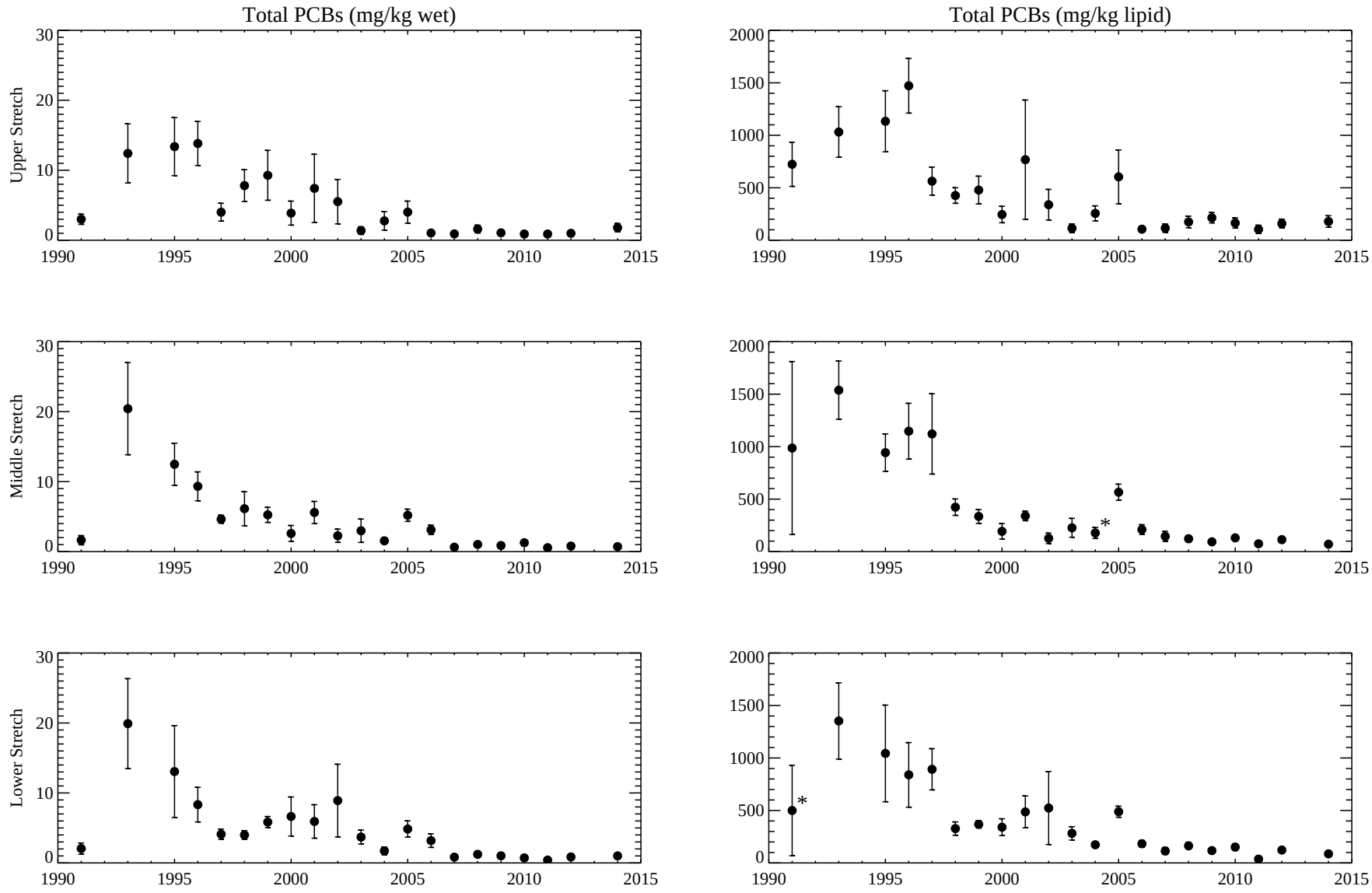


Figure 7-14. Average PCB Levels in Smallmouth Bass (1991 - 2014)
Data are arithmetic means +/- two standards errors of the mean.
Values below detection set to half the detection limit. If no detection limit reported, 0.05 mg/kg wet weight assumed.
Analytical methods employed by the laboratories have changed over time and thus, may affect comparability of these results.
**One 1991 and one 2004 sample were excluded due to unreasonably low lipid content (<0.1%).*

