

SAUGUS RIVER BASIN
1982
WATER QUALITY SURVEY

PREPARED BY
TECHNICAL SERVICES BRANCH
DIVISION OF WATER POLLUTION CONTROL

WESTBOROUGH, MASSACHUSETTS
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FOREWORD

During the summer of 1982, personnel of the Massachusetts Division of Water Pollution Control conducted a baseline water quality survey on the Saugus and Pines rivers. This report presents the results of field and laboratory analyses from that survey.

Surveys of the Saugus and Pines rivers were conducted on July 20 and September 15, 1982. One one-half gallon grab sample for chemical analysis and one bacteria sample were collected at each sampling station on each date. In addition, samples for concentration of dissolved oxygen and temperature determinations were collected and preserved in the field. Special samples for heavy metals analysis were collected in bottles fixed with nitric acid at four (4) sampling locations on each date.

Chemical and bacteriological samples were transported to the Lawrence Experiment Station of the Department of Environmental Quality Engineering for analysis in accordance with procedures set forth in the American Public Health Association's Standard Methods for the Examination of Water and Wastewater (fifteenth edition, 1981, New York.) Data were compiled and tabulated by Division personnel.

The 1982 water quality surveys of the Saugus and Pines rivers were conducted to establish baseline water quality data. Previous sampling conducted in 1976 by the Division was limited to only eight locations on the lower reaches of each river near Lynn Harbor. The 1982 survey locations were expanded to include the upper reaches of the Saugus River and several of its small tributaries. The purpose of sampling these locations was to identify possible water quality problems as a result of urban runoff. The July sampling was conducted during a very heavy rain event whereas the September sampling date followed five (5) consecutive days with no precipitation.

All inquiries concerning the information contained in this report should be directed to the Division's Technical Services Branch at the following address:

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WATER QUALITY SURVEY DATA

SAUGUS RIVER BASIN

1982

SAUGUS-PINES RIVER BASIN
CLASSIFICATION-SEGMENTATION

<u>SEGMENT NUMBER</u>	<u>STREAM</u>	<u>DESCRIPTION</u>	<u>MILE POINTS</u>	<u>MILES</u>	<u>CLASSI- FICATION</u>
1	Saugus River	From source to mouth (Lynn Harbor)	8.6-0.0	8.6	SB
1	Pines River	From source to mouth (Lynn Harbor)	6.4-0.0	6.4	SB

