INTERSTATE SANITATION COMMISSION

A TRI-STATE ENVIRONMENTAL AGENCY

1989 SURVEYS
TO
DETERMINE THE FEASIBILITY
OF
SHELLFISH HARVESTING
IN
JAMAICA BAY

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1989 Surveys to Determine the Feasibility of Shellfish Harvesting in Jamaica Bay

Introduction

The Interstate Sanitation Commission conducted intensive water quality surveys in Jamaica Bay during September 1989. The sampling was requested by the New York State Department of Environmental Conservation (NYS DEC) to collect water quality data for fecal and total coliforms for comparison to shellfish criteria developed by the U.S. Food and Drug Administration (U.S. FDA) and to collect water quality samples for a limited number of toxics substances.

Jamaica Bay is bordered by the counties of Kings, Queens, and Nassau in New York. The water quality classification is designated by the Commission as "Class A" -- primary contact recreation and, in designated areas, shellfish harvesting. Jamaica Bay supported a healthy shellfish industry during the 1800's; however, due to municipal and industrial pollution, all beds were closed to commercial and recreational harvesting in 1921. Refuse disposal and landfilling within the Bay waters has also contributed to water quality degradation. Presently, there are no active landfills, but there are seven (7) sewage treatment plants discharging nearly 285 MGD (million gallons per day) of secondary treated wastewater to Jamaica Bay. Poor water quality in Jamaica Bay is compounded by the discharges from 41 combined sewer overflows to the Bay itself.

Sampling Procedures

The study consisted of five (5) sampling trips with a total of 15 stations per trip. A total of 75 samples were taken --

each being analyzed for total and fecal coliforms for a total of 150 analyses. Seven (7) additional samples were collected for the determination of specific toxic parameters. All surveys were conducted using the ISC research vessel, the R/V Natale Colosi. Figure A-1 is a map showing the general area of sampling; the specific sampling station descriptions are given in Table A-1.

The surveys were carefully scheduled to collect the water samples during the worst case conditions -- on the outgoing tide and under wet weather conditions. All samples were taken during ebbing tides and, except for one trip, within 24 hours of a storm event of over 0.25 inches of rain. A tabulation of pertinent climatological and tidal information for the sampling area can be found in Table A-2. The high tide predictions at Sandy Hook, New Jersey and high tide time differences for the sampling area were prepared and published by the United States Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Ocean Service.

Coliform Sampling and Results

The sampling protocol and analysis procedure was in conformance with Section B of the National Shellfish Sanitation Program (NSSP) Operations Manual (1986); a three-tube decimal dilution MPN test, as requested by the NYS DEC, was used. The coliform sampling results are summarized in Table A-3 and the National Shellfish Sanitation Program coliform limitations are given in Table A-4. All fifteen (15) stations sampled throughout Jamaica Bay failed the NSSP coliform requirements for depuration.

Toxics Sampling and Results

On the September 21, 1989 survey, ISC field personnel collected additional samples at seven (7) specific locations -- Sta-

tions 5, 6, 7, 8, 9, 12 and 14 -- for toxics analyses. Previously, the U.S. FDA analyzed tissue samples from clams from the aforementioned stations for specific U.S. EPA Priority Pollutants: arsenic, cadmium, copper, chromium, lead, mercury, nickel, zinc, polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and pesticides. Table A-5 lists all toxic substances analyzed for and their lowest detection limits (LDLs).

At all seven (7) stations, the following were not detected: arsenic, chromium, nickel, PAHs, PCBs and pesticides. All stations showed high concentrations of lead, mercury and zinc. Cadmium was detected at Stations 5, 6 and 14. High concentrations of copper were detected at Stations 7, 8 and 9. Table A-6 contains a summary of the heavy metals concentrations found in the study area.

In comparison to New York State ambient water quality standards (promulgated in 1986) for copper (2.0 ug/l) and lead (8.6 ug/l), concentrations in Jamaica Bay are exceeding the standards by orders of magnitude of 100 and 50 times, respectively. Guidance values for cadmium (2.7 ug/l) and mercury (0.1 ug/l) are exceeded by orders of magnitude as high as 10 and 50 times, respectively. Zinc concentrations exceeded the standard (58 ug/l) at all times by a minimum factor of four. It should be noted that all New York State standards apply to the "acid-soluble" portion as opposed to the "total" metals concentrations measured. However, due to the magnitude of the concentrations measured, it is likely that the water quality standards for the metals detected are being exceeded.