Data tables: resfish_aro

ARC - P:\Projects\Alcoa\Grasse_River\Data Analysis\ResFish\IDL\fall14\allspec_allloc_PCBwetlip.pro
Wed Feb 18 09:07:05 2015

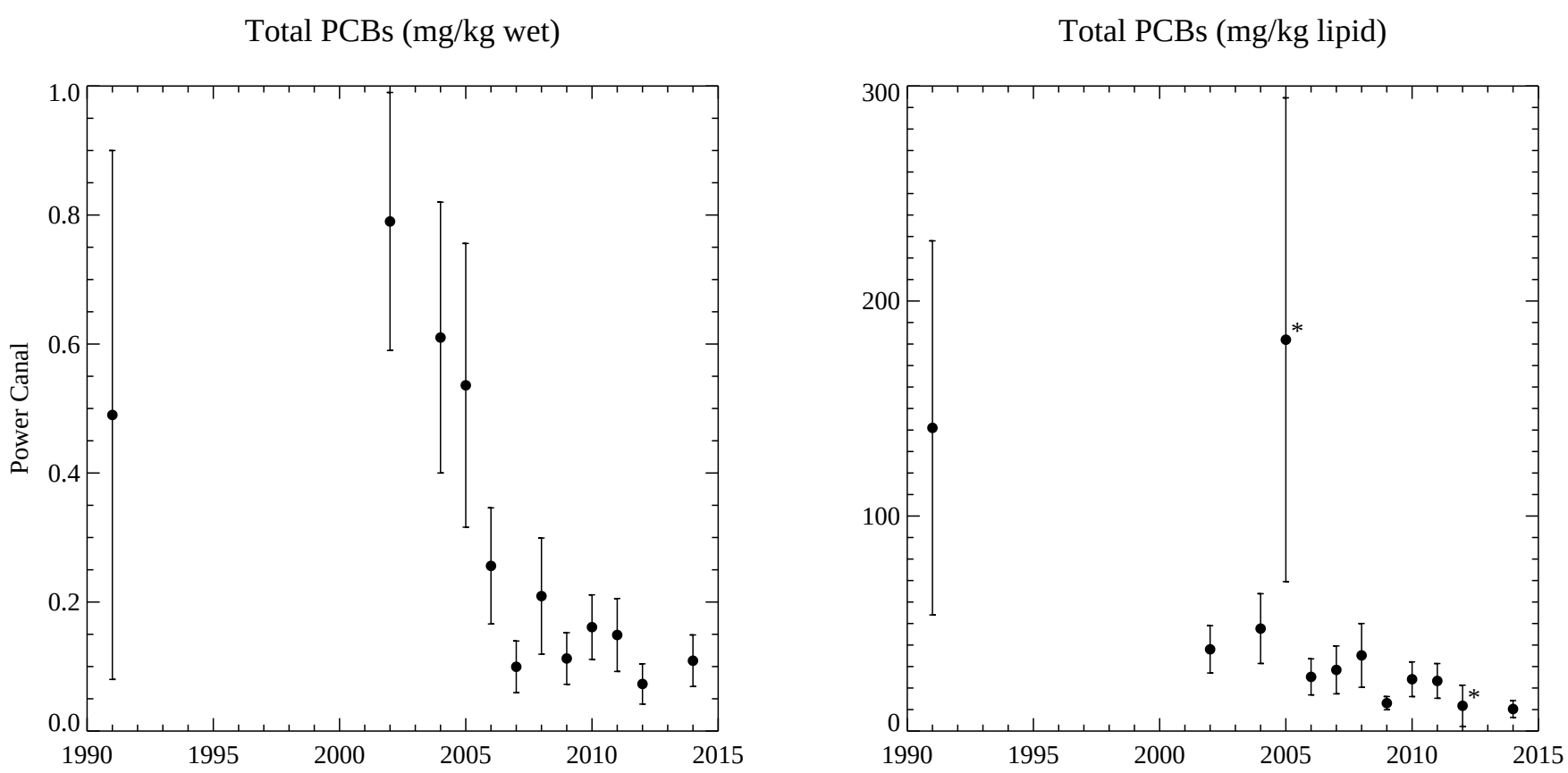


Figure 7-15. Average PCB Levels in Smallmouth Bass from the Power Canal

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

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

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

**One 2005 sample and two 2012 samples were excluded due to unreasonably low lipid content (<0.1%).*

Data tables: resfish_aro

ARC - P:\Projects\Alcoa\Grasse_River\Data Analysis\ResFish\IDL\fall14\allspec_allloc_PCBwetlip.pro
Wed Feb 18 09:07:05 2015

