

1971 RARITAN BAY AND SANDY HOOK BAY SURVEY

jointly conducted by the

INTERSTATE SANITATION COMMISSION

and the

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

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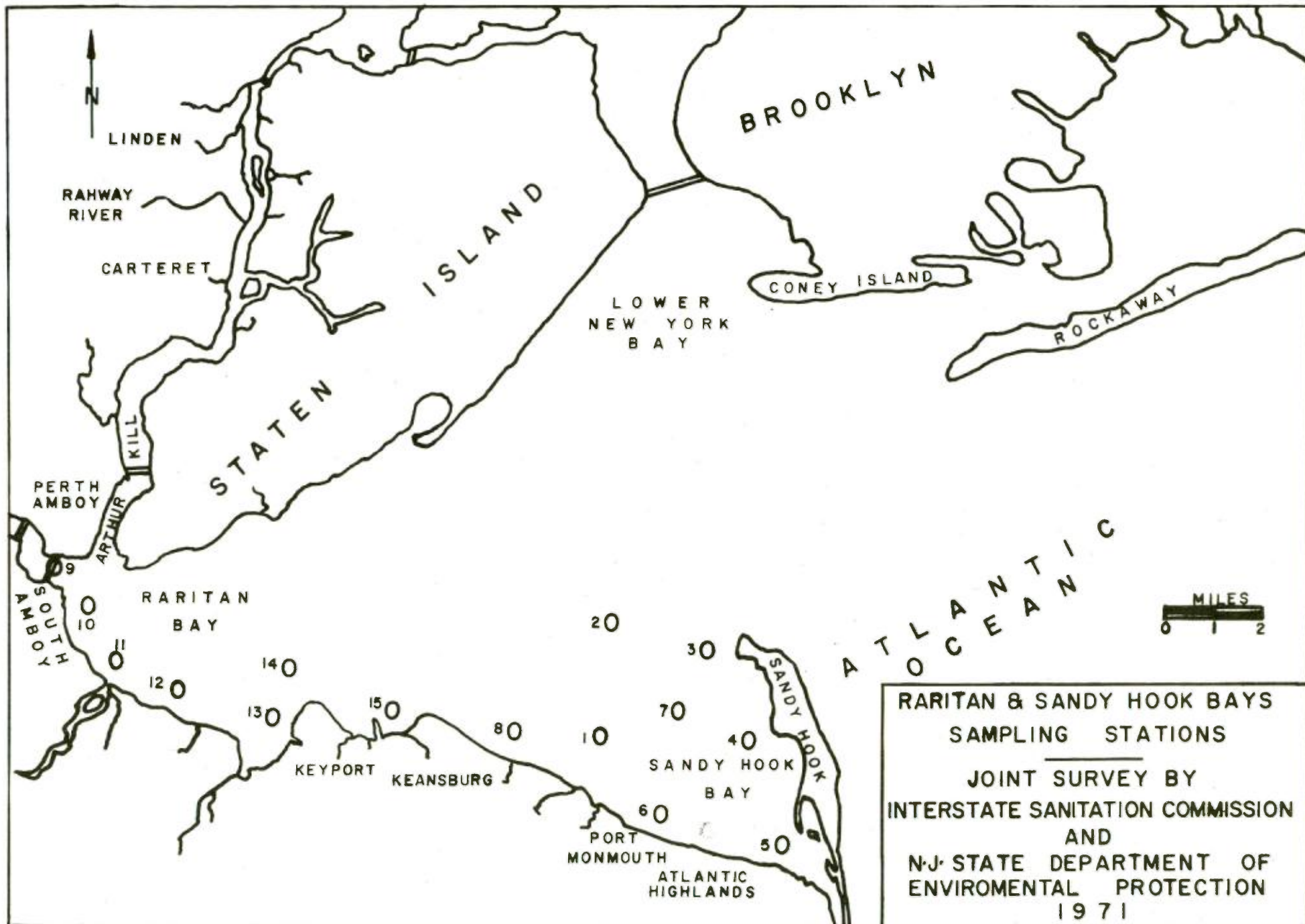
INTRODUCTION

A joint water quality survey was conducted by the Interstate Sanitation Commission and the New Jersey State Department of Environmental Protection in Raritan Bay and Sandy Hook Bay during the summer of 1971. Raritan Bay and Sandy Hook Bay are bounded by New Jersey, Staten Island, and Lower New York Bay. These waters are used for boating and recreational purposes, fishing and shellfish harvesting, as well as navigational purposes for ships and barges travelling up the Arthur Kill and the Raritan River. This survey was conducted to determine the present condition of the waters prior to construction of regional abatement facilities and to establish a baseline for future studies.

PROCEDURE

Fifteen sampling stations were selected for the survey. The stations are shown on the survey map on the following page and a description of each station is given at the end of this report.