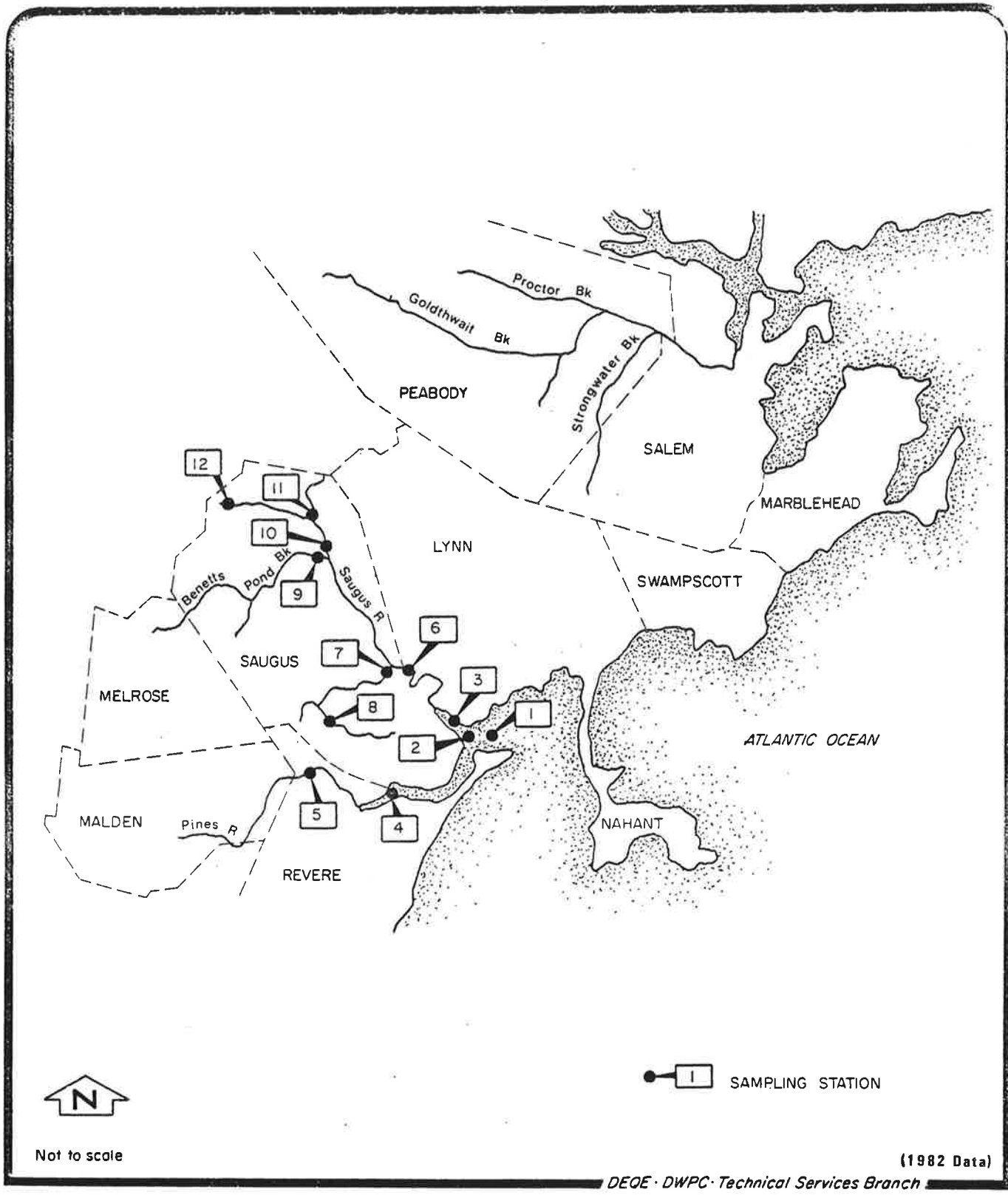


Figure 1

THE SAUGUS RIVER BASIN LOCATION OF SAMPLING STATIONS

SAUGUS RIVER BASIN SURVEY
HEAVY MEATALS DATA
1982

JULY 20, 1982

SEPTEMBER 15, 1982

STATION:	<u>SR01</u>	<u>SR02</u>	<u>SR03</u>	<u>PR04</u>	<u>SR01</u>	<u>SR02</u>	<u>SR03</u>	<u>PR04</u>
<u>PARAMETER</u>								
Aluminum	0.18	0.18	0.20	0.18	0.22	0.28	0.34	0.31
Cadmium	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.04
Chromium, Total	0.06	0.07	0.06	0.07	0.02	0.04	0.03	0.03
Chromium, Hexavalent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron	0.38	0.40	0.38	0.38	0.20	0.22	0.24	0.24
Mercury	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
Zinc	0.03	0.02	0.04	0.03	0.02	0.03	0.03	0.02

