

FINAL

Third Semiannual Progress Report

**Total Phosphorus Load Calculations for Sites
Stipulated in the SFWMD/Seminole Tribe Agreement**

For Period May 1, 1997 to April 30, 1998

By

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Introduction

The Agreement between the South Florida Water Management District (the District, SFWMD) and the Seminole Tribe of Florida (the Seminole Tribe), executed on January 17, 1996, requires periodic monitoring of the quality of surface water entering, originating on and leaving the Big Cypress Seminole Indian Reservation (the Reservation) to ensure compliance with applicable water quality standards imposed by law and that the overall surface water quality within the Reservation is not adversely impacted.

Pursuant to the Agreement, the District, with the cooperation of the Seminole Tribe, initiated a water quality monitoring program in June of 1996. To help the SFWMD/Seminole Agreement Working Group track the results and progress of this monitoring effort, the District prepares a semiannual report that analyzes and summarizes the water quality and flow data collected since the implementation of the program.

The third semiannual progress report had originally been planned to include data from September 1997 through February 1998. However, at the June 18, 1998 Working Group meeting, it was agreed to extend the date for this reporting period to April 30, 1998. This change essentially allows future semiannual reports to coincide with the normal South Florida wet (May through October) and dry (November through April) seasons. The next semiannual report will cover the wet season, May 1, 1998 through October 31, 1998, and will be available February 1, 1999. This report presents the results of TP load calculations from May 1, 1997 through April 30, 1998 for the following six sites the District monitors: North Feeder Canal (NFEED), West Feeder Canal (WFEED/WEIR), S190 Spillway (S190), L3 Canal Sampling Station (L3BRS), U.S. Sugar Outfall (USSO), and the S140 Pump Station Complex (S140). This report also includes the two sites the Seminole Tribe monitors: L28 Interceptor Canal North (L28IN) and L28 Canal Upstream (L28U). The Seminole Tribe began their water quality and nutrient data collection at sites L28IN and L28U on August 21, 1997. Total phosphorus concentration data were not yet available for the Miccosukee Tribe site, L28 Interceptor Canal South (L28IS). The United States Geological Survey (USGS) has been collecting flow data at the L28IN, L28IS and L28U sites since March 1, 1997. The USGS flow data are used for L28IN and L28U TP load calculations in this report. Comparisons are presented of the flows measured at the L28I and L28U canal sites with flows measured by the District at upstream structures.

All the water quality data collected from May 1997 through April 1998 at the eight sites monitored by the District and the Seminole Tribe are summarized in Tables 4 through 12. Each water quality parameter measured at the eight sites was compared with the Class III Criteria (Florida Administrative Code 62-302.530, Criteria for Surface Water Quality Classifications) and the Sub-Class 2-B Criteria (Seminole Tribe of Florida, Water Quality Standards for the Big Cypress Indian Reservation) to see if any criterion had been exceeded.

Most trace metal measurements were below the detection limit. Two cadmium and four copper detections are tabulated and compared with the standard value which is a function of water hardness (Table 13). Hardness is calculated using the magnesium and calcium concentrations of the same water sample used to measure the trace metals. The hardness equation is: Hardness mg equivalent CaCO₃/L = 2.497 [dissolved Ca, mg/L] + 4.118 [dissolved Mg, mg/L] (Standard Method 19th Ed., 2340 B., p2-36, 1995). Except for periodic low dissolved oxygen (D.O.) concentrations at some sites, no Class III Criteria were exceeded during this reporting period.

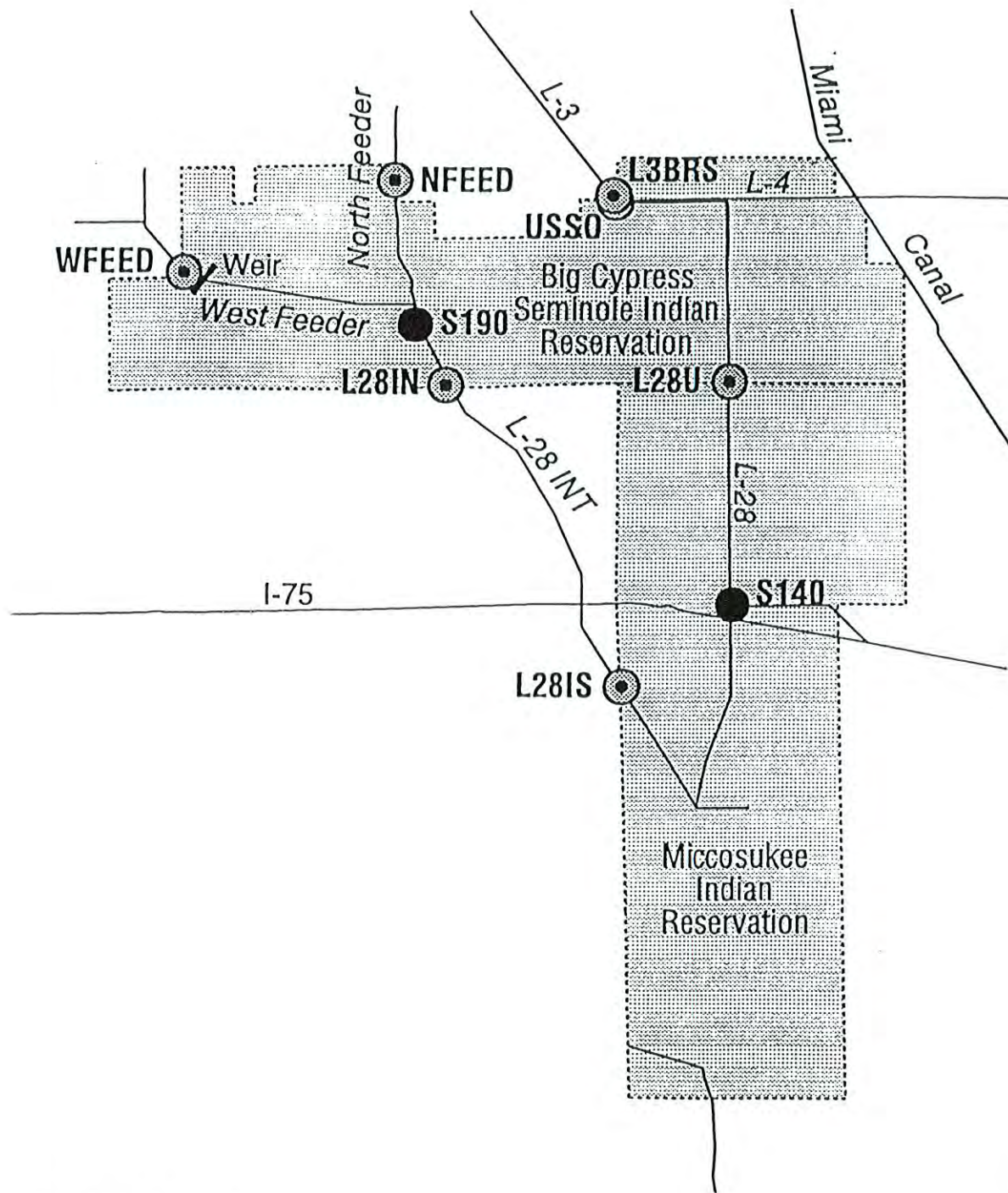
At the present time, there are two water quality monitoring stations for the West Feeder Canal, WFEED and WWEIR. WFEED is the sampling station 80 yards upstream of the weir and WWEIR is the sampling station at the south end of the weir. Both the WFEED and WWEIR auto-samplers are triggered by flows calculated from the weir equation. Comparisons of TP concentrations and loads for the two sites are presented in Appendix III. These data will be used to determine which site provides the best estimate of the West Feeder Canal TP load.

Methods

Figure 1 is a location map showing the water quality sampling and flow measurement sites that were established for the Agreement. The NFEED, WFEED, USSO, L3BRS, S190 and S140 sites are maintained and sampled by the District. The NFEED, USSO, and L3BRS sites are equipped with ultrasonic velocity meters (UVMs) to measure flow and auto-samplers to collect flow proportional water quality samples. The WFEED site uses a weir equation to calculate flow and trigger an auto-sampler. Since June 1997 grab samples have been collected at the NFEED and WFEED sites to supplement the auto-sampler data. In October 1997 grab sampling was also initiated at the WFEIR site. An auto-sampler was added to the WFEIR site on December 18, 1997. Flow through S190 and S140 is calculated using structure-specific equations. At both S190 and S140 water quality data are collected by grab sampling procedures. The sites at L28IN and L28U are equipped with UVMs installed and maintained by the USGS with auto-samplers supplied and operated by the Seminole Tribe. The Miccosukee Tribe has a monitoring site located at L28IS, which is equipped with a UVM supplied by the USGS and a Tribe-owned auto-sampler.

The graphs for the nine sites summarizing the daily mean flows, expressed in cubic feet per second (cfs), TP concentrations in parts per billion (ppb), and resulting daily TP loads in kilograms (kg) are presented in Figures 2 through 11. Please note that the same scales for flows, TP concentrations and TP loads are used in all nine figures, except for the TP load at L3BRS, to make comparisons easy.

Figure 1: SFWMD/Seminole Agreement Water Quality and Flow Sampling Sites



- Major Canal
- Grab samples and flow through structures
- ⊗ Autosamplers and flows from UVMS



Results of Phosphorus Load Calculations

The results of the water flow analyses and the computed total phosphorus loads for the period May 1, 1997 through April 30, 1998 at sites NFEED, USSO, L3BRS, S190, S140, L28IN, L28IS, L28U are presented in Tables 1 and 2. These data were used to create the total phosphorus load graphs for each of the sites. Because the TP loads are calculated on a monthly basis, TP data collected at L28IN and L28U between August 21 and 31, 1997 were not used. L28IS water quality data were not available for this reporting period and only flow data are reported. Table 3 summarizes the monthly flows; total phosphorus loads and total phosphorus flow-weighted mean concentrations for the current reporting period.

Usually, there is heavy rainfall during the summer months followed by a relatively dry season during the winter months in South Florida. The magnitude of the TP load is mostly governed by the amount of rainfall and subsequent canal flows. Time series graphs of TP loads in the study area usually show a similar pattern: a peak flow during the wet season which decreases rapidly as the dry season starts and remains low until the next wet season. However, during this reporting period there were exceptionally heavy rainfalls and, thus, high flows in canals during the dry season (October 1997 to April 1998) due to the effects of El Nino. All eight sites showed two TP load peaks between May 1997 and April 1998, one in the wet season and the other in the dry season.

The most notable phenomenon in the TP load output was the contrast between the WFEED/WWEIR and NFEED sites. TP concentrations at WFEED/WWEIR were very low, the lowest among the 8 monitored sites, while those at NFEED were high, almost the same as at L3BRS, which had the highest TP concentrations among the 8 sites. Moreover, TP concentrations at WFEED/WWEIR tended to be lower during high flows, indicating a dilution effect on TP in runoff by heavy rainfall. On the other hand, TP concentrations at NFEED were positively related to flow, implying that TP in storm water runoff entering the canal increases with increasing rainfall. The TP load at NFEED was three times higher than that at WFEED/WWEIR even though flow in the North Feeder Canal was almost 30% lower than flow in the West Feeder Canal. The TP concentrations at S190, which receives flow from both canals, were close to the average of the North and West Feeder Canals. The total flow and TP load at S190 were close to the sum of the two canals.

L3BRS

The results for L3BRS are presented in Figure 2. The total load for the entire reporting period was 25,759 kg, the largest of the 8 sites. A peak load of 5,361 kg occurred in August 1997 that is close to the sum of the entire yearly load of WFEED and NFEED. The TP load dropped to 133 kg in November 1997 but rose again to 2,849 kg in December 1997. The yearly flow at L3BRS was 134 thousand acre-feet, second only to S140. The associated flow-weighted mean concentration of total phosphorus data collected by the auto-sampler was 157 ppb, the highest of the 8 sites.

USSO

The total phosphorus load for the reporting period calculated from the composite TP concentrations was 3,920 kg (Figure 3). Total yearly flow was 46 thousand acre-feet. The flow-weighted mean concentration of the auto-sampler data was 68 ppb, much lower than that of L3BRS.

L28U

The results for L28U are presented in Figure 4. The total yearly flow measured at the USGS site was 89 thousand acre-feet which was about 1.9 times greater than that at the USSO site. Since the USGS flows have not been independently calibrated, the data is considered to be provisional by the USGS. The second factor affecting the load calculation for L28U is the difference in TP concentrations obtained from grab sampling vs the composite data from the auto-sampler. Theoretically there should be no difference between the two sampling methods if both are collecting representative samples from the canal. During the sampling period from September 1, 1997 through April 30, 1998, the auto-sampler flow-weighted mean TP concentration was 120 ppb compared to 62 ppb from the grab samples (Table 1, page 21). TP load calculations yield 7463 kg and 3655 kg for the auto-sampler data and grab sampler data, respectively (Table 2, page 29). Both the calibration of flows and the TP sampling procedures will need to be addressed before a reliable TP load estimate can be made.

S140

The total phosphorus load calculated for S140 was 7,014 kg. Although there were 101 days with no positive flow, the total flow was 156 thousand acre-feet, the highest of 9 sites and almost twice the flow at L28U. The load estimate is based on the grab samples collected during flow events (Figure 5). The associated flow-weighted mean concentration of total phosphorus was 37 ppb, considerably lower than that of either USSO or L28U. The low TP concentration and high flow volume at S140 compared to those at L28U indicate that S140 may get almost half of the water from that portion of L28 south of S140. If so, the TP concentration of that water is very low. The TP load estimated using grab sample data collected at S140 from September 1, 1997 through April 30, 1998 was added to Table 2 to provide comparative load data from the grab sample data collected during this same period at L28U. The results, 3655 kg TP at L28U and 3329 kg TP at S140, are comparable considering the higher flows measured at S140 (78 kacft) than at L28U (49 kacft).

WFEED/WWEIR

There has been a concern whether the auto-samples being collected at WFEED were representative of the water flowing over the weir (Figure 6). A new sampling pier at the south end of the weir was constructed and grab sampling at the weir (site name WWEIR) commenced October 9, 1997. An auto-sampler, installed with an intake tube located on the weir crest, began collecting samples December 18, 1997 (Figure 7). A comparison of TP concentration data and loads calculated for the WWEIR with that from the WFEED site is presented in Appendix IV. Grab sample TP concentrations taken at the two sites were remarkably similar to each other and their arithmetic means or the flow-weighted means were not statistically different. However, statistically the differences between the arithmetic means and the flow-weighted means of the auto-sampler composite TP data were very significant (P less than 0.01). The total phosphorus loads calculated from the

auto-samplers at WFEED and WWEIR were 835 kg and 604 kg, respectively, for the period of December 18, 1997 to April 30, 1998. Statistically, these loads were also significantly different. Moreover, the auto-sampler and grab sample TP data were more similar in concentration at WWEIR than at WFEED. These results indicate that the auto-sampler TP concentration data at WWEIR would more validly represent the West Feeder Canal load than the data collected at WFEED.

The TP load for the West Feeder Canal was calculated using the grab sample TP data at WFEED from May 1, 1997 until October 9, 1997, grab sample TP data at WWEIR until December 18, 1997 and auto-sampler data at WWEIR through April 30, 1998. The daily mean flow for the canal had missing data from December 19, 1997 to December 30, 1997 due to equipment break down. These missing flow data were estimated using interpolation between December 18 and December 31, 1997 measured flows. Because of the high flows during this period, the estimation of flow by interpolation would not have resulted in much bias of the missing data. The total phosphorus load calculated for the canal for the reporting period, May 1, 1997 through April 30, 1998, was 1,297 kg. The associated flow was 42 thousand acre-feet.

NFEED

Water flow in the North Feeder Canal is complex and can flow in both directions. When the gate at S190 is closed, the wind and any water entering the North Feeder Canal from the West Feeder Canal just north of S190 can create a circulation pattern that causes both positive and negative velocities to be measured by the UVM. These positive and negative velocities are translated into positive and negative flows at times when there is no net discharge past the UVM site. At times of discharge through S190 both positive and negative flows also can occur at the NFEED UVM site. For this reason both positive and negative flows are reported and the associated positive and negative total phosphorus loads are calculated and included in the data set. The auto-sampler does not take a water sample when the UVM is recording negative flows. Consequently, the positive flow TP data are used for both positive and negative load calculations.

The flow-weighted mean concentration of total phosphorus data collected by the auto-sampler was 146 ppb. Beginning June 12, 1997 grab sampling was started to supplement the auto-sampler data.

For the period, total positive flow was 30 thousand acre-feet and TP load was 5,126 kg (Figure 8). Total negative flow was 2 thousand acre-feet and the negative flow TP load was 194 kg. Even though the total flow was lower in the NFEED Canal, the TP load at NFEED was higher than that of WFEED/WWEIR because the TP concentration was higher.

S190

No reverse flow was recorded for the reporting period and 271 days had positive flows. The load estimate is based on grab samples collected during flow events (Figure 9). TP concentrations at S190, which is fed by the West Feeder and North Feeder Canals, were very close to the averaged results of the two canals. The flow-weighted mean concentration of total phosphorus was 85 ppb. The total phosphorus load calculated for

the reporting period was 6,988 kg for a total flow of 70 thousand acre-feet, very comparable to the sum of the NFEED and WFEED loads and flows.

L28IN

The results for L28IN are presented in Figure 10. Three daily flow data were missing for the reporting period and interpolation was used to estimate values for the subsequent calculations. Total flow was 54 thousand acre-feet. There is a deficit of about 20 thousand acre-feet of total flow at L28IN compared to the total flows at S190 and L28IS. It is possible that the daily mean flow at L28IN is under-estimated by about 50 cfs across the flow spectrum and that the zero-line may need to be adjusted. The USGS is planning to calibrate the UVM flow measurements at the site in cooperation with the District.

As water quality monitoring data are available only from August 21, 1997, it was impossible to compare the yearly values directly with other sites. For the period of record, September 1, 1997 to April 30, 1998, the flow-weighted mean concentration of total phosphorus data collected by auto-sampler was 101 ppb, while the flow-weighted mean concentration by grab samples was 65 ppb. This difference between the auto-sampler data and grab sample data is similar to that at L28U. The TP load for the period was 3,169 kg based on auto-sampler data and 1692 kg based on grab sample data (Table 2, page 29). Both of these load estimates are low compared to the 6,988 kg TP load calculated for S190. If the daily flow data at L28IN are adjusted by about 50 cfs and the discrepancy between the auto-sampler and grab sampling data is resolved, the TP loads at S190 and L28IN should be very comparable.

L28IS

There was no water quality data available for this report. Total flow at L28IS for the period was 73 thousand acre-feet, comparable to that at S190 (Figure11).