Brown Bullhead

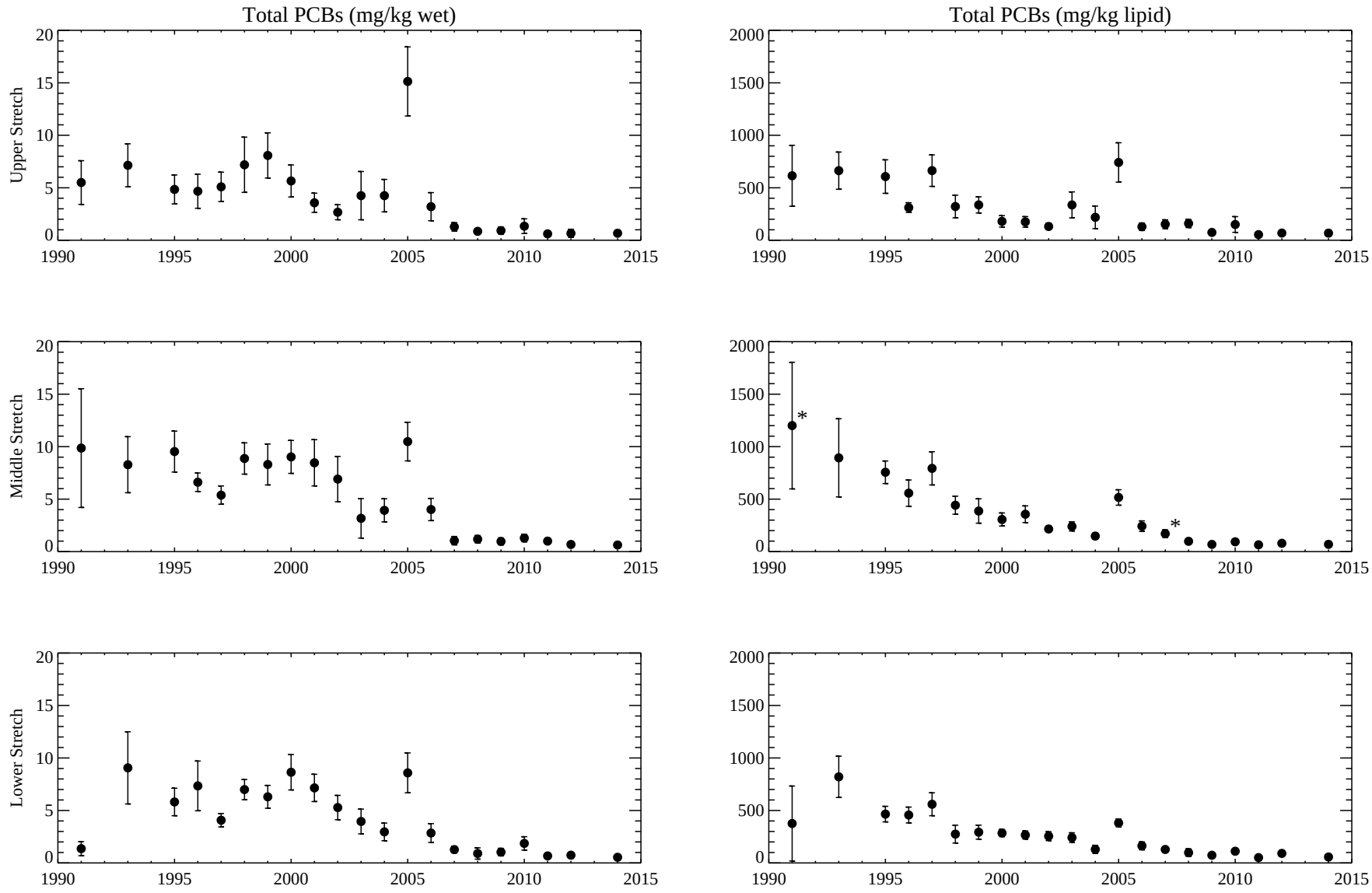


Figure 7-16. Average PCB Levels in Brown Bullhead (1991 - 2014)
Data are arithmetic means +/- two standards errors of the mean.
Values below detection set to half the detection limit. If no detection limit reported, 0.05 mg/kg wet weight assumed.
Analytical methods employed by the laboratories have changed over time and thus, may affect comparability of these results.
**One 1991 and one 2007 sample was excluded due to unreasonably low lipid content (<0.1%).*

Data tables: resfish_aro

ARC - P:\Projects\Alcoa\Grasse_River\Data Analysis\ResFish\IDL\fall14\allspec_allloc_PCBwetlip.pro
Wed Feb 18 09:07:05 2015

