REPORT ON

WATER POLLUTION

IN THE STATE OF MAINE

1950

DEPARTMENT OF HEALTH AND WELFARE
DIVISION OF SANITARY ENGINEERING

In Collaboration With

Department of Agriculture
Department of Sea and Shore Fisheries
Sanitary Water Board

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P R E F A C E

With the passage of Public Law 845 by the 80th Congress an allocation of funds was made to the State Department of Health and Welfare as the pollution control agency of the State of Maine. These funds were granted for the purpose of making a survey of water pollution conditions in the state, to assist in the preparation and adoption of a comprehensive program for the elimination or reduction of the pollution of such waters as a part of an eventual comprehensive program for the elimination or reduction of pollution of interstate waters and tributaries thereof throughout the United States.

For a great many years the State Department of Health and Welfare, under the general statutes, has had authority for making sanitary investigations and inquiries respecting the causes of disease, and especially communicable disease epidemics, and it has had the duty of taking measures for the suppression and prevention of disease in any part of the state. These general duties have pertained only to conditions where disease has actually occurred, and have not provided adequate means for regulation of pollution conditions, which eventually might cause disease, or become nuisances, or a menace to the welfare of the people. Ordinary nuisances have long been a police function and regulated by general law, with authority in the courts for prevention and abatement.

The State Sanitary Water Board was established in 1941 for the general purpose of regulating and controlling pollution of streams and other waters of the state. Initially provided with insufficient funds, it was unable to carry out investigational work directly, but in 1945, with the provision of a modest state appropriation, studies of various pollution conditions were undertaken. These studies resulted in the compilation of considerable data, and although a report dealing particularly with polluted clam flat areas was prepared in 1947, in cooperation with the Department of Agriculture, it was not possible to publish this report.

Subsequently, additional data on pollution conditions of a number of rivers were secured by making numerous tests from various sampling points during the past three years.

With the funds available, it was not possible for the Sanitary Water Board to develop the data it had secured, the bulk of which remained "buried" in files and not easily accessible for study or use. Therefore, it was believed that one of the first steps in preparing for future work should be the assembling and coordinating of this material. This plan met with the approval of the Federal Security Agency, under whose supervision or direction allocated funds must be expended.

Concurrently, the State Department of Health and Welfare was designated the "State Water Pollution Agency", as under the authority of Public Law 845, the U. S. Public Health Service, in making grants to states, or in dealing with them on water pollution control problems, must work with a single state agency having jurisdiction on matters pertaining to stream pollution. This also involves approval of loans for public works, under Public Law 352, which permits loans for the preparation of plans and surveys of public works, including sewage treatment plants, extensions to existing sewerage works, and

other public works, such as schools, etc. The requirement in no way supersedes or eliminates existing regulatory provisions or powers of other state departments, but is in addition thereto, where applicable.

Personnel were employed under the above mentioned grant and allocated to the Division of Sanitary Engineering, to work under the direction of, and with the Division, as it was the logical administrative organization for performing this function. Because their initial duties were to be a review of the previous work of employees of the Sanitary Water Board, and future investigations, laboratory work, etc., would be made in areas similar to those being investigated by the Board, it was decided to coordinate these activities under the same supervisor and thus eliminate overlapping of duties and effort.

At approximately the same time, the Sea and Shore Fisheries Department was given an appropriation by the State Legislature for the study and investigation of shellfish in closed areas for a two-year period. Because this, likewise, would overlap the activities just enumerated, it was believed desirable to coordinate these efforts also, and by interchange of information prevent duplication of investigations in the closed clam flat areas; the Sea and Shore Fisheries Department assuming the function of investigating the degree of contamination of the tidal waters and shellfish in the closed areas, and the Division of Sanitary Engineering, with the personnel allocated to this work, to assume investigation of sources of pollution entering tidal waters; all of this work being coordinated and supervised under the direction of the Division director.

Acknowledgements of assistance are gratefully extended to the State Department of Agriculture for procurement of samples for studies of closed clam areas in 1946 and 1947; to the Department of Sea and Shore Fisheries for bacteriological data on closed clam flat areas; to the Brown Paper Company of Berlin, New Hampshire, the International Paper Company of Livermore Falls, and the Oxford Paper Company of Rumford, Maine, for reports on conditions of the Androscoggin River; to officials of the Public Health Service for advice and assistance; and to the various employees of the several state departments for the technical work and assistance which makes this report possible.

PURPOSE AND SCOPE

This report has been prepared to furnish information to the Maine Legislature, the people of the State of Maine, and all other interested parties concerning the stream pollution activities within the state which have been conducted under the auspices of the Sanitary Water Board, and by their employees, and by the Division of Sanitary Engineering of the State Department of Health and Welfare.

This report is essentially nontechnical in nature, being prepared primarily for persons unfamiliar with technical nomenclature and methods of evaluating data relating to stream pollution investigations such as are indicated in biological, bacteriological and chemical analyses of watercourses under investigation. Further information concerning technical data and details is available at the Division of Sanitary Engineering in Augusta.

One of the objectives in the preparation of this report has been to present the information in as brief a form as possible, while still maintaining complete clarity. It is intended also to demonstrate the need for further study and classification in an overall, long range program of pollution reduction in both the inland and tidal waters of the state.

After the survey and report of river and stream conditions in the State of Maine conducted by a committee of pulp and paper officials of the state in cooperation with the Department of Health, Division of Sanitary Engineering in 1930, the next stream pollution investigational work was made by the Division of Sanitary Engineering, State Department of Health and Welfare and printed as, "Report of the Bureau of Health of the Department of Health and Welfare on Pollution of the Androscoggin River Waters to the 90th Legislature". This report indicated to the Legislature the need for establishing an agency for considering water pollution problems and, combined with other information, resulted in the passage of an Act creating the Sanitary Water Board.

Initially the Sanitary Water Board was provided with only sufficient funds for holding meetings but the necessity for making special investigations was forcibly brought to their attention by conditions in the Androscoggin River Basin, and in 1942 a sufficient amount was allocated by the Governor and Council, from the contingent fund, to permit a special investigation of the pollution of the Androscoggin River and remedial measures, which investigation was carried out by Metcalf and Eddy, investigators of Boston, Massachusetts, and which was published as Bulletin #1 of the Sanitary Water Board in 1942.

For lack of funds no extensive pollution investigational work could be developed until 1945, when the Legislature granted an appropriation sufficient to permit the employment of technically trained personnel. A program of stream and coastal water pollution investigation was initiated. This activity included investigations of wastes from industrial establishments together with setting up water sampling points on various rivers for immediate and future investigations. This program has been expanded and will be further discussed by specific areas. Some of the work, particularly relating to a survey of the salt water bathing beaches west of Portland, was compiled

in a report completed in 1946, and a report on closed clam flat areas was completed in 1946 and 1947, which reports, unfortunately, never have been published, but much of the data is included under the section entitled "Coastal Survey".

The Federal Security Agency which is the administrative agency established by Public Law 845, of the 80th Congress, divided the United States into nine major drainage basins. New England, with a portion of eastern New York, has been designated as the New England Drainage Basin, and the major river watershed areas have been called sub-basins of the New England Drainage Basin. The sub-basins in the State of Maine are numbered from eleven to twenty, inclusive, and are further divided into principal rivers and main and lesser tributaries.

The report has been divided into three sections consisting of Inland Surveys, Coastal Surveys, and Special Investigations.

The section entitled, "Inland Surveys", is further sub-divided into ten parts representing the so-called "Sub-basins", each being an area of the state consisting of either a large watershed, a group of small watersheds, or a combination thereof. The other sections are divided into three lesser parts which present information obtained from the three inland surveys covering the various sections of each sub-basin. These surveys in order consist of the Water Sampling Survey, the Comprehensive Water Pollution Survey conducted in cooperation with the U.S. Public Health Service, and the Industrial Survey, all of which are fully described in the Inland Surveys section.

The Water Sampling Survey and the Industrial Survey are contemplated as continuing programs requiring continuous activities throughout each season of the year and over a considerable period of years, not only for the determination of present conditions, but also for the purpose of evaluating the results of pollution abatement programs and variations in pollution loads.

The second section presents three coastal studies: The Coastal Sewer Survey, Survey of the Closed Clam Flat Areas, and Survey of the Salt Water Bathing Areas. It is divided into three main parts as the geographical locations involved in each one are completely different from the others.