Figure 2. L3BRS TP Load, Flow and TP Concentration

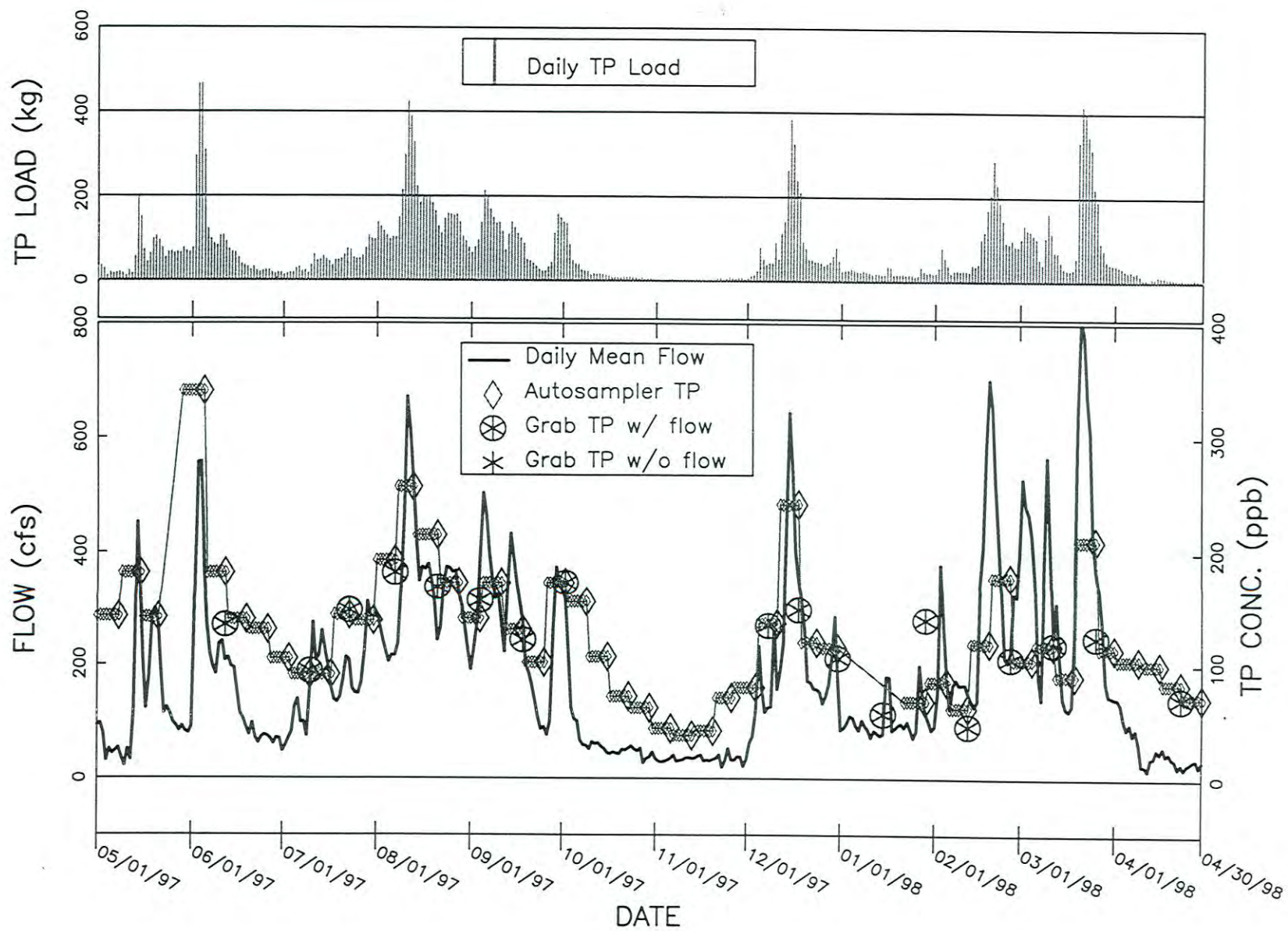


Figure 3. USSO TP Load, Flow and TP Concentration

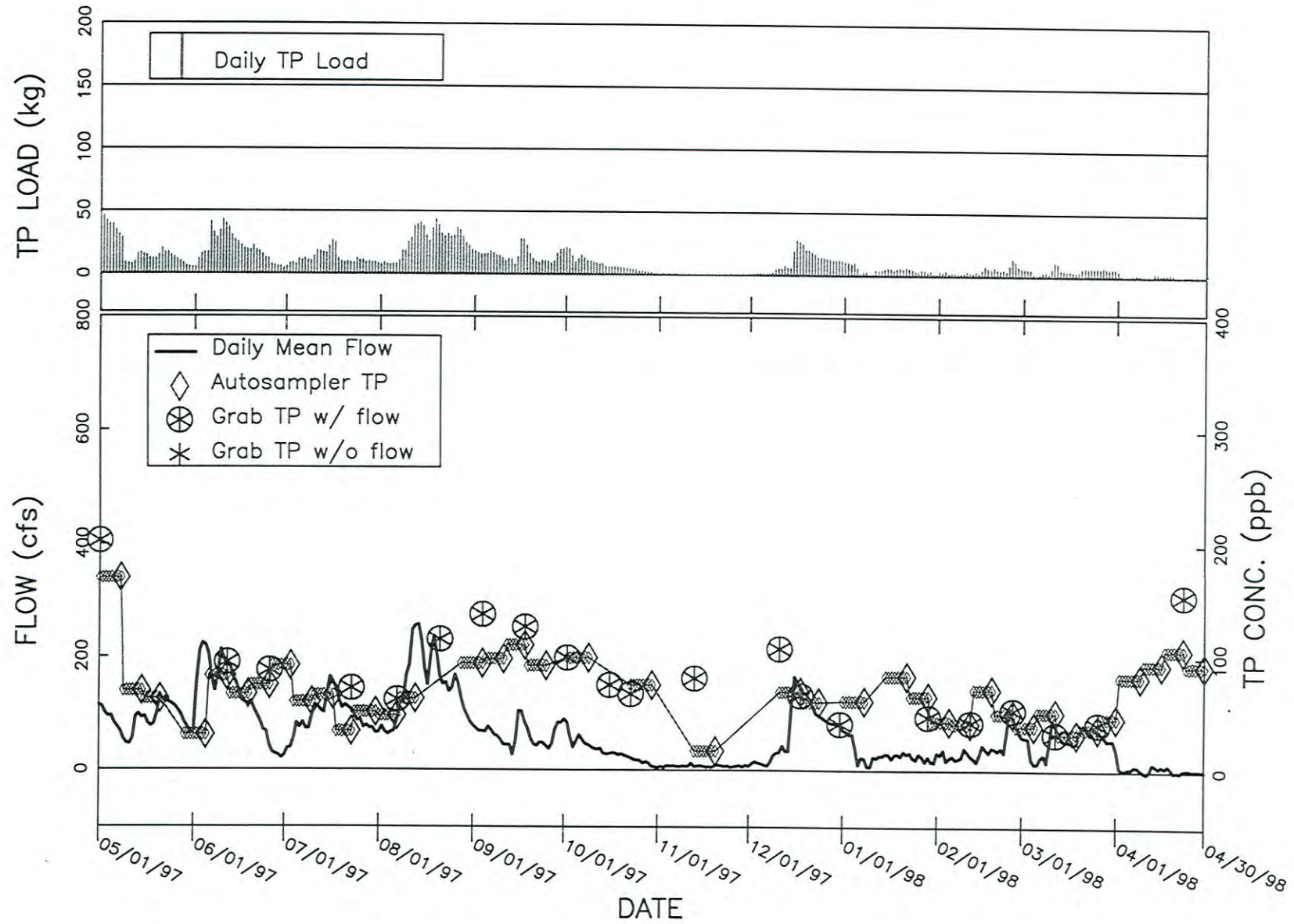


Figure 4. L28U TP Load, Flow and TP Concentration

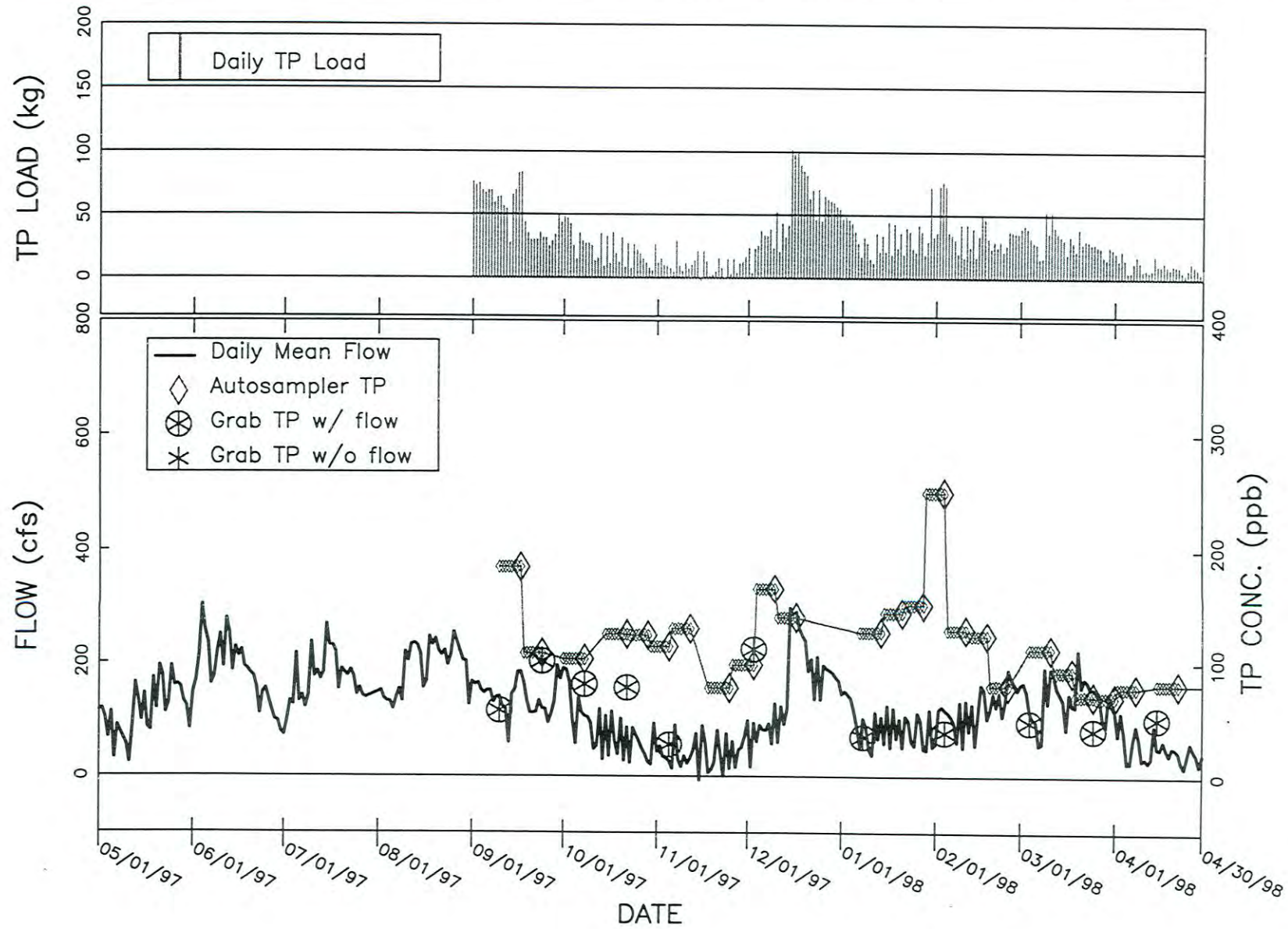


Figure 5. S140 TP Load, Flow and TP Concentration

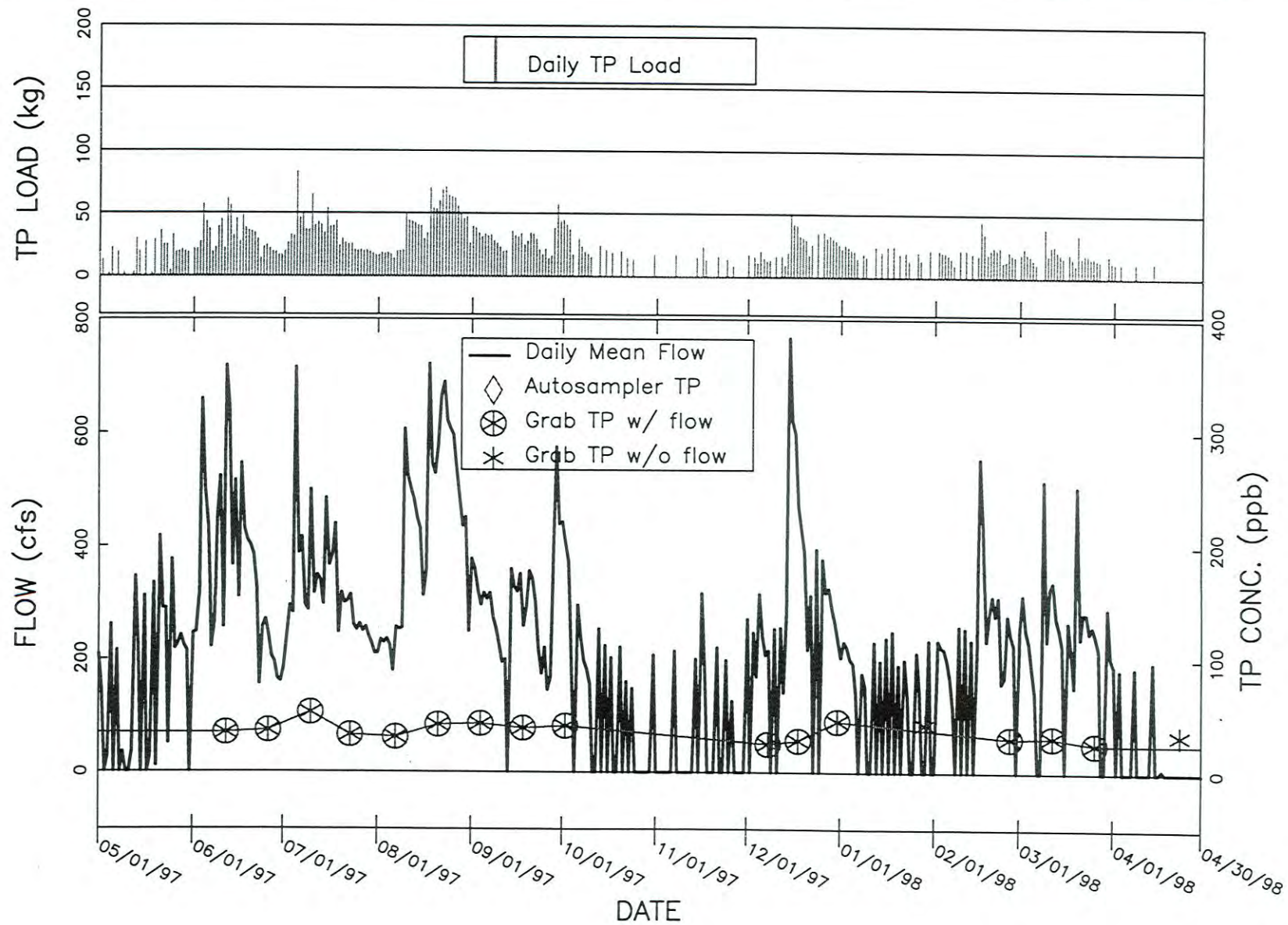


Figure 6. WFEED TP Load, Flow and TP Concentration

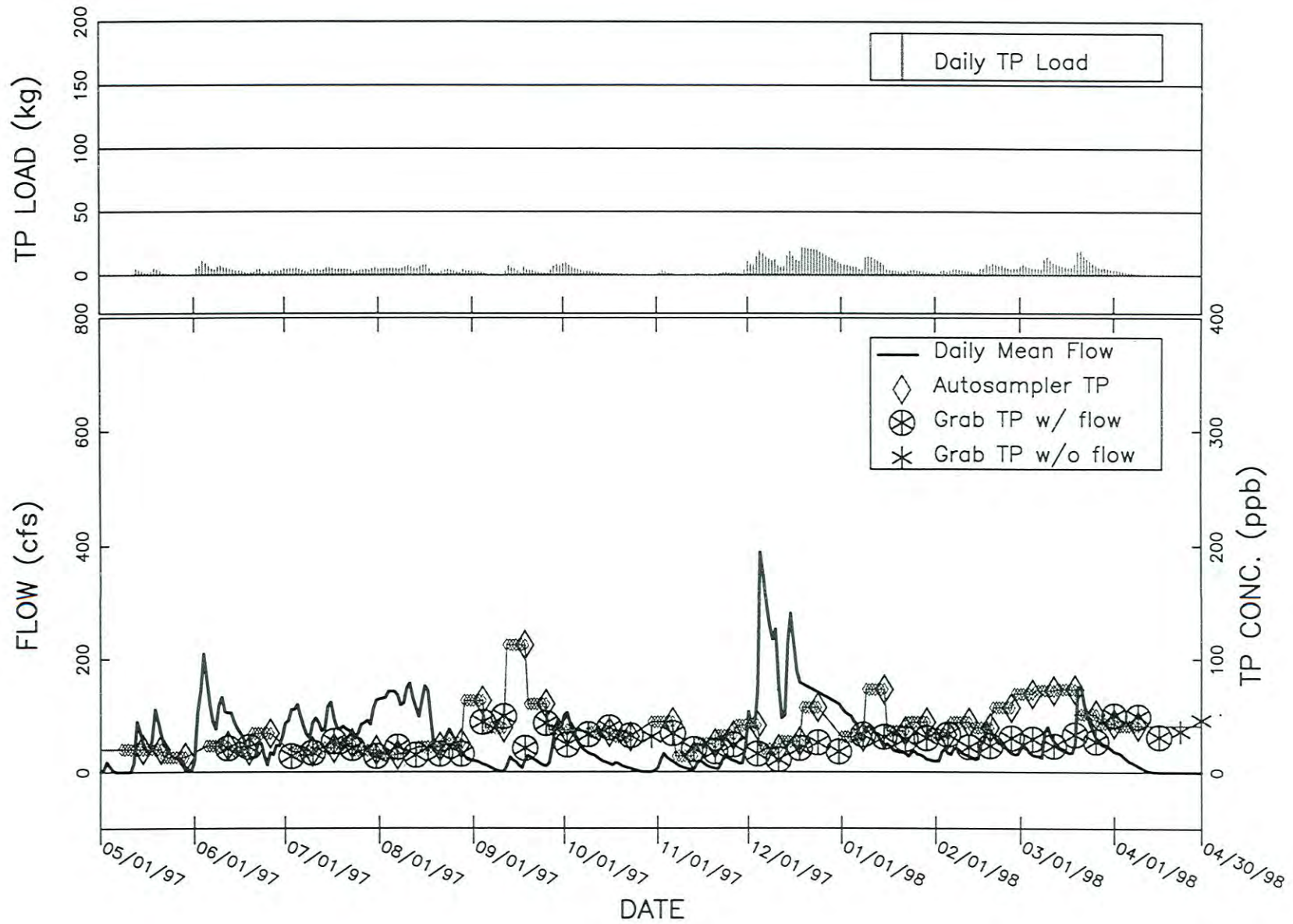


Figure 7. WWEIR TP Load, Flow and TP Concentration

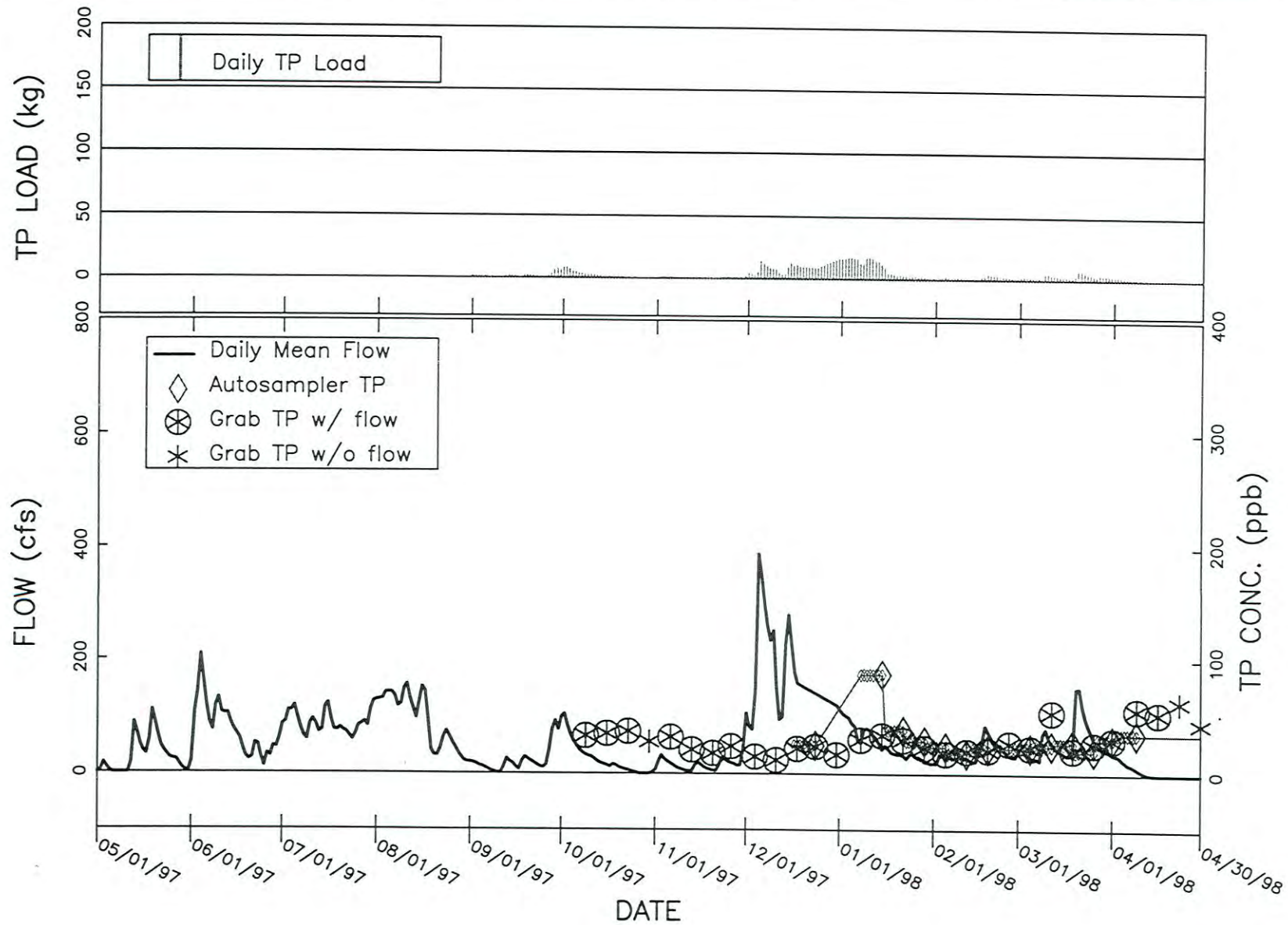


Figure 8. NFEED TP Load, Flow and TP Concentration

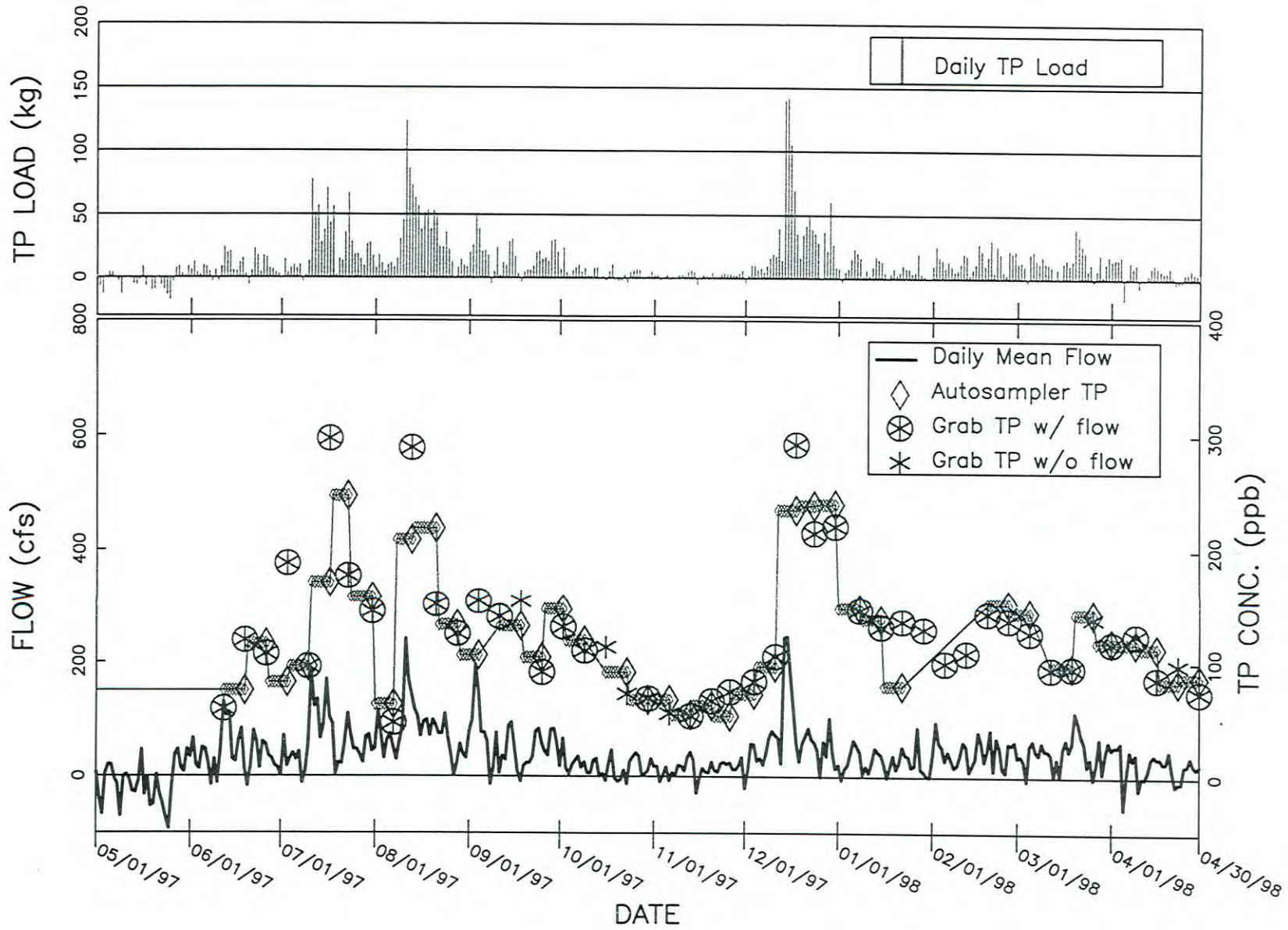


Figure 9. S190 TP Load, Flow and TP Concentration

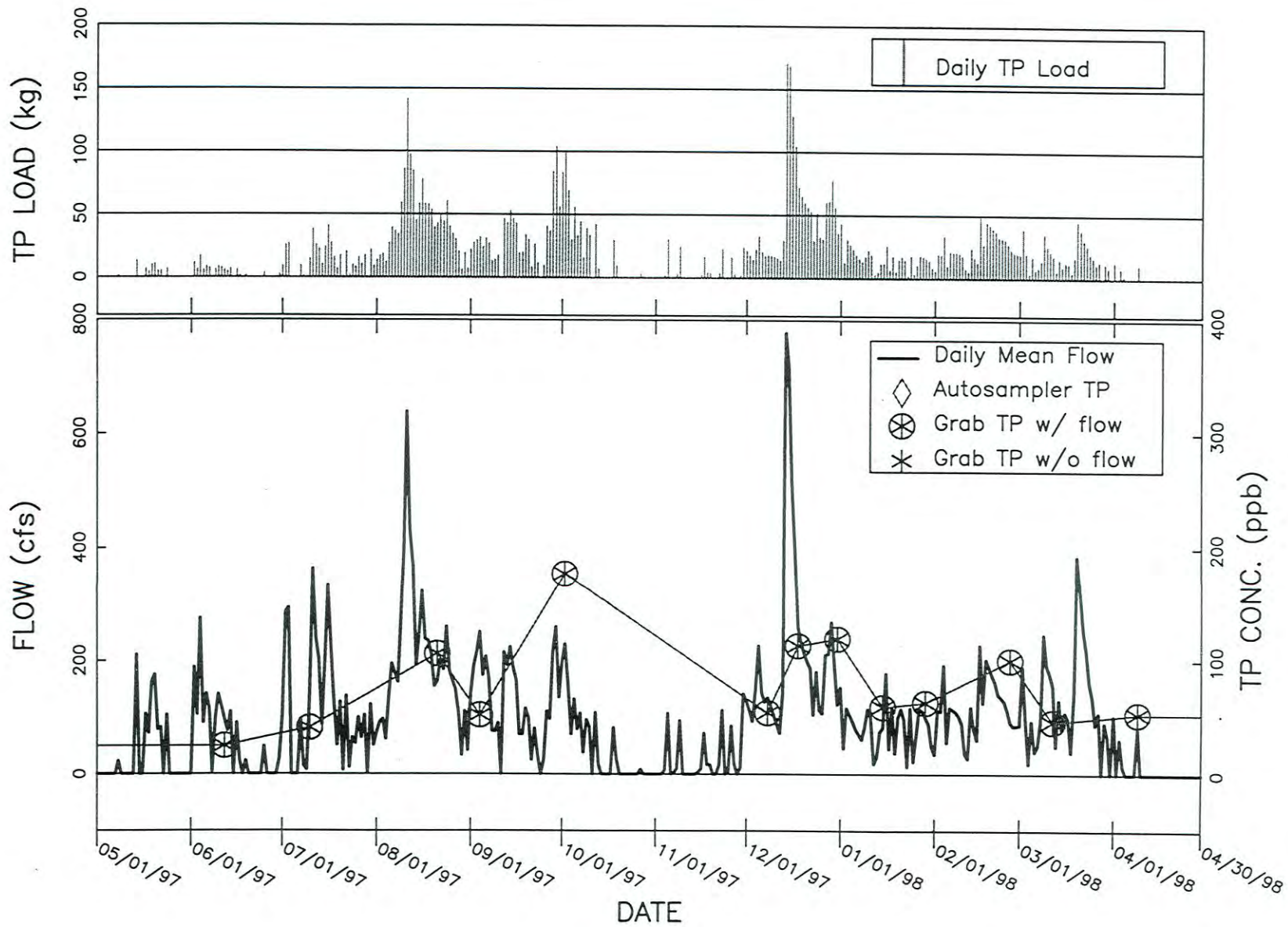


Figure 10. L28IN TP Load, Flow and TP Concentration

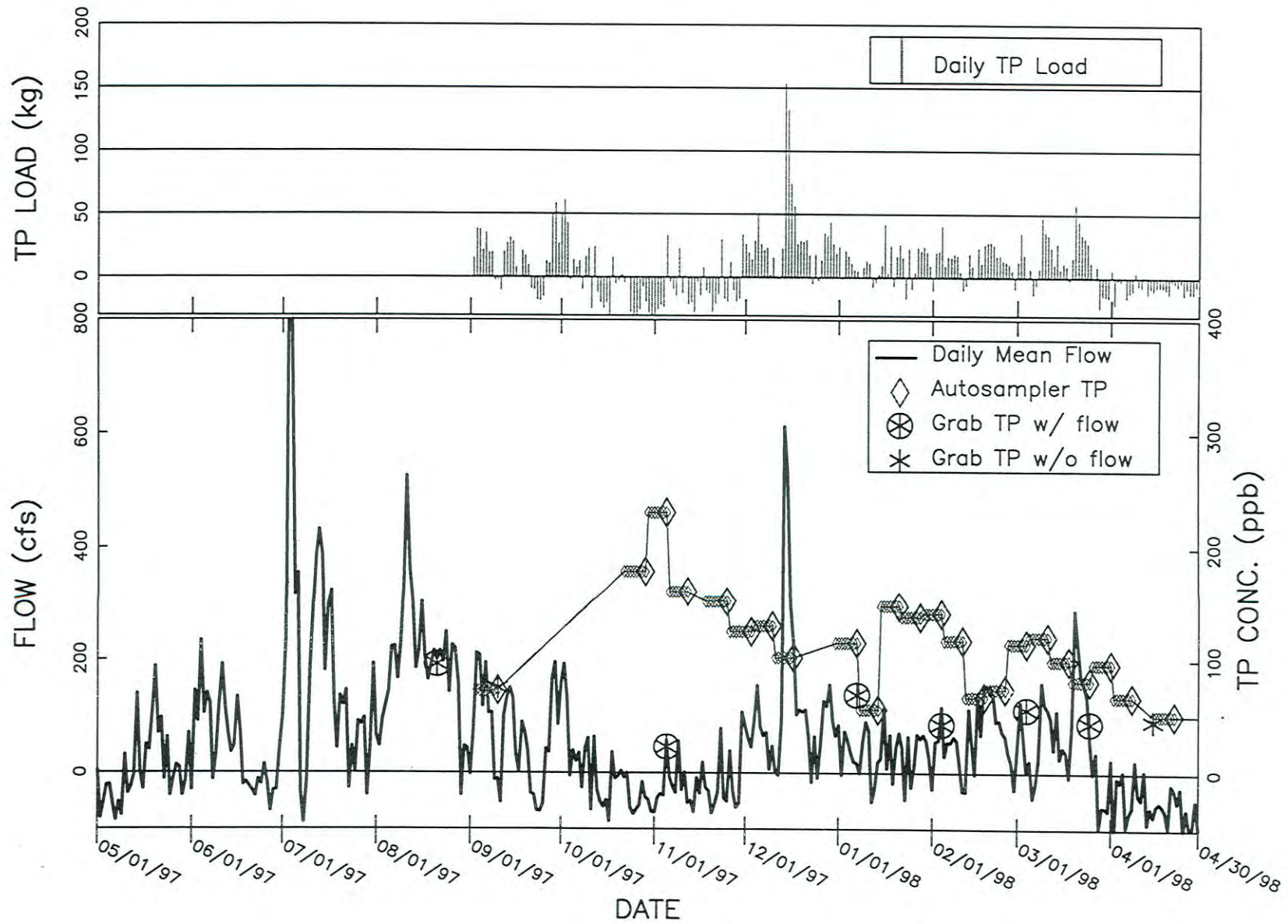


Figure 11. L28IS Flow.

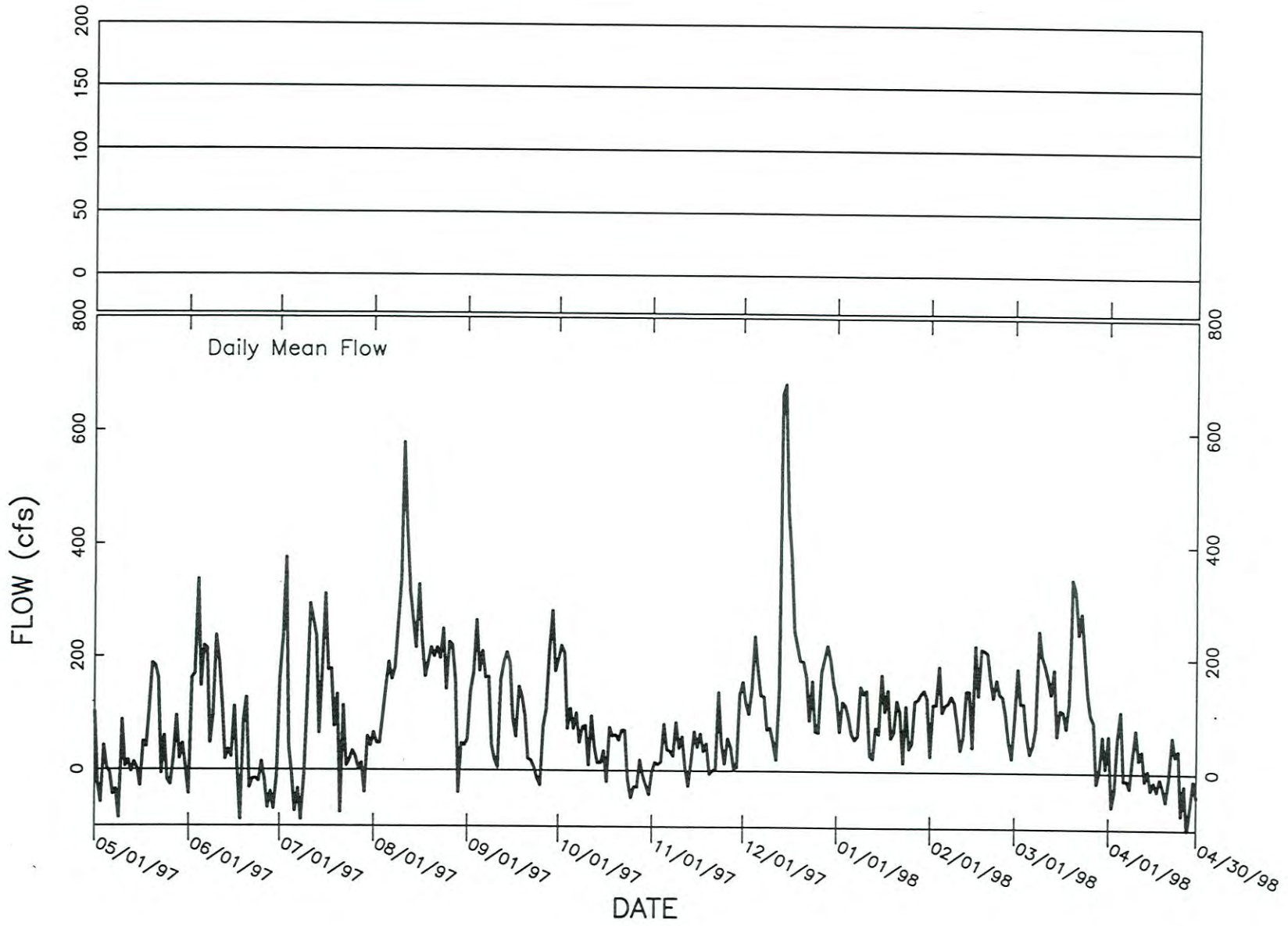


Table 1. Seminole/SFWMD Agreement total phosphorus (TP) data and water flow data summary for the period: May 1, 1997 – April 30, 1998.

For L3BRS:

term auto_lab grab_lab flow_lab dbkey qsign itype iyndcomp
L3BRS USL3BRS L3BRS L3BRS_O 16245 1 auto 19841030

Grab sample n = 18

first datum : 1997/06/12

last datum /: 1998/04/23

average value (arithmetic mean) of all grab = 124 ppb

range = 46 to 182 ppb

Grab sample w/ positive flow n = 18

first datum : 1997/06/12

last datum : 1998/04/23

average value (arithmetic mean) = 124 ppb

range = 46 to 182 ppb

flow weighted mean = 134 ppb

regression: TP conc (ppb) = 75.0548 + 0.225976 * flow (cfs)

load ratio of comp:grab = 1.18425

Auto-sampler (flow proportional composite) n = 49

note: composite sample missing 8 days after 1997/05/21,
22 days after 1997/12/31

first datum : 1997/05/08

last datum : 1998/05/07

average value (arithmetic mean) = 128 ppb

range = 38 to 341 ppb

flow weighted mean = 157 ppb

regression: TP conc (ppb) = 73.1547 + 0.288430 * flow (cfs)

Flow data from 1997/05/01 to 1998/04/30

number of no flow days = 0

number of positive flow days = 365

total positive flow = 67509.031 cfs-d

note: no negative flow days

note: no missing flow data

Table 1. (continued)

For USSO :

term auto_lab grab_lab flow_lab dbkey qsign itype iyndcomp
USSO USSO USSO USSO_O 16749 1 auto 19961231

Grab sample n = 21
first datum : 1997/05/01 last datum : 1998/04/23
average value (arithmetic mean) of all grab = 86 ppb
range = 32 to 203 ppb

Grab sample w/ positive flow n = 21
first datum : 1997/05/01 last datum : 1998/04/23
average value (arithmetic mean) = 86 ppb
range = 32 to 203 ppb
flow weighted mean = 89 ppb
regression: TP conc (ppb) = 78.2640 + 0.102568 * flow (cfs)
load ratio of comp:grab = 0.860972

Auto-sampler (flow proportional composite) n = 40
note: composite sample missing 8 days after 1997/05/21,
15 days after 1997/08/13, 7 days after 1997/09/25,
14 days after 1997/10/09, 14 days after 1997/10/30,
21 days after 1997/11/20, 8 days after 1997/12/24,
7 days after 1998/01/08
first datum : 1997/05/08 last datum : 1998/05/07
average value (arithmetic mean) = 69 ppb
range = 17 to 170 ppb
flow weighted mean = 68 ppb
regression: TP conc (ppb) = 71.2518 - 0.0388450 * flow (cfs)

Flow data from 1997/05/01 to 1998/04/30
number of no flow days = 0
number of positive flow days = 361 total positive flow = 23232.383 cfs-d
number of negative flow days = 4 total negative flow = -5.870 cfs-d
note: 0 missing flow data

(For the period: 1997/09/01 - 1998/04/30)

Grab sample n = 15
first datum : 1997/09/04 last datum : 1998/04/23
average value = 77.9 ppb range = 32 to 154 ppb

Grab sample w/ +flow n = 15
first datum : 19970904 last datum : 19980423
average value = 77.9 ppb range = 32 to 154 ppb
flow weighted mean for data w/ +flow = 72.8 ppb
regression: TP conc (ppb) = 88.7826 - 0.191854 * flow (cfs)
load ratio of comp:grab = 0.927987

Flow data from 1997/09/01 to 1998/04/30
number of positive flow days = 238 total flow (cfs-d) = 9193.106
number of negative flow days = 4 total flow (cfs-d) = -5.870

Table 1. (continued)

For L28U:

term	auto_lab	grab_lab	flow_lab	dbkey	qsign	itype	iyndcomp
L28U	L28U	L28U(BCS7)	L28U_O	FF808(FF809)	1	auto	19970901

Grab sample n = 11
first datum : 1997/09/10
last datum : 1998/04/15
average value = 61 ppb
range = 28 to 112 ppb

Grab sample w/ positive flow n = 11
first datum : 1997/09/10
last datum : 1998/04/15
average value (arithmetic mean) = 61 ppb
range = 28 to 112 ppb
flow weighted mean = 62 ppb
regression: TP conc (ppb) = 50.3160 + 0.105731 * flow (cfs)
load ratio of comp:grab = 2.06055

Auto-sampler (flow proportional composite) n = 24
Note: composite sample missing 7 days after 1997/09/24,
7 days after 1997/10/08, 6 days after 1997/11/12,
21 days after 1997/12/17, 7 days after 1998/02/25,
7 days after 1998/04/08
first datum : 1997/09/17
last datum : 1998/04/22
average value (arithmetic mean) = 120 ppb
range = 70 to 250 ppb
flow weighted mean = 120 ppb
regression: TP conc (ppb) = 120.829 - 0.00862704 * flow (cfs)

Flow data from 1997/05/01 to 1998/04/30
note: flow data missing 1997/05/08 - 1997/05/09, 1997/05/23,
1997/07/29 - 1997/08/01
note: missing flow are filled with interpolated values of two adjacent flow
for subsequent calculations.
number of no flow days = 0
number of positive flow days = 364
total flow = 45023.297 cfs-d
number of negative flow days = 1
total negative flow(cfs-d) = -6.900

Table 1. (continued)

For S140:

term auto_lab grab_lab flow_lab dbkey qsign itype iyndcomp
S140 NONE S140 S140_T 06754 1 grab no auto

Grab sample n = 17
first datum : 1997/06/12
last datum : 1998/04/23
average value (arithmetic mean) of all grab = 36 ppb
range = 25 to 53 ppb

Grab sample w/ +flow) n = 15
first datum : 1997/06/12
last datum : 1998/03/26
average value (arithmetic mean) = 36 ppb
range = 25 to 53 ppb
flow weighted mean for data w/ +flow = 37 ppb
regression: TP conc (ppb) = 30.2285 + 0.0159106 * flow (cfs)
load ratio of comp:grab = 0.860972

Flow data from 1997/05/01 to 1998/04/30
number of no flow days = 99
number of positive flow days = 264
total positive flow = 78572.219 cfs-d
number of negative flow days = 2
total negative flow = -0.970 cfs-d
note: 0 missing flow data

(For the period: 1997/09/01 - 1998/04/30)

Grab sample n = 11
first datum : 1997/09/04
last datum : 1998/04/23
average value = 34.7 ppb
range = 25 to 45 ppb

Grab sample w/ +flow n = 9
first datum : 1997/09/04
last datum : 1998/03/26
average value = 34.1 ppb
range = 25 to 45 ppb
flow weighted mean for data w/ +flow = 34.2 ppb
regression: TP conc (ppb) = 33.3270 + 0.00260771 * flow (cfs)
load ratio of comp:grab = 0.927987

Flow data from 1997/09/01 to 1998/04/30
number of no flow days = 91
number of positive flow days = 149
total flow positive (cfs-d) = 39508.125
number of negative flow days = 2
total negative flow (cfs-d) = -0.970
0 missing flow data

Table 1. (continued)

For WFEED:

term	auto_lab	grab_lab	flow_lab	dbkey	qsign	itype	iyndcomp
WFEED	WFEED	WFEED	WFEED_O	16752	1	auto	19960606

Grab sample n = 46
first datum : 1997/06/12
last datum : 1998/04/30
average value (arithmetic mean) of all grab = 28 ppb
range = 11 to 50 ppb

Grab sample w/ positive flow n = 43
first datum : 1997/06/12
last datum : 1998/04/16
average value (arithmetic mean) of all grab = 27 ppb
range = 11 to 50 ppb
flow weighted mean = 22 ppb