Young-of-Year Spottail Shiner

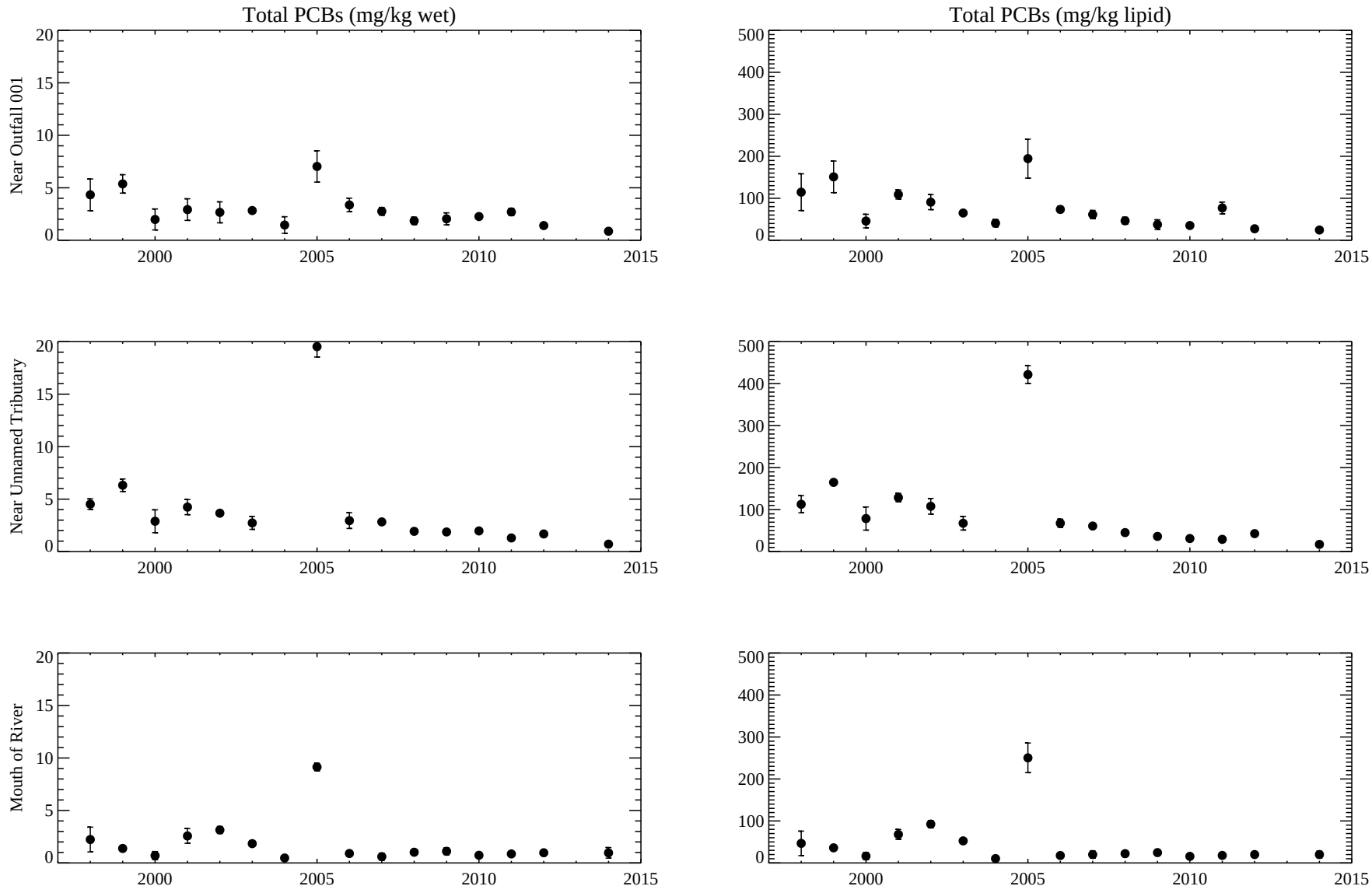
