

CAPE CORAL
WATER QUALITY
MONITORING SUMMARY
WY '09

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ENVIRONMENTAL RESOURCES SECTION
PUBLIC WORKS DEPARTMENT
CITY OF CAPE CORAL

CAPE CORAL MONITORING SUMMARY
WY '09

EXECUTIVE SUMMARY

This summary is based on the eighteenth year of water quality data (WY-09) in the Environmental Resources Section's water quality monitoring program. Overall water quality in the city improved slightly during this sampling period as compared to the previous year. By comparison with state indices, water quality is 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, pH, chlorophyll a, total nitrogen and total suspended solids. 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 '09

INTRODUCTION

The Environmental Resources Section (ERS) 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, 2008 - September 30, 2009 (Water Year 2009). Figure 1. shows the locations of the main regular sampling stations for which monthly sampling have 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 ERS 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 ERS 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, 2008 through September 30, 2009. For clarity in interpretation, data were separated into freshwater and saltwater.

pH numbers made up 32% of the Class II water quality standards outliers. Dissolved oxygen numbers made up 23% and chlorophyll a made up 14% (Table 3).

Stations 120 and 310 had violations in eight areas. Stations 130, 190, 290, 390 and 510 all had violations in seven areas. The majority of these violations occurred in pH and dissolved oxygen. Stations 120, 130 and 190 are located in the northwestern part of the city, which takes stormwater runoff from outlying areas, including several trailer parks. Stations 310, 290 and 390 are in freshwater areas that have been subject to algae blooms. Station 510 is located at a bottleneck downstream of several condominiums and high density residential.

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 39. According to this index, Cape Coral water quality is good. (The state range for "good" is 0 to 49; fair is 50-59; poor is 60-100). Overall water quality has remained at about the same level as in previous years. (Table 4).