regression: TP conc (ppb) = 33.6235 - 0.119293 * flow (cfs)
load ratio of comp:grab = 1.52905

Auto-sampler (flow proportional composite) n = 42
Note: composite sample missing 7 days after 1997/05/29,
7 days after 1997/06/26, 7 days after 1997/08/07,
7 days after 1997/10/02, 7 days after 1997/10/23,
8 days after 1997/12/24
first datum : 1997/05/15
last datum : 1998/04/09
average value (arithmetic mean) = 39 ppb
range = 13 to 112 ppb
flow weighted mean for data w/ +flow = 33 ppb
regression: TP conc (ppb) = 44.7085 - 0.102533 * flow (cfs)

Flow data from 1997/05/01 to 1998/04/30
note: flow data missing 1997/12/19 - 1997/12/30
note: missing flow are filled with interpolated values of two adjacent flow
for subsequent calculations.
number of no flow days = 21
number of positive flow days = 344
total positive flow = 21044.119 cfs-d
note: no negative flow days

Table 1. (continued)

For WWEIR:

term	auto_lab	grab_lab	flow_lab	dbkey	qsign	itype	iyndcomp
WWEIR	WWEIR	WWEIR	WFEED_O	16752	1	auto	19971224

Grab sample n = 30
first datum : 1997/10/09
last datum : 1998/04/30
average value (arithmetic mean) of all grab = 30 ppb
range = 12 to 63 ppb

Grab sample w/ +flow n = 27
first datum : 1997/10/09
last datum : 1998/04/16
average value (arithmetic mean) = 28 ppb
range = 12 to 56 ppb
flow weighted mean for data w/ +flow = 23 ppb
regression: TP conc (ppb) = 33.4770 - 0.106799 * flow (cfs)
load ratio of comp:grab = 1.20232

Auto-sampler (flow proportional composite) n = 13
note: composite sample missing 15 days after 1997/12/24,
7 days after 1998/02/19
first datum : 1997/12/24
last datum : 1998/04/09
average value (arithmetic mean) = 31 ppb
range = 18 to 87 ppb
flow weighted mean = 32 ppb
regression: TP conc (ppb) = 31.0046 - 0.0000857029 * flow (cfs)

Flow data are the same as that of WFEED.

Table 1. (continued)

For NFEED:

term	auto_lab	grab_lab	flow_lab	dbkey	qsign	itype	iyndcomp
NFEED	NFEED	NFEED	NFEED_O	16754	1	auto	19960619

Grab sample n = 47
first datum : 1997/06/12
last datum : 1998/04/30
average value (arithmetic mean) of all grab = 127 ppb
range = 47 to 297 ppb

Grab sample w/ positive flow n = 41
first datum : 1997/06/12
last datum : 1998/04/30
average value (arithmetic mean) = 130 ppb
range = 47 to 297 ppb
flow weighted mean = 144 ppb
regression: TP conc (ppb) = 98.1536 + 0.615612 * flow (cfs)
load ratio of comp:grab = 0.942944

Auto-sampler (flow proportional composite) n = 40
note: composite sample missing 50 days after 1997/04/24,
7 days after 1997/09/04, 7 days after 1997/10/09,
28 days after 1998/01/22, 7 days after 1998/03/05
first datum : 1997/06/19
last datum : 1998/05/07
average value (arithmetic mean) = 124 ppb
range = 53 to 247 ppb
flow weighted mean = 146 ppb
regression: TP conc (ppb) = 74.9479 + 1.08431 * flow (cfs)

Flow data from 1997/05/01 to 1998/04/30
number of no flow days = 0
number of positive flow days = 318
total positive flow = 15000.495 cfs-d
number of negative flow days = 47
total negative flow = -966.030 cfs-d
note: no missing flow data

Table 1. (continued)

For S190:

term	auto_lab	grab_lab	flow_lab	dbkey	qsign	itype	iyndcomp
S190	NONE	S190	S190_S	15987	1	grab	no auto

Grab sample n = 13

first datum : 1997/06/12

last datum : 1998/04/09

average value (arithmetic mean) of all grab = 78 ppb

range = 25 to 177 ppb

Grab sample w/ positive flow n = 13

first datum : 1997/06/12

last datum : 1998/04/09

average value (arithmetic mean)= 78 ppb

range = 25 to 177 ppb

flow weighted mean = 85 ppb

regression: TP conc (ppb) = 34.6344 + 0.291557 * flow (cfs)

load ratio of comp:grab = 0.860972

Flow data from 1997/05/01 to 1998/04/30

number of no flow days = 94

number of positive flow days = 271

total positive flow = 35451.473 cfs-d

note: no negative flow days

note: no missing flow data

Table 1. (continued)

For L28IN:

term	auto_lab	grab_lab	flow_lab	dbkey	qsign	itype	iyndcomp
L28IN	L28IN	L28IN(BSC5)	L28IN_O	FF809(FF809)	1	auto	19970901

Grab sample n = 7

first datum : 1997/08/21

last datum : 1998/03/25

average value (arithmetic mean) of all grab = 58 ppb

range = 23 to 96 ppb

Grab sample w/ positive flow n = 6

first datum : 1997/08/21

last datum : 1998/03/25

average value (arithmetic mean) = 55 ppb

range = 23 to 96 ppb

flow weighted mean = 65 ppb

regression: TP conc (ppb) = 42.5032 + 0.168025 * flow (cfs)

load ratio of comp:grab = 3.59858

Auto-sampler (flow proportional composite) n = 20

note: composite sampling started on 1997/09/03

composite sample missing 6 days after 1997/11/12,

42 days after 1997/09/10 for 42 days, 14 days after 1997/12/17,

7 days after 1998/04/08

first datum : 1997/09/10

last datum : 1998/03/25

average value (arithmetic mean) = 121 ppb

range = 56 to 231 ppb

flow weighted mean = 101 ppb

regression: TP conc (ppb) = 144.890 - 0.374531 * flow (cfs)

Flow data from 1997/05/01 to 1998/04/30

note: missing flow data 1997/06/20, 1997/08/04, 1997/08/19

note: missing flow are filled with interpolated values of two adjacent flow
for subsequent calculations.

number of no flow days = 0

number of positive flow days = 229

total positive flow = 27436.578 cfs-d

number of negative flow days = 136

total flow = -5689.870 cfs-d

Table 1. (continued)

For L28IS :

term	auto_lab	grab_lab	flow_lab	dbkey	qsign	itype	iyndcomp
L28IS	L28IS	L28I@175	L28IS_O	FF812	1		

No TP Data available

Flow data from 1997/05/01 to 1998/04/30

number of no flow days = 0

number of positive flow days = 302

total positive flow = 36708.469 cfs-d

number of negative flow days = 63

total negative flow = -2053.700 cfs-d

**Table 2. Seminole/SFWMD Agreement TP load calculation summary
for the period: May 1, 1997 – April 30, 1998.**

For positive flow:

Term	Period	TP Data Used	Flow (kacft)	Load(kg)
L3BRS	5/1/1997-4/30/1998	auto only	133.902	25758.613
USSO	5/1/1997-4/30/1998 (9/1/1997-4/30/1998)	auto only grab only	46.081 18.234	3920.408 1622.973)
L28U	5/1/1997-4/30/1998 9/1/1997-4/30/1998 (9/1/1997-4/30/1998)	N/A grab only auto only	89.302 49.185 49.185	N/A 3655.474 7462.679)
S140	5/1/1997-4/30/1998 (9/1/1997-4/30/1998)	grab only grab only	155.846 78.363	7013.951 3329.270)
WFEEED/WWEIR	5/1/1997-4/30/1998	grab then auto	41.740	1697.282
NFEED	5/1/1997-4/30/1998	auto only	29.753	5125.972
S190	5/1/1997-4/30/1998	grab only	70.317	6988.053
L28IN	5/1/1997-4/30/1998 9/1/1997-4/30/1998 (9/1/1997-4/30/1998)	N/A grab only auto only	54.420 24.725 24.725	N/A 1691.829 3168.714)
L28IS	5/1/1997-4/30/1998	N/A	72.810	N/A

For negative (reverse) flow:

Term	Period	TP Data Used	Flow (kacft)	Load (kg)
USSO	5/1/1997-4/30/1998 (9/1/1997-4/30/1998)	auto only grab only	-0.012 -0.012	-1.401 -1.714)
L28U	5/1/1997-4/30/1998 9/1/1997-4/30/1998 (9/1/1997-4/30/1998)	N/A grab only auto only	-0.014 -0.014 -0.014	N/A -0.980 -1.757)
S140	5/1/1997-4/30/1998 (9/1/1997-4/30/1998)	grab only grab only	-0.002 -0.002	-0.059 -0.059)
NFEED	5/1/1997-4/30/1998	auto only	-1.916	-193.647
L28IN	5/1/1997-4/30/1998 9/1/1997-4/30/1998 (9/1/1997-4/30/1998)	N/A grab only auto only	-11.286 -8.833 -8.833	N/A -812.051 -1224.297)
L28IS	5/1/1997-4/30/1998	N/A	-4.073	N/A

**Table 3. Seminole/SFWMD Agreement total phosphorus (TP) load calculation
monthly summary by station for the period: May 1, 1997 – April 30, 1998.**

Note: flow is in million cubic meters and in (thousand acre-feet).