APPENDIX

Figure A-1

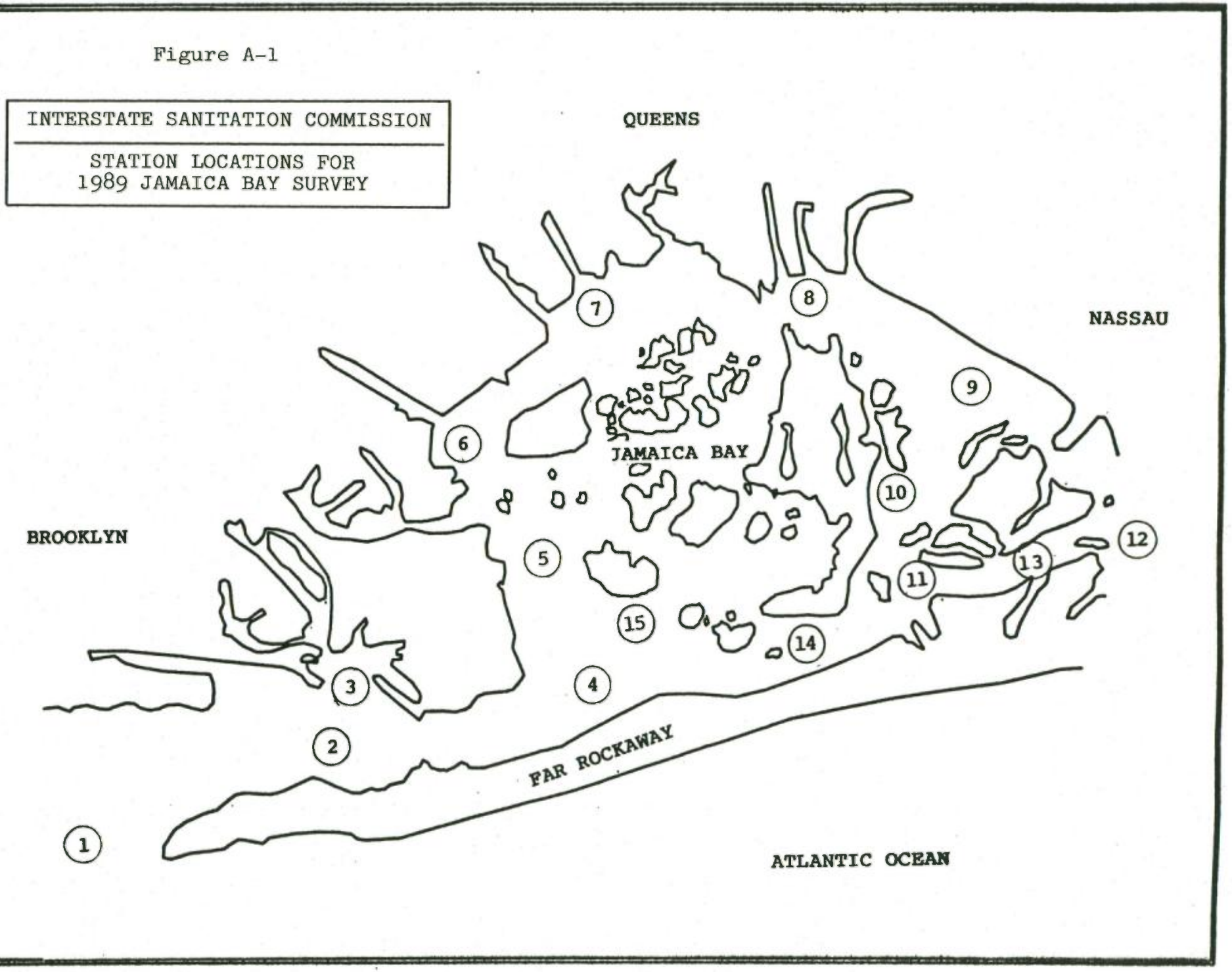
INTERSTATE SANITATION COMMISSION
STATION LOCATIONS FOR
1989 JAMAICA BAY SURVEY
QUEENS
NASSAU
JAMAICA BAY
BROOKLYN
FAR ROCKAWAY
ATLANTIC OCEAN
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Table A-1