CITY OF CAPE CORAL Water Quality Sampling Stations

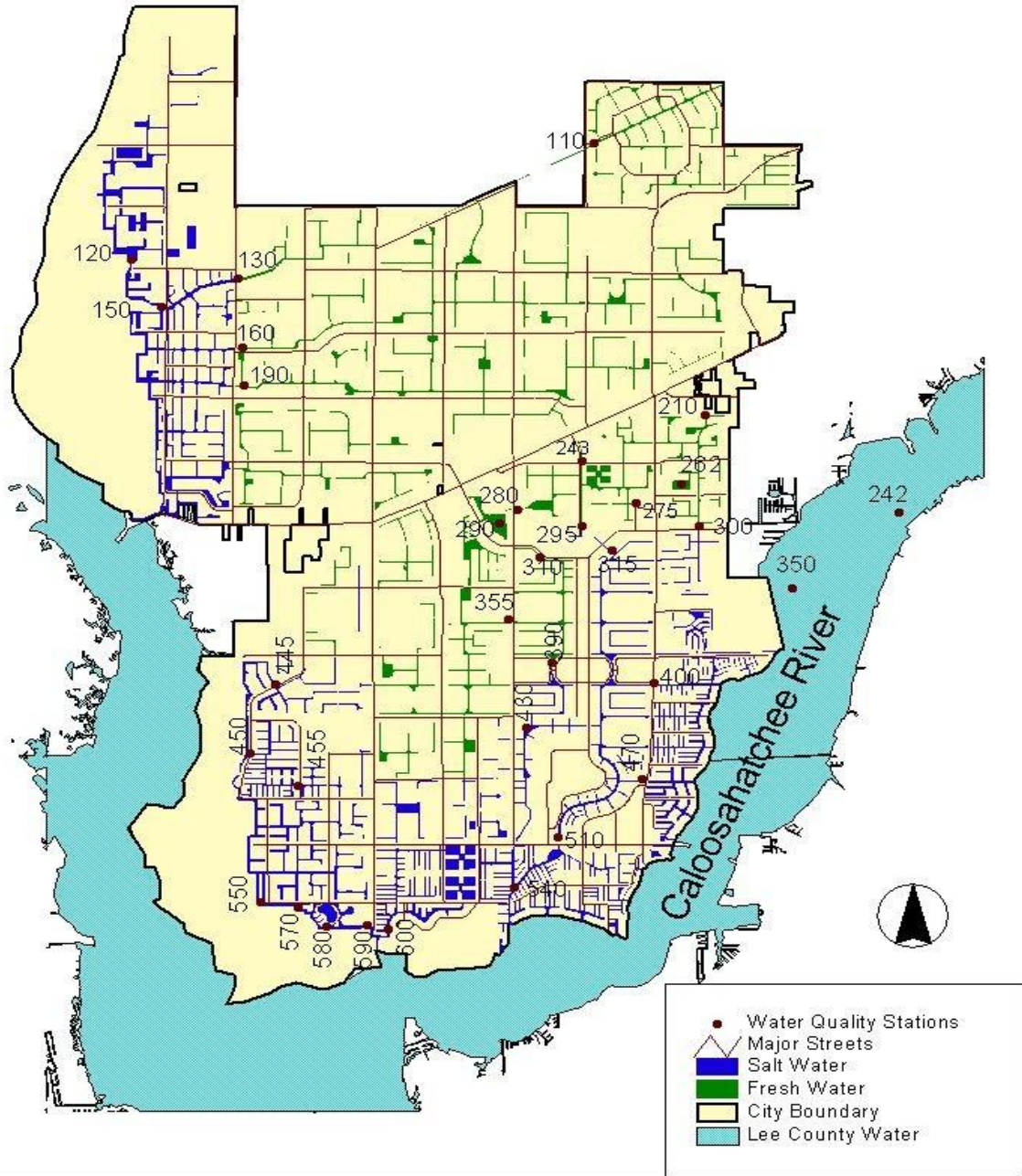


TABLE 1. MONITORING FACTORS

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 '2009

FACTOR	UNITS	MEAN	STD. DEV.	MIN.	MAX.	#
TEMPERATURE	DEG. C	25.16	4.95	15.24	31.88	490
DISSOLVED O2	MG/L	6.87	3.92	0.45	60.05	490
pH	STD. UNITS	8.22	0.31	7.51	9.15	490
CONDUCT.	MS/CM	0.617	0.116	0.306	0.872	490
TURBIDITY	NTU	3.52	3.92	0.01	24.25	399
SECCHI DEPTH	M	1.17	0.57	0.15	3.10	175
NITRATE N	MG/L	0.035	0.032	0.025	0.430	399
NITRITE N	MG/L	0.025	0.000	0.025	0.025	399
AMMONIA N	MG/L	0.059	0.037	0.000	0.300	399
KJEHDAHL N	MG/L	0.782	0.485	0.050	4.200	399
ORGANIC N	MG/L	0.723	0.482	0.000	4.000	399
TOTAL N	MG/L	0.797	0.483	0.050	4.200	399
TDS	MG/L	365.73	105.33	209.0	1233.0	399
TSS	MG/L	7.15	6.71	0.0	45.0	399
TOTAL P	MG/L	0.031	0.019	0.025	0.190	399
FECAL STREP	CFU'S/100 ML	16.3	28.8	1	240	172
FECAL COLIFORMS	CFU'S/100 ML	122.5	233.4	1	888	172
CHL A	uG/L	7.23	6.78	0.5	33.5	171
5 DAY BOD	MG/L	1.65	0.94	1.2	6.7	399

TABLE 2B: SALTWATER MONITORING DATA SUMMARY
 WY '2009

FACTOR	UNITS	MEAN	STD.DEV.	MIN.	MAX.	#
TEMPERATURE	DEG. C	25.35	5.14	14.32	34.51	553
DISSOLVED O2	MG/L	5.97	1.94	0.30	10.24	553
pH	STD. UNITS	8.25	0.24	7.39	8.72	553
CONDUCT.	MS/CM	19.324	13.119	0.462	51.900	553
TURBIDITY	NTU	3.05	3.47	0.01	28.87	338
SECCHI DEPTH	M	1.17	0.43	0.20	2.40	195
NITRATE N	MG/L	0.038	0.036	0.025	0.320	338
NITRITE N	MG/L	0.025	0.000	0.025	0.025	338
AMMONIA N	MG/L	0.087	0.108	0.050	1.000	338
KJELDAHL N	MG/L	0.719	0.398	0.050	2.100	338
ORGANIC N	MG/L	0.632	0.393	0.000	2.050	338
TOTAL N	MG/L	0.736	0.401	0.050	2.100	338
TDS	MG/L	12705.07	8539.91	236.0	33660.0	338
TSS	MG/L	8.68	8.49	0.5	85.0	338
TOTAL P	MG/L	0.060	0.046	0.010	0.320	338
FECAL STREP	CFU'S/100 ML	15.5	78.9	1	888	130
FECAL COLIFORMS	CFU'S/100 ML	89.0	219.1	1	888	130
CHL A	uG/L	6.87	5.58	0.5	31.9	127
5 DAY BOD	MG/L	1.53	0.92	1.0	8.2	338