For L3BRS :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
L3BRS	1997/05	31	9.777 (7.926)	1793.228	183.274	0.000 (0.000)	0.000
L3BRS	1997/06	30	13.087 (10.610)	2906.258	221.906	0.000 (0.000)	0.000
L3BRS	1997/07	31	12.801 (10.378)	1505.839	117.543	0.000 (0.000)	0.000
L3BRS	1997/08	31	25.795 (20.912)	5360.739	207.660	0.000 (0.000)	0.000
L3BRS	1997/09	30	20.031 (16.239)	2974.949	148.404	0.000 (0.000)	0.000
L3BRS	1997/10	31	6.046 (4.902)	770.993	127.423	0.000 (0.000)	0.000
L3BRS	1997/11	30	2.534 (2.054)	132.677	52.325	0.000 (0.000)	0.000
L3BRS	1997/12	31	16.665 (13.511)	2848.761	170.811	0.000 (0.000)	0.000
L3BRS	1998/01	31	7.741 (6.276)	650.949	84.029	0.000 (0.000)	0.000
L3BRS	1998/02	28	19.202 (15.567)	2392.817	124.520	0.000 (0.000)	0.000
L3BRS	1998/03	31	27.474 (22.273)	4032.313	146.656	0.000 (0.000)	0.000
L3BRS	1998/04	30	4.014 (3.254)	389.092	96.853	0.000 (0.000)	0.000

For USSO :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
USSO	1997/05	31	6.862 (5.563)	588.367	85.675	0.000 (0.000)	0.000
USSO	1997/06	30	9.367 (7.594)	618.204	65.946	0.000 (0.000)	0.000
USSO	1997/07	31	7.007 (5.681)	382.847	54.592	0.000 (0.000)	0.000
USSO	1997/08	31	11.111 (9.008)	802.764	72.191	0.000 (0.000)	0.000
USSO	1997/09	30	4.547 (3.686)	449.322	98.745	0.000 (0.000)	0.000
USSO	1997/10	31	2.607 (2.114)	239.516	91.801	0.000 (0.000)	0.000
USSO	1997/11	30	0.533 (0.432)	16.839	31.591	0.000 (0.000)	0.000
USSO	1997/12	31	5.326 (4.318)	335.663	62.973	0.000 (0.000)	0.000
USSO	1998/01	31	2.189 (1.775)	149.516	68.255	0.000 (0.000)	0.000
USSO	1998/02	28	2.719 (2.204)	137.007	50.355	0.000 (0.000)	0.000
USSO	1998/03	31	4.164 (3.376)	167.174	40.115	0.000 (0.000)	0.000
USSO	1998/04	30	0.407 (0.330)	33.190	81.454	-0.014 (-0.012)	-1.401

Table 3. (continued)

For L28U : TP load calculated using auto-sampler data.

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
L28U	1997/05	31	8.798 (7.133)			0.000 (0.000)	
L28U	1997/06	30	13.547 (10.982)			0.000 (0.000)	
L28U	1997/07	31	12.633 (10.241)			0.000 (0.000)	
L28U	1997/08	31	14.507 (11.761)			0.000 (0.000)	
L28U	1997/09	30	10.251 (8.311)	1569.423	152.980	0.000 (0.000)	0.000
L28U	1997/10	31	6.266 (5.080)	709.381	113.130	0.000 (0.000)	0.000
L28U	1997/11	30	2.959 (2.399)	307.306	103.787	-0.017 (-0.014)	-1.757
L28U	1997/12	31	11.763 (9.537)	1635.432	138.924	0.000 (0.000)	0.000
L28U	1998/01	31	6.821 (5.530)	995.638	145.853	0.000 (0.000)	0.000
L28U	1998/02	28	8.228 (6.670)	1012.889	123.011	0.000 (0.000)	0.000
L28U	1998/03	31	10.540 (8.545)	928.859	88.061	0.000 (0.000)	0.000
L28U	1998/04	30	3.841 (3.114)	303.752	79.018	0.000 (0.000)	0.000

For L28U : TP load calculated using grab sample data.

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
L28U	1997/09	30	10.251 (8.311)	775.326	75.575	0.000 (0.000)	0.000
L28U	1997/10	31	6.266 (5.080)	495.087	78.955	0.000 (0.000)	0.000
L28U	1997/11	30	2.959 (2.399)	187.538	63.338	-0.017 (-0.014)	-0.980
L28U	1997/12	31	11.763 (9.537)	923.503	78.448	0.000 (0.000)	0.000
L28U	1998/01	31	6.821 (5.530)	266.775	39.080	0.000 (0.000)	0.000
L28U	1998/02	28	8.228 (6.670)	352.804	42.846	0.000 (0.000)	0.000
L28U	1998/03	31	10.540 (8.545)	467.019	44.276	0.000 (0.000)	0.000
L28U	1998/04	30	3.841 (3.114)	187.422	48.756	0.000 (0.000)	0.000

For S140 :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
S140	1997/05	31	11.600 (9.404)	406.302	35.000	0.000 (0.000)	0.000
S140	1997/06	30	26.497 (21.481)	948.413	35.766	0.000 (0.000)	0.000
S140	1997/07	31	24.536 (19.892)	1046.969	42.638	0.000 (0.000)	0.000
S140	1997/08	31	32.941 (26.706)	1272.997	38.615	0.000 (0.000)	0.000
S140	1997/09	30	21.253 (17.230)	868.027	40.812	0.000 (0.000)	0.000
S140	1997/10	31	9.519 (7.717)	371.644	39.013	0.000 (0.000)	0.000
S140	1997/11	30	3.575 (2.899)	107.190	29.958	0.000 (0.000)	0.000
S140	1997/12	31	21.111 (17.115)	652.571	30.888	0.000 (0.000)	0.000
S140	1998/01	31	8.671 (7.029)	359.423	41.421	0.000 (0.000)	0.000
S140	1998/02	28	13.696 (11.104)	448.486	32.719	0.000 (0.000)	0.000
S140	1998/03	31	16.979 (13.765)	485.491	28.572	0.000 (0.000)	0.000
S140	1998/04	30	1.856 (1.505)	46.438	25.000	-0.002 (-0.002)	-0.059

Table 3. (continued)

For WFEED :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
WFEED	1997/05	31	2.164 (1.755)	45.483	21.000	0.000 (0.000)	0.000
WFEED	1997/06	30	5.570 (4.516)	114.834	20.600	0.000 (0.000)	0.000
WFEED	1997/07	31	6.670 (5.407)	125.803	18.847	0.000 (0.000)	0.000
WFEED	1997/08	31	7.129 (5.779)	124.317	17.425	0.000 (0.000)	0.000
WFEED	1997/09	30	1.626 (1.318)	55.548	34.129	0.000 (0.000)	0.000
WWEIR	1997/10	31	2.016 (1.635)	67.619	33.511	0.000 (0.000)	0.000
WWEIR	1997/11	30	1.156 (0.937)	28.662	24.776	0.000 (0.000)	0.000
WWEIR	1997/12	31	13.226 (10.722)	285.413	21.564	0.000 (0.000)	0.000
WWEIR	1998/01	31	4.159 (3.372)	264.294	63.501	0.000 (0.000)	0.000
WWEIR	1998/02	28	2.760 (2.238)	59.715	21.616	0.000 (0.000)	0.000
WWEIR	1998/03	31	4.437 (3.597)	105.322	23.721	0.000 (0.000)	0.000
WWEIR	1998/04	30	0.573 (0.464)	19.609	34.223	0.000 (0.000)	0.000

For NFEED :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
NFEED	1997/05	31	0.643 (0.521)	48.270	75.000	-1.601 (-1.298)	-120.156
NFEED	1997/06	30	3.168 (2.569)	269.015	84.841	-0.108 (-0.088)	-9.852
NFEED	1997/07	31	4.644 (3.765)	781.702	168.185	-0.029 (-0.023)	-2.741
NFEED	1997/08	31	6.022 (4.882)	1007.665	167.201	0.000 (0.000)	0.000
NFEED	1997/09	30	4.345 (3.522)	518.836	119.330	-0.054 (-0.044)	-6.804
NFEED	1997/10	31	1.406 (1.140)	141.346	100.452	-0.090 (-0.073)	-8.217
NFEED	1997/11	30	1.151 (0.933)	68.895	59.823	-0.119 (-0.096)	-7.577
NFEED	1997/12	31	5.110 (4.143)	1042.007	203.751	-0.050 (-0.041)	-3.659
NFEED	1998/01	31	2.063 (1.673)	239.995	116.230	-0.017 (-0.014)	-2.277
NFEED	1998/02	28	3.017 (2.446)	407.438	134.949	0.000 (0.000)	0.000
NFEED	1998/03	31	3.301 (2.676)	410.014	124.107	-0.024 (-0.020)	-3.461
NFEED	1998/04	30	1.829 (1.483)	190.790	104.225	-0.271 (-0.220)	-28.904

For S190 :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
S190	1997/05	31	2.488 (2.017)	62.237	25.000	0.000 (0.000)	0.000
S190	1997/06	30	4.355 (3.531)	111.873	25.668	0.000 (0.000)	0.000
S190	1997/07	31	8.859 (7.182)	434.585	49.016	0.000 (0.000)	0.000
S190	1997/08	31	15.430 (12.509)	1413.965	91.568	0.000 (0.000)	0.000
S190	1997/09	30	9.578 (7.765)	947.828	98.888	0.000 (0.000)	0.000
S190	1997/10	31	3.520 (2.854)	592.634	168.228	0.000 (0.000)	0.000
S190	1997/11	30	1.784 (1.446)	158.553	88.799	0.000 (0.000)	0.000
S190	1997/12	31	16.292 (13.208)	1565.934	96.042	0.000 (0.000)	0.000
S190	1998/01	31	6.364 (5.160)	477.805	75.017	0.000 (0.000)	0.000
S190	1998/02	28	7.875 (6.384)	672.994	85.397	0.000 (0.000)	0.000
S190	1998/03	31	9.553 (7.744)	516.631	54.042	0.000 (0.000)	0.000
S190	1998/04	30	0.637 (0.516)	33.015	51.781	0.000 (0.000)	0.000

Table 3. (continued)

For L28IN : TP load calculated using auto-sampler data

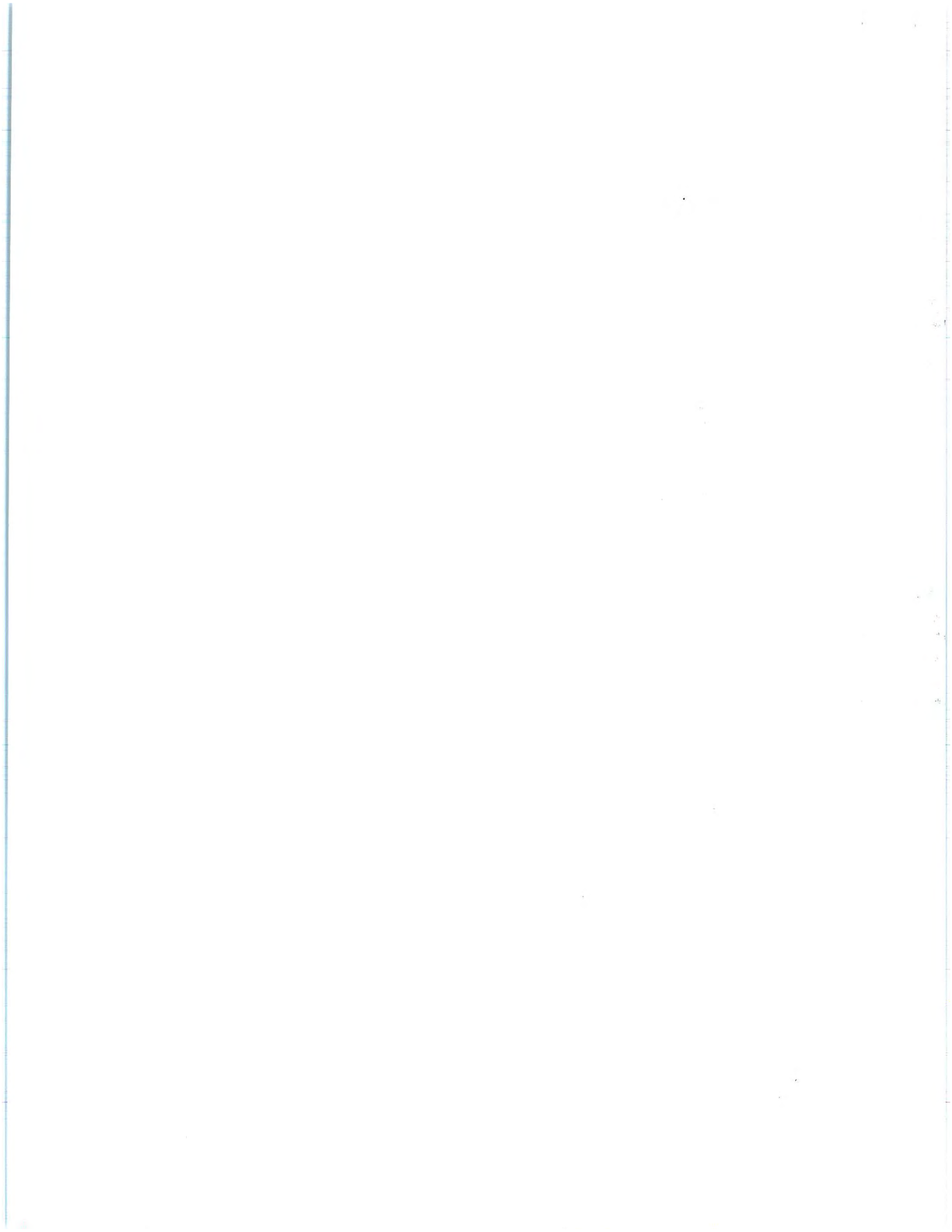
Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
L28IN	1997/05	31	2.178 (1.766)			-1.583 (-1.284)	
L28IN	1997/06	30	4.211 (3.414)			-0.860 (-0.697)	
L28IN	1997/07	31	15.490 (12.558)			-0.487 (-0.395)	
L28IN	1997/08	31	14.749 (11.957)			-0.095 (-0.077)	
L28IN	1997/09	30	5.654 (4.584)	497.053	87.844	-0.832 (-0.674)	-82.701
L28IN	1997/10	31	1.938 (1.571)	264.567	136.402	-2.018 (-1.636)	-357.747
L28IN	1997/11	30	0.885 (0.717)	137.437	155.233	-2.345 (-1.901)	-389.592
L28IN	1997/12	31	8.926 (7.236)	977.926	109.474	-0.069 (-0.056)	-7.469
L28IN	1998/01	31	3.108 (2.519)	373.508	120.098	-0.420 (-0.340)	-42.498
L28IN	1998/02	28	4.546 (3.685)	399.916	87.909	-0.303 (-0.246)	-32.653
L28IN	1998/03	31	5.310 (4.305)	507.966	95.597	-0.871 (-0.706)	-87.461
L28IN	1998/04	30	0.132 (0.107)	10.341	78.213	-4.037 (-3.273)	-224.175

For L28IN : TP load calculated using grab sample data.

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
L28IN	1997/09	30	5.654 (4.584)	414.961	73.336	-0.832 (-0.674)	-55.649
L28IN	1997/10	31	1.938 (1.571)	102.139	52.659	-2.018 (-1.636)	-75.292
L28IN	1997/11	30	0.885 (0.717)	30.029	33.917	-2.345 (-1.901)	-74.306
L28IN	1997/12	31	8.926 (7.236)	473.642	53.022	-0.069 (-0.056)	-3.995
L28IN	1998/01	31	3.108 (2.519)	184.143	59.209	-0.420 (-0.340)	-24.767
L28IN	1998/02	28	4.546 (3.685)	220.770	48.529	-0.303 (-0.246)	-14.605
L28IN	1998/03	31	5.310 (4.305)	260.327	48.992	-0.871 (-0.706)	-40.088
L28IN	1998/04	30	0.132 (0.107)	5.818	44.000	-4.037 (-3.273)	-177.769

For L28IS :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
L28IS	1997/05	31	3.062 (2.483)			-0.803 (-0.651)	
L28IS	1997/06	30	5.773 (4.681)			-1.015 (-0.823)	
L28IS	1997/07	31	7.714 (6.254)			-0.804 (-0.652)	
L28IS	1997/08	31	15.056 (12.206)			-0.095 (-0.077)	
L28IS	1997/09	30	8.748 (7.092)			-0.098 (-0.079)	
L28IS	1997/10	31	4.433 (3.594)			-0.524 (-0.425)	
L28IS	1997/11	30	2.781 (2.255)			-0.085 (-0.069)	
L28IS	1997/12	31	14.905 (12.083)			0.000 (0.000)	
L28IS	1998/01	31	7.350 (5.958)			0.000 (0.000)	
L28IS	1998/02	28	8.485 (6.879)			0.000 (0.000)	
L28IS	1998/03	31	10.166 (8.242)			-0.044 (-0.036)	
L28IS	1998/04	30	1.337 (1.084)			-1.555 (-1.261)	



Results of Flow Comparisons

Similarity of flow data at different sampling locations within a canal is one indication as to whether different measuring methods are providing essentially the same data.

West Feeder Canal and S190

Because S190 is fed by the West and North Feeder Canals, the flow at S190 should be close to the sum of flows at WFEED and NFEED. The total flows matched closely and the graphs for the daily flows of the three sites and the sum of WFEED and NFEED show the daily peaks also match well (Figure 12). However, the magnitude of high peaks of the sum and the peaks of S190 flow are sometimes different, suggesting that the flow calculations may need further calibration, especially for NFEED flow. The effect of this mismatch on the load calculation however would be very minor for this reporting period.

S190, L28IN and L28IS

Flow in the L28 Interceptor Canal is measured by the USGS at the southern boundary of the Big Cypress Seminole Indian Reservation (site L28IN) and at the western boundary of the Miccosukee Reservation (site L28IS). The S-190 spillway located within the Seminole Reservation is operated by the District and determines the flow in the L28I canal. Figure 13 presents the flow data at these three sites from May 1, 1997 through April 30, 1998. It can be observed that the flows at L28IN and L28IS correlate very well with the flow from S190 but L28IN flow has many negative (reverse) flow values and is generally about 50 cfs lower than L28IS and S190 flows. When the S-190 gate is closed or open for a short period of time, reverse flows that are most likely wind driven can occur at both downstream stations. However, Figure 14 shows that L28IS flow matches S190 flow very closely, L28IN flow is about 50 cfs lower than S190 or L28IS flow across the spectrum.

L28U and USSO

In Figure 15 the L-28 Canal flow measured at the USSO site is compared with flow at L28U. The highs and lows in the flow pattern correlate fairly well but flow at L28U is more variable than at USSO. In addition, the flow at L28U is higher than that at USSO. It will be necessary to calibrate the flow data being collected by the USGS at this site before a reliable total phosphorus load calculation can be made.

Figure 12. Comparison of WFEED/WWEIR, NFEED, and S190 flows.

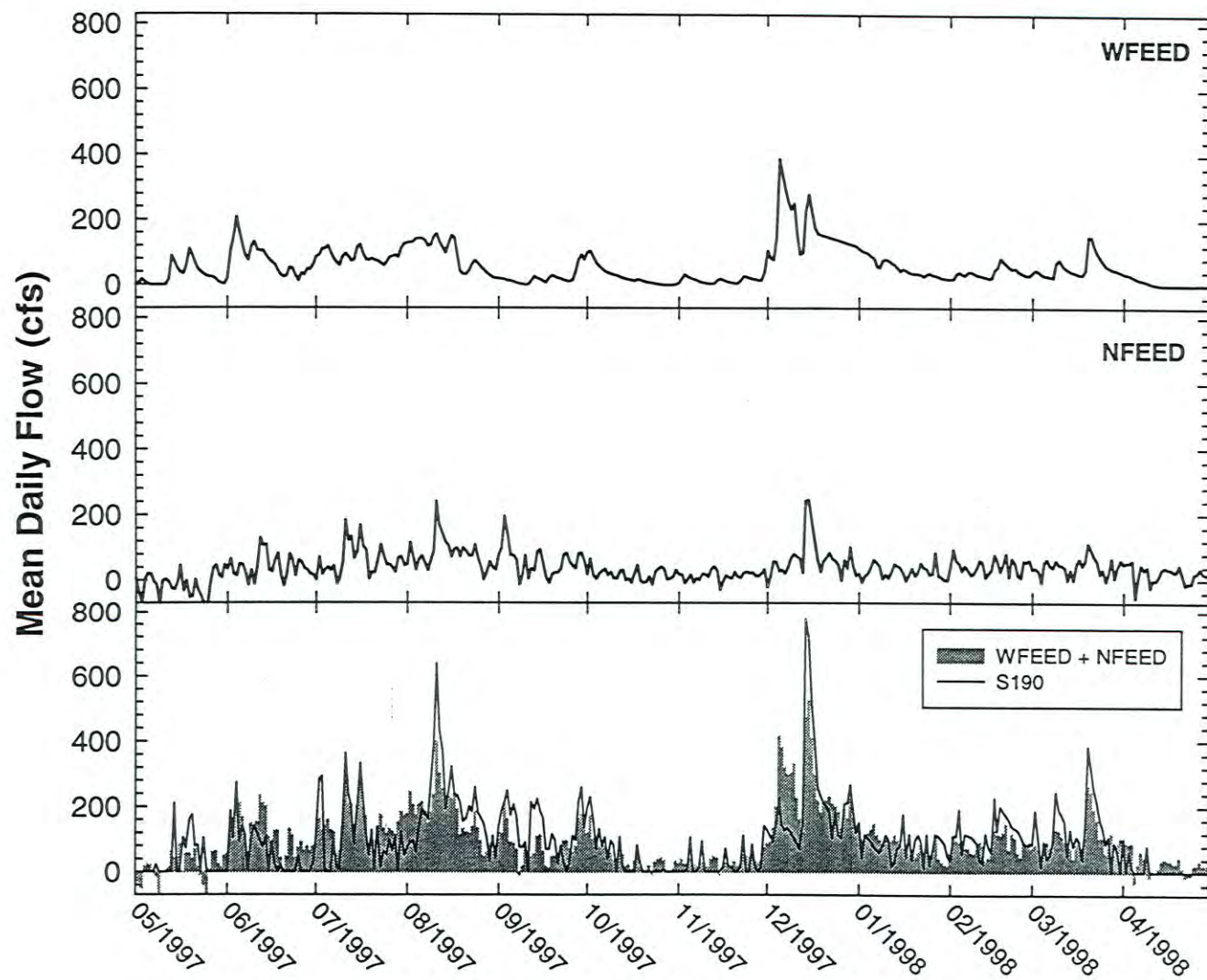


Figure 13. Comparison of L28IN, L28IS, and S190 flows for 5/1/ 1997-4/30/1998.