The Coastal Sewer Survey is approximately two-thirds completed and it is expected that this program will be completed during the year 1951. Details of the survey findings are presented, but no conclusions are attempted as it has been thought best to await completion of the work.

The last main section of the report covers special investigations. It is divided into four special studies pertaining to potato starch factories, pulp and paper mills, potato dumps and fish processing plants. These are considered representative of the many special investigations that have been conducted during the interval covered by this report.

POLLUTION LAWS

Whereas the majority of laws pertaining to stream pollution in the State of Maine have been passed during the last few years, there were general laws concerning various phases of the subject enacted as far back as 1841. Prior to that special laws concerning specific water bodies were enacted in 1837, to prevent the depositing of large quantities of slabs or other mill wastes in such manner as to adversely affect navigation.

Chapter 164, Revised Statutes 1841, designated the corruption of any body of water in the state as a public nuisance. This law has been continued and part of its original form is contained in Chapter 128, Revised Statutes 1944, which provides means for the abatement of public nuisances.

Many specific laws in addition have been passed relating to the deposit of sawmill wastes in streams and rivers. A general law concerning sawmill wastes was passed in Section 14, Chapter 206, Public Laws 1913. This placed pollution by such materials under the control of the Department of Inland Fisheries and Game. Later, however, the Legislature transferred much of this responsibility to the Sanitary Water Board by Chapter 72, Revised Statutes 1944, as amended.

The Public Utilities Commission under the provisions of Chapter 40, Revised Statutes 1944, Section 13, exercises control over pollution of sources of public water supplies but the following rivers are exempted from such regulations, namely the Penobscot, the Kennebec, the Androscoggin and the Saco.

Another measure of long standing, originating in 1891, being now Section 1 of Chapter 124, Revised Statutes 1944, provides severe penalties for whoever "knowingly and wilfully poisons, defiles, or in any way corrupts the waters of any well, spring, brook, lake, pond, river, or reservoir used for domestic purposes for man or beast, or knowingly corrupts the sources of any public water supply, or the tributaries of said sources of supply in such manner as to affect the purity of the water so supplied, or knowingly defiles such water in any manner, whether the same be frozen or not, or puts the carcass of any dead animal or other offensive material in said waters, or upon the ice thereof".

The Department of Health and Welfare under the general provisions of Chapter 22, Revised Statutes 1944, has adopted regulations to regulate in part the discharge of domestic sewage from private homes into any river, stream, lake, pond or similar water source; or into a well or spring; or into an open highway or similar ditch or into salt water where bathing beaches or clam flats may be polluted.

The principal laws relating to stream pollution are P. L. 845, 80th Congress, and Chapter 72, Revised Statutes, State of Maine, 1944, as amended, and Chapter 387, P. L. 1949.

PUBLIC LAW 845

NEW ENGLAND DRAINAGE BASIN

SUB-BASINS

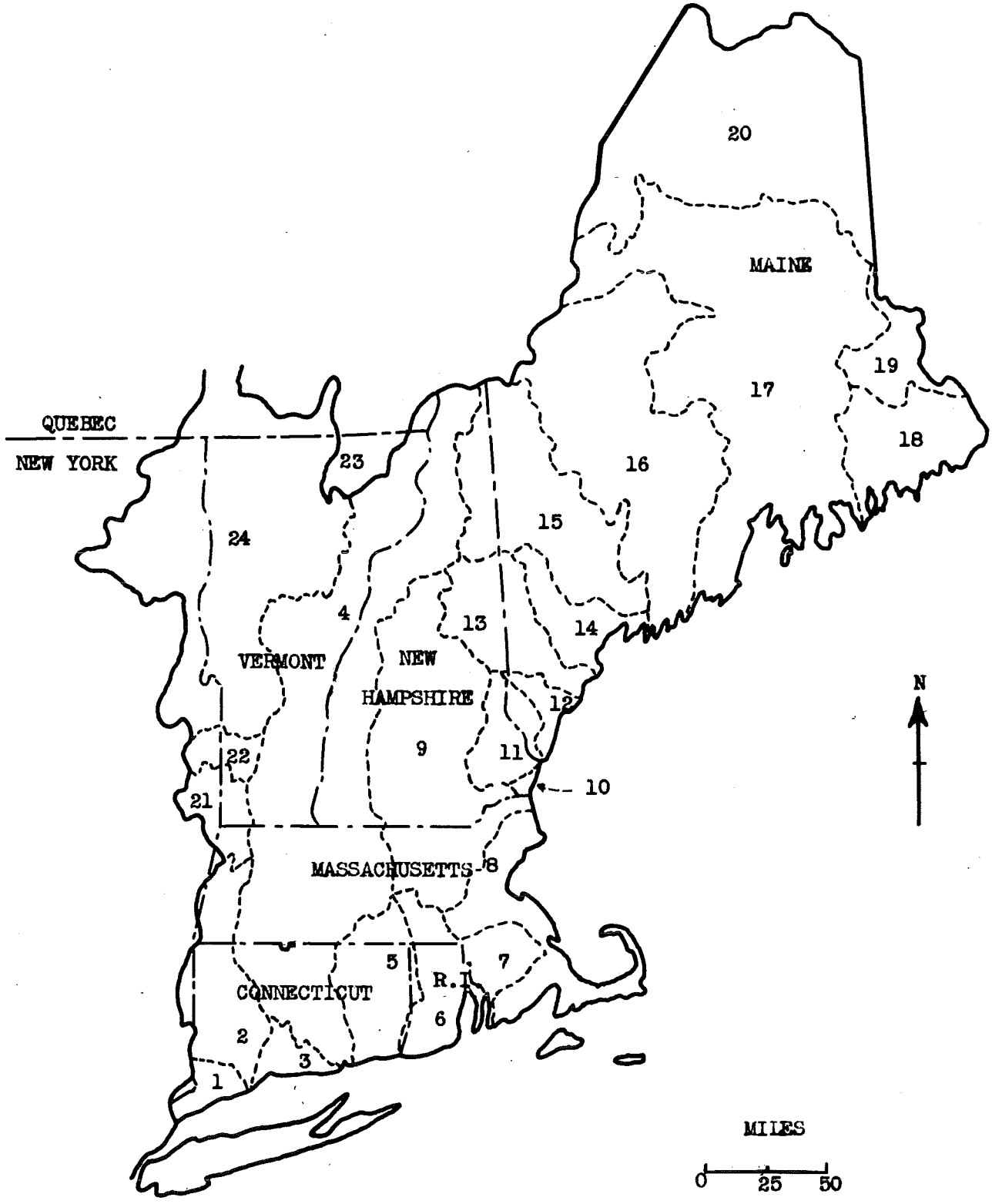
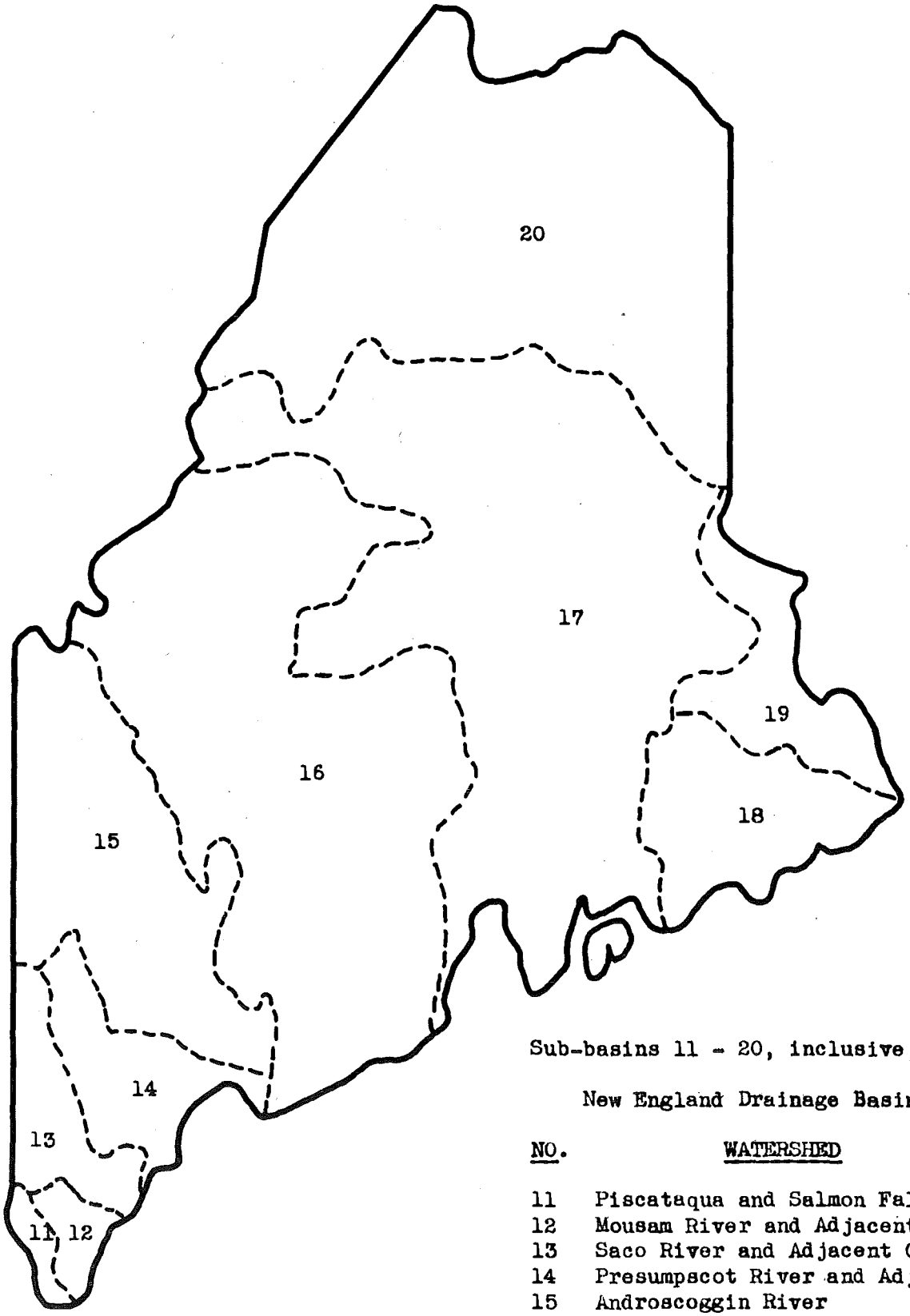


