

CAPE CORAL
WATER QUALITY
MONITORING SUMMARY
WY '13

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ENVIRONMENTAL RESOURCES DIVISION
PUBLIC WORKS DEPARTMENT
CITY OF CAPE CORAL

**CAPE CORAL MONITORING SUMMARY
WY '13**

EXECUTIVE SUMMARY

This summary is based on the twenty-second year of water quality data (WY-13) in the Environmental Resources Division's water quality monitoring program. Overall water quality in the city declined during this sampling period as compared to the previous year. By comparison with state indices, water quality is fair to good in all systems.

As in earlier reports, potential problems were noted in both fresh and salt water with turbidity, streptococcus and coli form bacteria, biological oxygen demand, dissolved oxygen, chlorophyll a, total nitrogen, total phosphorous, pH and total suspended solids (TSS). For the seawater canals, these problems are partially caused by runoff from the general river basin, which is the source of water to Cape Coral. Areas of high development and increased population within the city also affect both freshwater and saltwater canals.

CAPE CORAL MONITORING SUMMARY WY '13

INTRODUCTION

The Environmental Resources Division (ERD) of the Public Works Department of the City of Cape Coral conducts routine monitoring of aquatic systems in the City. This report summarizes the findings from October 1, 2012 - September 30, 2013 (Water Year 2013). Figure 1. shows the locations of the main regular sampling stations for which monthly sampling has been conducted. Appendix Table 1. describes these sampling stations. The full set of data on which this report is based is on file at the office of the ERD in Cape Coral.

The water quality characteristics routinely measured at each station are listed in Table 1. along with the frequency and the applicable Florida water quality standards. Laboratory analyses were provided by the Chemistry Group of the Cape Coral Water Reclamation Plant and by staff of ERS. Staff members of ERD collected field instrument data. All methods followed APHA, 1989.

RESULTS AND DISCUSSION

Tables 2A and 2B summarize statistics for all regular water quality samples taken during the sampling period October 1, 2012 through September 30, 2013. For clarity in interpretation, data were separated into freshwater and saltwater.

Fecal coliform numbers made up 25% of the Class II water quality standards outliers. Dissolved oxygen (DO) made up 24% and biological oxygen demand (BOD) numbers made up 21% (Table 3).

Stations 129, 160, 210, 290 and 510 had violations in seven areas. Stations 262, 310, 350, and 442 all had violations in six areas. The majority of these violations occurred in fecal coliform, DO, BOD and chlorophyll a. Stations 210, 262, 290, 310 and 510 are located in populated areas in the southeastern part of the city. Stations 129 and 160 are located north of Pine Island Road and are subject to runoff from numerous sources. Station 350 is located in the Caloosahatchee River, and 442 is at the dead end canal within the south spreader system.

The State of Florida (Hand et al. 1988) developed a water quality index for streams based on water clarity, dissolved oxygen, oxygen demand, bacteria, nutrients and biological diversity. ERS calculated a similar index based on all of the 6 factors except biological diversity (for which information is presently inadequate). Because the State index is a simple arithmetic average, it is reasonable to compare the Cape Coral index with it. Table 4. gives the calculated indices for the main aquatic system types of Cape Coral.

The overall average for the Cape Coral systems was 51. According to this index, Cape Coral water quality is fair. (The state range for "good" is 0 to 45; fair is 46-59; poor is 60-100). Overall water quality has remained the same as compared to the previous year. (Table 4).