TABLE 3. DEVIATIONS FROM STATE STANDARDS
 WY '2009

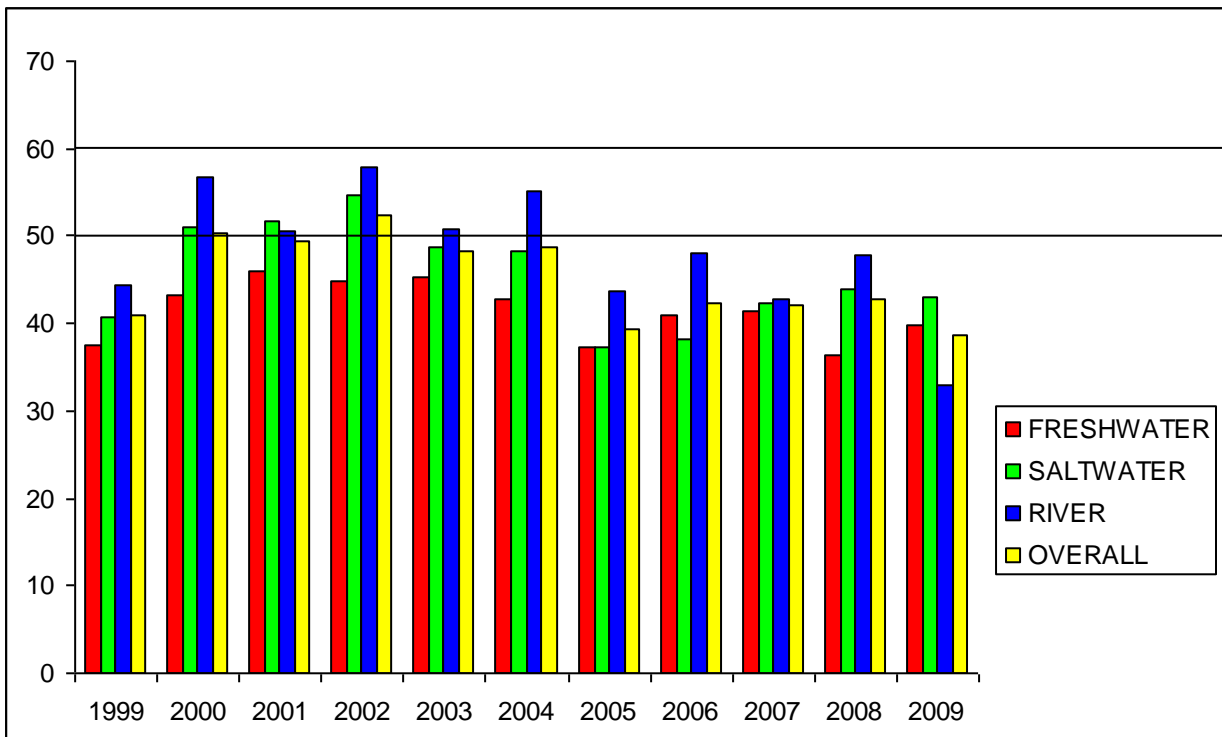
AT FRESHWATER STATIONS			AT SALTWATER STATIONS	
FACTORS	FREQUENCY	STATIONS	FREQUENCY	STATIONS
TURBIDITY	6	129,310,390	5	120,130,350 430
TSS	30	110,129,160, 190,290,295, 300,310,390	27	120,130,242, 271,315,350, 400,430,510, 540,550,600
BOD	22	262,310,355, 390	23	120,130,271, 510,550,590 600
TN	7	160,190,290, 295,300	3	120,130
STREP	19	160,190,210, 243,262,275, 290,295,300, 310,390	6	315,430,510, 590
COLI	22	105,110,129, 160,190,210, 243,262,275, 290,295,300, 310,390	13	120,130,315, 400,430,470, 510,550,590
DO	67	105,110,129, 160,190,210, 243,262,275, 290,295,300, 310,355	73	120,130,150, 242,271,350, 430,445,450, 455,470,510, 540,570,580, 590,600
CHL A	44	105,110,129, 190,210,262, 280,290,295, 300,310,355, 390	37	120,130,242, 271,315,350, 400,430,470 510,540,550

pH	88	129,160,190, 210,262,275, 280,290,295, 300,310,355, 390	105	120,150,242 350,400,445, 450,455,470, 510,540,550, 570,580,590, 600
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TABLE 4. WATER QUALITY INDICES FOR CAPE CORAL
WY '2009