Fig. 1

State Of

Maine

Watershed Areas



Sub-basins 11 - 20, inclusive, of the New England Drainage Basins.

NO.	WATERSHED
11	Piscataqua and Salmon Falls Rivers
12	Mousam River and Adjacent Coastal
13	Saco River and Adjacent Coastal
14	Presumpscot River and Adjacent Coastal
15	Androscoggin River
16	Kennebec River and Adjacent Coastal
17	Penobscot River and Adjacent Coastal
18	Machias River and Adjacent Coastal
19	St. Croix River
20	St. John River

Fig. 2

INLAND SURVEYS

To assist in coordinating the investigations on inland surveys with those of other agencies such as, the U. S. Public Health Service, the New England Interstate Water Pollution Control Commission, other states which are part of the interstate drainage basins, and other investigating agencies, a classification of water in the watercourses has been developed. This classification follows closely the system previously adopted by the New England Interstate Water Pollution Control Commission and is indicated in Table No. 1. The various chemical and bacteriological tests are made in accordance with standard procedures as published in the latest edition of the "Standard Methods For The Examination of Water and Sewage", published by the American Public Health Association.

Each sub-division is considered separately with a description of the various water sampling points along the rivers followed by a compilation of the average results of the various tests which have been made, and by a description of the sewage and industrial pollution load. It should be noted that the classifications as indicated and tabulations of unclassified waters are intended only to show an average of the data available and may not be expected to furnish information concerning either the minimum or maximum conditions of water quality. In several sub-basins very few tests of quality have been possible with many samples being tested for chemical qualities only, without any bacteriological examinations. In other cases, although complete analyses have been made of a limited number of samples, the total number available has provided insufficient data to permit a true and accurate classification of every watercourse.

STATE OF MAINE

TENTATIVE WATER CLASSIFICATION STANDARDS

Table I

TYPE	CLASS A	CLASS B	CLASS C	CLASS D	CLASS E
DISSOLVED OXYGEN	>75% SAT. > 7 PPM	>75% SAT. > 7 PPM	>60% SAT. > 5 PPM	>35% SAT. > 3 PPM	<35% SAT. < 3 PPM
BIOCHEMICAL OXYGEN DEMAND	0 - 2.0	2.0 - 3.0	3.0 - 4.0	3.0 - 4.0	OVER 4.0
pH	6.0 - 8.0	6.0 - 8.0	5.5 - 8.5	5.5 - 8.5	5.0 - 9.0
B. COLI (MPN)	<50/100 ML	<500/100 ML	<5000/100 ML	<10,000/100 ML	>10,000/100 ML
ODOR	NONE	NONE	NONE	NOT OBJECTIONABLE	OBJECTIONABLE
COLOR	NONE	NOT OBJECTIONABLE	NOT OBJECTIONABLE	NOT OBJECTIONABLE	OBJECTIONABLE
SCUM, FLOATING DEBRIS	NONE	NONE	NOT OBJECTIONABLE	NOT OBJECTIONABLE	OBJECTIONABLE
SLUDGE DEPOSITS	NONE	NONE	NONE	NOT OBJECTIONABLE	OBJECTIONABLE
TURBIDITY, SUSPENDED SOLIDS	NONE	NOT OBJECTIONABLE	NOT OBJECTIONABLE	NOT OBJECTIONABLE	OBJECTIONABLE

>= GREATER THAN
<= LESS THAN

SUITABLE USES FOR WATER BY CLASSIFICATION

CLASS A - Suitable for public water supply. Character uniformly excellent.

CLASS B - Suitable for bathing and recreation, irrigation and agricultural uses; good fish habitat; good aesthetic value. Acceptable for public water supply with filtration and disinfection.

CLASS C - Suitable for recreational boating, irrigation of crops not used for consumption without cooking; habitat for wildlife and common food and game fishes indigenous to the region.

CLASS D - Suitable for transportation of sewage and industrial wastes without nuisance, and for power, navigation and other industrial uses.

CLASS E - Does not meet the requirements set forth for Class D water, but may serve same uses as Class D, or may constitute a public nuisance, depending upon the amount of pollution.

SUB - BASIN # 11

(Piscataqua and Salmon Falls Rivers)