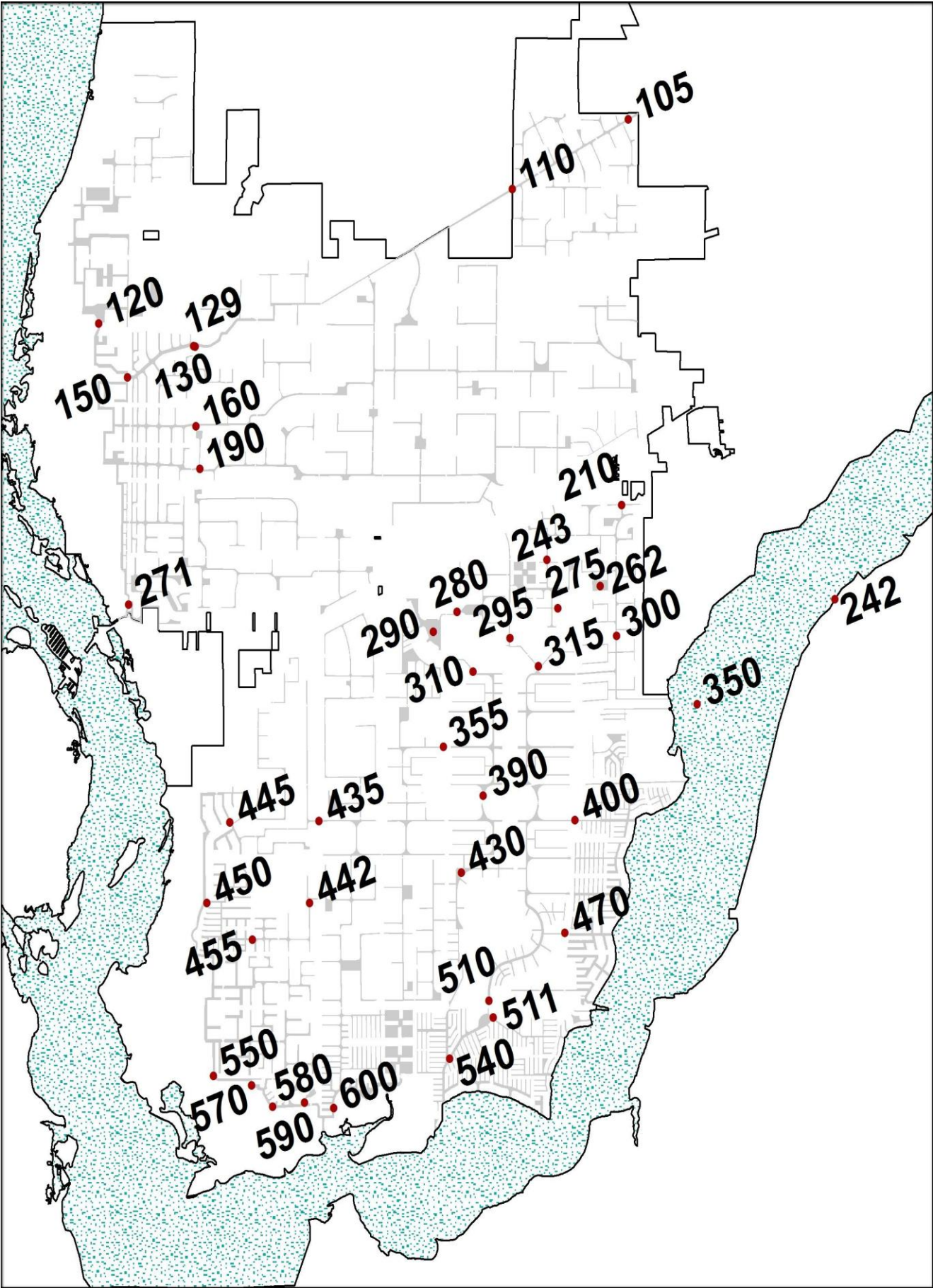


TABLE 1. MONITORING FACTORS

FACTOR	SAMPLING FREQUENCY	FLORIDA STANDARD
Dissolved oxygen	Monthly	>4 mg/l
Temperature	Monthly	NA
pH	Monthly	>6.0 <8.5
Conductivity & Salinity	Monthly	<1275 or 50%
Turbidity	Monthly	>background
Total Suspended Solids	Monthly	<29 NTU > background
Nitrate Nitrogen	Monthly	<18
Nitrite Nitrogen	Monthly	<10 mg/l
Total Nitrogen	Monthly	<10 mg/l
Ortho-phosphorous	Monthly	< 2.0 mg/l
Total Phosphorous	Monthly	<0.1 mg/l
Secchi Disk Depth	Monthly	< 0.46 mg/l
Fecal Coliforms	Monthly	>0.6 M
Fecal Streptococcus	Monthly	<200/100 ml
Chlorophyll a	Monthly	<33/100 ml
Biochemical Oxygen Demand	Monthly	< 10 ug/l
		<3.3 mg/l