SYSTEM TYPE	INDEX VALUE
FRESHWATER	39.87
SALTWATER	43.04
RIVER	32.92
OVERALL	38.61

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



SUMMARY AND CONCLUSIONS

ERS continued to monitor 22 water quality factors at 33 locations in the vicinity of Cape Coral during Water Year 2009. Based on these observations and comparisons with Florida water quality indices, the overall water quality of Cape Coral sampling stations was good, and in comparison to previous years had remained about 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
DECEMBER 1998**

STATION NUMBER	CODE	DESCRIPTION AND SYNONYMS
110	FAWNE	Gator Slough above Weir 19 at Andalusia - drains headlands of NE Cape Coral.
120	FICNW	North Spreader at junction with Laguna Lake N of Kismet. Drains NW corner of Cape. = MNS4.
130	FAWNW	Gator Slough above Weir 11 at Burnt Store Rd. Drains mid section of slough. =MNGS.
150	FICNW	North Spreader W of Old Burnt Store Rd., N of NW 16th 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 9th St.
210	FACNE	Head of Meade Canal at Cleveland Canal, S of 6th St., E of 19th Ct. =RM3.
242	SARNE	Caloosahatchee River off Ft. Myers at Centennial Park east of bridge.
243	FACNE	Greene Canal at Hancock Bridge between SE 12th Ct and SE 13th Av; NE side of Bridge.
262	FALSE	Lake Manitoba center, 4th St and 18th Ave. = RMLM.
275	FACSE	Rachel Canal at Dual Water Pumphouse 8, SE 6th St and SE 13th Ave.
280	FACSE	Lake Saratoga outlet at SE First PL between SE 5th St and SE 6th St. =BF9.
290	FALSW	Lake Kennedy, center. =BL2 =SC8.
295	FACSE	Mackinac Canal at n side of SE 9th St bridge between SE 8th PL and St. Jock Blvd.
300	FACSE	Meade Canal above Weir 3, Viscaya Pky between SE 20th Ct. and SE 21st Ave. =BF7.
310	FACSE	Nicholas Canal, center of wide area between SE 3rd Ave and SE 4th Ave. =SC7.
315	SACSE	Industrial Park; jct. Rubicon & Honolulu Canals, SE 12th Terr at SE 13th AVE = BT1=RM6.
350	SARSW	Caloosahatchee River, 1/2 mile due E of Chantry Canal. =CR4.
355	FACSW	Dual Water Pumphouse on Escapade Canal, 20th 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 First Ave at 34th Terr. =SC4.
445	SICSW	Maxine Canal at Surfside Blvd. Bridge near SW 28 th Ave.
450	SICSW	South Spreader, bridge at Hernando Canal, S of 36th Terr. =SP5.
455	SICSW	Rose Canal at Oasis Blvd. Bridge near SW 41 st St.
470	SACSE	Plato Canal, just W of Del Prado, S of 40th St. =RM9.
510	SACSE	Rubicon Canal, south end, between 5th Ave. and 6th Ave at 47th St. =RM8.
540	SACSE	Bimini Canal jct. with San Carlos Canal; ca. 53rd 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 58th Ln. =FB1.

DESCRIPTION CODES FOR SAMPLING SITES

DIGIT SYMBOL	DESCRIPTION
1 F	FRESHWATER
" S	SALTWATER; SALINITY >0.1 PPT
" W	WWEIR
" C	CANAL
" L	LAKE
" R	RIVER
" M	MISCELLANEOUS OTHER (e.g. wetland, marsh, swamp etc.)
2 A	ALL ROUTINE PARAMETERS MEASURED
" I	INSTRUMENT MEASUREMENTS ONLY MEASURED ROUTINELY
" E	EXCEPTIONAL - NOT A ROUTINE SAMPLING STATION
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 LINES