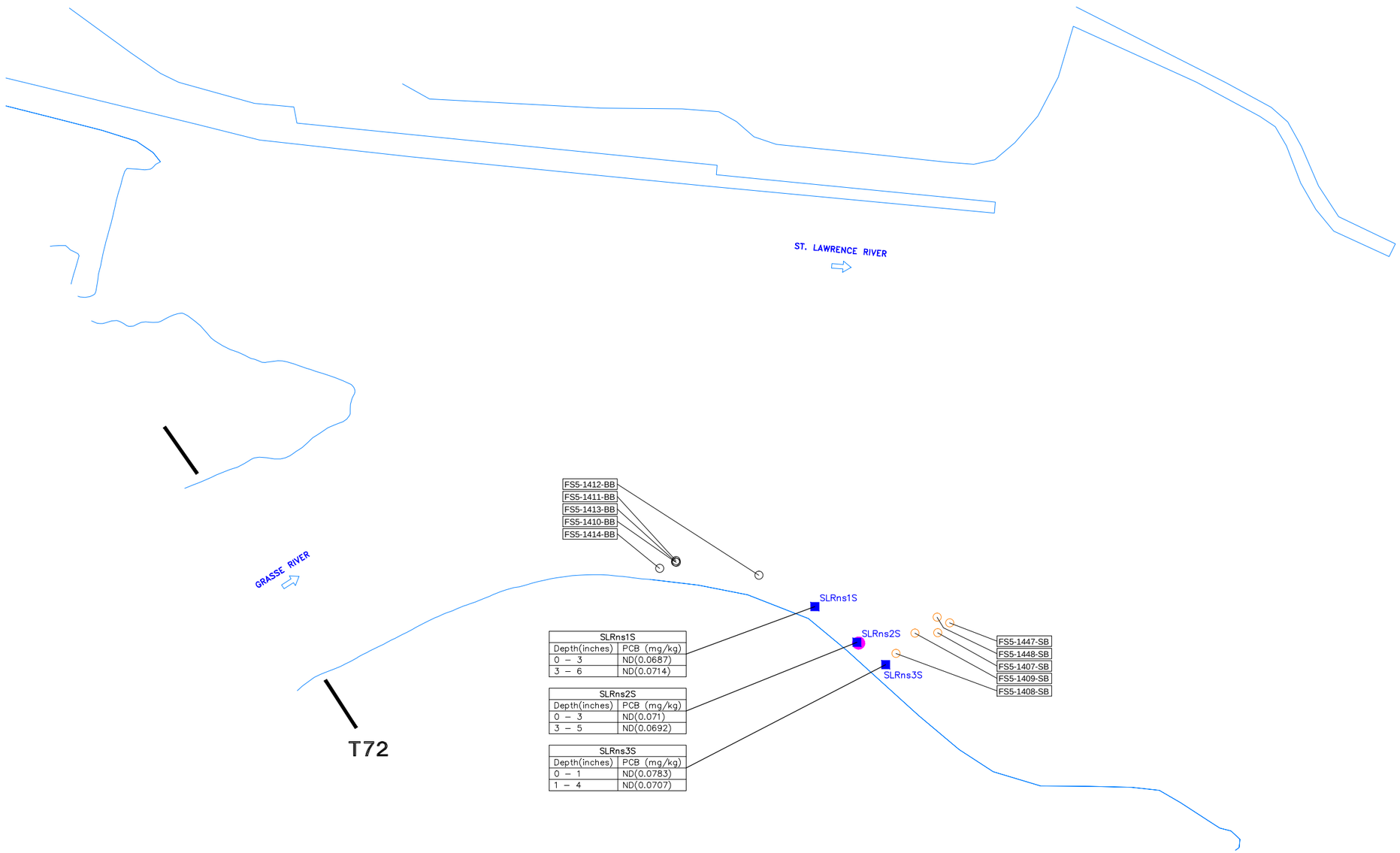