TABLE 2A: FRESHWATER MONITORING DATA
SUMMARY
WY '2013

FACTOR	UNITS	MEAN	STD. DEV.	MIN.	MAX.	#
TEMPERATURE	DEG. C	25.42	3.87	17.96	31.25	537
DISSOLVED O2	MG/L	6.49	1.96	0.00	11.83	537
pH	STD. UNITS	7.85	0.28	6.91	8.60	537
CONDUCT.	MS/CM	0.610	0.124	0.002	0.842	537
TURBIDITY	NTU	4.30	4.95	0.01	64.06	437
SECCHI DEPTH	M	1.11	0.47	0.30	3.50	183
NITRATE N	MG/L	0.029	0.016	0.025	0.190	437
NITRITE N	MG/L	0.025	0.000	0.025	0.025	437
AMMONIA N	MG/L	0.050	0.004	0.050	0.100	437
KJEHDAHL N	MG/L	0.705	0.574	0.050	10.200	437
ORGANIC N	MG/L	0.655	0.600	0.000	10.150	399
TOTAL N	MG/L	0.711	0.575	0.050	10.200	437
TDS	MG/L	351.3	126.9	149	2391	437
TSS	MG/L	11.6	25.0	0.5	345	437
TOTAL P	MG/L	0.033	0.032	0.010	0.390	437
	CFU'S/100					
FECAL STREP	ML	6.7	12.4	1	122	192
FECAL	CFU'S/100					
COLIFORMS	ML	430.3	398.8	1	888	192
CHL A	uG/L	6.92	5.53	0.50	32.70	192
5 DAY BOD	MG/L	2.20	1.32	1.20	7.00	437

TABLE 2B: SALTWATER MONITORING DATA SUMMARY
 WY '2013

FACTOR	UNITS	MEAN	STD.DEV.	MIN.	MAX.	#
TEMPERATURE	DEG. C	25.60	3.94	16.72	31.98	733
DISSOLVED O2	MG/L	5.76	1.74	0.00	11.24	709
pH	STD. UNITS	7.78	0.26	6.29	8.97	734
CONDUCT.	MS/CM	13.391	11.749	0.001	46.820	733
TURBIDITY	NTU	2.88	6.56	0.05	133.00	478
SECCHI DEPTH	M	1.14	0.50	0.03	3.60	258
NITRATE N	MG/L	0.063	0.091	0.025	0.800	478
NITRITE N	MG/L	0.025	0.000	0.025	0.025	478
AMMONIA N	MG/L	0.052	0.017	0.050	0.300	478
KJELDAHL N	MG/L	0.862	0.670	0.100	14.000	467
ORGANIC N	MG/L	0.808	0.698	0.050	13.950	425
TOTAL N	MG/L	0.887	0.692	0.000	14.000	478
TDS	MG/L	8199.8	7615.2	184	29485	478
TSS	MG/L	12.0	9.1	1.5	87.5	478
TOTAL P	MG/L	0.064	0.047	0.010	0.470	478
FECAL STREP	CFU'S/100 ML	5.4	7.0	1	50	192
FECAL COLIFORMS	CFU'S/100 ML	244.2	353.9	1	888	192
CHL A	uG/L	7.26	8.65	0.50	88.40	192
5 DAY BOD	MG/L	1.78	1.82	1.20	35.00	478