Interstate Sanitation Commission
Station Locations for 1989 Jamaica Bay Sampling Survey

STATION NUMBER	LATITUDE (NORTH) D M S	LONGITUDE (WEST) D M S	DESCRIPTION
1	40-33-30.6	73-56-48.6	Rockaway Inlet Gong "9" Fl G 4 sec
2	40-34-21.0	73-53-59.4	Rockaway Inlet R "20" Fl R 6 sec
3	40-34-56.4	73-54-34.8	Gerristen Inlet R "10" Nun
4	40-34-49.2	73-52-16.2	Rockaway Inlet GR "N" IQ
5	40-35-59.4	73-52-35.4	West of Ruffle Bar R "4" Nun
6	40-37-12.0	73-53-35.4	Bergen Beach C "13"
7	40-38-26.4	73-52-05.4	Hendrix Creek C "23"
8	40-38-45.6	73-49-49.8	Howard Beach C "33"
9	40-37-55.8	73-48-00.6	Grassy Bay East of Pier FR 25 ft "C"
10	40-37-12.0	73-48-36.6	Winhole Channel GC "5"
11	40-36-27.0	73-47-25.2	Grass Hassock Channel C "19"
12	40-37-38.4	73-46-00.6	Head of Bay C "27"
13	40-36-51.6	73-46-42.0	Norton Basin R "20" Nun
14	40-35-31.2	73-49-28.8	Beach Channel C "9"
15	40-35-36.6	73-51-10.8	South of Ruffle Bar R "R" Fl 2.5 sec

Table A-2

Interstate Sanitation Commission
Climatological and Tidal Information for
1989 Jamaica Bay Sampling Survey

HIGH TIDE AT SANDY HOOK, NJ AND RAINFALL AT JFK INT. AIRPORT

DATE	HIGH TIDE AT SANDY HOOK, NJ (E.S.T.)	RAINFALL AT JFK INT. AIRPORT PREVIOUS 24 HOURS (INCHES)	RAINFALL AT JFK INT. AIRPORT PREVIOUS 48 HOURS (INCHES)
09/13/89	0640	0.00	Trace
09/15/89	0812	1.19	1.19
09/20/89	1222	1.16	1.17
09/21/89	1320	0.52	1.68
09/27/89	0658	0.80	0.87

TIME DIFFERENCES FOR HIGH TIDE IN SAMPLING AREA vs HIGH TIDE AT SANDY HOOK, NJ

PLACE	POSITION LATITUDE NORTH (DEG-MIN)	POSITION LONGITUDE WEST (DEG-MIN)	TIME DIFFERENCE (MINUTES)
Plumb Beach Channel	40-35	73-55	+02
Barren Island	40-35	73-53	-01
Beach Channel	40-35	73-49	+37
Motts Basin	40-37	73-46	+39
Norton Point	40-38	73-45	+38
JFK Int. Airport	40-37	73-47	+25
Grassy Bay	40-39	73-50	+43
Canarsie	40-38	73-53	+27
Mill Basin	40-37	73-55	+28

Table A-3

Interstate Sanitation Commission
Summary of Coliform Results
for 1989 Jamaica Bay Sampling Survey

STATION NUMBER	FECAL COLIFORMS (MPN/100 ml) MEDIAN	FECAL COLIFORMS (MPN/100 ml) GEOMETRIC MEAN	FECAL COLIFORMS (MPN/100 ml) % OF SAMPLES >300	TOTAL COLIFORMS (MPN/100 ml) MEDIAN	TOTAL COLIFORMS (MPN/100 ml) GEOMETRIC MEAN	TOTAL COLIFORMS (MPN/100 ml) % OF SAMPLES >3300
1	<30	>140	20	230	>320	20
2	2400	1100	80	2400	2000	0
3	430	530	80	2400	1400	0
4	930	490	60	930	1500	20
5	2400	2300	100	>24000	>8600	80
6	>24000	>9200	100	>24000	>13000	80
7	930	>1500	80	2400	>1800	40
8	11000	>8000	100	>24000	>21000	100
9	4600	>4400	100	4600	>4900	60
10	4600	>5300	100	2400	>3900	40
11	2400	1400	80	2400	2200	40
12	>24000	>8600	100	>24000	>9900	80
13	2400	3100	100	11000	4500	60
14	750	760	60	4600	4600	60
15	2400	1300	80	2400	>4300	40