Two boats were used to collect samples on eight days between July 12, 1971, and July 22, 1971. Additionally, the Interstate Sanitation Commission collected samples on July 26, 1971, and both agencies conducted a 24-hour survey at Station 6 from 11:00 A.M. (EST) on July 27, 1971, to 11:00 A.M. (EST) on July 28, 1971. The Interstate Sanitation Commission collected the samples for Stations 1 through 8 and the New Jersey State Department of Environmental Protection personnel sampled Stations 9 through 15. Stations 1 through 8 were sampled twice daily and Stations 9 through 15 were sampled three times a day -- all samples being taken approximately five feet below the surface. All samples, except some on the 24-hour survey, were taken during daylight hours. Determinations were made for the following parameters: temperature, chlorides, dissolved oxygen, fecal coliform density, pH, turbidity, ortho-phosphate phosphorus, nitrate, nitrite and ammonia nitrogen, total carbon, total organic carbon, chromium (hexavalent), copper,



nickel, zinc, cadmium, mercury, and lead. To take advantage of all available facilities, analyses were divided between the laboratories of the two participating agencies. All tests were made using instrumental techniques or according to Standard Methods for the Examination of Water and Wastewater.

The data for each station were analyzed and arithmetic means were calculated for each parameter except fecal coliform density and pH. The geometric mean was computed for fecal coliform density and logarithmic averages were used for pH.

RESULTS

The results obtained at each station are summarized in the table on the following page.

Dissolved Oxygen

The dissolved oxygen ranged from a low average and minimum value of 3.50 mg/l and 1.60 mg/l at Station 9 to a high average value of 9.44 mg/l at Station 6 and a high minimum value of 7.55 mg/l at Station 8. An average value of 10.80 mg/l and a minimum value of 6.80 mg/l were obtained at Station 6 during the 24-hour survey.

Fecal Coliform Density

The averages for the fecal coliform density ranged from a maximum value of 230 organisms/100 ml to a minimum value of "less than" 3 organisms/100 ml.

Other Parameters

The water temperature and chlorides showed little variation at all the sampling stations.

The pH averaged from 6.8 at Station 1 to 8.1 at Station 15. An average pH of 8.1 was also obtained during the 24-hour survey at Station 6.

The values for turbidity at all stations were in the range of 17 to 22 Jackson Turbidity Units.

The values for the nutrients (ortho-phosphate phosphorus and nitrate, nitrite and ammonia nitrogen) were lower

SUMMARY OF RESULTS (A)

STATION	TEMPERATURE	CHLORIDES	D. O.	D.O. (MIN)	FECAL COLIFORM DENSITY (B)	pH (C)	TURBIDITY	ORTHO-PO ₄ -P	NO ₃ -N	NO ₂ -N	NH ₃ -N
1	21.7	14,830	8.36	6.30	< 17	6.8	17	0.13	0.44	0.08	2.55
2	21.3	14,530	8.15	5.25	< 59	7.0	17	0.12	0.39	0.07	1.50
3	21.3	14,500	8.16	6.65	< 20	7.3	18	0.11	0.43	0.17	3.03
4	22.7	14,210	8.80	7.38	< 6	7.3	18	0.16	0.37	0.13	3.32
5	22.6	14,400	8.15	5.85	< 14	7.2	18	0.18	0.41	0.07	2.93
6	22.2	13,870	9.44	6.85	< 11	7.3	18	0.13	0.41	0.07	2.64
7	22.0	14,100	8.60	6.55	< 15	7.2	18	0.14	0.41	0.08	2.24
8	22.8	13,930	9.16	7.55	< 8	7.2	19	0.16	0.48	0.10	3.19
9	21.7	14,290	3.50	1.60	230	7.7	20	0.18	1.03	0.13	4.44
10	21.3	14,070	3.73	2.40	120	7.5	21	0.23	0.91	0.13	3.73
11	21.2	14,070	4.30	2.70	< 30	7.7	19	0.21	0.86	0.11	3.62
12	21.2	14,280	5.06	2.10	< 7	7.8	21	0.22	0.89	0.12	4.28
13	21.1	14,130	5.97	2.45	< 4	7.9	20	0.21	0.53	0.12	4.57
14	20.9	14,570	5.79	3.40	< 3	7.9	22	0.20	0.79	0.13	3.76
15	20.9	14,830	7.26	5.00	< 3	8.1	22	0.19	0.76	0.17	2.39
(D)	21.9	14,500	10.80	6.80	< 10	8.1	--	0.14	0.69	0.07	---

- NOTES:
- (A) All values are averages except column headed "D.O. (MIN)" which is the minimum dissolved oxygen value observed at each station. All units are mg/l except Temperature which is °C, Fecal Coliform Density which is the number of organisms per 100 ml, Turbidity which is JTU, and pH.
- (B) Geometric Mean
- (C) Logarithmic Average
- (D) 24-Hour survey taken at Station 6 from 11 A.M., July 27, through 11 A.M., July 28, 1971.