TABLE 3. DEVIATIONS FROM STATE STANDARDS
WY '2013

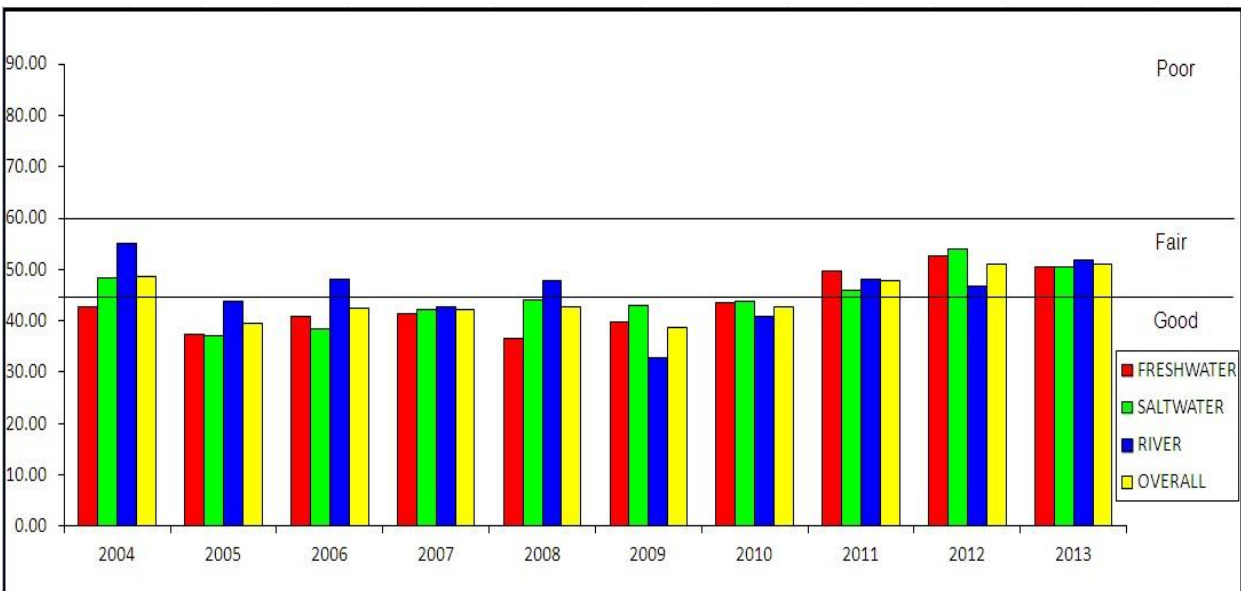
AT FRESHWATER STATIONS			AT SALTWATER STATIONS	
FACTORS	FREQUENCY	STATIONS	FREQUENCY	STATIONS
TURBIDITY	7	160,210,262, 290,295,310	9	160,210,262, 290,295,310, 315
TSS	27	110,160,210, 262,280,290, 300,310,390	99	110,120,130, 160,210,242, 262,271,280, 290,300,310, 315,350,390, 400,430,442, 470,510,511, 540,550,590, 600
BOD	87	129,160,190, 210,243,262, 275,280,290, 295,300,310, 355,390	130	120,129,160, 190,210,242, 243,262,271, 275,280,290, 295,300,310, 315,350,355, 390,400,430, 435,442,470, 510,540,600
TN	5	129,160,210, 290	9	129,160,210, 290,350,435, 442,510
TP	NA		1	430
STREP	3	129,275,295	5	129,275,295, 510,511
COLI	100	105,110,129, 160,190,210, 243,262,275, 280,290,295, 300,310,355, 390	155	105,110,120, 129,130,160, 190,210,242, 243,262,271, 275,280,290, 295,300,310,