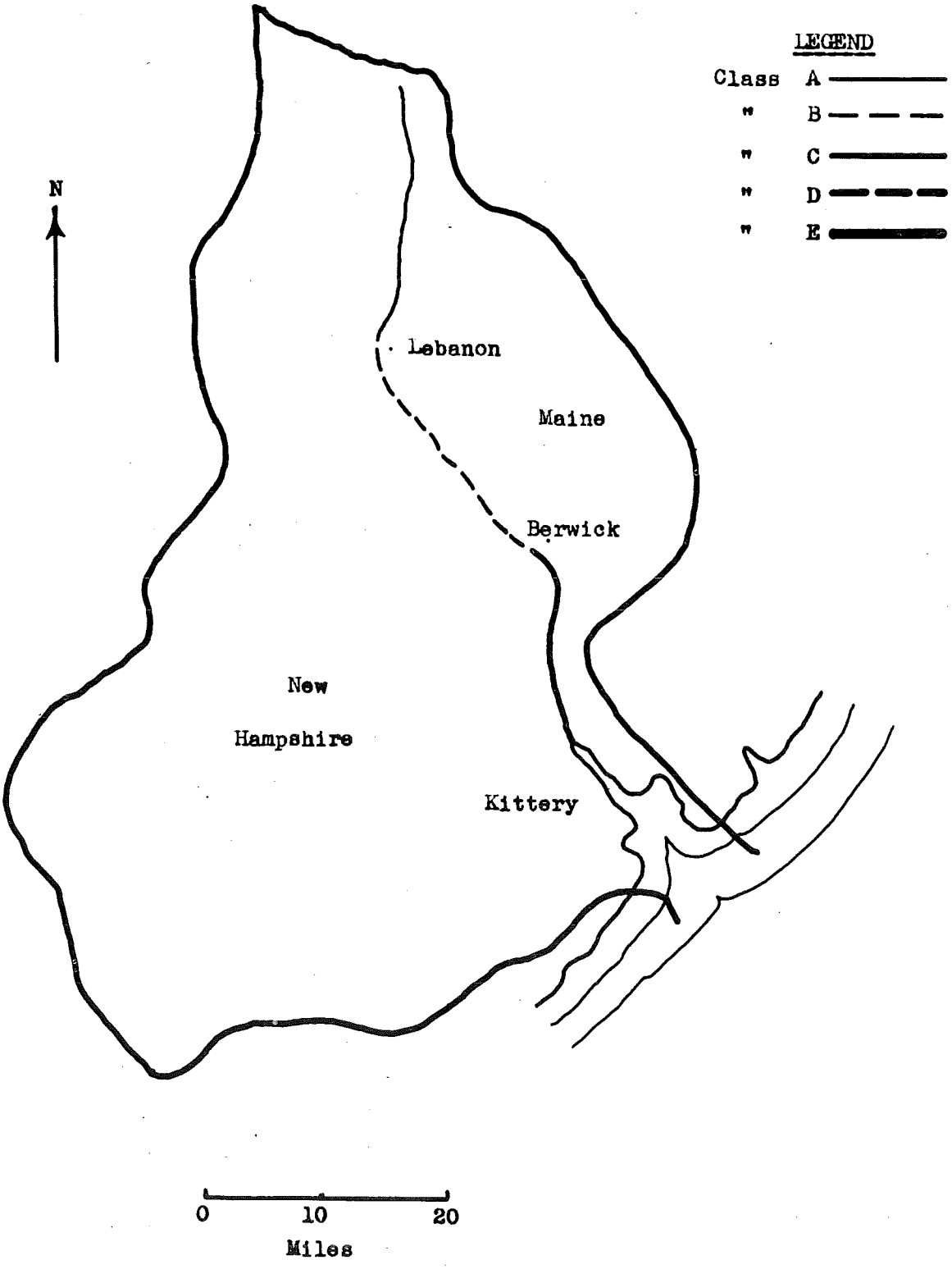


Fig. 3

SUB-BASIN 11

The Maine section of the Piscataqua and Salmon Falls Rivers drainage basin is about 250 square miles in area. It is 40 miles long and about 16 miles in width at its widest point, and is located at the southwestern tip of the state. The greater part of this sub-basin, 750 square miles, is located in New Hampshire.

The land has a low elevation and is relatively flat near the coast but rolling inland. It is not heavily wooded, and what growth exists is scrubby in nature.

The population in this basin is concentrated along the main stems of the Piscataqua and Salmon Falls Rivers; about 14,000 people living on the Maine side. This population is centered in the towns of Acton, Lebanon, Berwick, South Berwick and Kittery. The largest of these is Kittery, an industrialized community having a population of 5,374. The area is more heavily populated on the New Hampshire side of the river, with approximately 42,000 people living in the cities of Rochester, Dover, and Portsmouth.

About 5,900 people are employed at the Portsmouth Navy Yard, actually located in the town of Kittery, which is the major economic influence in the area. Other industries include a woolen mill in North Berwick, a tannery in Berwick, and shoe and woolen mills in South Berwick.

The main stem of the Piscataqua River is only 12 miles in length, being formed at the confluence of the Cocheco and Salmon Falls Rivers at Eliot, and extending to the ocean below Kittery. This river constitutes a portion of the Maine-New Hampshire border over its entire length. It is a broad, sluggish river having a total fall of only 10 feet. Tidewater, therefore, extends upstream to South Berwick on the Salmon Falls River. The total area of the sub-basin is estimated at 1,010 square miles.

The Salmon Falls River also constitutes a portion of the Maine-New Hampshire border. It extends from Great East Lake in Acton in the north to the Piscataqua River at Eliot in the south. It has a total fall of 570 feet over its 36 miles of length. The drainage area of this river including both Maine and New Hampshire is 340 square miles.

The heaviest pollution load in this sub-basin occurs in the Portsmouth-Kittery area near the mouth of the Piscataqua River where large quantities of sanitary sewage and various industrial wastes are discharged to the water.

The Great Works River, a tributary to the Salmon Falls River, is also polluted for a short distance near its mouth by sanitary sewage and some industrial wastes.

PISCATAQUA AND SALMON FALLS RIVERS

Water Sampling Stations and Test Results

Nine sampling stations have been established at various points along the Piscataqua and Salmon Falls Rivers. These range from Lebanon in the north on the Salmon Falls River to Kittery in the south on the Piscataqua River, and are located as follows:

Station No.	Town	Location
1A	Lebanon	Bridge about one mile above Route 202
1	Lebanon	Old Bridge on Route 202
2	Rochester	Walnut Grove Bridge above junction of Little River
2A	Berwick	Last bridge on Little River
3	Berwick	Interstate Bridge on Route 103 above Berwick
4	Berwick	Power station canal below Berwick
4A	South Berwick	Great Works River Bridge at its mouth
5	South Berwick	Interstate bridge below Great Works River
6	Kittery	Interstate toll bridge

During the late summer of the years 1944, 1945 and 1946, a limited number of samples were taken at these stations. Following are the average results:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	Tentative Classification
1	13	9.5	87	4.0	2.7	6.6	B
1A	6	10.8	87	4.5	2.0	6.4	B
2	5	11.6	88.3	4.7	2.4	6.4	B
2A	4	12.6	96	6.8	2.3	6.1	B
3	13	9.3	83	5.4	2.0	6.4	B
4	5	10.9	85	5.0	3.7	6.5	C
4A	13	9.2	83	5.5	4.6	6.5	E
5	13	7.8	70	6.1	2.2	7.2	C
6	7	9.2	75	5.3	1.3	7.6	A

Sewage Pollution

Sewage from a population of over 10,100 is discharged directly to the Salmon Falls and Piscataqua Rivers from the towns located on the Maine side. Approximately 500 in Berwick, 485 in South Berwick, 150 in South Eliot, and 9,000 in Kittery contribute to the sanitary sewage load of these two rivers. The water is used for industrial processes, navigation, and shellfishing although it is too highly polluted in this area to be considered satisfactory for growing of edible shellfish.

The Great Works River, a Maine tributary of the Salmon Falls River, is polluted by sewage from 1,325 people in North Berwick. It is fed by Goodall Brook which carries sewage from approximately 5,000 people in the city of Sanford and is used for industrial processes and also serves as a source of supply for livestock.

All towns which discharge sewage to the watercourses in this sub-basin require new treatment plants in order to reduce the pollution load.

Industrial Pollution

Only a moderate amount of pollution due to industrial wastes exists in Sub-basin 11.

A sawmill located on Beaver Dam Stream in the town of Berwick discharges sawdust directly to the river. Industrial wastes from a tannery in Berwick is discharged to the Salmon Falls River. A shoe shop and woolen mill in South Berwick also contribute to the pollution load. Further downstream a considerable variety of industrial wastes are discharged from the town of Kittery and a navy yard located there deposits both industrial wastes and sanitary sewage into the Piscataqua River.

At North Berwick a woolen mill and a small slaughter house discharge their wastes to the Great Works River. In addition much industrial wastes is contributed to the Piscataqua and Salmon Falls Rivers from the towns and cities on the New Hampshire side of the boarder.

MUNICIPAL SOURCES OF POLLUTION

Sub-basin 11

SEPTEMBER 1950

Table 2

MUNICIPALITIES*	SOURCES OF POLLUTION (IN NUMBER OF MUNICIPALITIES)	POPULATION SERVED BY SEWERAGE SYSTEM	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE)
HAVING DATA ON POLLUTION LOAD DISCHARGED TO WATERCOURSE	31 (1)	53,050	47,798
HAVING ONLY POPULATION DATA AVAILABLE (DATA ON POLLUTION LOAD TO WATERCOURSE INCOMPLETE OR NOT AVAILABLE)	4	32,200	NOT APPLICABLE
TOTAL	35	85,250	XXX

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 5 industries having 875 employees, which discharge sanitary sewage only.

MAJOR INDUSTRIAL SOURCES OF POLLUTION

Sub-basin 11

Table 3 SEPTEMBER 1950

INDUSTRIES	SOURCES OF POLLUTION (IN NUMBER OF PLANTS)	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE*)
PRODUCING ORGANIC WASTES	0	0
PRODUCING ORGANIC WASTES	18	UNDETERMINED
PRODUCING INORGANIC WASTES	0	NOT APPLICABLE
PRODUCING WASTES OF UNDETERMINED TYPE	0	UNDETERMINED
TOTAL	18	XXX

* The term, "population equivalent", is used to compare the strength of an industrial waste with that of domestic sewage. The latter has been found to contribute an average of 0.167 pound B.O.D. per capita per day. If the volume of flow and the 5-day B.O.D. of a given waste are determined, then: Volume (gallons per day) x p.p.m. (parts per million) B.O.D. x 0.00005 = population equivalent of waste.

