

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

SUMMARY OF DATA COLLECTED FOR THE MIAMI
RIVER RESTORATION PROJECT DURING MARCH AND SEPTEMBER, 1971

By

F.W. Meyer and E.T. Wimberly

OPEN-FILE REPORT

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South Florida Water
Management District
REFERENCE CENTER

Prepared by
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CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT,
DADE COUNTY, WATER CONTROL DIVISION
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INTRODUCTION

The U.S. Geological Survey in cooperation with the Florida Department of Natural Resources, the Central and Southern Florida Flood Control District, Dade County, and the city of Miami Department of Water and Sewers made water-quality surveys of the Miami River-Canal during March and September 1971 to provide data on the condition of the water course, which could be used as a base for pollution-control efforts.

Water and sediment from the Miami River-Canal was sampled intensively on March 9 and 10, 1971, at 11 stations (see table 1) along the reach from Biscayne Bay to Levee 30 (see location on figure 1); and a less intensive sampling was made on September 22, 1971. Analyses of water samples, including physical characteristics, principal dissolved inorganic ions, nutrients, dissolved carbon, and bacteria, are presented in table 2. Pesticide analyses of water and bottom sediment samples are presented in table 3. The drainage patterns during the dry and wet periods are shown in figures 1 and 2, respectively. The two samplings showed that seasonal variations in water quality occur in the Miami River-Canal; therefore, the results of the two samplings can be used only as an indication of the conditions in the River-Canal at the time of sampling.

Table 1
near
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Fig. 1
near
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Tables 2
and 3
near here

Fig. 2
near
here

Table 1.--Sampling stations in Miami River-Miami Canal area.

<u>Station No.</u>	<u>USGS ID. No.</u>	<u>Station Name</u>
1	2-2873.95	Miami Canal E. of L-30, nr. Miami, Fla.
2	2-2875	Miami Canal at Pennsuco, Fla.
3	2-2882	Miami Canal at Palmetto by-pass, nr. Hialeah, Fla.
4	25°47'38"N 80°17'18"W	Miami Canal at City of Miami's Hialeah water plant, Hialeah, Fla.
5	25°49'18"N 80°17'01"W	Southside Canal, at Footbridge, Miami Springs, Fla.
6	25°49'40"N 80°17'20"W	Well G1282 nr. Miami Springs, Fla.
7	2-2886	Miami Canal at NW 36th Street, above control, Miami, Fla.
8	2-2886	Miami Canal at NW 36th Street below control, Miami, Fla.
9	2-2905.1	Miami River at NW 27th Ave., Miami, Fla.
10	25°46'56"N 80°12'54"W	Miami River at NW 12th Avenue, Miami, Fla.
11	2-2905.3	Miami River at Brickell Avenue, Miami, Fla.

DRY-PERIOD SAMPLING, MARCH 9-10, 1971

During the seasonal dry period, samples of water and bottom sediment were collected in the Miami River-Canal from all stations from Levee 30 to Biscayne Bay. The water in the Canal from Levee 30 (station 1) to the upstream side of the 36th Street control (station 7) was fresh, and chloride content ranged from 64 mg/l at the Palmetto Expressway (station 3) to 46 mg/l above the control (station 7). Canal flow at Levee 30 (station 1) and at the Palmetto Expressway (station 3) was about 130 cfs. Flow at the 36th Street control (station 7) was only about 30 cfs because the control was closed but leaking. The 100 cfs loss between stations 3 and 7 was due chiefly to infiltration to the drawdown cones of the city of Miami's well fields in Hialeah and Miami Springs. Flow in the river from the downstream side of the 36th Street control (station 8) to Biscayne Bay (station 11) was tidal. The river water ranged from brackish at 36th Street (station 8) to sea water at Biscayne Bay (station 11). Normally, the 36th Street control is closed during the dry season to reduce fresh-water losses and to maintain high head above the control to protect the well fields in Hialeah and Miami Springs from salt-water intrusion.