				315,350,355, 390,400,430, 435,442,470, 510,511,540, 550,590,600
DO	69	105,110,129, 160,190,210, 262,290,310	173	105,110,120, 129,130,150, 160,190,210, 242,262,271, 290,310,350, 430,435,442, 445,450,455, 510,511,540, 570,580,590, 600
CHL A	45	105,129,160, 210,243,262, 275,280,290, 295,300,310, 355,390	88	105,120,129, 160,210,242, 243,262,271, 275,280,290, 295,300,310, 315,350,355, 390,400,435, 442,470,510, 511,540,550, 590,600
pH	1	129	13	129,550,570, 580,590

TABLE 4. WATER QUALITY INDICES FOR CAPE CORAL
WY '2013

SYSTEM TYPE	INDEX VALUE
FRESHWATER	50.53
SALTWATER	50.49
RIVER	51.78
OVERALL	50.93

Note: index based on Hand et al. (1988).
Low values better than high.



SUMMARY AND CONCLUSIONS

ERD continued to monitor 22 water quality factors at 36 locations in the vicinity of Cape Coral during Water Year 2013. Based on these observations and comparisons with Florida water quality indices, the overall water quality of Cape Coral sampling stations was fair, and in comparison to previous years had remained the same.

The recommendations for improvement of these conditions continue to include the following:

1) Lobby for drainage basin improvements in the Caloosahatchee River upstream of Cape Coral. The saltwater canals of Cape Coral cannot be much better than the water that they receive from adjacent and upstream areas.

2) Proceed as rapidly as possible to connect the entire City of Cape Coral to sewers. Nutrients from septic drainage systems are fostering excessive growth of plants in the canals and may also be responsible for elevated bacterial counts in areas of higher population and development.

3) Encourage the use of best management practices, BMP's, in all areas of the Cape. Emphasize BMP's dealing with fertilizing of lawns and gardens, pesticide applications, the installation of barrier strips of vegetation to intercept runoff along waterways and enforce and improve existing erosion control ordinances.

4) In some of the deeper canals, dissolved oxygen violations are consistently occurring. Addition of hard substrate on the bottom would lead to increased mixing and could alleviate some of these violations.

5) To improve flow conditions dead-end canals should be connected to other canals. This could also improve oxygen conditions and clarity.

Literature Cited

APHA, 1989.

Standard Methods for the Examination of Water and Wastewater 17th Edition. American Public Health Association, Washington, DC 20005.

Hand, J., V. Tauxe and M. Friedman, 1988.

1988 Florida Water Quality Assessment 305(b) Technical Appendix. Standards and Monitoring Section, Bureau of Surface Water Management, Division of Water Management, Florida Department of Environmental Regulation, Tallahassee, FL.