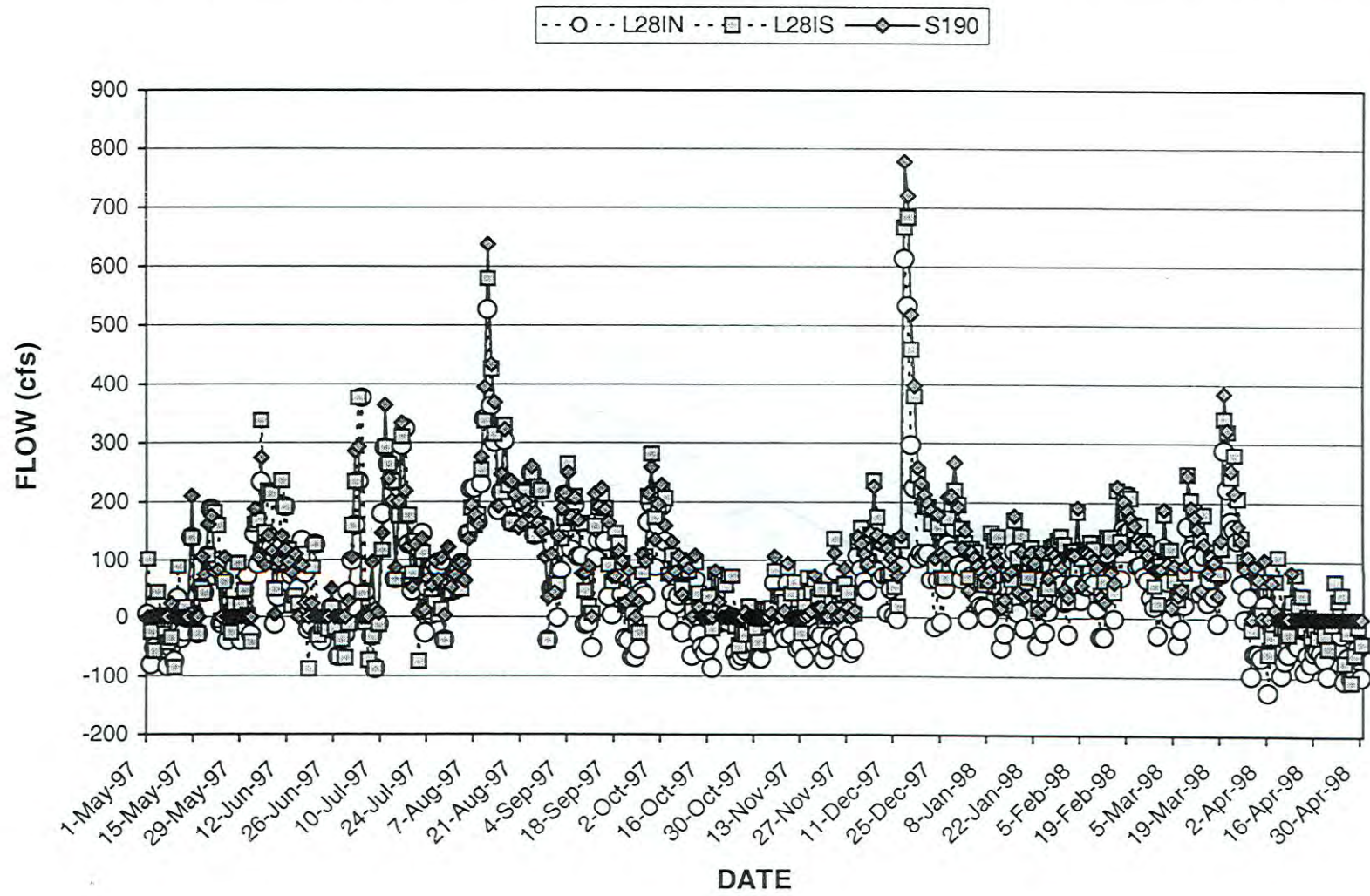


Figure 14. Relationship of L28IN and L28IS flow with S190 flow.

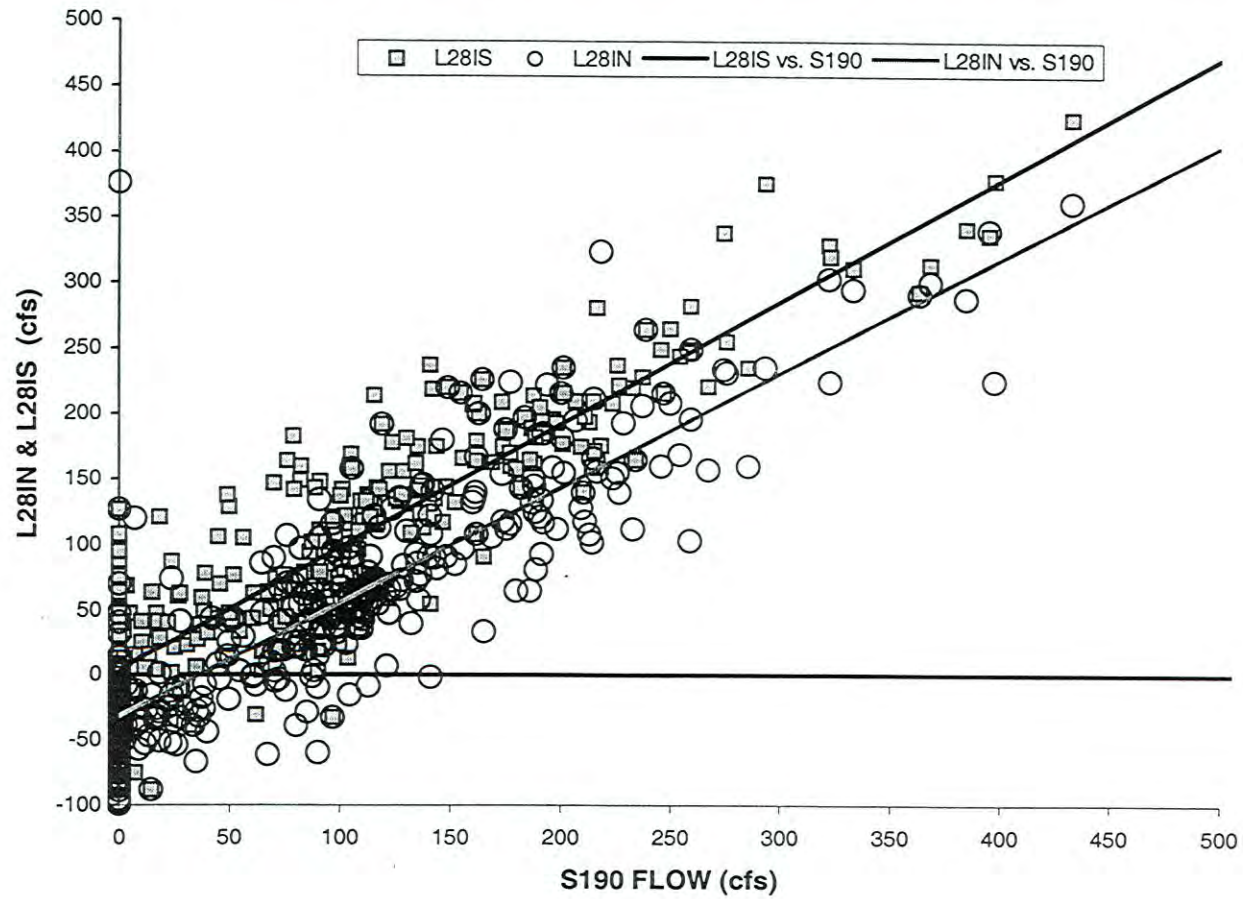
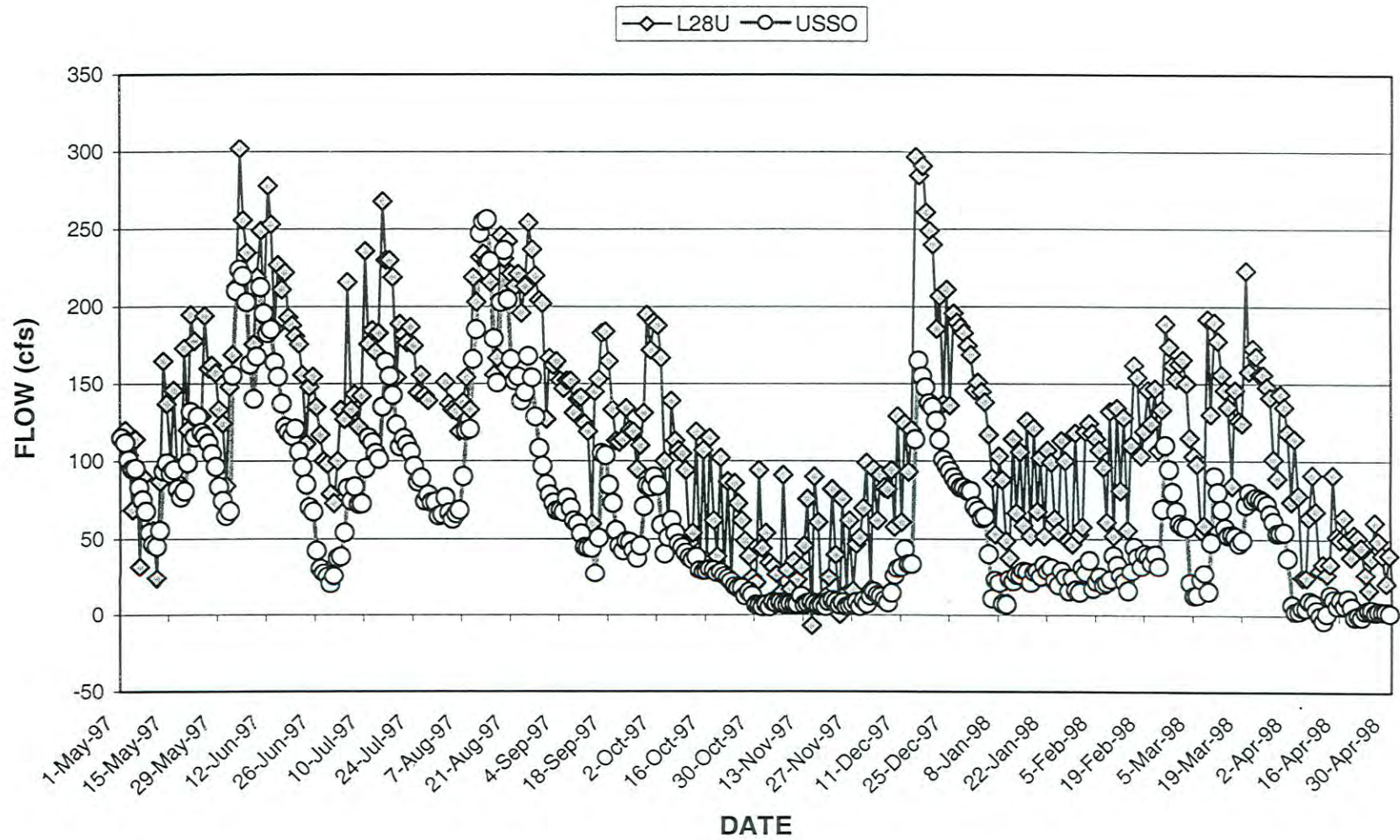


Figure 15. Comparison of L28U flow with USSO flow for 5/1/197-4/30/1998.



Water Quality Data

Total phosphorus concentration (TP) data collected by both grab samples and auto-samplers (Figure 16) and total nitrogen (TN) data calculated by summing total Kjeldahl nitrogen (TKN) and total nitrite and nitrate (NOX) (Figure 17) at the 9 sites, WFEED, WWEIR, S190, L28IN, L3BRS, USSO, L28U, and S140 are presented as classic notched box plots. The narrowest part of the notch represents the median value for each site. The complete notch represents the lower and upper 95% confidence interval values. If the notches of two sites do not overlap, the respective site medians are significantly different at the 95% confidence level. The top and bottom sides of the boxes represent the 75th and 25th percentiles, respectively. The whiskers show the range of values which fall within 1.5 times the absolute value of the difference between the 75th and 25th percentiles. Values outside the whiskers are plotted with asterisks if they do not exceed 3 times the absolute value of the difference between the 75th and 25th percentiles. Values beyond 3 times the absolute value are plotted with empty circles.

Figure 16 presents notched box plots for TP concentrations at the nine sampling sites. The TP concentration data from grab samples and auto-samplers were combined at sites where both sampling methods were used. The WFEED and WWEIR sites had the lowest TP concentrations of all sites and, in contrast to the significant statistical difference described in Appendix IV for the auto-sampler data from these sites, the difference between the sites was not significant when the data were combined. The TP median concentrations were highest at NFEED and L3BRS. The notched box plots for total nitrogen concentrations are much more uniform among the sites than TP concentrations (Figure 17). These results can not be interpreted until the variability of the nitrogen species comprising total nitrogen are evaluated for each site and compared.

The water quality data collected by grab sampling are summarized for each site in Tables 4 through 12. The tables were organized to present basic statistics for each parameter collected in accordance with Table 1.2 in the Standard Operating Procedures for Water Quality Collection in Support of the Big Cypress Seminole Indian Reservation Water Quality Agreement, Water Quality Monitoring Division, SFWMD, May 22, 1996 as well as the associated water quality criterion for those parameters listed in the table of Surface Water Quality Criteria, Chapter 62-302.530, F.A.C. and Table 12 of the Seminole Tribe's Water Quality Standards.

Comparison of the data with the criteria indicated that dissolved oxygen (D.O.) was the only parameter that exceeded its criterion and that dissolved oxygen exceedences occurred at all sites. D.O. is measured once per week when the auto-samplers are serviced or grab samples collected during daylight hours. D.O. values, however, change throughout the day usually exhibiting highs in mid- to late afternoon and lows in early morning before sunrise. A variety of factors affect the D.O. concentration and the magnitude of the daily range. The values reported here are typical of Everglades Protection Area data from canals and marsh stations

Most of the trace metal measurements were below the detection limits (BDL). The five values measured above the detection limit during this reporting period are compared with the calculated criteria in Table 13. All measurements were below the criteria values.

Figure 16. Comparison of total phosphorus concentrations and median values.

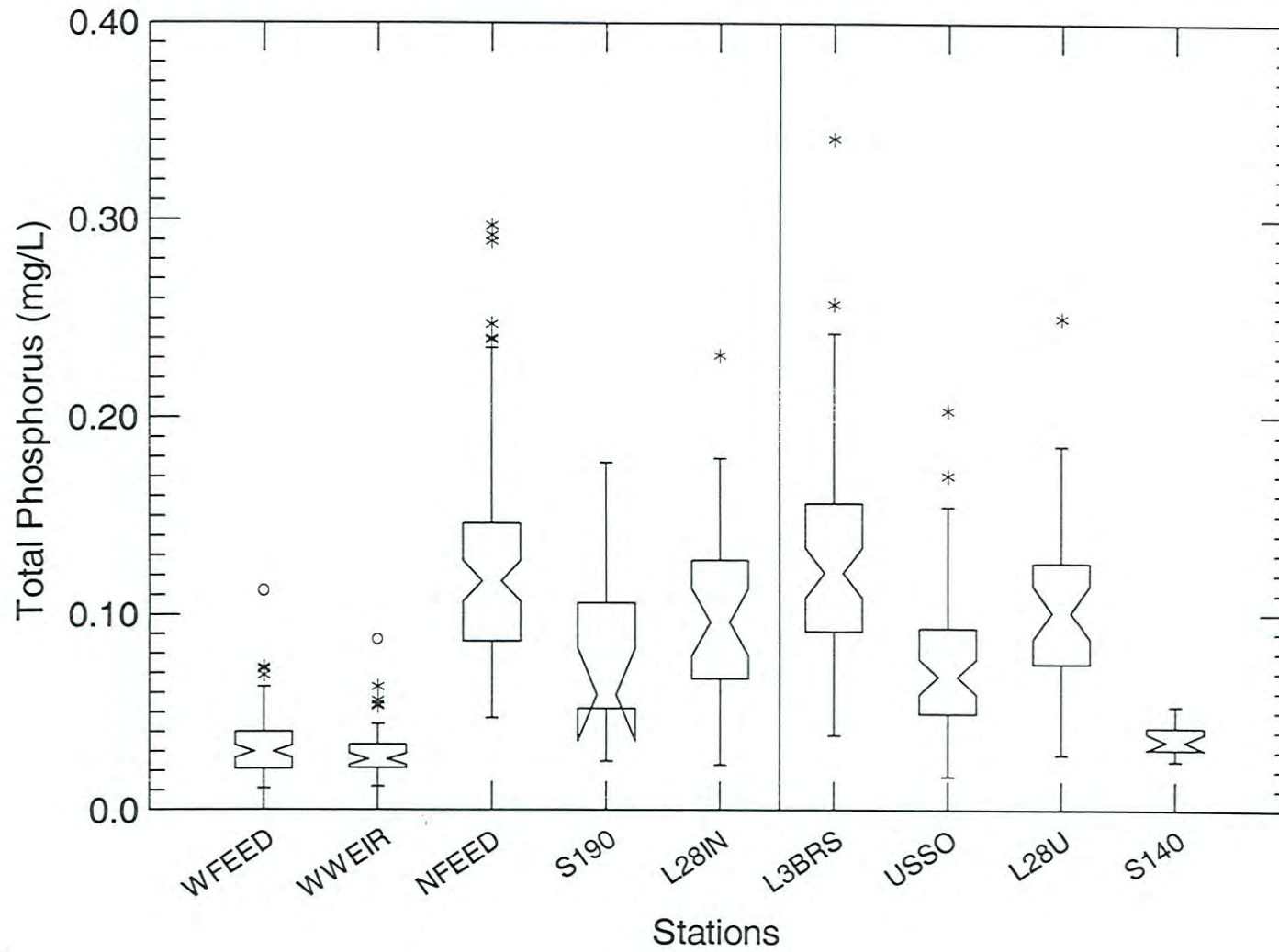


Figure 17. Comparison of total nitrogen concentrations and median values.

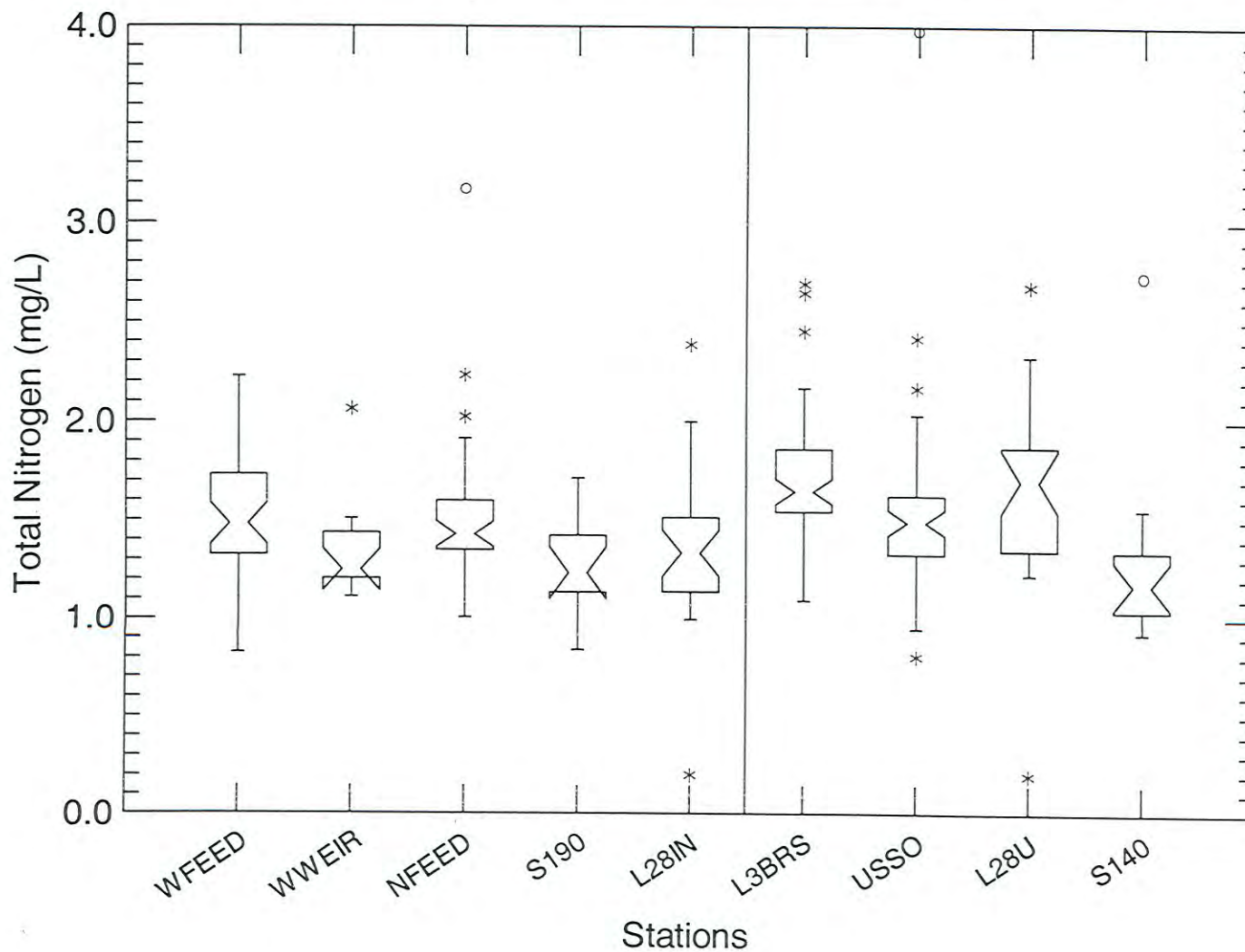


Table 4. Summary of Water Quality Parameters Collected by Grab Sampling at Station L3BRS for the Period from August 1997 through April 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
Physical					
Water Temperature (°C)	24.6	17.0 - 30.8	5.0	20	Not Applicable
Specific Conductance (µmhos/cm)	505	404 - 600	67	20	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)	<3	<3 - <3		4	Not Applicable
Turbidity (NTU)	2.0	0.9 - 5.3	1.2	20	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	4.7	1.7 - 7.7	1.7	20	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	54.4	22.1 - 96.3	19.0	20	Not Applicable
Water pH	7.2	6.5 - 7.6	0.3	20	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)	126	83 - 173	33	20	Not Applicable
Total Hardness (mg/L)	188	99 - 240	52	6	Not Applicable
Major Ions					
Calcium (mg/L)	60.9	34.0 - 83.5	20.5	4	Not Applicable
Sodium (mg/L)	32.1	16.0 - 41.4	11.1	4	Not Applicable
Potassium (mg/L)	3.2	2.3 - 4.5	1.0	4	Not Applicable
Magnesium (mg/L)	6.2	3.4 - 7.7	1.9	4	Not Applicable
Total Alkalinity (mg/L)	175.0	142.5 - 213.2	23.3	20	Not less than 20 mg/L
Sulfate (mg/L)	8.8	6.4 - 10.4	1.8	4	Not Applicable
Chloride (mg/L)	43.2	31.1 - 55.9	7.7	20	Not greater than 10% of background
Nutrients					
Ammonium (mg/L)	0.082	0.021 - 0.172	0.043	18	Not Applicable
Nitrate+nitrite (mg/L)	0.166	<0.006 - 0.353	0.085	18	Not Applicable
Total Nitrogen (mg/L)	1.66	1.18 - 2.17	0.24	18	Not Applicable
Orthophosphate (mg/L)	0.101	0.036 - 0.177	0.039	18	Not Applicable
Total Phosphorus (mg/L)	0.124	0.046 - 0.182	0.039	18	Not Applicable
Silica (mg/L)	7.7	4.3 - 9.8	2.5	4	Not Applicable
Trace Elements					
Arsenic (µg/L)	<1.5	<1.5 - <1.5		2	Less than or equal to 50 µg/L
Cadmium (µg/L)	0.4	<0.3 - 0.4	0.1	2	Less than or equal to calculated value using: $e^{(0.7052(n+1)-3.49)}$
Copper (µg/L)	2.2	1.7 - 2.7	0.7	2	Less than or equal to calculated value using: $e^{(0.8545(n+1)-1.465)}$
Iron (µg/L)	438	313 - 537	93	4	Less than or equal to 1,000 µg/L
Lead (µg/L)	<0.8	<0.8 - <0.8		2	Less than or equal to calculated value using: $e^{(1.273(n+1)-4.705)}$
Zinc (µg/L)	<4	<4 - <4		2	Less than or equal to calculated value using: $e^{(0.9173(n+1)-0.7614)}$