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The quality of the water in the Miami Canal above the 36th Street control (station 7) is acceptable for public surface-water supplies, according to Federal Water Quality Criteria (1968) except for a few constituents. Dissolved oxygen content at stations 1, 3 and 6 was below the recommended minimum limit (3 mg/l). Iron content was slightly higher than the recommended maximum limit (0.3 mg/l). Arsenic content at stations 3 through 5 was slightly under the recommended maximum limit (0.05 mg/l). Traces of Silvex were found in water samples from the Southside Canal tributary (station 5) and from a 50-foot well (station 6) on the west bank of the Miami Canal in Miami Springs. Chlorinated hydrocarbon pesticides were found in most of the bottom sediment samples. Unfortunately, the presence of polychlorinated biphenyls (PCB's) interfered with the separation and identification of some pesticides in sediments at five stations (PCB's are chlorinated hydrocarbons, similar to DDT, and are extremely persistent). Confirmation by additional analysis was beyond the monetary constraints on the project; however, problem areas were identified. PCB concentrations were highest in bottom sediments near the Hialeah Water Plant (station 4), suggesting a source of PCB's between stations 3 and 4. DDD and DDE, which are metabolites of DDT, were found in sediments at stations 2, 3 and 5.

Coliform bacteria were found in all canal-water samples, but none were found in the ground-water sample from the 50-foot well in Miami Springs (station 6). Coliforms in the fresh-water reach above the 36th Street control were generally below the 1968 Federal Water Quality Criteria's recommended limit for PCR (primary contact recreation--swimming, wading, etc.). Coliforms at Southside Canal (station 5) and at Miami Canal above the control (station 7) were above the limit for PCR (200 fecal colonies/100 ml, or about 2,500 total colonies/100 ml). Coliforms in the tidal reach from the control (station 8) to the NW 27th Ave. bridge (station 9) were generally above the recommended PCR limits. Coliforms in the tidal reach from NW 12th Street (station 10) to Biscayne Bay (station 11) were below the recommended PCR limit.

Organic carbon and organic nitrogen (table 4) were highest in bottom sediment at Southside Canal (station 5), Miami Canal at Seaboard RR bridge (station 8A), Miami River at 12th Avenue bridge (station 10), and at the Miami River at Dupont Plaza (station 11A).

Table 4
near
here

Table 4.--Analyses of core samples from Miami River - Canal area.

<u>Sampling Site No.</u>	<u>Depth Interval (inch)</u>	<u>Total Carbon (percent)</u>	<u>Inorganic Carbon (percent)</u>	<u>Organic Carbon (percent)</u>	<u>Organic Nitrogen (percent)</u>
3	0- 2	3.4	1.2	2.2	0.14
4	0- 1.5	6.9	3.0	3.9	0.22
4A	0- 2	1.3	1.0	0.3	0.04
5	0- 2	14.4	6.5	7.9	0.30
5	7- 9	10.7	8.2	2.5	0.24
8A	0- 2	15.2	6.8	8.4	0.55
9A	0- 2	7.0	4.8	2.2	0.13
9B	0- 2	5.0	3.2	1.8	0.12
10	0- 2	9.5	4.5	5.0	0.24
11A	0- 2	13.8	8.2	5.6	0.42
11A	6- 8	14.0	7.8	6.2	0.41
11A	14- 16	14.9	7.2	7.7	0.50

WET-PERIOD SAMPLING, SEPTEMBER 22, 1971

Analyses of water samples collected September 22 were limited to a few parameters, such as dissolved oxygen, pH, alkalinity, conductivity and coliforms. The 36th Street control (station 7) was open, and the flow was about 360 cfs. The Miami Canal-Miami River estuary was fresh from Levee 30 (station 1) to the 12th Street bridge (station 10). Concentrations of dissolved materials were generally lower in September than in March. Also, dissolved oxygen was below recommended minimum limits at most of the stations. Coliform concentrations were higher at most stations in September due to high inflow to the Miami Canal-River from storm drains, secondary canals, and bank runoff. Coliforms were generally above the recommended limit for PCR at all stations except stations 1 and 2.