EXISTING MUNICIPAL TREATMENT FACILITIES

Sub-basin 11

Table 4 SEPTEMBER 1950

DEGREE OF TREATMENT PROVIDED	NUMBER		POPULATION SERVED
	MUNICIPALITIES*	PLANTS	
PRIMARY	3	3	8,300
SECONDARY	3	3	6,450
NO TREATMENT	29 (1)	0	70,500

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 5 industries having 875 employees, which discharge sanitary sewage only.

EXISTING INDUSTRIAL* WASTE TREATMENT FACILITIES

Sub-basin 11

Table 5 SEPTEMBER 1950

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF INDUSTRIAL PLANTS HAVING		
		TREATMENT FACILITIES	NO TREATMENT FACILITIES	UNDETERMINED FACILITIES
FOOD AND KINDRED PRODUCTS	1	0	1	0
TEXTILE MILL PRODUCTS	12	0	12	0
PAPER AND ALLIED PRODUCTS	1	0	1	0
CHEMICAL AND ALLIED PRODUCTS	2	0	2	0
PRODUCTS OF PETROLEUM AND COAL	0			
RUBBER PRODUCTS	0			
LEATHER AND LEATHER PRODUCTS	2	0	2	0
PRIMARY METAL INDUSTRIES	0			
FABRICATED METAL PRODUCTS	0			
MISCELLANEOUS	0			

* Industries having separate outlets and discharging wastes directly to watercourse.

SUB - BASIN # 12

(Mousam River and Adjacent Waters)

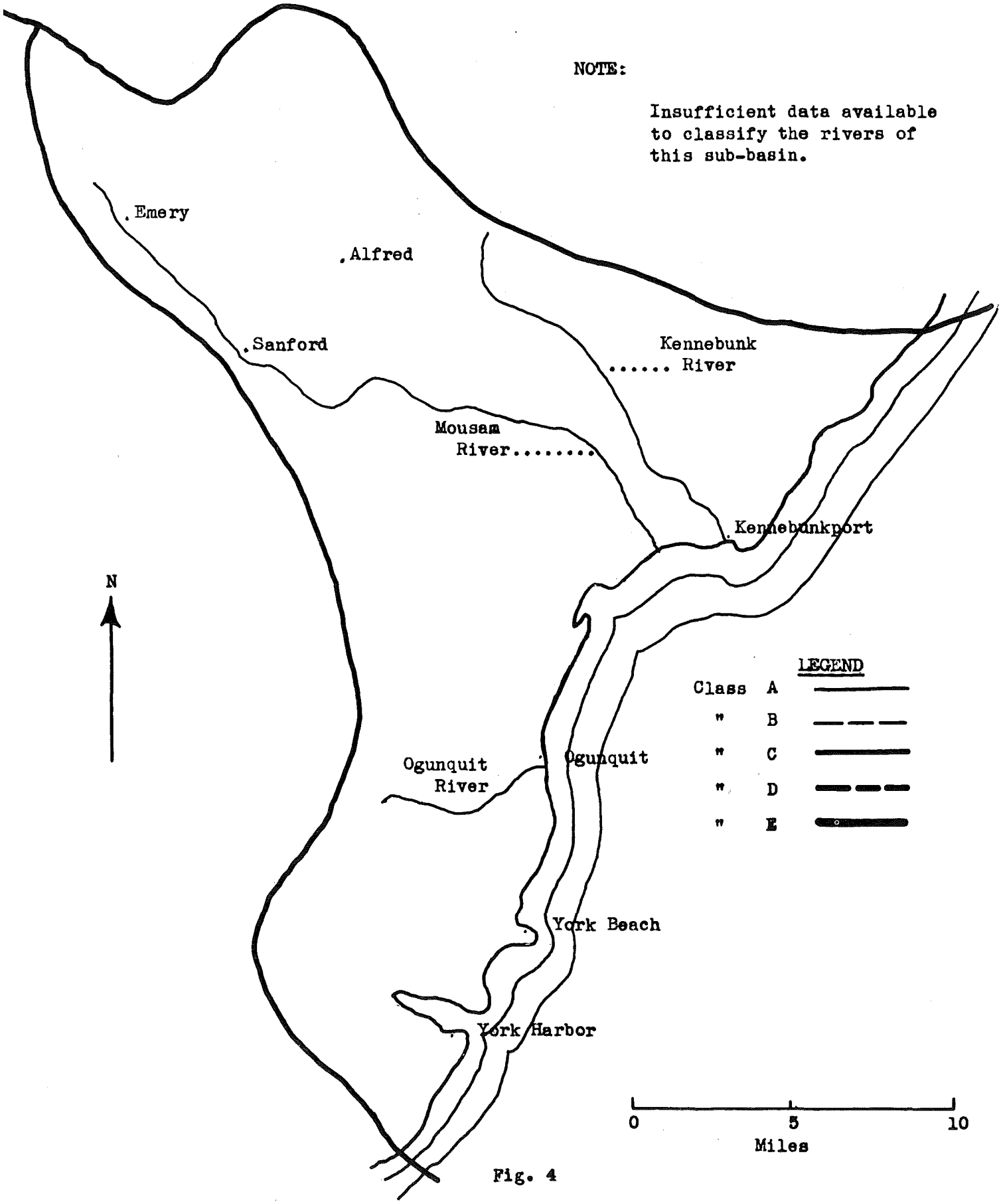


Fig. 4

SUB-BASIN 12

The Mousam River and adjacent coastal watershed is approximately 390 square miles in area, about 30 miles long and 30 miles wide at the coast. It is located at the southern part of the state and is bordered on the west by the Piscataqua and Salmon Falls Rivers sub-basin and on the east by the Saco River sub-basin.

The land is comparatively flat. It is low lying near the coast and slightly rolling inland. What wooded growth exists is scrubby in nature.

The population of this sub-basin is about 26,500, over one-half of which, about 15,000, is located in Sanford on the Mousam River. Some population is also concentrated in the coastal villages of York and Wells. Over 5,000 people live in these areas permanently, plus a marked increase in population during the summer months.

The two main economic influences in Sub-basin 12 are the textile mills in Sanford and the summer tourist trade along the coast. Other industries in the area include two shoe factories in Sanford and a shoe factory and a fiber mill in Kennebunk.

The drainage area of the Mousam River is 150 square miles. The river is 24 miles long and has a total fall of 450 feet, rising in Shapleigh and passing through Sanford, Alfred and Kennebunk. It is the largest river in this sub-basin which bears its name. The next in size is the Kennebunk River, 16 miles in length with a fall of 230 feet and a watershed of 38 square miles. The smaller coastal rivers include the Branch, York, Ogunquit and Webhannet.

No extreme pollution problem is encountered in this area although a heavy pollution condition exists in the Mousam River at and below Sanford. However, some recovery is made within 7 miles of the city. This pollution load is caused by the sewage of approximately 7,870 people and industrial wastes from two textile mills in the city of Sanford.

MOUSAM RIVER

Water Sampling Stations and Test Results

A total of nine sampling stations have been established along the Mousam River. They all lie in or between the village of Springvale and the town of Kennebunk. A description of their location follows:

Station No.	Town	Location
1	Springvale	East river bank in back of cemetery
2	Sanford	River Street Bridge near Front Street
3	Sanford	Butler Bridge on outer School Street
4	Sanford	Bridge on Route 4A
4A	Sanford	Face of dam at Jagger Brothers mill
5	Sanford	Bridge near junction with Middle Branch River
5A	Kennebunk	Bridge near Route 99 near West Kennebunk
6	Kennebunk	Power station canal below Kennebunk
6A	Kennebunk	Bridge on Route 1

During the period extending from July 26, 1945 to August 30, 1946, samples were taken from seven of the sampling stations, the analyses of which indicated water qualities ranging from good to bad over certain portions of the river. Following are the average readings of the various tests:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	pH	Tentative Classification
1	16	8.9	86	5	6.5	Insufficient Data Available to Classify
2	13	9.4	85	4.5	6.5	
3	16	2.5	88	15.5	6.2	
4A	18	3.2	34	14	6.3	
5	18	6.1	63	10	6.4	
5A	6	11.1	88	6.5	6.5	
6	13	10.0	91	7.5	6.5	

Sewage Pollution

The Mousam River receives sewage discharged from an estimated population of 9,000 and industrial wastes from three shoe factories, one fiber and two woolen mills. The majority of these sources of pollution are located in the Springvale-Sanford area where 7,870 people and four mills contribute wastes to the water. The other pollution sources are located in the town of Kennebunk.