Table 5. Summary of Water Quality Parameters Collected by Grab Sampling at Station USSO for the Period from August 1997 through April 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
Physical					
Water Temperature (°C)	23.7	16.8 - 29.1	4.4	20	Not Applicable
Specific Conductance (µmhos/cm)	500	372 - 561	38	20	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)	3.3	<3 - 4	0.5	4	Not Applicable
Turbidity (NTU)	1.5	0.5 - 5.5	1.2	20	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	5.1	2.5 - 8.8	1.7	20	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	58.3	31.3 - 89.8	16.1	20	Not Applicable
Water pH	7.1	6.6 - 7.6	0.3	20	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)	97	52 - 145	24	20	Not Applicable
Total Hardness (mg/L)	229	212 - 239	11	6	Not Applicable
Major Ions					
Calcium (mg/L)	83.3	78.0 - 88.1	5.5	4	Not Applicable
Sodium (mg/L)	26.4	22.0 - 33.3	4.9	4	Not Applicable
Potassium (mg/L)	4.5	3.0 - 6.3	1.4	4	Not Applicable
Magnesium (mg/L)	4.9	4.1 - 6.4	1.0	4	Not Applicable
Total Alkalinity (mg/L)	179.7	159.1 - 202.7	12.4	20	Not less than 20 mg/L
Sulfate (mg/L)	18.9	8.2 - 24.6	7.4	4	Not Applicable
Chloride (mg/L)	35.5	31.9 - 44.7	3.5	20	Not greater than 10% of background
Nutrients					
Ammonium (mg/L)	0.083	0.009 - 0.202	0.056	19	Not Applicable
Nitrate+nitrite (mg/L)	0.040	0.006 - 0.245	0.055	18	Not Applicable
Total Nitrogen (mg/L)	1.44	0.81 - 2.42	0.39	18	Not Applicable
Orthophosphate (mg/L)	0.066	0.021 - 0.190	0.045	19	Not Applicable
Total Phosphorus (mg/L)	0.086	0.032 - 0.203	0.043	21	Not Applicable
Silica (mg/L)	7.2	4.0 - 8.9	2.2	4	Not Applicable
Trace Elements					
Arsenic (µg/L)	1.6	<1.5 - 1.6	0.1	2	Less than or equal to 50 µg/L
Cadmium (µg/L)	<0.3	<0.3 - <0.3		2	Less than or equal to calculated value using: $e^{(0.7852(t+1)-3.49)}$
Copper (µg/L)	<1.2	<1.2 - <1.2		2	Less than or equal to calculated value using: $e^{(0.8549(t+1)-1.455)}$
Iron (µg/L)	225	56 - 373	148	4	Less than or equal to 1,000 µg/L
Lead (µg/L)	<0.8	<0.8 - <0.8		2	Less than or equal to calculated value using: $e^{(1.273(t+1)-4.705)}$
Zinc (µg/L)	<4	<4 - <4		2	Less than or equal to calculated value using: $e^{(0.8473(t+1)-0.7514)}$

Table 6. Summary of Water Quality Parameters Collected by Grab Sampling at Station L28U for the Period from September 1997 through April 1988.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Prédominantly Fresh Surface Waters, FAC 62-302
Physical					
Water Temperature (°C)		-		0	Not Applicable
Specific Conductance (µmhos/cm)	578	501 - 645	47	6	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)		-		0	Not Applicable
Turbidity (NTU)	2.2	<1 - 4.9	1.7	5	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)		-		0	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)		-		0	Not Applicable
Water pH		-		0	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)	110	80 - 140	21	9	Not Applicable
Total Hardness (mg/L)	223	212 - 234	16	2	Not Applicable
Major Ions					
Calcium (mg/L)	81.0	77.0 - 85.0	5.7	2	Not Applicable
Sodium (mg/L)	26.5	26.0 - 27.0	0.7	2	Not Applicable
Potassium (mg/L)	3.6	3.5 - 3.7	0.1	2	Not Applicable
Magnesium (mg/L)	5.0	4.7 - 5.3	0.4	2	Not Applicable
Total Alkalinity (mg/L)	213.6	190.0 - 240.0	14.3	11	Not less than 20 mg/L
Sulfate (mg/L)	14.0	11.0 - 17.0	4.2	2	Not Applicable
Chloride (mg/L)	40.5	34.0 - 52.0	5.1	11	Not greater than 10% of background
Nutrients					
Ammonium (mg/L)	0.150	0.062 - 0.238	0.124	2	Not Applicable
Nitrate+nitrite (mg/L)	0.041	0.013 - 0.084	0.025	9	Not Applicable
Total Nitrogen (mg/L)	1.51	1.25 - 1.92	0.26	8	Not Applicable
Orthophosphate (mg/L)	0.037	0.020 - 0.062	0.015	11	Not Applicable
Total Phosphorus (mg/L)	0.061	0.028 - 0.112	0.028	11	Not Applicable
Silica (mg/L)	7.5	6.2 - 8.8	1.8	2	Not Applicable
Trace Elements					
Arsenic (µg/L)	1.3	-		1	Less than or equal to 50 µg/L
Cadmium (µg/L)	<0.5	-		1	Less than or equal to calculated value using: $e^{(0.7952(t+1)-3.49)}$
Copper (µg/L)	<1	-		1	Less than or equal to calculated value using: $e^{(0.8545(t+1)-1.465)}$
Iron (µg/L)	305	220 - 390	120	2	Less than or equal to 1,000 µg/L
Lead (µg/L)	<1	-		1	Less than or equal to calculated value using: $e^{(1.273(t+1)-4.705)}$
Zinc (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.8473(t+1)-0.7614)}$

Table 7. Summary of Water Quality Parameters Collected by Grab Sampling at Station S140 for the Period from August 1997 through April 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
Physical					
Water Temperature (°C)	25.2	17.6 - 30.7	4.4	18	Not Applicable
Specific Conductance (µmhos/cm)	433	346 - 594	69	18	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)	<3	<3 - <3		4	Not Applicable
Turbidity (NTU)	1.1	0.7 - 3.1	0.5	18	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	3.5	1.6 - 6.0	1.6	18	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	40.2	20.0 - 68.7	15.8	18	Not Applicable
Water pH	7.1	6.4 - 7.5	0.2	18	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)	74	51 - 113	18	18	Not Applicable
Total Hardness (mg/L)	215	163 - 254	36	6	Not Applicable
Major Ions					
Calcium (mg/L)	74.0	59.0 - 91.5	13.9	4	Not Applicable
Sodium (mg/L)	24.2	17.0 - 32.1	6.6	4	Not Applicable
Potassium (mg/L)	2.5	2.3 - 3.0	0.3	4	Not Applicable
Magnesium (mg/L)	4.9	3.7 - 6.2	1.1	4	Not Applicable
Total Alkalinity (mg/L)	168.8	141.3 - 218.2	21.6	18	Not less than 20 mg/L
Sulfate (mg/L)	7.4	5.4 - 10.1	2.1	4	Not Applicable
Chloride (mg/L)	26.3	17.7 - 41.2	6.2	18	Not greater than 10% of background
Nutrients					
Ammonium (mg/L)	0.069	<0.009 - 0.191	0.048	16	Not Applicable
Nitrate+nitrite (mg/L)	0.081	0.018 - 0.591	0.138	16	Not Applicable
Total Nitrogen (mg/L)	1.28	0.93 - 2.73	0.43	16	Not Applicable
Orthophosphate (mg/L)	0.020	0.009 - 0.049	0.010	18	Not Applicable
Total Phosphorus (mg/L)	0.036	0.025 - 0.053	0.008	17	Not Applicable
Silica (mg/L)	6.7	4.7 - 9.4	2.0	4	Not Applicable
Trace Elements					
Arsenic (µg/L)	1.7	<1.5 - 1.8	0.2	2	Less than or equal to 50 µg/L
Cadmium (µg/L)	<0.3	<0.3 - <0.3		2	Less than or equal to calculated value using: $e^{(0.7822 \ln(1+3.49))}$
Copper (µg/L)	1.4	1.2 - 1.7	0.3	2	Less than or equal to calculated value using: $e^{(0.8549 \ln(1+1.455))}$
Iron (µg/L)	232	156 - 383	104	4	Less than or equal to 1,000 µg/L
Lead (µg/L)	<0.8	<0.8 - <0.8		2	Less than or equal to calculated value using: $e^{(1.273 \ln(1+4.709))}$
Zinc (µg/L)	<4	<4 - <4		2	Less than or equal to calculated value using: $e^{(0.8173 \ln(1+0.7614))}$

Table 8. Summary of Water Quality Parameters Collected by Grab Sampling at Station WFEED for the Period from August 1997 through April 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
Physical					
Water Temperature (°C)	25.1	18.2 - 31.0	3.8	47	Not Applicable
Specific Conductance (µmhos/cm)	604	0.62 - 772	130	47	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)		-		0	Not Applicable
Turbidity (NTU)		-		0	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	2.3	0.2 - 5.6	1.4	47	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	27.4	2.2 - 68.0	16.4	47	Not Applicable
Water pH	7.1	6.5 - 7.8	0.3	47	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)		-		0	Not Applicable
Total Hardness (mg/L)		-		0	Not Applicable
Major Ions					
Calcium (mg/L)		-		0	Not Applicable
Sodium (mg/L)		-		0	Not Applicable
Potassium (mg/L)		-		0	Not Applicable
Magnesium (mg/L)		-		0	Not Applicable
Total Alkalinity (mg/L)		-		0	Not less than 20 mg/L
Sulfate (mg/L)		-		0	Not Applicable
Chloride (mg/L)		-		0	Not greater than 10% of background
Nutrients					
Ammonium (mg/L)	0.052	<0.009 - 0.095	0.061	2	Not Applicable
Nitrate+nitrite (mg/L)	0.009	0.006 - 0.012	0.004	2	Not Applicable
Total Nitrogen (mg/L)	1.13	0.82 - 1.43	0.43	2	Not Applicable
Orthophosphate (mg/L)		-		0	Not Applicable
Total Phosphorus (mg/L)	0.027	0.011 - 0.050	0.010	46	Not Applicable
Silica (mg/L)		-		0	Not Applicable
Trace Elements					
Arsenic (µg/L)		-		0	Less than or equal to 50 µg/L
Cadmium (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.7652(n+H)-3.49)}$
Copper (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.8543(n+H)-1.465)}$
Iron (µg/L)		-		0	Less than or equal to 1,000 µg/L
Lead (µg/L)		-		0	Less than or equal to calculated value using: $e^{(1.273(n+H)-4.705)}$
Zinc (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.8473(n+H)-0.7614)}$

Table 9. Summary of Water Quality Parameters Collected by Grab Sampling at Station WVEIR for the Period from October 1997 through April 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
Physical					
Water Temperature (°C)	21.3	18.2 - 23.7	1.8	14	Not Applicable
Specific Conductance (µmhos/cm)	674	512 - 725	56	14	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)		-		0	Not Applicable
Turbidity (NTU)		-		0	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	2.7	1.3 - 5.1	1.2	14	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	30.0	14.0 - 53.7	13.2	14	Not Applicable
Water pH	7.1	6.8 - 7.8	0.3	14	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)		-		0	Not Applicable
Total Hardness (mg/L)		-		0	Not Applicable
Major Ions					
Calcium (mg/L)		-		0	Not Applicable
Sodium (mg/L)		-		0	Not Applicable
Potassium (mg/L)		-		0	Not Applicable
Magnesium (mg/L)		-		0	Not Applicable
Total Alkalinity (mg/L)		-		0	Not less than 20 mg/L
Sulfate (mg/L)		-		0	Not Applicable
Chloride (mg/L)		-		0	Not greater than 10% of background
Nutrients					
Ammonium (mg N/L)		-		0	Not Applicable
Nitrate+nitrite (mg N/L)		-		0	Not Applicable
Total Nitrogen (mg/L)		-		0	Not Applicable
Orthophosphate (mg/L)		-		0	Not Applicable
Total Phosphorus (mg/L)	0.030	0.012 - 0.063	0.013	30	Not Applicable
Silica (mg/L)		-		0	Not Applicable
Trace Elements					
Arsenic (µg/L)		-		0	Less than or equal to 50 µg/L
Cadmium (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.7852(x+)-3.45)}$
Copper (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.0545(x+)-1.455)}$
Iron (µg/L)		-		0	Less than or equal to 1,000 µg/L
Lead (µg/L)		-		0	Less than or equal to calculated value using: $e^{(12.73(x+)-4.705)}$
Zinc (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.0473(x+)-0.7514)}$

Table 10. Summary of Water Quality Parameters Collected by Grab Sampling at Station NFEED for the Period from May 1997 through April 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
Physical					
Water Temperature (°C)	25.3	17.6 - 31.4	3.9	47	Not Applicable
Specific Conductance (µmhos/cm)	432	0.438 - 512	73	47	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)		-		0	Not Applicable
Turbidity (NTU)		-		0	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	4.4	1.2 - 7.3	1.5	47	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	51.9	15.5 - 81.6	16.4	47	Not Applicable
Water pH	7.2	6.5 - 7.8	0.3	47	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)		-		0	Not Applicable
Total Hardness (mg/L)		-		0	Not Applicable
Major Ions					
Calcium (mg/L)		-		0	Not Applicable
Sodium (mg/L)		-		0	Not Applicable
Potassium (mg/L)		-		0	Not Applicable
Magnesium (mg/L)		-		0	Not Applicable
Total Alkalinity (mg/L)		-		0	Not less than 20 mg/L
Sulfate (mg/L)		-		0	Not Applicable
Chloride (mg/L)		-		0	Not greater than 10% of background
Nutrients					
Ammonium (mg/L)	0.024	-		1	Not Applicable
Nitrate+nitrite (mg/L)	0.029	-		1	Not Applicable
Total Nitrogen (mg/L)	1.54	-		1	Not Applicable
Orthophosphate (mg/L)		-		0	Not Applicable
Total Phosphorus (mg/L)	0.127	0.047 - 0.297	0.059	47	Not Applicable
Silica (mg/L)		-		0	Not Applicable
Trace Elements					
Arsenic (µg/L)		-		0	Less than or equal to 50 µg/L
Cadmium (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.7852 \ln C + 1.349)}$
Copper (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.8545 \ln C + 1.465)}$
Iron (µg/L)		-		0	Less than or equal to 1,000 µg/L
Lead (µg/L)		-		0	Less than or equal to calculated value using: $e^{(1.273 \ln C + 4.705)}$
Zinc (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.8473 \ln C + 0.7814)}$

Table 11. Summary of Water Quality Parameters Collected by Grab Sampling at Station S190 for the Period from May 1997 through April 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
Physical					
Water Temperature (°C)	24.5	18.2 - 30.0	4.6	14	Not Applicable
Specific Conductance (µmhos/cm)	576	495 - 689	63	14	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)	5.8	<3 - 14	5.5	4	Not Applicable
Turbidity (NTU)	2.0	0.8 - 6.5	1.4	14	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	4.7	0.7 - 7.3	1.8	14	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	55.0	9.4 - 79.6	20.2	14	Not Applicable
Water pH	7.3	6.2 - 7.7	0.4	14	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)	71	48 - 92	13	14	Not Applicable
Total Hardness (mg/L)	265	222 - 284	24	6	Not Applicable
Major Ions					
Calcium (mg/L)	90.8	77.0 - 101.0	10.1	4	Not Applicable
Sodium (mg/L)	35.6	29.0 - 44.6	8.1	3	Not Applicable
Potassium (mg/L)	2.7	2.1 - 3.2	0.5	4	Not Applicable
Magnesium (mg/L)	7.8	6.8 - 9.3	1.1	4	Not Applicable
Total Alkalinity (mg/L)	226.8	194.3 - 258.7	23.5	14	Not less than 20 mg/L
Sulfate (mg/L)	9.5	7.1 - 12.0	2.1	4	Not Applicable
Chloride (mg/L)	39.6	30.2 - 58.6	8.4	14	Not greater than 10% of background
Nutrients					
Ammonium (mg/L)	0.034	<0.009 - 0.114	0.032	13	Not Applicable
Nitrate+nitrite (mg/L)	0.045	0.010 - 0.178	0.046	13	Not Applicable
Total Nitrogen (mg/L)	1.26	0.84 - 1.71	0.24	12	Not Applicable
Orthophosphate (mg/L)	0.034	0.004 - 0.099	0.030	13	Not Applicable
Total Phosphorus (mg/L)	0.078	0.025 - 0.177	0.042	13	Not Applicable
Silica (mg/L)	9.5	6.9 - 11.2	1.9	4	Not Applicable
Trace Elements					
Arsenic (µg/L)	<1.5	<1.5 - <1.5	0.0	2	Less than or equal to 50 µg/L
Cadmium (µg/L)	0.3	<0.3 - 0.4	0.1	2	Less than or equal to calculated value using: $e^{(0.7852(n)-3.449)}$
Copper (µg/L)	1.4	<1.2 - 1.6	0.2	2	Less than or equal to calculated value using: $e^{(0.8545(n)-1.465)}$
Iron (µg/L)	354	119 - 841	330	4	Less than or equal to 1,000 µg/L
Lead (µg/L)	<0.8	<0.8 - <0.8		2	Less than or equal to calculated value using: $e^{(1.273(n)-4.705)}$
Zinc (µg/L)	<4	<4 - <4		2	Less than or equal to calculated value using: $e^{(0.9473(n)-0.7614)}$

Table 12. Summary of Water Quality Parameters Collected by Grab Sampling at Station L281N for the Period from August 1997 through April 1998.

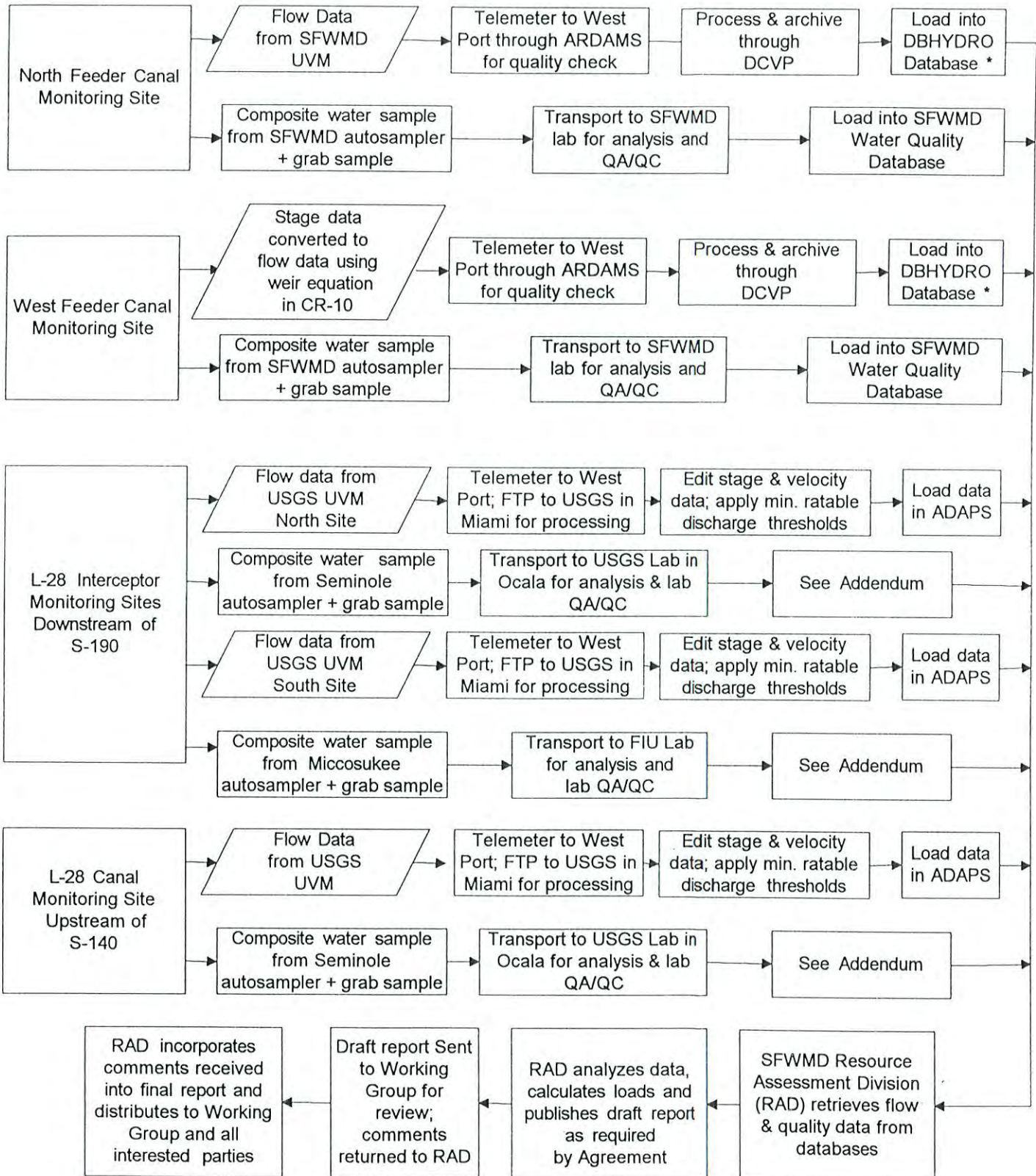
Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
Physical					
Water Temperature (°C)		-		0	Not Applicable
Specific Conductance (µmhos/cm)	646	590 - 696	41	6	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)	1.0	-		1	Not Applicable
Turbidity (NTU)	2.1	1.5 - 3.4	0.7	6	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)		-		0	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)		-		0	Not Applicable
Water pH		-		0	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)	90	70 - 120	23	7	Not Applicable
Total Hardness (mg/L)	262	-		1	Not Applicable
Major Ions					
Calcium (mg/L)	94.0	-		1	Not Applicable
Sodium (mg/L)	26.0	-		1	Not Applicable
Potassium (mg/L)	2.5	-		1	Not Applicable
Magnesium (mg/L)	6.6	-		1	Not Applicable
Total Alkalinity (mg/L)	244.4	200.0 - 280.0	26.0	9	Not less than 20 mg/L
Sulfate (mg/L)	10.0	-		1	Not Applicable
Chloride (mg/L)	42.1	36.0 - 52.0	5.4	8	Not greater than 10% of background
Nutrients					
Ammonium (mg/L)	0.017	-		1	Not Applicable
Nitrate+nitrite (mg/L)	0.025	<0.002 - 0.052	0.022	7	Not Applicable
Total Nitrogen (mg/L)	1.14	1.00 - 1.25	0.09	6	Not Applicable
Orthophosphate (mg/L)	0.021	0.008 - 0.040	0.012	9	Not Applicable
Total Phosphorus (mg/L)	0.057	0.023 - 0.096	0.023	8	Not Applicable
Silica (mg/L)	6.4	-		1	Not Applicable
Trace Elements					
Arsenic (µg/L)		-		0	Less than or equal to 50 µg/L
Cadmium (µg/L)	<0.5	-		1	Less than or equal to calculated value using: $e^{(0.7852(x+1)-3.49)}$
Copper (µg/L)	<1	-		1	Less than or equal to calculated value using: $e^{(0.8542(x+1)-1.465)}$
Iron (µg/L)	240	-		1	Less than or equal to 1,000 µg/L
Lead (µg/L)	<1	-		1	Less than or equal to calculated value using: $e^{(1.273(x+1)-4.705)}$
Zinc (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.8472(x+1)-0.7614)}$

Table 13. Trace metal concentrations above the method detection limit and compared with Class III Standard calculated using water hardness.