Water from the Miami Canal near the Hialeah Water Plant (station 4) was sampled September 17 for physical characteristics, principal dissolved inorganic ions, some nutrients, pesticides, and PCB's. Samples of the bottom sediment, an aquatic plant (Elodea), snails, and a sunfish were collected for analyses of pesticides and PCB's. Only small amounts of silvex, parathion, and 2,4-D were detected in the canal water. Concentrations of DDE and PCB were highest in the sediment and in the sunfish. PCB concentration in the sunfish was about 0.4-ppm (400 micrograms per kilogram), which is below the Food and Drug Administration's recommended limit of 5.0 ppm in fish and poultry.

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DESCRIPTIONS OF BOTTOM SEDIMENT

Samples of bottom sediment were obtained with an Ekman Dredge and a piston core-sampler in March and April 1971. Generally, the bottom of the river from Biscayne Bay to the 36th Street control was hard, and only small amounts of soft silt and fine-grained sand overlies a hard rock bottom. The maximum thickness of soft bottom sediment was found near the Dupont Plaza (station 1), where a 20-inch core was obtained. Generally, the bottom sediment was less than 6 inches thick and was composed chiefly of calcite. Organic sludgelike material was found chiefly in the reach between the control (station 7) and the NW 27th Ave. bridge (station 9). // downst
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Generally, the bottom of the Miami Canal from the 36th Street control to Levee 30 was hard and rocky. The maximum thickness of soft sediment was found near the Palmetto Expressway (station 3), where a 6-inch core was obtained. Thick beds of aquatic weeds (Elodea) were found in the reach from Pennsuco (station 2) to the 36th Street control (station 7). ? meaning what
- alive or dead?

Carbon and nitrogen content in samples from nine stations are presented in table 4. Pesticide and PCB content in samples from eight stations are presented in table 3.