Downstream from Sanford the river is used by industries and for game fishing, shell fishing, livestock and bathing. Tests indicate, however, that the water is too highly polluted to be entirely satisfactory for these uses. In the area below Kennebunk shellfish grow in the river which is used for swimming and other recreational purposes, although heavily polluted and therefore unsatisfactory.

Industrial Pollution

The major part of the industrial wastes reaching the Mousam River originate in the city of Sanford. Here two large textile companies and two shoe factories discharge sanitary and industrial wastes.

Industrial pollution in Kennebunk is mainly from shoe and fiber mills, both of which contribute small amounts of untreated liquid wastes.

Sawdust pollution in the Mousam River is insignificant as only two sawmills are located in the area. They are situated in the town of Kennebunk and do not allow waste products to enter the water.

COASTAL WATERSHED ADJACENT TO MOUSAM RIVER

Water sampling stations have not been established in this portion of the sub-basin, consequently no tests have been made.

Sewage Pollution

Six small rivers adjacent to the Mousam River are included in this watershed. They are of relatively small flow and serve small populations, the majority of which are summer residents. They include the Kennebunk, Branch, Merrillard, Webhannet, Ogunquit, and York Rivers. An estimated population of 5,550 discharge sewage to these coastal rivers.

The York River receives untreated sewage from a population of 4,100 in the town of York. Near the ocean the water is used for bathing and other recreation as well as for shell fishing, although it appears to be unsatisfactory for those uses because of heavy pollution.

An estimated population of 600 discharge untreated sewage into the Cape Neddick River from the inland sections near York Beach. Although this water also is apparently unsuitable, it is used for shell fishing, bathing, and other recreation.

The Ogunquit River at Ogunquit receives the effluent from septic tanks serving a population of approximately 3,000. The greater part of this effluent receives chlorination before being discharged near the mouth of the river. Increased facilities are needed here to treat all sewage adequately as this river receives sufficient pollution to be considered unsatisfactory for shell fishing and swimming, but suitable for other recreation.

The Kennebunk River is polluted by the untreated sewage from a population of 400 about one-half of whom are located in Kennebunk and the remainder in Kennebunkport. The water at the mouth of the river is used for game fishing, shell fishing, bathing and other recreation, although it is unsatisfactory because of the pollution load.

Industrial Pollution

Because these small coastal rivers are located in what is primarily a summer resort area, they receive a negligible amount of pollution from industrial wastes.

MUNICIPAL SOURCES OF POLLUTION

Sub-basin 12

Table 6 SEPTEMBER 1950

MUNICIPALITIES*	SOURCES OF POLLUTION (IN NUMBER OF MUNICIPALITIES)	POPULATION SERVED BY SEWERAGE SYSTEM	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE)
HAVING DATA ON POLLUTION LOAD DISCHARGED TO WATERCOURSE	14 (1)	17,180	15,380
HAVING ONLY POPULATION DATA AVAILABLE (DATA ON POLLUTION LOAD TO WATERCOURSE INCOMPLETE OR NOT AVAILABLE)	0	0	NOT APPLICABLE
TOTAL	14	17,180	XXX

*Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 5 industries having 1,030 employees, which discharge sanitary sewage only.

MAJOR INDUSTRIAL SOURCES OF POLLUTION

Sub-basin 12

Table 7 SEPTEMBER 1950

INDUSTRIES	SOURCES OF POLLUTION (IN NUMBER OF PLANTS)	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE*)
PRODUCING ORGANIC WASTES	0	0
PRODUCING ORGANIC WASTES	1	UNDETERMINED
PRODUCING INORGANIC WASTES	0	NOT APPLICABLE
PRODUCING WASTES OF UNDETERMINED TYPE	0	UNDETERMINED
TOTAL	1	XXX

* The term, "population equivalent", is used to compare the strength of an industrial waste with that of domestic sewage. The latter has been found to contribute an average of 0.167 pound B.O.D. per capita per day. If the volume and flow and the 5-day B.O.D. of a given waste are determined, then: Volume (gallons per day) x p.p.m. (parts per million) B.O.D. x 0.00005 = popluation equivalent of waste.

EXISTING MUNICIPAL TREATMENT FACILITIES

Sub-basin 12

Table 8 SEPTEMBER 1950

DEGREE OF TREATMENT PROVIDED	NUMBER		POPULATION SERVED
	MUNICIPALITIES*	PLANTS	
PRIMARY	1	1	3,000
SECONDARY	0	0	0
NO TREATMENT	13 (1)	0	14,180

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 5 industries having 1,030 employees, which discharge sanitary sewage only.