Station Number	Date Collected	Total Cadmium (µg/L)		Total Copper (µg/L)	
		Measured	Standard	Measured	Standard
L3BRS	10-Jul-97	0.4	1.1	1.7	11.7
L3BRS	15-Jan-98	--	--	2.7	25.0
S140	29-Jan-98	--	--	1.7	26.2
S190	10-Jul-97	0.4	2.1	--	--
S190	15-Jan-98	--	--	1.6	28.8

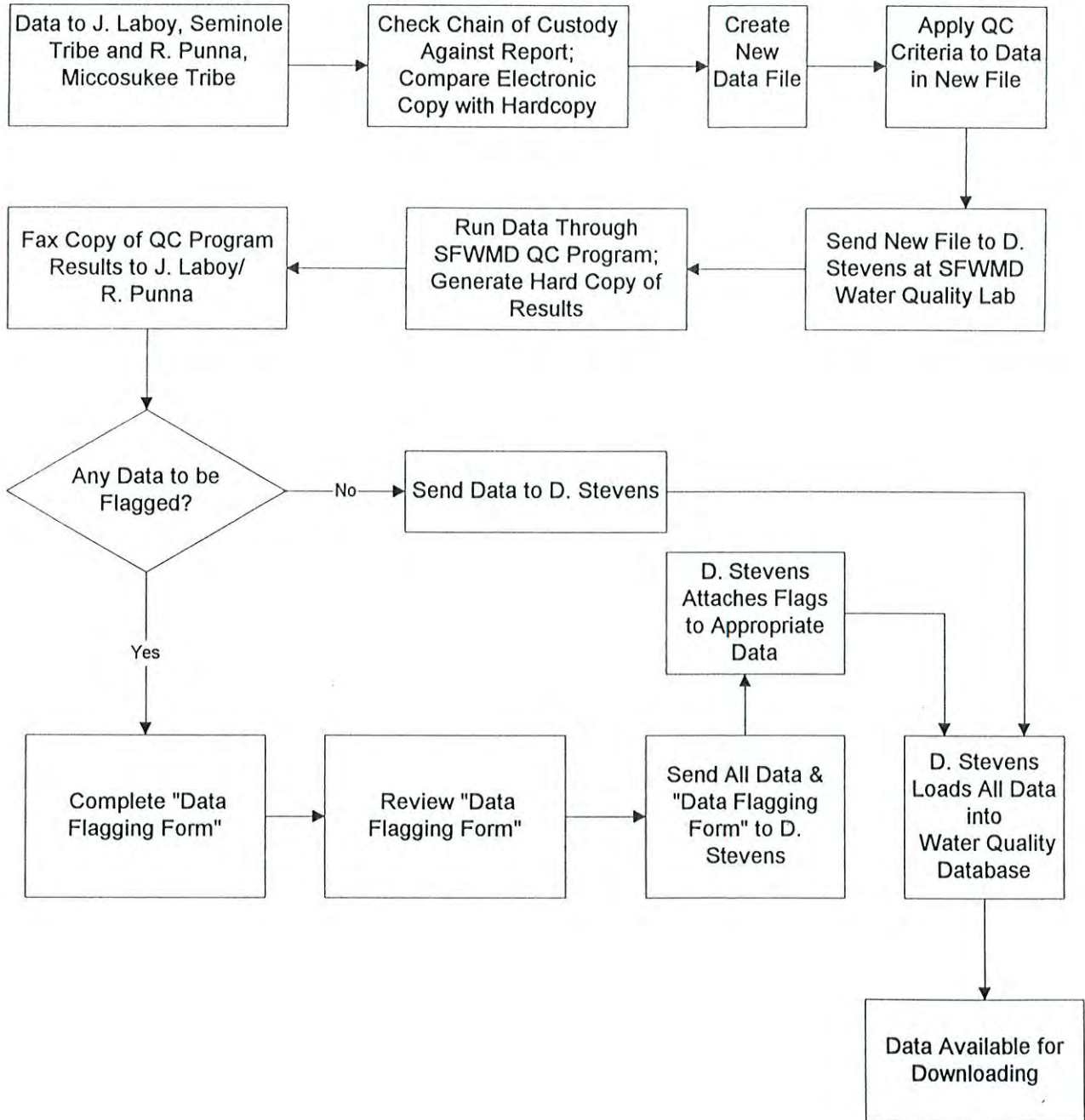
APPENDIX I. Flow Chart for Water Flow and Water Quality Data Collected for the SFWMD/Seminole Cooperative Agreement

Updated 6/19/98

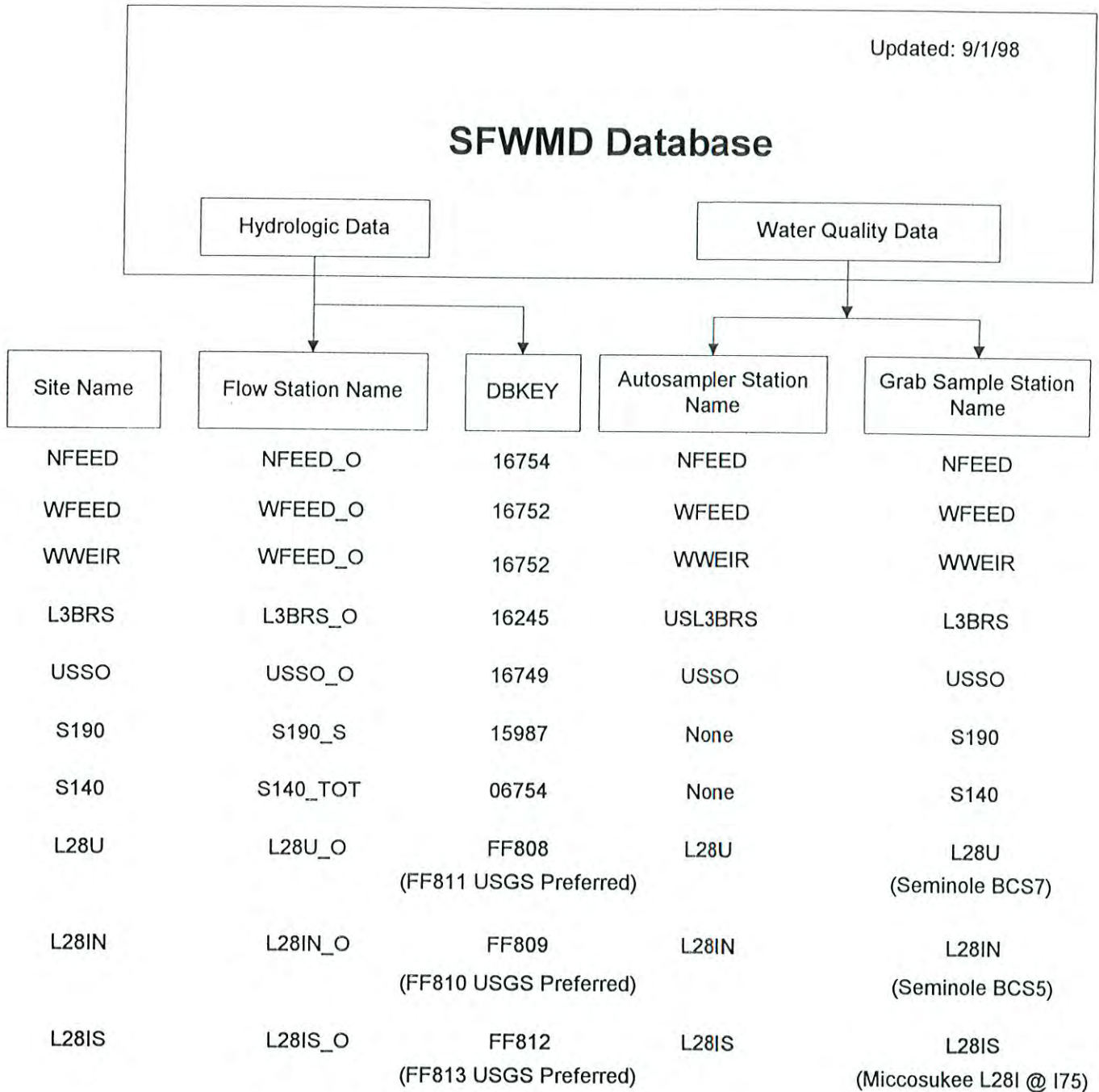


**Addendum to Appendix I. Flow Chart for Water Flow and Water Quality
Data Collected for the Seminole/SFWMD Cooperative Agreement**

Updated 9/1/98



APPENDIX II. SFWMD/Seminole Agreement Sampling Station Names



**APPENDIX III. Total phosphorus concentration data for the period:
May 1, 1997 – April 30, 1998.**

For L3BRS and USL3BRS:

(1) Grab sample TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
L3BRS	CAMB	19970612	0	0.135	59495	L8136-6	SFWMD
L3BRS	CAMB	19970710	0	0.094	59550	149794	PPB
L3BRS	CAMB	19970723	0	0.148	59581	L8348-4	SFWMD
L3BRS	CAMB	19970807	0	0.182	59617	L8427-7	SFWMD
L3BRS	CAMB	19970821	0	0.169	60023	L8540-10	SFWMD
L3BRS	CAMB	19970904	0	0.157	60036	74844010	HBEL
L3BRS	CAMB	19970918	0	0.122	60074	L8709-7	SFWMD
L3BRS	CAMB	19971002	0	0.173	60097	L8793-11	SFWMD
L3BRS	CAMB	19971208	0	0.135	60191	L9154-6	SFWMD
L3BRS	CAMB	19971218	0	0.149	60222	L9225-7	SFWMD
L3BRS	CAMB	19971231	0	0.106	60251	L9294-7	SFWMD
L3BRS	CAMB	19980115	0	0.057	60270	L9379-6	SFWMD
L3BRS	CAMB	19980129	0	0.140	60295	L9457-5	SFWMD
L3BRS	CAMB	19980212	0	0.046	60319	L9560-7	SFWMD
L3BRS	CAMB	19980226	0	0.105	60354	L9638-7	SFWMD
L3BRS	CAMB	19980312	0	0.118	60394	L9724-7	SFWMD
L3BRS	CAMB	19980326	0	0.124	60413	L9814-4	SFWMD
L3BRS	CAMB	19980423	0	0.070	60471	L9982-7	SFWMD

(2) Auto-sampler flow proportional composite TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
USL3BRS	CAMB	19970508	24	0.143	59420	L7937-4	SFWMD
USL3BRS	CAMB	19970515	24	0.182	59429	L7976-6	SFWMD
USL3BRS	CAMB	19970521	24	0.142	59638	L8017-6	SFWMD
USL3BRS	CAMB	19970605	24	0.341	59475	L8091-6	SFWMD
USL3BRS	CAMB	19970612	24	0.182	59483	L8137-6	SFWMD
USL3BRS	CAMB	19970619	24	0.140	59506	L8167-6	SFWMD
USL3BRS	CAMB	19970626	24	0.131	59529	148999	PPB
USL3BRS	CAMB	19970703	24	0.105	59538	149368	PPB
USL3BRS	CAMB	19970710	24	0.091	59562	149867	PPB
USL3BRS	CAMB	19970717	24	0.091	59572	L8315-5	SFWMD
USL3BRS	CAMB	19970723	24	0.144	59595	L8350-5	SFWMD
USL3BRS	CAMB	19970731	24	0.139	59605	L8397-5	SFWMD
USL3BRS	CAMB	19970807	24	0.193	59626	L8431-4	SFWMD
USL3BRS	CAMB	19970813	24	0.257	60005	L8467-6	SFWMD
USL3BRS	CAMB	19970821	24	0.215	60012	L8542-6	SFWMD
USL3BRS	CAMB	19970828	24	0.173	60045	74762005	HBEL
USL3BRS	CAMB	19970904	24	0.141	60050	74845004	HBEL
USL3BRS	CAMB	19970911	24	0.173	60058	74862005	HBEL
USL3BRS	CAMB	19970918	24	0.131	60062	L8712-3	SFWMD
USL3BRS	CAMB	19970925	24	0.102	60085	L8760-6	SFWMD
USL3BRS	CAMB	19971002	24	0.173	60103	L8795-5	SFWMD
USL3BRS	CAMB	19971009	24	0.156	60114	L8830-5	SFWMD
USL3BRS	CAMB	19971016	24	0.107	60133	L8882-4	SFWMD
USL3BRS	CAMB	19971023	24	0.072	60127	L8930-4	SFWMD
USL3BRS	CAMB	19971030	24	0.062	60138	L8955-3	SFWMD

USL3BRS	CAMB	19971106	24	0.044	60151	L8994-4	SFWMD
USL3BRS	CAMB	19971113	24	0.038	60174	L9032-5	SFWMD
USL3BRS	CAMB	19971120	24	0.042	60178	L9067-4	SFWMD
USL3BRS	CAMB	19971126	24	0.071	60182	L9103-3	SFWMD
USL3BRS	CAMB	19971204	24	0.080	60187	L9147-5	SFWMD
USL3BRS	CAMB	19971211	24	0.137	60207	L9190-6	SFWMD
USL3BRS	CAMB	19971218	24	0.242	60214	L9228-6	SFWMD
USL3BRS	CAMB	19971224	24	0.120	60235	L9255-6	SFWMD
USL3BRS	CAMB	19971231	24	0.115	60243	L9292-6	SFWMD
USL3BRS	CAMB	19980129	24	0.068	60311	L9458-6	SFWMD
USL3BRS	CAMB	19980205	24	0.085	60331	L9510-6	SFWMD
USL3BRS	CAMB	19980212	24	0.062	60338	L9557-6	SFWMD
USL3BRS	CAMB	19980219	24	0.119	60345	L9599-6	SFWMD
USL3BRS	CAMB	19980226	24	0.178	60367	L9639-6	SFWMD
USL3BRS	CAMB	19980305	24	0.104	60374	L9686-6	SFWMD
USL3BRS	CAMB	19980312	24	0.117	60383	L9725-6	SFWMD
USL3BRS	CAMB	19980319	24	0.090	60408	L9773-6	SFWMD
USL3BRS	CAMB	19980326	24	0.210	60430	L9816-6	SFWMD
USL3BRS	CAMB	19980401	24	0.114	60435	L9853-4	SFWMD
USL3BRS	CAMB	19980409	24	0.104	60442	L9897-6	SFWMD
USL3BRS	CAMB	19980416	24	0.100	60461	L9943-4	SFWMD
USL3BRS	CAMB	19980423	24	0.083	60483	L9983-4	SFWMD
USL3BRS	CAMB	19980430	24	0.071	60488	L10025-4	SFWMD

APPENDIX III. (continued)

For USSO:

(1) Grab sample TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
USSO	CAMB	19970612	0	0.095	59497	L8136-7	SFWMD
USSO	CAMB	19970626	0	0.088	59516	L8200-5	SFWMD
USSO	CAMB	19970723	0	0.072	59582	L8348-5	SFWMD
USSO	CAMB	19970807	0	0.062	59618	L8427-8	SFWMD
USSO	CAMB	19970821	0	0.115	60024	L8540-11	SFWMD
USSO	CAMB	19970904	0	0.137	60037	74844011	HBEL
USSO	CAMB	19970918	0	0.126	60078	L8709-11	SFWMD
USSO	CAMB	19971002	0	0.099	60098	L8793-12	SFWMD
USSO	CAMB	19971016	0	0.075	60117	L8877-2	SFWMD
USSO	CAMB	19971023	0	0.067	60135	L8930-7	SFWMD
USSO	CAMB	19971113	0	0.081	60156	L9027-2	SFWMD
USSO	CAMB	19971211	0	0.107	60208	L9190-7	SFWMD
USSO	CAMB	19971218	0	0.066	60223	L9225-8	SFWMD
USSO	CAMB	19971231	0	0.041	60255	L9294-11	SFWMD
USSO	CAMB	19980129	0	0.047	60296	L9456-3	SFWMD
USSO	CAMB	19980212	0	0.042	60320	L9560-8	SFWMD
USSO	CAMB	19980226	0	0.053	60358	L9638-11	SFWMD
USSO	CAMB	19980312	0	0.032	60395	L9724-8	SFWMD
USSO	CAMB	19980326	0	0.041	60420	L9814-11	SFWMD
USSO	CAMB	19980423	0	0.154	60475	L9982-11	SFWMD

(2) Auto-sampler flow proportional composite TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
USSO	CAMB	19970508	24	0.170	59421	L7937-5	SFWMD
USSO	CAMB	19970515	24	0.070	59430	L7976-7	SFWMD
USSO	CAMB	19970521	24	0.063	59639	L8017-7	SFWMD
USSO	CAMB	19970605	24	0.031	59476	L8091-7	SFWMD
USSO	CAMB	19970612	24	0.083	59485	L8137-7	SFWMD
USSO	CAMB	19970619	24	0.067	59507	L8167-7	SFWMD
USSO	CAMB	19970626	24	0.075	59530	149000	PPB
USSO	CAMB	19970703	24	0.092	59539	149369	PPB
USSO	CAMB	19970710	24	0.060	59563	149868	PPB
USSO	CAMB	19970717	24	0.066	59573	L8315-6	SFWMD
USSO	CAMB	19970723	24	0.034	59596	L8350-6	SFWMD
USSO	CAMB	19970731	24	0.051	59606	L8397-6	SFWMD
USSO	CAMB	19970807	24	0.048	59627	L8431-5	SFWMD
USSO	CAMB	19970813	24	0.063	60006	L8467-7	SFWMD
USSO	CAMB	19970904	24	0.094	60051	74845005	HBEL
USSO	CAMB	19970911	24	0.098	60059	74862006	HBEL
USSO	CAMB	19970918	24	0.110	60065	L8712-6	SFWMD
USSO	CAMB	19970925	24	0.092	60086	L8760-7	SFWMD
USSO	CAMB	19971009	24	0.099	60115	L8830-6	SFWMD
USSO	CAMB	19971030	24	0.075	60141	L8955-6	SFWMD
USSO	CAMB	19971120	24	0.017	60179	L9067-5	SFWMD
USSO	CAMB	19971218	24	0.069	60215	L9228-7	SFWMD
USSO	CAMB	19971224	24	0.060	60236	L9255-7	SFWMD
USSO	CAMB	19980108	24	0.061	60264	L9334-6	SFWMD

USSO	CAMB	19980122	24	0.083	60290	L9418-6	SFWMD
USSO	CAMB	19980129	24	0.065	60312	L9458-7	SFWMD
USSO	CAMB	19980205	24	0.043	60332	L9510-7	SFWMD
USSO	CAMB	19980212	24	0.041	60339	L9557-7	SFWMD
USSO	CAMB	19980219	24	0.071	60346	L9599-7	SFWMD
USSO	CAMB	19980226	24	0.050	60368	L9639-7	SFWMD
USSO	CAMB	19980305	24	0.039	60375	L9686-7	SFWMD
USSO	CAMB	19980312	24	0.051	60384	L9725-7	SFWMD
USSO	CAMB	19980319	24	0.032	60409	L9773-7	SFWMD
USSO	CAMB	19980326	24	0.037	60431	L9816-7	SFWMD
USSO	CAMB	19980401	24	0.046	60436	L9853-5	SFWMD
USSO	CAMB	19980409	24	0.082	60443	L9897-7	SFWMD
USSO	CAMB	19980416	24	0.093	60462	L9943-5	SFWMD
USSO	CAMB	19980423	24	0.106	60484	L9983-5	SFWMD
USSO	CAMB	19980430	24	0.092	60491	L10025-7	SFWMD

APPENDIX III. (continued)

For L28U:

(1) Grab sample TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
L28U	BCSB	19970910	0	0.058	0013	9709672	SEMI
L28U	BCSB	19970924	0	0.101	0027	9800212	SEMI
L28U	BCSB	19971008	0	0.081	0042	9800552	SEMI
L28U	BCSB	19971022	0	0.078	0055	9800847	SEMI
L28U	BCSB	19971105	0	0.028	0074	9801296	SEMI
L28U	BCSB	19971203	0	0.112	0099	9801979	SEMI
L28U	BCSB	19980108	0	0.035	0126	9802792	SEMI
L28U	BCSB	19980204	0	0.039	0150	9803557	SEMI
L28U	BCSB	19980304	0	0.048	0173	9804284	SEMI
L28U	BCSB	19980325	0	0.041	0190	9804863	SEMI
L28U	BCSB	19980415	0	0.051	209	9805590	SEMI

(2) Auto-sampler flow proportional composite TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
L28U	BCSB	19970917	24	0.185	0021	9800049	SEMI
L28U	BCSB	19970924	24	0.108	0026	9800211	SEMI
L28U	BCSB	19971008	24	0.103	0038	9800556	SEMI
L28U	BCSB	19971022	24	0.125	0051	9800843	SEMI
L28U	BCSB	19971029	24	0.124	0063	9801080	SEMI
L28U	BCSB	19971105	24	0.114	0076	9801301	SEMI
L28U	BCSB	19971112	24	0.130	0081	9801498	SEMI
L28U	BCSB	19971125	24	0.078	0090	9802014	SEMI
L28U	BCSB	19971203	24	0.098	0101	9801984	SEMI
L28U	BCSB	19971210	24	0.166	0107	9802214	SEMI
L28U	BCSB	19971217	24	0.140	0112	9802447	SEMI
L28U	BCSB	19980114	24	0.127	0131	9802953	SEMI
L28U	BCSB	19980121	24	0.144	0134	9803108	SEMI
L28U	BCSB	19980128	24	0.151	0141	9803312	SEMI
L28U	BCSB	19980204	24	0.250	0152	9803562	SEMI
L28U	BCSB	19980211	24	0.129	0155	9803679	SEMI
L28U	BCSB	19980218	24	0.124	0160	9803829	SEMI
L28U	BCSB	19980225	24	0.080	0165	9804032	SEMI
L28U	BCSB	19980311	24	0.112	0177	9804476	SEMI
L28U	BCSB	19980318	24	0.092	0182	9804717	SEMI
L28U	BCSB	19980325	24	0.071	0192	9804867	SEMI
L28U	BCSB	19980401	24	0.07	196	9805104	SEMI
L28U	BCSB	19980408	24	0.078	201	9805295	SEMI
L28U	BCSB	19980422	24	0.081	215	9806052	SEMI

APPENDIX III. (continued)

For S140:

Grab sample TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
S140	CAMB	19970612	0	0.035	59500	L8136-10	SFWMD
S140	CAMB	19970626	0	0.037	59517	L8200-6	SFWMD
S140	CAMB	19970710	0	0.053	59557	149801	PPB
S140	CAMB	19970723	0	0.033	59586	L8348-9	SFWMD
S140	CAMB	19970807	0	0.031	59619	L8427-9	SFWMD
S140	CAMB	19970821	0	0.042	60026	L8540-13	SFWMD
S140	CAMB	19970904	0	0.043	60040	74844014	HBEL
S140	CAMB	19970918	0	0.039	60079	L8709-12	SFWMD
S140	CAMB	19971002	0	0.041	60109	L8793-15	SFWMD
S140	CAMB	19971208	0	0.025	60197	L9154-12	SFWMD
S140	CAMB	19971218	0	0.028	60229	L9225-14	SFWMD
S140	CAMB	19971231	0	0.045	60258	L9294-14	SFWMD
S140	CAMB	19980129	0	0.042	60305	L9456-7	SFWMD
S140	CAMB	19980226	0	0.030	60361	L9638-14	SFWMD
S140	CAMB	19980312	0	0.031	60401	L9724-14	SFWMD
S140	CAMB	19980326	0	0.025	60423	L9814-14	SFWMD
S140	CAMB	19980423	0	0.033	60478	L9982-14	SFWMD

APPENDIX III. (continued)

For WFEED:

(1) Grab sample TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
WFEED	SEMI	19970417	0	0.009	59641	L7827-8	SFWM
WFEED	SEMI	19970612	0	0.021	59488	L8137-9	SFWM
WFEED	SEMI	19970619	0	0.022	59509	L8167-9	SFWM
WFEED	SEMI	19970703	0	0.014	59545	149375	PPB
WFEED	SEMI	19970710	0	0.017	59567	149872	PPB
WFEED	SEMI	19970717	0	0.027	59576	L8315-9	SFWM
WFEED	SEMI	19970723	0	0.021	59600	L8350-10	SFWM
WFEED	SEMI	19970731	0	0.014	59609	L8397-9	SFWM
WFEED	SEMI	19970807	0	0.022	59633	L8431-11	SFWM
WFEED	SEMI	19970813	0	0.015	0302	L8465-3	SFWM
WFEED	SEMI	19970821	0	0.016	0306	L8543-4	SFWM
WFEED	SEMI	19970828	0	0.016	0310	L8587-4	SFWM
WFEED	SEMI	19970904	0	0.044	0314	L8620-4	SFWM
WFEED	SEMI	19970911	0	0.049	0318	L8664-4	SFWM
WFEED	SEMI	19970918	0	0.021	0322	L8714-4	SFWM
WFEED	SEMI	19970925	0	0.043	0326	L8758-4	SFWM
WFEED	SEMI	19971002	0	0.024	0330	L8796-4	SFWM
WFEED	SEMI	19971009	0	0.033	0333	L8829-3	SFWM
WFEED	SEMI	19971016	0	0.039	0337	L8883-3	SFWM
WFEED	SEMI	19971023	0	0.032	0345	L8931-4	SFWM
WFEED	SEMI	19971030	0	0.031	0349	L8954-3	SFWM
WFEED	SEMI	19971106	0	0.034	0354	L8995-4	SFWM
WFEED	SEMI	19971113	0	0.020	0358	L9033-4	SFWM
WFEED	SEMI	19971120	0	0.018	0365	L9066-6	SFWM
WFEED	SEMI	19971126	0	0.024	0372	L9104-6	SFWM
WFEED	SEMI	19971204	0	0.016	0377	L9144-4	SFWM
WFEED	SEMI	19971211	0	0.011	0382	L9191-4	SFWM
WFEED	SEMI	19971218	0	0.021	0387	L9229-4	SFWM
WFEED	SEMI	19971224	0	0.026	0392	L9254-4	SFWM
WFEED	SEMI	19971231	0	0.018	0397	L9293-3	SFWM
WFEED	SEMI	19980108	0	0.033	0402	L9335-4	SFWM
WFEED	SEMI	19980115	0	0.031	0408	L9377-4	SFWM
WFEED	SEMI	19980122	0	0.029	0414	L9417-4	SFWM
WFEED	SEMI	19980129	0	0.030	1330	L9459-4	SFWM
WFEED	SEMI	19980205	0	0.033	1334	L9509-3	SFWM
WFEED	SEMI	19980212	0	0.022	1339	L9558-3	SFWM
WFEED	SEMI	19980219	0	0.023	1344	L9598-3	SFWM
WFEED	SEMI	19980226	0	0.030	1356	L9640-7	SFWM
WFEED	SEMI	19980305	0	0.029	1361	L9685-4	SFWM
WFEED	SEMI	19980312	0	0.023	1367	L9726-4	SFWM
WFEED	SEMI	19980319	0	0.033	1373	L9772-4	SFWM
WFEED	SEMI	19980326	0	0.027	1379	L9817-4	SFWM
WFEED	SEMI	19980401	0	0.050	1387	L9852-6	SFWM
WFEED	SEMI	19980409	0	0.049	1393	L9896-4	SFWM
WFEED	SEMI	19980416	0	0.031	1401	L9944-6	SFWM
WFEED	SEMI	19980423	0	0.036	1407	L9984-4	SFWM
WFEED	SEMI	19980430	0	0.046	1416	L10026-4	SFWM