Table A-4

National Shellfish Sanitation Program
Coliform Requirements

Direct Harvesting

One of the following standards shall be met:

The total coliform median or geometric mean MPN of the water does not exceed 70 per 100 ml and not more than 10 percent of the samples exceed an MPN of 230 per 100 ml for a 5-tube decimal dilution test (or an MPN of 330 per 100 ml for a 3-tube decimal dilution test).

OR

The fecal coliform median or geometric mean MPN of the water does not exceed 14 per 100 ml and not more than 10 percent of the samples exceed an MPN of 43 per 100 ml for a 5-tube decimal dilution test (or an MPN of 49 per 100 ml for a 3-tube decimal dilution test).

Depuration

One of the following standards shall be met:

The total coliform median or geometric mean MPN of the water does not exceed 700 per 100 ml and not more than 10 percent of the samples exceed an MPN of 2,300 per 100 ml for a 5-tube decimal dilution test (or an MPN of 3,300 per 100 ml for a 3-tube decimal dilution test).

OR

The fecal coliform median or geometric mean MPN of the water does not exceed 88 per 100 ml and not more than 10 percent of the samples exceed an MPN of 260 per 100 ml for a 5-tube decimal dilution test (or an MPN of 300 per 100 ml for a 3-tube decimal dilution test).

Table A-5

Interstate Sanitation Commission
Summary of Toxics Analyzed for 1989 Jamaica Bay Sampling Survey

PARAMETER	LDL*	PARAMETER	LDL*
Aldrin	0.05	Arsenic	5.0
Alpha-BHC	0.05	Cadmium	0.5
Beta-BHC	0.05	Chromium	1.0
Gama-BHC	0.05	Copper	1.0
Delta-BHC	0.05	Lead	5.0
Clordane	0.10	Mercury	0.2
4,4-DDT	0.05	Nickel	1.0
4,4-DDE	0.05	Zinc	5.0
4,4-DDD	0.05	Indeno-(1,2,3)-C,U)-Pyrene	3.0
Dieldrin	0.02	Naphthalene	2.0
Endosulfan 1	0.05	Phenanthene	2.0
Endosulfan II	0.05	Pyrene	2.0
Endosulfan sulfate	0.05	Acenapthene	2.0
Acenapthylene	3.0	Anthracene	2.0
Benzo (A) Antracene	5.0	Benzo (A) Pyrene	3.0
Benzo (B) Fluoranthene	5.0	Benzo-(G,H,I)-Perlyene	3.0
Benzo (K) Fluranthene	5.0	Chrysene	3.0
Dibenzo-(A,H)-Anthracene	3.0	Fluoranthene	2.0
Endrin	0.05	Fluorene	2.0
Endrin aldehyde	0.10		
Heptachlor	0.05		
Heptachlor epoxide	0.05		
Toxaphene	1.00		
PCB-1016	0.30		
PCB-1221	0.30		
PCB-1232	0.30		
PCB-1242	0.30		
PCB-1248	0.30		
PCB-1254	0.30		
PCB-1260	0.30		

* Lowest detection limit measured in ug/l

Table A-6

Interstate Sanitation Commission
Summary of Heavy Metals Concentrations
for 1989 Jamaica Bay Sampling Survey

STATION	SAMPLE DEPTH* (FEET)	HEAVY METALS CONCENTRATIONS**				
		CADMIUM	COPPER	LEAD	MERCURY	ZINC
5	27	19	<1	511	4.72	233
6	43	7	<1	484	4.0	252
7	37	<0.5	258	450	3.62	366
8	17	<0.5	257	453	2.56	279
9	23	<0.5	234	409	2.76	305
12	23	<0.5	<1	452	2.5	322
14	29	29	<1	470	5	294

* Sample depth is one foot above the bottom
** Concentrations are for "total" metals in ug/l