APPENDIX TABLE 1

Regular Sampling Station List

February, 2012

Sta.#	Code	Description and Synonyms
105	FACNE	Gator Slough at Garden Blvd. Bridge, north of NE 43 rd Lane
110	FAWNE	Gator Slough above Weir 19 at Andalusia, drains headlands of NE Cape Coral.
120	SACNW	North Spreader at junction with Laguna Lake N of Kismet. Drains NW corner of Cape. = MNS4.
129	FAWNW	Gator Slough above Weir 11 at Burnt Store Rd.. Drains mid section of slough.
130	SAWNW	Gator Slough below Weir 11 at Burnt Store Rd.. Drains mid section of slough. =MNGS.
150	SICNW	North Spreader W of Old Burnt Store Rd., N of NW 16 th Terr. jct. with Gator Slough and Wray Canal =MNS6.
160	FAWNW	Horseshoe Canal at Burnt Store Rd. N of Diplomat above Weir 13.
190	FAWNW	Hermosa Canal above Weir 14, Burnt Store Rd. at NW 9 th St.
210	FACNE	Head of Meade Canal at Cleveland Canal, S of 6 th St., E of 19 th Ct. =RM3.
242	SARNE	Caloosahatchee River, NW of Caloosahatchee Bridge and McGregor Blvd. intersection
243	FACNE	Greene Canal at Hancock Bridge between NE 12 th Ct and NE 13 th Ave; N side of Bridge.
262	FALSE	Lake Manitoba center, 4 th St and 18 th Ave. = RMLM.
271	SACSW	North Spreader W of Old Burnt Store Rd., N side of Ceitus Boat Lift site.
275	FACSE	Rachel Canal at Dual Water Pumphouse 8, West of Caloosa Middle School.
280	FACSE	Lake Saratoga outlet at SE 1 st PI between SE 5 th St and SE 6 th St. =BF9.
290	FALSW	Lake Kennedy, center. =BL2 =SC8.
295	FACSE	Mackinac Canal at n side of SE 9 th St bridge between SE 8 th PI and St. Jock Blvd.
300	FACSE	Meade Canal above Weir 3, Viscaya Pkwy. between SE 20 th Ct. and SE 21 st Ave. =BF7.
310	FACSE	Nicholas Canal, center of wide area between SE 3 rd Ave and SE 4 th Ave. =SC7.
315	SACSE	Industrial Park; jct. Rubicon & Honolulu Canals, SE 12 th Terr at SE 13 th AVE = BT1=RM6.
350	SARSW	Caloosahatchee River, East of Chantry Canal, at marker DBN-R8. =CR4.
355	FACSW	Dual Water Pumphouse on Escapade Canal, 20 th St SW.
390	FAWSE	San Carlos Canal (or Retunda Canal N) above Weir 1. =SC6 =BF3.
400	SACSE	Lido Canal at Del Prado Bridge, S of Shelby Pky.
430	SACSE	San Carlos Basin, SE 1 st Ave at 34 th Terr. =SC4.

435	SACSW	Shaughnessey Canal, Chiquita Boulevard at SW 28 th Ter., SW.
442	SACSW	Perch Canal, Savona Parkway at SW 17 th Pl.
445	SICSW	Maxine Canal at Surfside Blvd. Bridge near SW 28 th Ave.
450	SICSW	South Spreader, jct with SW 37 th Terr. =SP-5.
455	SICSW	Rose Canal at Oasis Blvd. Bridge near SW 41 st ST.
470	SACSE	Plato Canal, just W of Del Prado, S of 40 th St. =RM9.
510	SACSE	Rubicon Canal, south end, between 5 th Ave. and 6 th Ave at 47 th St. =RM8.
511	SACSE	Bimini Basin Beach, Tarpon Ct, SW of Cape Coral Pkwy.
540	SACSE	Bimini Canal jct. with San Carlos Canal; ca. 53 rd Terr. near Sarasota Ct. =SC1 =BL3.
550	SACSW	South Spreader, SW corner, W end of El Dorado Pky. =SP4.
570	SICSW	South Spreader at bend at Sagamore Pl. =SP3.
580	SICSW	South Spreader at bend W of Peelinore Ct. =SP2.
590	SACSW	South Spreader, W of Boat Lock. =SP1.
600	SACSW	Casaba Canal jct. with its Southernmost branch along 58 th Ln. =FB1.

DESCRIPTION CODES FOR SAMPLING SITES

DIGIT	SYMBOL	DESCRIPTION
1	F	FRESHWATER
"	S	SALTWATER; SALINITY >0.1 PPT
2	A	ALL ROUTINE PARAMETERS MEASURED
"	I	INSTRUMENT MEASUREMENTS ONLY MEASURED
"	E	EXCEPTIONAL - NOT A ROUTINE SAMPLING STATION
3	W	WEIR
"	C	CANAL
"	L	LAKE
"	R	RIVER
"	M	MISCELLANEOUS OTHER (e.g. wetland, marsh, swamp etc.)
4&5	NW	NW OF EMBERS-HANCOCK, SANTA BARBARA-JUANITA LINES
"	NE	NE OF EMBERS-HANCOCK, SANTA BARBARA LINES
"	SW	SW OF EMBERS-HANCOCK, SANTA BARBARA LINES
"		SE SE OF EMBERS-HANCOCK,
		SANTA BARBARA