APPENDIX III. (continued)

(2) WFEED auto-sampler flow proportional composite TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
WFEED	SEMI	19970515	24	0.020	59431	L7976-8	SFWMD
WFEED	SEMI	19970521	24	0.020	59640	L8017-8	SFWMD
WFEED	SEMI	19970529	24	0.013	59461	L8053-8	SFWMD
WFEED	SEMI	19970612	24	0.023	59487	L8137-10	SFWMD
WFEED	SEMI	19970619	24	0.019	59508	L8167-8	SFWMD
WFEED	SEMI	19970626	24	0.034	59533	149003	PPB
WFEED	SEMI	19970710	24	0.018	59566	149871	PPB
WFEED	SEMI	19970717	24	0.021	59577	L8315-10	SFWMD
WFEED	SEMI	19970723	24	0.025	59599	L8350-9	SFWMD
WFEED	SEMI	19970731	24	0.019	59610	L8397-10	SFWMD
WFEED	SEMI	19970807	24	0.015	59632	L8431-10	SFWMD
WFEED	SEMI	19970821	24	0.022	0305	L8543-3	SFWMD
WFEED	SEMI	19970828	24	0.025	0309	L8587-3	SFWMD
WFEED	SEMI	19970904	24	0.063	0313	L8620-3	SFWMD
WFEED	SEMI	19970911	24	0.039	0317	L8664-3	SFWMD
WFEED	SEMI	19970918	24	0.112	0321	L8714-3	SFWMD
WFEED	SEMI	19970925	24	0.060	0325	L8758-3	SFWMD
WFEED	SEMI	19971002	24	0.037	0329	L8796-3	SFWMD
WFEED	SEMI	19971016	24	0.035	0336	L8883-2	SFWMD
WFEED	SEMI	19971023	24	0.031	0344	L8931-3	SFWMD
WFEED	SEMI	19971106	24	0.044	0353	L8995-3	SFWMD
WFEED	SEMI	19971113	24	0.014	0357	L9033-3	SFWMD
WFEED	SEMI	19971120	24	0.025	0364	L9066-5	SFWMD
WFEED	SEMI	19971126	24	0.032	0371	L9104-5	SFWMD
WFEED	SEMI	19971204	24	0.041	0376	L9144-3	SFWMD
WFEED	SEMI	19971211	24	0.020	0381	L9191-3	SFWMD
WFEED	SEMI	19971218	24	0.027	0386	L9229-3	SFWMD
WFEED	SEMI	19971224	24	0.057	0391	L9254-3	SFWMD
WFEED	SEMI	19980108	24	0.031	0401	L9335-3	SFWMD
WFEED	SEMI	19980115	24	0.073	0407	L9377-3	SFWMD
WFEED	SEMI	19980122	24	0.036	0413	L9417-3	SFWMD
WFEED	SEMI	19980129	24	0.044	1331	L9459-5	SFWMD
WFEED	SEMI	19980205	24	0.033	1333	L9509-2	SFWMD
WFEED	SEMI	19980212	24	0.044	1338	L9558-2	SFWMD
WFEED	SEMI	19980219	24	0.039	1343	L9598-2	SFWMD
WFEED	SEMI	19980226	24	0.057	1355	L9640-6	SFWMD
WFEED	SEMI	19980305	24	0.069	1360	L9685-3	SFWMD
WFEED	SEMI	19980312	24	0.072	1366	L9726-3	SFWMD
WFEED	SEMI	19980319	24	0.073	1372	L9772-3	SFWMD
WFEED	SEMI	19980326	24	0.051	1378	L9817-3	SFWMD
WFEED	SEMI	19980401	24	0.043	1386	L9852-5	SFWMD
WFEED	SEMI	19980409	24	0.041	1392	L9896-3	SFWMD

APPENDIX III. (continued).

For WWEIR:

(1) WWEIR grab sample TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
WWEIR	SEMI	19971009	0	0.033	0334	L8829-4	SFWMD
WWEIR	SEMI	19971016	0	0.035	0341	L8883-7	SFWMD
WWEIR	SEMI	19971023	0	0.037	0346	L8931-5	SFWMD
WWEIR	SEMI	19971030	0	0.028	0350	L8954-4	SFWMD
WWEIR	SEMI	19971106	0	0.032	0355	L8995-5	SFWMD
WWEIR	SEMI	19971113	0	0.021	0359	L9033-5	SFWMD
WWEIR	SEMI	19971120	0	0.018	0366	L9066-7	SFWMD
WWEIR	SEMI	19971126	0	0.024	0373	L9104-7	SFWMD
WWEIR	SEMI	19971204	0	0.015	0378	L9144-5	SFWMD
WWEIR	SEMI	19971211	0	0.012	0383	L9191-5	SFWMD
WWEIR	SEMI	19971218	0	0.022	0388	L9229-5	SFWMD
WWEIR	SEMI	19971224	0	0.024	0393	L9254-5	SFWMD
WWEIR	SEMI	19971231	0	0.017	0398	L9293-4	SFWMD
WWEIR	SEMI	19980108	0	0.030	0404	L9335-5	SFWMD
WWEIR	SEMI	19980115	0	0.034	0410	L9377-6	SFWMD
WWEIR	SEMI	19980122	0	0.030	0416	L9417-6	SFWMD
WWEIR	SEMI	19980129	0	0.023	1329	L9459-3	SFWMD
WWEIR	SEMI	19980205	0	0.018	1335	L9509-4	SFWMD
WWEIR	SEMI	19980212	0	0.020	1340	L9558-4	SFWMD
WWEIR	SEMI	19980219	0	0.021	1348	L9598-7	SFWMD
WWEIR	SEMI	19980226	0	0.027	1357	L9640-8	SFWMD
WWEIR	SEMI	19980305	0	0.023	1362	L9685-5	SFWMD
WWEIR	SEMI	19980312	0	0.054	1369	L9726-6	SFWMD
WWEIR	SEMI	19980319	0	0.021	1375	L9772-6	SFWMD
WWEIR	SEMI	19980326	0	0.026	1381	L9817-6	SFWMD
WWEIR	SEMI	19980401	0	0.030	1388	L9852-7	SFWMD
WWEIR	SEMI	19980409	0	0.056	1395	L9896-6	SFWMD
WWEIR	SEMI	19980416	0	0.053	1402	L9944-7	SFWMD
WWEIR	SEMI	19980423	0	0.063	1412	L9984-9	SFWMD
WWEIR	SEMI	19980430	0	0.044	1418	L10026-6	SFWMD

(2) WWEIR auto-sampler flow proportional composite TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
WWEIR	SEMI	19971224	24	0.025	0394	L9254-6	SFWMD
WWEIR	SEMI	19980115	24	0.087	0409	L9377-5	SFWMD
WWEIR	SEMI	19980122	24	0.038	0415	L9417-5	SFWMD
WWEIR	SEMI	19980129	24	0.029	1328	L9459-2	SFWMD
WWEIR	SEMI	19980205	24	0.024	1336	L9509-5	SFWMD
WWEIR	SEMI	19980212	24	0.018	1341	L9558-5	SFWMD
WWEIR	SEMI	19980219	24	0.022	1349	L9598-8	SFWMD
WWEIR	SEMI	19980305	24	0.023	1363	L9685-6	SFWMD
WWEIR	SEMI	19980312	24	0.025	1368	L9726-5	SFWMD
WWEIR	SEMI	19980319	24	0.027	1374	L9772-5	SFWMD
WWEIR	SEMI	19980326	24	0.020	1380	L9817-5	SFWMD
WWEIR	SEMI	19980401	24	0.030	1389	L9852-8	SFWMD
WWEIR	SEMI	19980409	24	0.035	1394	L9896-5	SFWMD

APPENDIX III. (continued).

For NFEED:

(1) NFEED grab sample TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
NFEED	SEMI	19970612	0	0.059	59486	L8137-8	SFWMD
NFEED	SEMI	19970619	0	0.119	59511	L8167-11	SFWMD
NFEED	SEMI	19970626	0	0.116	59532	149002	PPB
NFEED	SEMI	19970703	0	0.188	59544	149374	PPB
NFEED	SEMI	19970710	0	0.096	59565	149870	PPB
NFEED	SEMI	19970717	0	0.297	59574	L8315-7	SFWMD
NFEED	SEMI	19970723	0	0.177	59597	L8350-7	SFWMD
NFEED	SEMI	19970731	0	0.145	59608	L8397-8	SFWMD
NFEED	SEMI	19970807	0	0.047	59631	L8431-9	SFWMD
NFEED	SEMI	19970813	0	0.289	0301	L8465-2	SFWMD
NFEED	SEMI	19970821	0	0.151	0304	L8543-2	SFWMD
NFEED	SEMI	19970828	0	0.125	0308	L8587-2	SFWMD
NFEED	SEMI	19970904	0	0.154	0312	L8620-2	SFWMD
NFEED	SEMI	19970911	0	0.140	0316	L8664-2	SFWMD
NFEED	SEMI	19970918	0	0.154	0320	L8714-2	SFWMD
NFEED	SEMI	19970925	0	0.091	0324	L8758-2	SFWMD
NFEED	SEMI	19971002	0	0.131	0328	L8796-2	SFWMD
NFEED	SEMI	19971009	0	0.110	0332	L8829-2	SFWMD
NFEED	SEMI	19971016	0	0.113	0335	L8883-1	SFWMD
NFEED	SEMI	19971023	0	0.072	0343	L8931-2	SFWMD
NFEED	SEMI	19971030	0	0.068	0348	L8954-2	SFWMD
NFEED	SEMI	19971106	0	0.055	0352	L8995-2	SFWMD
NFEED	SEMI	19971113	0	0.053	0356	L9033-2	SFWMD
NFEED	SEMI	19971120	0	0.066	0363	L9066-4	SFWMD
NFEED	SEMI	19971126	0	0.074	0370	L9104-4	SFWMD
NFEED	SEMI	19971204	0	0.083	0375	L9144-2	SFWMD
NFEED	SEMI	19971211	0	0.105	0380	L9191-2	SFWMD
NFEED	SEMI	19971218	0	0.292	0385	L9229-2	SFWMD
NFEED	SEMI	19971224	0	0.215	0390	L9254-2	SFWMD
NFEED	SEMI	19971231	0	0.221	0396	L9293-2	SFWMD
NFEED	SEMI	19980108	0	0.146	0400	L9335-2	SFWMD
NFEED	SEMI	19980115	0	0.131	0406	L9377-2	SFWMD
NFEED	SEMI	19980122	0	0.136	0412	L9417-2	SFWMD
NFEED	SEMI	19980129	0	0.129	1327	L9459-1	SFWMD
NFEED	SEMI	19980205	0	0.099	1332	L9509-1	SFWMD
NFEED	SEMI	19980212	0	0.108	1337	L9558-1	SFWMD
NFEED	SEMI	19980219	0	0.143	1342	L9598-1	SFWMD
NFEED	SEMI	19980226	0	0.137	1351	L9640-2	SFWMD
NFEED	SEMI	19980305	0	0.126	1359	L9685-2	SFWMD
NFEED	SEMI	19980312	0	0.094	1364	L9726-1	SFWMD
NFEED	SEMI	19980319	0	0.095	1371	L9772-2	SFWMD
NFEED	SEMI	19980326	0	0.139	1377	L9817-2	SFWMD
NFEED	SEMI	19980401	0	0.117	1385	L9852-4	SFWMD
NFEED	SEMI	19980409	0	0.124	1391	L9896-2	SFWMD
NFEED	SEMI	19980416	0	0.086	1399	L9944-4	SFWMD
NFEED	SEMI	19980423	0	0.098	1405	L9984-2	SFWMD
NFEED	SEMI	19980430	0	0.074	1414	L10026-2	SFWMD

APPENDIX III. (continued).

(2) NFEED auto-sampler flow proportional composite TP concentration.

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	LIMS no.	Source
NFEED	SEMI	19970619	24	0.075	59510	L8167-10	SFWMD
NFEED	SEMI	19970626	24	0.116	59531	149001	PPB
NFEED	SEMI	19970703	24	0.082	59543	149373	PPB
NFEED	SEMI	19970710	24	0.096	59564	149869	PPB
NFEED	SEMI	19970717	24	0.171	59575	L8315-8	SFWMD
NFEED	SEMI	19970723	24	0.247	59598	L8350-8	SFWMD
NFEED	SEMI	19970731	24	0.158	59607	L8397-7	SFWMD
NFEED	SEMI	19970807	24	0.063	59630	L8431-8	SFWMD
NFEED	SEMI	19970813	24	0.209	0300	L8465-1	SFWMD
NFEED	SEMI	19970821	24	0.219	0303	L8543-1	SFWMD
NFEED	SEMI	19970828	24	0.133	0307	L8587-1	SFWMD
NFEED	SEMI	19970904	24	0.106	0311	L8620-1	SFWMD
NFEED	SEMI	19970918	24	0.132	0319	L8714-1	SFWMD
NFEED	SEMI	19970925	24	0.104	0323	L8758-1	SFWMD
NFEED	SEMI	19971002	24	0.147	0327	L8796-1	SFWMD
NFEED	SEMI	19971009	24	0.119	0331	L8829-1	SFWMD
NFEED	SEMI	19971023	24	0.091	0342	L8931-1	SFWMD
NFEED	SEMI	19971030	24	0.067	0347	L8954-1	SFWMD
NFEED	SEMI	19971106	24	0.067	0351	L8995-1	SFWMD
NFEED	SEMI	19971113	24	0.054	Z0355	L9033-1	SFWMD
NFEED	SEMI	19971120	24	0.062	0360	L9066-1	SFWMD
NFEED	SEMI	19971126	24	0.053	0367	L9104-1	SFWMD
NFEED	SEMI	19971204	24	0.072	0374	L9144-1	SFWMD
NFEED	SEMI	19971211	24	0.096	0379	L9191-1	SFWMD
NFEED	SEMI	19971218	24	0.235	0384	L9229-1	SFWMD
NFEED	SEMI	19971224	24	0.239	0389	L9254-1	SFWMD
NFEED	SEMI	19971231	24	0.240	0395	L9293-1	SFWMD
NFEED	SEMI	19980108	24	0.148	0399	L9335-1	SFWMD
NFEED	SEMI	19980115	24	0.138	0405	L9377-1	SFWMD
NFEED	SEMI	19980122	24	0.079	0411	L9417-1	SFWMD
NFEED	SEMI	19980226	24	0.152	1350	L9640-1	SFWMD
NFEED	SEMI	19980305	24	0.144	1358	L9685-1	SFWMD
NFEED	SEMI	19980319	24	0.096	1370	L9772-1	SFWMD
NFEED	SEMI	19980326	24	0.143	1376	L9817-1	SFWMD
NFEED	SEMI	19980401	24	0.118	1382	L9852-1	SFWMD
NFEED	SEMI	19980409	24	0.117	1390	L9896-1	SFWMD
NFEED	SEMI	19980416	24	0.113	1396	L9944-1	SFWMD
NFEED	SEMI	19980423	24	0.083	1404	L9984-1	SFWMD
NFEED	SEMI	19980430	24	0.087	1413	L10026-1	SFWMD

APPENDIX IV. (continued)

Table A-3. Statistical analysis of TP concentration differences of the grab sample pairs.

(a) Paired Two Sample t-Test for arithmetic means for grab samples.

	WFEEED	WWEIR
Mean	0.0293	0.0297
Variance	8.37195E-05	0.000164769
Observations	30	30
Pearson Correlation		0.591714391
Hypothesized Mean Difference		0
df		29
t Stat		-0.226821795
P (T<=t) one-tail		0.411076818
t Critical one-tail		1.699127097
P (T<=t) two-tail		0.822153636
t Critical two-tail		2.045230758

(b) Paired Two Sample t-Test for flow weighted means of grab samples.

	WFEEED	WWEIR
Mean	0.0224	0.0217
Variance	0.000363774	0.000389974
Observations	30	30
Pearson Correlation		0.920304424
Hypothesized Mean Difference		0
df		29
t Stat		0.492205897
P(T<=t) one-tail		0.313139723
t Critical one-tail		1.699127097
P(T<=t) two-tail		0.626279446
t Critical two-tail		2.045230758

APPENDIX IV. (continued)

Table A-4. WFEED and WWEIR auto-sampler composite TP data pairs.

Date	WFEED	WWEIR	Total Flow	WFEED FWM	WWEIR FWM
19971224	0.057	0.025	158.360	0.030	0.013
19980115	0.073	0.087	466.020	0.111	0.133
19980122	0.036	0.038	274.540	0.032	0.034
19980129	0.044	0.029	210.470	0.030	0.020
19980205	0.033	0.024	189.940	0.021	0.015
19980212	0.044	0.018	241.900	0.035	0.014
19980219	0.039	0.022	335.110	0.043	0.024
19980305	0.069	0.023	256.570	0.058	0.019
19980312	0.072	0.025	351.000	0.083	0.029
19980319	0.073	0.027	286.390	0.068	0.025
19980326	0.051	0.020	741.250	0.124	0.049
19980401	0.043	0.030	276.790	0.039	0.027
19980409	0.041	0.035	179.490	0.024	0.021
Sum	0.698	0.423	3967.830		
Arithmetic Mean:	0.052	0.031	305.218		
			FWMC:	0.054	0.033

APPENDIX IV. (continued)

Table A-5. Statistical analysis of TP concentration differences of the auto-sampler data pairs.

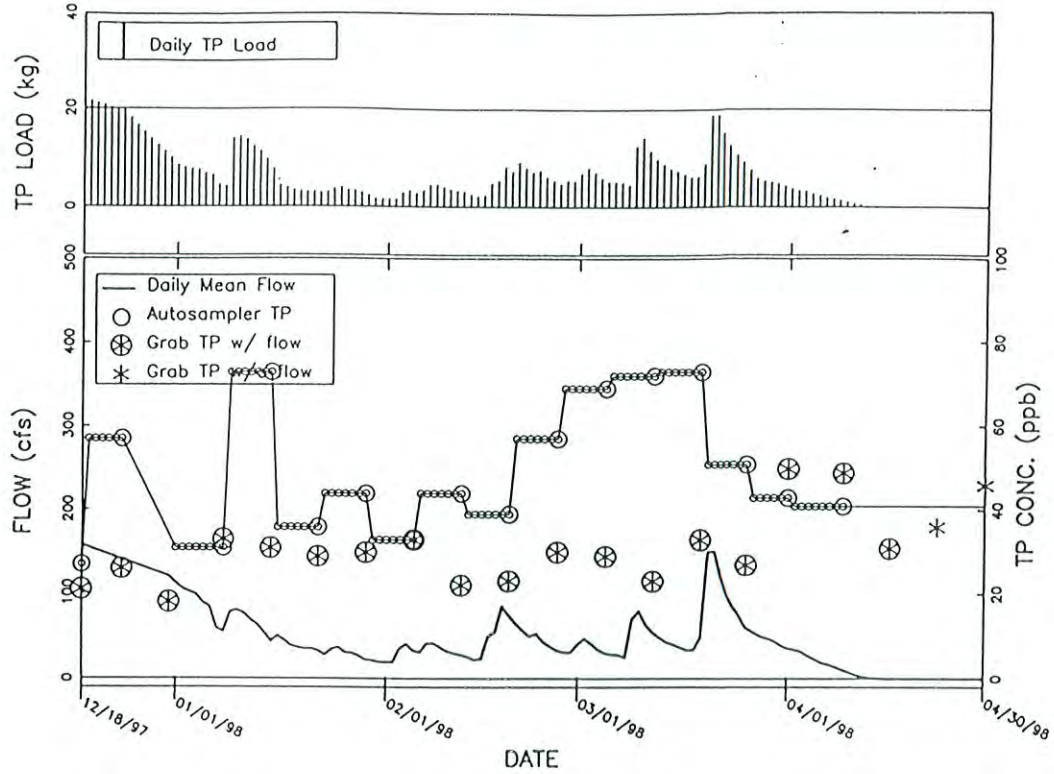
(a) Paired Two Sample t-Test for arithmetic means for auto-sampler.

	WFEEED	WWEIR
Mean	0.0519	0.031
Variance	0.000226077	0.000314833
Variance	107.6193776	89.93593297
Observations	13	13
Pearson Correlation	0.324850562	
Hypothesized Mean Difference	0	
df		12
t Stat		3.934804042
P(T<=t) one-tail		0.000990704
t Critical one-tail		1.782286745
P(T<=t) two-tail		0.001981407
t Critical two-tail		2.178812792

(b) Paired Two Sample t-Test for flow weight values for auto-sampler.

	WFEEED	WWEIR
Mean(Conc. x Flow)	17.74263385	10.52577385
FWMC	0.054	0.033
Variance	107.6193776	89.93593297
Observations	13	13
Pearson Correlation		0.665126861
Hypothesized Mean Difference		0
df		12
t Stat		3.186478491
P(T<=t) one-tail		0.003913254
t Critical one-tail		1.782286745
P(T<=t) two-tail		0.007826508
t Critical two-tail		2.178812792

WFEED TP Load, Flow and TP Concentration



WWEIR TP Load, Flow and TP Concentration

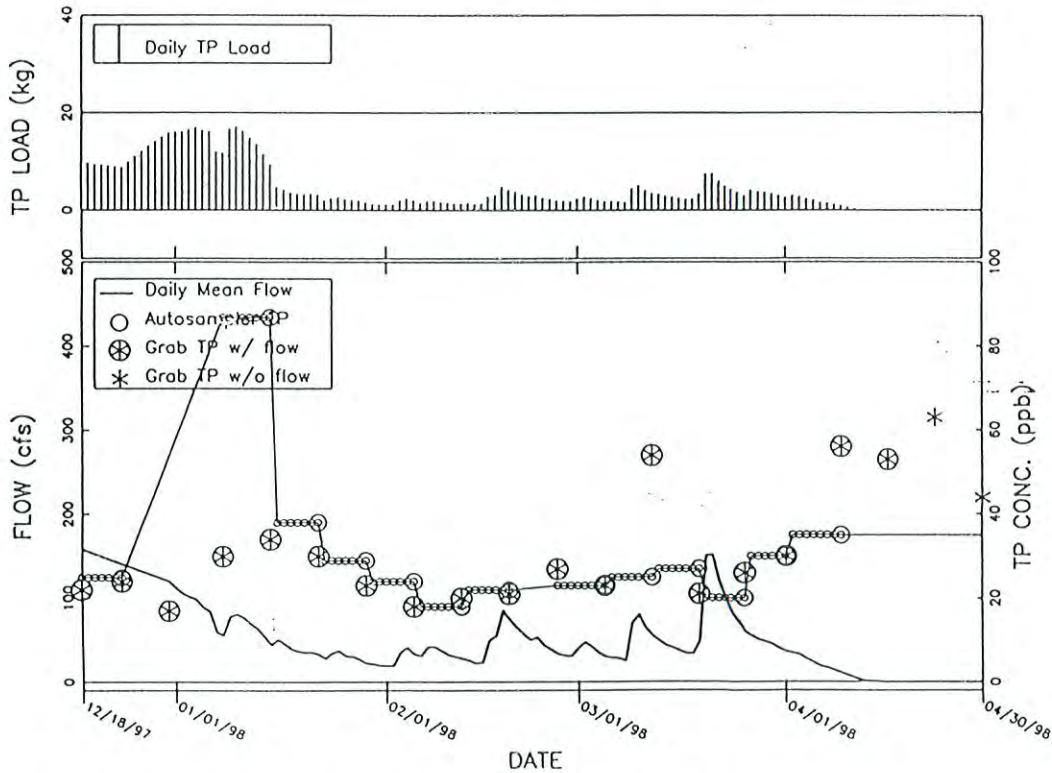


Figure A-1. Comparison of grab and auto-sampler TP concentration data, flows, and TP loads between WFEED and WWEIR.