SAUGUS RIVER BASIN SURVEY
CHEMICAL AND BACTERIOLOGICAL ANALYSES DATA

1982

SEPTEMBER 15, 1982

STATION: PARAMETER ¹	SR01	SR02	SR03	PR04	PR05	SR06	SR07	SR08	SR09	SR10	SR11	SR12
BOD ₅	2.7	3.3	3.6	4.8	3.0	2.7	3.6	4.2	2.1	3.3	3.0	5.4
pH (Standard Units)	8.1	8.1	8.1	8.1	7.8	7.8	7.7	7.0	7.4	7.8	7.5	7.8
Alkalinity, Total	110	110	100	110	110	100	80	25	40	77	63	87
Total Solids	37,350	36,660	37,056	37,172	37,468	35,202	566	276	210	376	260	300
Suspended Solids	14	17	16	21	16	16	4	11	2	8	15	7
Volatile Suspended Solids	8	6	7	10	10	6	3	5	1	2	4	4
Total Kjeldahl- Nitrogen	2.1	1.9	2.1	1.9	1.9	2.1	1.3	1.1	0.78	1.1	1.0	1.3
Ammonia-Nitrogen	0.11	0.15	0.18	0.18	0.32	0.20	0.12	0.12	0.04	0.22	0.09	0.06
Nitrate-Nitrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.5	0.3	0.2	0.1
Total Phosphorus	0.17	0.14	0.13	0.14	0.18	0.17	0.04	0.06	0.04	0.07	0.09	0.09
Chloride	17,500	18,750	18,125	18,125	18,125	17,500	166	74	46	102	64	74
Total Coliform (Coliform/100 ml)	100	60	500	40	500	4,200	8,500	500	5,400	2,400	22,000	2,000
Fecal Coliform (Coliform/100 ml)	10	20	<5	<5	20	340	2,000	160	2,200	900	600	400

¹All values reported as mg/l unless otherwise noted

SAUGUS RIVER BASIN SURVEY

WATER QUALITY ANALYSIS

1982

Water quality data gathered during the surveys conducted in 1982 reveal that the Saugus River and its tributaries are subject to increased pollutant loadings as the result of stormwater runoff. Analysis of samples collected under dry weather conditions on September 15 indicate general compliance with Class SB water quality criteria as defined in the Massachusetts Water Quality Standards (MDWPC, 1978). Dissolved oxygen data show concentrations well above the minimum standard of 5.0 mg/l. Biochemical oxygen demand (BOD₅), suspended solids, and ammonia-nitrogen (NH₃-N) levels are all indicative of good water quality, particularly given the dense urbanization of the basin. Notable exceptions with this general evaluation are high total and fecal coliform densities recorded at Shutes Brook (SR07), Bennett Pond Brook (SR09), Saugus River (SR10), and Hawkes Brook (SR11). These locations are situated in densely populated areas and are influenced heavily by man's activities. In addition, none of these streams offer more than minimal flow and in many cases stagnant pools can be observed. The assimilative capacity of these streams is extremely low and are thus very sensitive to pollution inputs. Nevertheless, the coliform data indicate that sources of organic (domestic) pollution do exist in the upper reaches of the basin. Increased flow and dilution in the lower basin increases the assimilative capacity of the Saugus River and the pollutant loadings carried over from upstream do not adversely impact the water quality of the river. This is particularly true in the estuarine reaches of the river (Stations SR01, SR02, and SR03).

Storm events have a dramatic effect on the water quality of the basin as evidenced by the July 20 sampling data. BOD₅ levels in the upper basin increased as much as 17 times the dry weather levels from 3.7 mg/l to 64 mg/l (SR07). The elevated BOD₅ levels resulted in Class SB dissolved oxygen violations at all but one sampling station (SR07) in the upper basin. As a result of the very high BOD₅ levels, dissolved oxygen concentrations were recorded as low as 3.8 mg/l (SR11). Other water quality parameters including suspended solids and nitrogen compounds also showed increased instream concentrations due to stormwater runoff. Again this was limited generally to the upper basin. Estuarine reaches showed little impact due to the large dilution and transport factors.

Coliform densities perhaps best illustrate the effect of storm events on the basin. Densities at all 12 sampling stations violated Class SB criteria. Total coliform and fecal coliform densities as high as 300,000 organisms/100 ml and 50,000 organisms/100 ml, respectively, were recorded. The upper basin is most severely impacted by sources of sanitary pollution and much of this is carried over to the lower reaches of the basin. The high coliform densities indicate that sources of domestic pollution such as combined sewers, illegal sewer connections, and failing individual septic systems exist in the basin.