Figure 7-17. Average PCB Levels in Young-of-Year Spottail Shiner (1998 - 2014)
Data are arithmetic means +/- two standards errors of the mean. Does not include results of 2014 newly sampled locations along the southern shoreline.
Values below detection set to half the detection limit. If no detection limit reported, 0.05 mg/kg wet weight assumed.
Analytical methods employed by the laboratories have changed over time and thus, may affect comparability of these results.
Samples analyzed as whole body composites. Composite was considered as YOY if all lengths were <6.5 cm.

Data tables: resfish_aro

ARC - P:\Projects\Alcoa\Grasse_River\Data Analysis\ResFish\IDL\fall14\allspec_allloc_PCBwetlip.pro
Wed Feb 18 09:07:05 2015



SLRns1S	
Depth(inches)	PCB (mg/kg)
0 – 3	ND(0.0687)
3 – 6	ND(0.0714)

SLRns2S	
Depth(inches)	PCB (mg/kg)
0 – 3	ND(0.071)
3 – 5	ND(0.0692)

SLRns3S	
Depth(inches)	PCB (mg/kg)
0 – 1	ND(0.0783)
1 – 4	ND(0.0707)

LEGEND:

- T72 — SEDIMENT PROBING TRANSECT
- RIVER BOUNDARY
- DIRECTION OF RIVER FLOW
- 2013 SEDIMENT SAMPLE LOCATION
- APPROXIMATE ADULT SMALLMOUTH BASS COLLECTION LOCATION
- APPROXIMATE ADULT BROWN BULLHEAD COLLECTION LOCATION
- APPROXIMATE WATER COLUMN SAMPLE LOCATION
- FS4-1367-SB SAMPLE IDENTIFICATION NUMBER

NOTES:

1. ST. LAWRENCE RIVER WATERLINE GENERATED USING 5/1/01 AERIAL PHOTOGRAPHY.
2. ADULT SMALLMOUTH BASS AND BROWN BULLHEAD LOCATIONS ARE APPROXIMATE AND WERE OBTAINED USING A HAND-HELD GPS UNIT WITH A ± 15 FEET HORIZONTAL ACCURACY.

0 150' 300'
GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
PRE-DESIGN INVESTIGATION DATA SUMMARY REPORT

BASELINE MONITORING - ST. LAWRENCE RIVER

ALCOA

FIGURE
7-18

CITY: SYRACUSE, NY DIV/GROUP: IMDV/CAD DB: L.POSENAUER PIC/PM: H.VANDEWALKER LYR:(Off)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0010886\0019\00001\DWG\PDI-DSR\10886G72.DWG LAYOUT: 7-18 SAVED: 3/25/2015 10:07 AM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 3/25/2015 10:07 AM BY: POSENAUER, LISA
XREFS: 10886X02 10886X00 IMAGES: 10886X00.TIF