EXISTING INDUSTRIAL* WASTE TREATMENT FACILITIES

Sub-basin 12

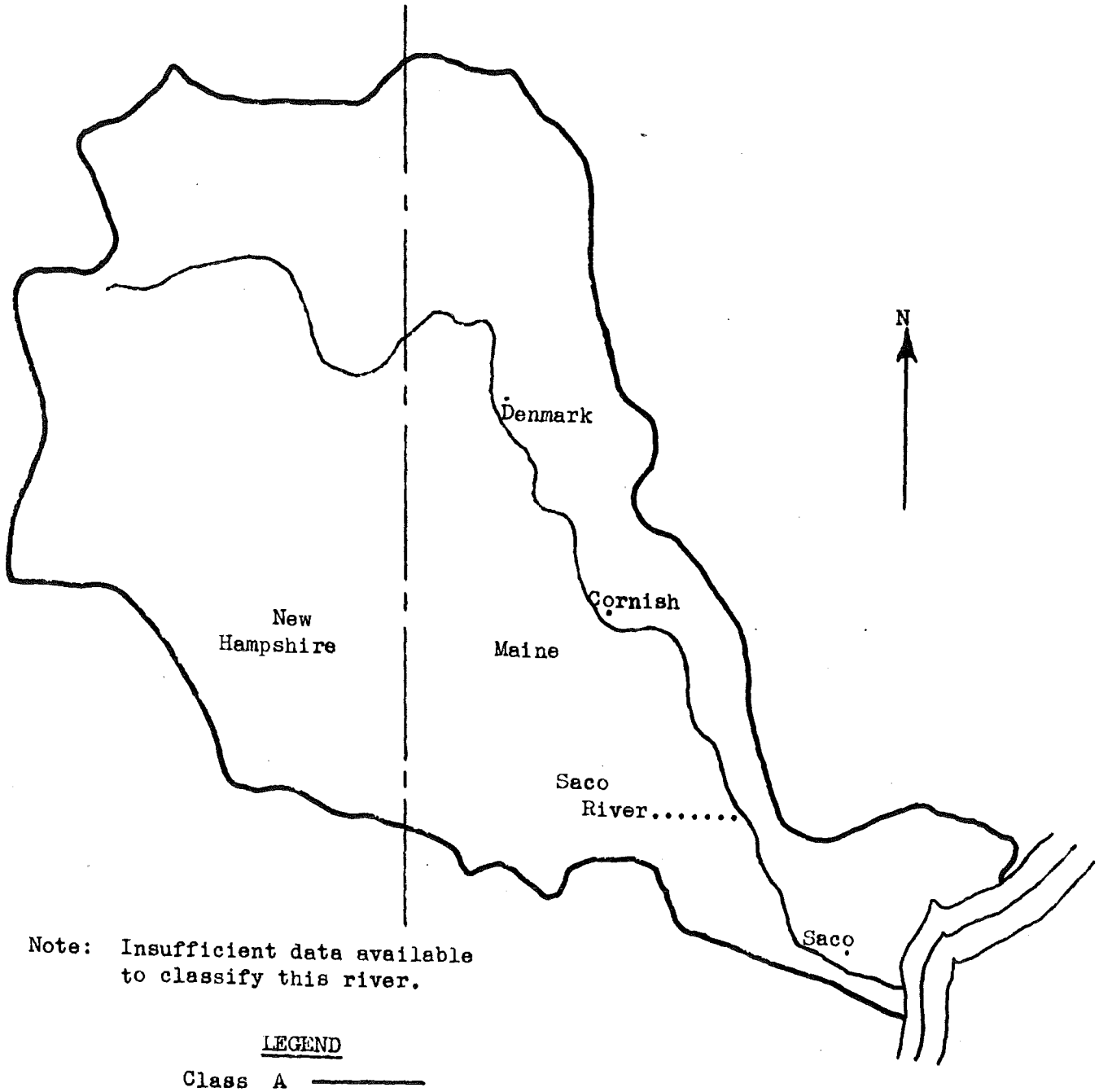
Table 9 SEPTEMBER 1950

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF INDUSTRIAL PLANTS HAVING		
		TREATMENT FACILITIES	NO TREATMENT FACILITIES	UNDETERMINED FACILITIES
FOOD AND KINDRED PRODUCTS				
TEXTILE MILL PRODUCTS	1	0	1	0
PAPER AND ALLIED PRODUCTS				
CHEMICAL AND ALLIED PRODUCTS				
PRODUCTS OF PETROLEUM AND COAL				
RUBBER PRODUCTS				
LEATHER AND LEATHER PRODUCTS				
PRIMARY METAL INDUSTRIES				
FABRICATED METAL PRODUCTS				
MISCELLANEOUS				

*Industries having separate outlets and discharging wastes directly to watercourse.

SUB - BASIN # 13

(Saco River and Adjacent Waters)



Note: Insufficient data available to classify this river.

LEGEND

Class A ——————

" B — — — —

" C ——————

" D ▬ ▬ ▬ ▬

" E ▬▬▬▬▬▬

Fig. 5

SUB-Basin 13

The watershed of the Saco River is 1,700 square miles in area of which 846 square miles are located in the Maine section of Sub-basin 13. The entire area of the Sub-basin is 2,158 square miles including a group of small coastal watersheds. It is a long narrow area about 70 miles in length and 24 miles in width at its widest point. It is bounded on the west by Sub-basin 12 and the Maine-New Hampshire border, and on the east by the Presumpscot River watershed, Sub-basin 14.

The northern section is somewhat mountainous and contains many lakes while in the south there are fewer lakes and the terrain is more even.

The population is mostly concentrated at the southern end of the basin, the cities of Biddeford and Saco having a combined population of over 28,000. The resort centers of Old Orchard Beach, Higgins Beach, Prouts Neck and Biddeford Pool are concentrated in a twenty-mile area along the coast. The population in the remainder of the area is well distributed.

The main economic influence in this sub-basin is mostly concentrated in the cities of Biddeford and Saco and consists principally of the textile and textile machinery industries. The summer resort trade is also highly important to the coastal resort areas.

The Saco River is 121 miles long, has a total fall of 1,890 feet and a watershed of 1,700 square miles. Its major tributaries are the Ossippee River, 8 miles in length, the Little Ossippee, 24 miles long and the Kezar River, 12 miles in length.

SACO RIVER WATERSHED

Water Sampling Stations and Test Results

Only four sampling stations were set up in the Saco River watershed. These are located as follows:

Station No.	Town	Location
1	Fryeburg	Bridge on Route 113
2	Cornish	Cornish-Baldwin Bridge on Route 5
3	Saco	Saco-Biddeford Bridge on Route 5
4	Saco	Saco-Biddeford Bridge near Saco railroad station (lower bridge on eastern side of island)

Tests made on water samples collected at the various stations during the year produced the following average results:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	pH	Tentative Classification
1	22	8.4	94	3.8	6.7	Insufficient Data
2	21	8.2	92	3.8	6.7	Available to
3	22	8.6	96	3.5	6.7	Classify
4	21	8.2	91	3.8	6.6	

Sewage Pollution

Sanitary sewage from a population of over 15,250 in Maine towns and cities is discharged to the Saco River and its tributaries.

Approximately 50 people contribute sewage from the town of Fryeburg, another 75 from West Buxton, and 100 from the town of Bar Mills. Downstream from Fryeburg the river is used as a source of water supply for livestock, for game fishing and wildlife. In addition it serves as a source of domestic and industrial water supply below West Buxton and Bar Mills.

At Biddeford and Saco the river receives its heaviest concentration of sewage from a population of 7,200 and 5,845 respectively. From there to the ocean the river is used for watering livestock, for game fishing, and for shell fishing.

Sewage from a population of 500 in Fryeburg is discharged to Ward Pond and approximately 235 at Kezar Falls contribute wastes to the Ossippee River. The Little Ossippee River is somewhat polluted by the sewage from an estimated population of 80 in Newfield and by Brown Brook which carries the wastes from a population of 200 at Limerick. These tributaries of the Saco River are relatively lightly polluted, and are used as water supplies for livestock and for game fishing and wildlife.

Goosefare Brook, a small stream leading to the ocean receives sewage from an estimated 1,300 in the city of Saco. It has a relatively small flow; consequently it is highly polluted by the wastes it receives. Also the Nonesuch River receives sewage from a population of 350 and due to low flow is likewise heavily contaminated.

The shores of the Atlantic Ocean in the vicinity of Old Orchard Beach and Scarboro show increased pollution near the end of the summer season from populations which are much greater at that time than the 3,000 and 600 people respectively who live in the areas as permanent residents.

The majority of the cities and towns in this sub-basin require new treatment plants if stream pollution is to be reduced.

Industrial Pollution

With the exception of Biddeford and Saco there is relatively little industry in this sub-basin. Only four of the many sawmills contribute to the pollution load. Two such mills are located on the Little Ossipee and one each on the Ossippee River and Ridlon Brook.

Other industrial wastes reaching the Saco River originate mainly from the textile mills in the cities of Biddeford and Saco. Here wastes from various other industries such as a machine shop and rawhide plant also supplement the pollution load. A fiber company upstream in Bar Mills also discharges waste products to the river.

The Ossippee and Little Ossippee Rivers receive textile wastes at Kezar Falls and Limerick respectively.

MUNICIPAL SOURCES OF POLLUTION

Sub-basin 13

Table 10 SEPTEMBER 1950

MUNICIPALITIES*	SOURCES OF POLLUTION (IN NUMBER OF MUNICIPALITIES)	POPULATION SERVED BY SEWERAGE SYSTEM	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE)
HAVING DATA ON POLLUTION LOAD DISCHARGED TO WATER COURSE	17 (1)	34,807	34,241
HAVING ONLY POPULATION DATA AVAILABLE (DATA ON POLLUTION LOAD TO WATERCOURSE INCOMPLETE OR NOT AVAILABLE)	3	7,000	NOT APPLICABLE
TOTAL	20	41,807	XXX

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 1 industry having 92 employees, which discharges sanitary sewage only.

MAJOR INDUSTRIAL SOURCES OF POLLUTION

Sub-basin 13

Table 11 SEPTEMBER 1950

INDUSTRIES	SOURCES OF POLLUTION (IN NUMBER OF PLANTS)	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE*)
PRODUCING ORGANIC WASTES	0	0
PRODUCING ORGANIC WASTES	6	UNDETERMINED
PRODUCING INORGANIC WASTES	1	NOT APPLICABLE
PRODUCING WASTES OF UNDETERMINED TYPE	0	UNDETERMINED
TOTAL	7	XXX

* The term, "population equivalent", is used to compare the strength of an industrial waste with that of domestic sewage. The latter has been found to contribute an average of 0.167 pound B.O.D. per capita per day. If the volume of flow and the 5-day B.O.D. of a given waste are determined, then: Volume (gallons per day) x p.p.m. (parts per million) B.O.D. x 0.00005 = population equivalent of waste.

EXISTING MUNICIPAL TREATMENT FACILITIES

Sub-basin 13

Table 12 SEPTEMBER 1950

DEGREE OF TREATMENT PROVIDED	NUMBER		POPULATION SERVED
	MUNICIPALITIES*	PLANTS	
PRIMARY	0	0	0
SECONDARY	3	3	750
NO TREATMENT	17 (1)	0	41,057

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 1 industry having 92 employees, which discharges sanitary sewage only.