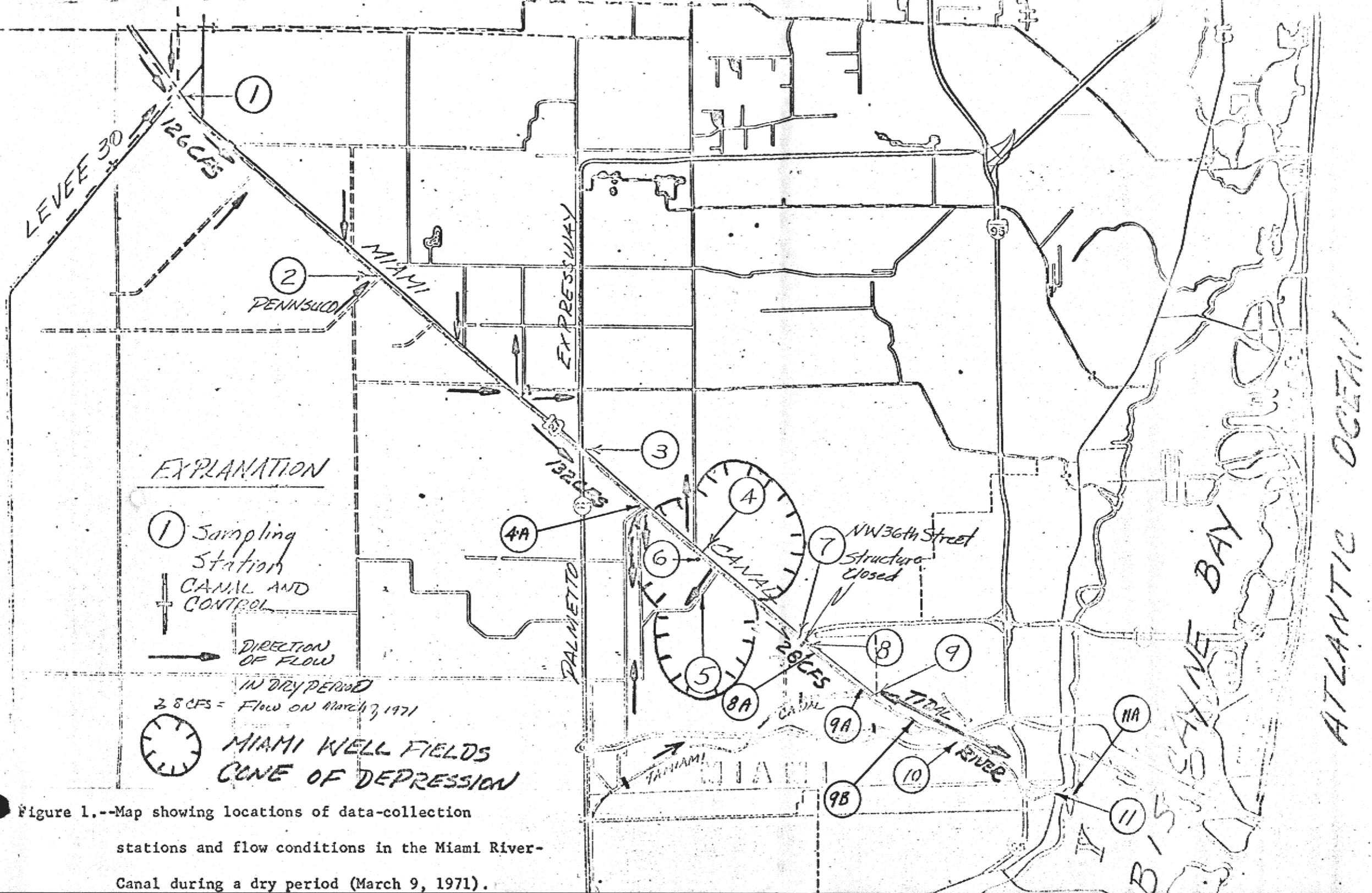


Figure 1.--Map showing locations of data-collection stations and flow conditions in the Miami River-Canal during a dry period (March 9, 1971).