(Continued on Next Page)

SUMMARY OF RESULTS (A) continued

STATION	TOTAL CARBON	TOTAL ORGANIC CARBON	CHLOROPHYLL A	CHROMIUM	COPPER	NICKEL	ZINC	CADMIUM	MERCURY	LEAD
1	36	10	0.018	< 0.01	0.066	0.046	0.055	0.0010	0.00024	0.002
2	35	9	0.021	< 0.01	0.067	0.045	0.043	0.0011	0.00026	0.004
3	34	8	0.020	< 0.01	0.065	0.048	0.063	0.0007	0.00019	0.006
4	34	10	0.010	< 0.01	0.059	0.048	0.045	0.0007	0.00019	0.003
5	35	10	0.010	< 0.01	0.058	0.049	0.040	0.0007	0.00021	0.003
6	35	9	0.012	< 0.01	0.067	0.046	0.045	0.0008	0.00030	0.004
7	34	8	0.018	< 0.01	0.066	0.048	0.049	0.0007	0.00023	0.005
8	34	9	0.018	< 0.01	0.067	0.043	0.052	0.0018	0.00022	0.007
9	36	9	0.017	< 0.01	0.076	0.033	0.111	0.0007	0.00026	0.005
10	38	10	0.017	< 0.01	0.080	0.054	0.124	0.0007	0.00024	0.006
11	37	9	0.018	< 0.01	0.081	0.045	0.119	0.0007	0.00036	0.006
12	37	9	0.025	< 0.01	0.082	0.047	0.121	0.0007	0.00028	0.006
13	36	9	0.021	< 0.01	0.064	0.044	0.109	0.0015	0.00019	0.005
14	36	9	0.016	< 0.01	0.063	0.046	0.154	0.0049	0.00019	0.003
15	35	9	0.020	< 0.01	0.064	0.046	0.149	0.0074	0.00028	0.009
(D)	--	--	0.086	---	-----	-----	-----	-----	-----	-----

NOTES:

- (A) All values are averages except column headed "D.O. (MIN)" which is the minimum dissolved oxygen value observed at each station. All units are mg/l except Temperature which is °C, Fecal Coliform Density which is the number of organisms per 100 ml, Turbidity which is JTU, and pH.
- (D) 24-Hour survey taken at Station 6 from 11 A.M., July 27, through 11 A.M., July 28, 1971.

at Stations 1 through 8 (Sandy Hook Bay) than at Stations 9 through 15 (Raritan Bay). Zinc values showed this same pattern but the other metals showed little variation at any of the stations except the values of cadmium which were higher at Stations 8, 13, 14, and 15. Total carbon and total organic carbon values also showed little variation at any of the stations.

During the survey period from July 12 through July 22, the chlorophyll A values ranged from 0.010 mg/l to 0.025 mg/l. However, during the 24-hour survey (July 27 and 28), an average value of 0.086 mg/l of chlorophyll A was obtained at Station 6.

SUMMARY AND CONCLUSIONS

- (1) A baseline for many parameters has been established for future reference.
- (2) The dissolved oxygen requirements of the Interstate Sanitation Commission and the State of New Jersey are met at all stations except Stations 9 through 14. The abatement plans for this area will correct this condition.

DESCRIPTION OF SAMPLING POINTS

- STATION 1 Nun buoy N"2" at channel entrance for Compton Creek, Port Monmouth
- STATION 2 Flashing Red bell buoy R"6" in Raritan Bay, East Reach Channel
- STATION 3 Flashing Green buoy "17" in Sandy Hook Channel, West of Sandy Hook Point
- STATION 4 East-West Range --
Largest radar dome on Sandy Hook and south of fish net poles
- North-South Range --
Line of flashing White bell buoy at Sandy Hook Point and R"2" bell buoy off Navesink Park
- STATION 5 Bell buoy R"2" off Navesink Park
- STATION 6 Flashing Red private buoy "2" east of the southernmost tip of Leonardo (U.S.N.) pier
- STATION 7 Flashing Red buoy R"4" off the tip of Leonardo (U.S.N.) pier
- STATION 8 East-West Range --
Line of Nun buoy N"2" at channel entrance to Compton Creek and standpipe on Point Comfort
- North-South Range --
Approximately 200 yards west of Pews Creek
- STATION 9 Mid-channel
- Under C.R.R. of New Jersey bridge
- STATION 10 Flashing Green buoy "3" in Great Beds Reach

- STATION 11 Due south of the western edge of Staten Island
and in line with the Channel of Cheesequake
Creek approximately 700 yards off shore
- STATION 12 East-West Range --
Line of flashing buoy "7" at channel entrance
of Keyport Harbor and flashing Red buoy at
entrance to Cheesequake Creek
- North-South Range --
Line of flashing Green boundary light and
entrance to Whale Creek
- STATION 13 Flashing buoy "7" at channel entrance to
Matawan Creek in Keyport Harbor
- STATION 14 Buoy C"3" off Conaskonk Point at channel
entrance to Keyport Harbor
- STATION 15 Private flashing Green buoy "1" off Belvedere
Beach Point Comfort