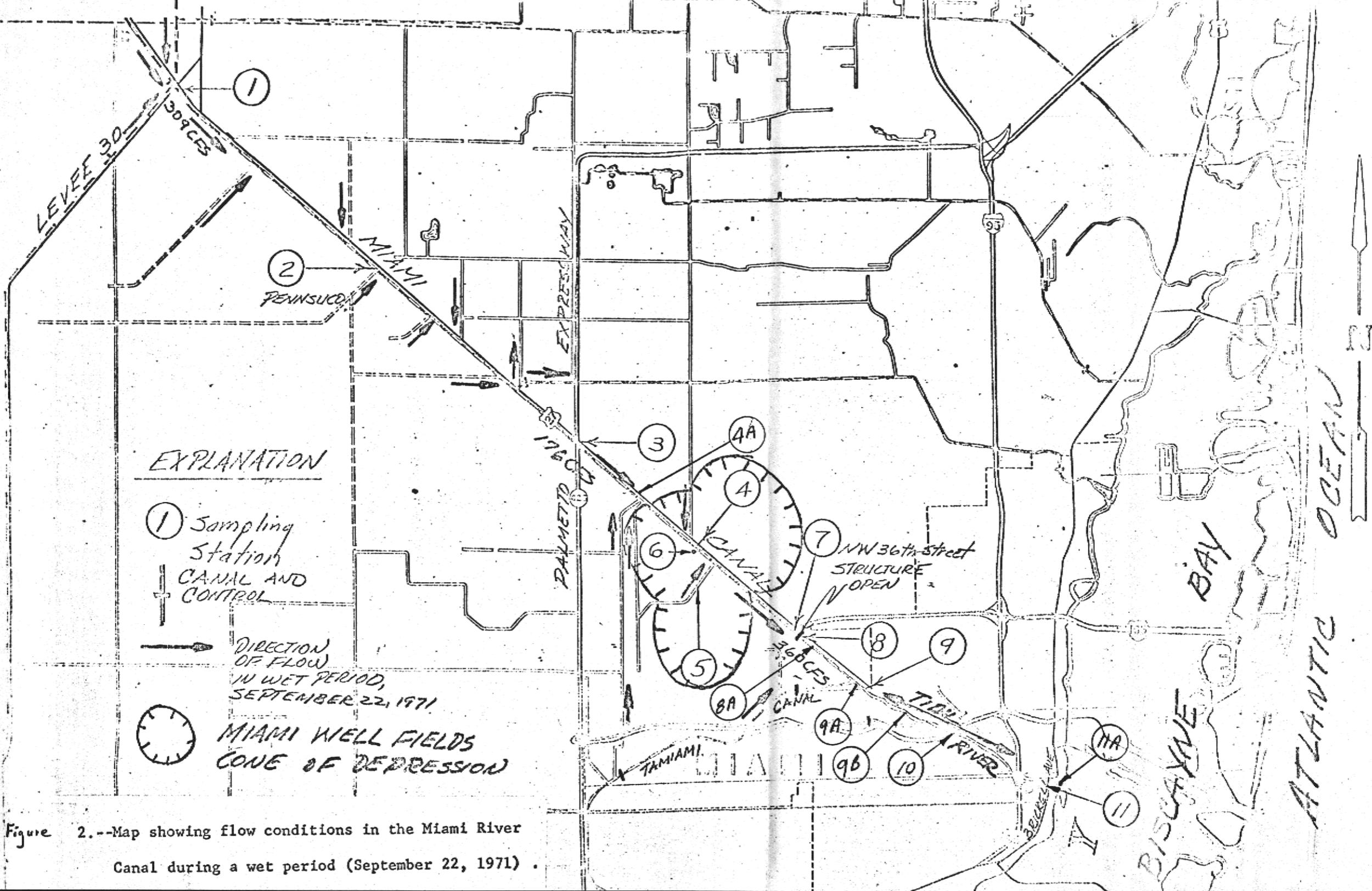


Figure 2.--Map showing flow conditions in the Miami River Canal during a wet period (September 22, 1971).

Table 3.--Analyses of pesticides and PCB's in water, sediment, and selected biota samples in the Miami River-Canal area. Values for water samples in micrograms per liter (ug/l). Values for sediment and biota samples in micrograms per kilogram (ug/kg).

Sampling Station No.	Date and Time of Collection	Type of Sample	ALDRIN	DDD	DDE	DDT	DELDRIN	ENDRIN	HEPTACHLOR	LINDANE	2, 4-D	2, 4, 5, -T	SILVEX	METHYL PARATHION	MALATHION	PARATHION	DIAZINON	ETHION	TRITHION	CHLORDANE	PCB	
1	3/9/71 @ 0910	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		Sediment		0.0	0.0	0.0						0.0	0.0	0.0							0	9
2	3/9/71 @ 1015	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		Sediment	0.0	1.9	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0								
3	3/9/71 @ 1115	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		Sediment	0.0	30	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0								Trace
4	3/9/71 @ 1245	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		Sediment					0.0					0.0	0.0	0.0								3,200
	9/17/71 @ 1130	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0	0
		Sediment	0.0	30	120	6.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0							0	600
		Plant Elodea	0.0	1.4	4.6	2.6	0.3	0.0	0.0	0.0											25	50
		Snails	0.0	0.6	3.0	0.6	0.5	0.0	0.0	0.0											0	50
Sunfish	0.0	18	35	16	4.5	0.0	0.0	0.0											80	400		
5	3/9/71 @ 1345	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Trace	0.00	0.00	0.00	0.00	0.00	0.00			
		Sediment		15	45	0.0	0.0	0.0														Trace
6	3/9/71 @ 1415	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00			
7	3/9/71 @ 1500	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		Sediment		11	11	4.0	0.9					0.0	0.0	0.0							90	1,000
9	3/9/71 @ 1615	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		Sediment		45		0.0	0.0					0.0	0.0	0.0							480	300