EXISTING INDUSTRIAL* WASTE TREATMENT FACILITIES

Sub-basin 13

Table 13 SEPTEMBER 1950

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF INDUSTRIAL PLANTS HAVING		
		TREATMENT FACILITIES	NO TREATMENT FACILITIES	UNDETERMINED FACILITIES
FOOD AND KINDRED PRODUCTS	1	1	0	0
TEXTILE MILL PRODUCTS	3	0	3	0
PAPER AND ALLIED PRODUCTS	1	0	1	0
CHEMICAL AND ALLIED PRODUCTS				
PRODUCTS OF PETROLEUM AND COAL				
RUBBER PRODUCTS				
LEATHER AND LEATHER PRODUCTS	1	0	1	0
PRIMARY METAL INDUSTRIES				
FABRICATED METAL PRODUCTS	1	0	1	0
MISCELLANEOUS				

* Industries having separate outlets and discharging wastes directly to watercourse.

SUB - BASIN # 14

(Presumpscot River and Adjacent Waters)

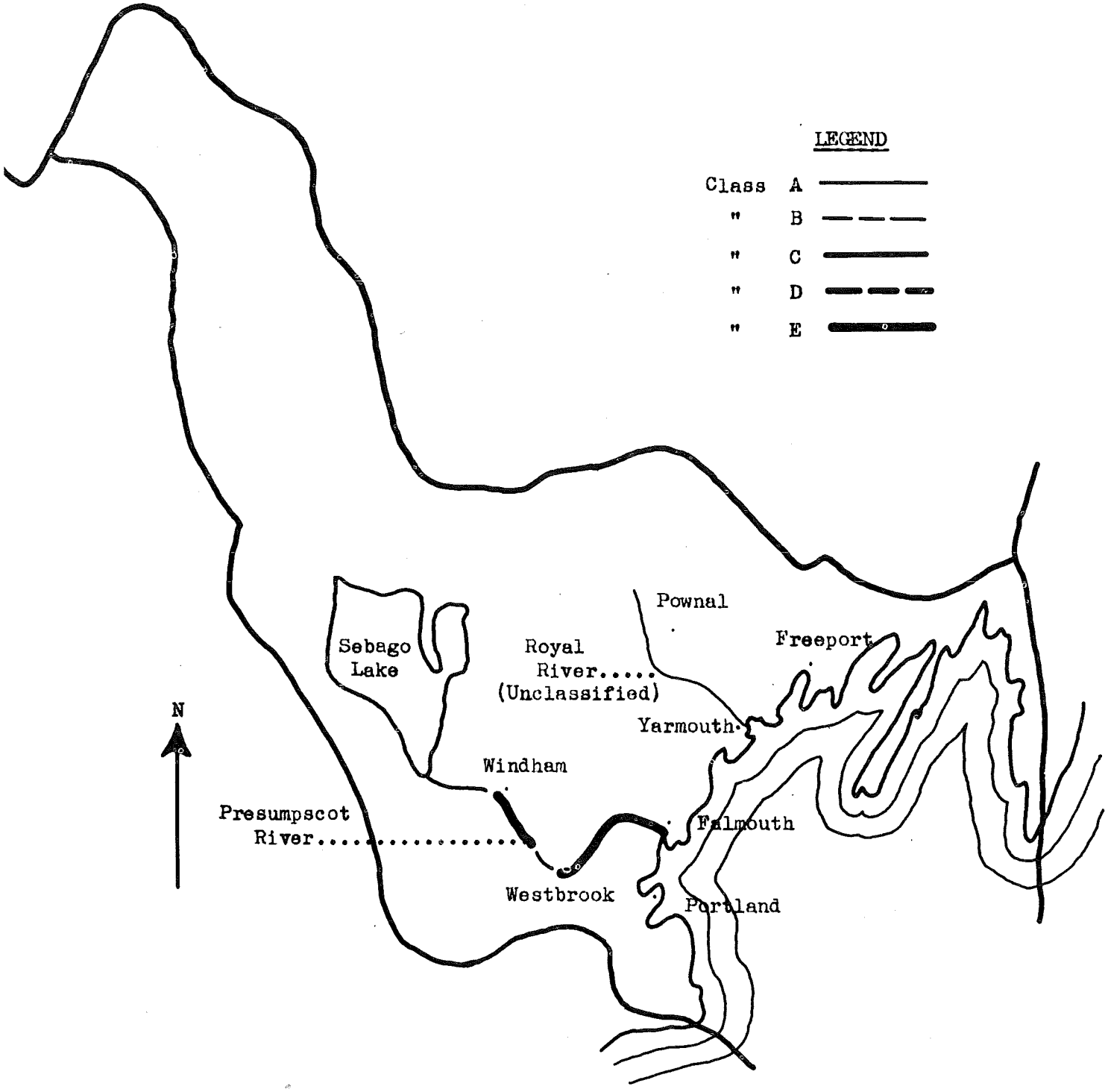


Fig. 6

SUB-BASIN 14

The area of Sub-basin 14 covers approximately 998 square miles, of which 615 square miles represent the Presumpscot River watershed, 97 square miles the Royal River watershed, and 63 square miles the Stroudwater River plus other coastal watercourses. This basin is bounded on the west by the Saco River and on the east and north by the Androscoggin River sub-basins.

The land in this region is hilly in nature and well covered with second growth forests. Of the many lakes located here, Sebago Lake is the largest and is 45 square miles in area.

Approximately 125,000 persons are located in the Portland metropolitan area. The inland population is more evenly distributed and is largely devoted to farming.

Because of its excellent harbor, Portland has become the largest shipping and industrial center north of Boston and it is the major economic influence in the sub-basin.

The Presumpscot River is 24 miles long, starting at Sebago Lake and discharging to the ocean at Falmouth. It has a fall of 262 feet and a watershed of 615 square miles. Its major tributary is the Crooked River with a drainage area of 273 square miles and a fall of 393 feet over its 46 miles of length.

The Royal River discharges to the ocean at Yarmouth. It is 26 miles long, falls 298 feet, and has a 97-square mile drainage area. The three mile long Fore River is actually a tidal estuary rather than a river. Its principal tributary is the Stroudwater River, which is 14 miles in length and has a drainage area of 40 square miles.

Casco Bay in and around Portland Harbor is heavily polluted by domestic sewage and industrial wastes. Untreated sewage from over 74,000 people in Portland and 13,000 in South Portland reaches tidewater. The various industrial wastes discharged to the water include a considerable amount of fish wastes from packing and filleting plants.

The pollution load in the Presumpscot River downstream from Westbrook has recently approached a nuisance condition. This heavy pollution is caused by the sanitary sewage of 10,500 people in Westbrook and by industrial wastes from textile, pulp, and paper mills.

PRESUMPSCOT RIVER WATERSHED

Water Sampling Stations and Test Results

Seven sampling stations have been established on the Presumpscot River. They are located as follows in the towns of Windham, Westbrook, and Falmouth.

Station No.	Town	Location
1	Windham	Bridge across river at Newhall
2	Windham	Mallison Bridge at S.Windham near reformatory
3	Westbrook	Bridge on Cumberland Street
4	Westbrook	Westbrook-Portland Bridge on Route 302
4A	Falmouth	Lambert Street Bridge (west of Route 26)
5	Falmouth	Bridge on Route 26
6	Falmouth	Smelt Hill Power Station (near head of tide)

Samples have been collected at each station on an average of three times a week during the period September to November, 1950.

Sta. No.	Temp. degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	pH	CO_2 p.p.m.	B.O.D. p.p.m.	Alkalinity Phe	Alkalinity MO	Turb.	Classification
1	23.	7.92	--	6.9	0.58	0.68	--	--	--	A
2	23.6	7.34	--	7.7+	--	7.19	--	--	--	E
3	18.1	8.91	95.2	6.76	1.88	1.43	--	1.13	0	A
4	18.6	8.21	89.4	7.98+	--	8.63	0.66	3.59	56	E
4A	51.35	8.80	83.7	7.92+	--	8.15	0.50	3.53	44	E
6	17.6	6.97	72.5	8.22	--	8.87	0.44	3.82	27	E

As a result of tests made during 1950 three graphs have been prepared to show variations in the water characteristics during this interval.

The first graph shows the dissolved oxygen and biochemical oxygen demand at four sampling stations on August 14th - 16th, when minimum conditions for the year were observed. The oxygen concentration at all stations is above the minimum required for fish life, (3.0 p.p.m.) but approaches that value at Station 4, where in addition the biochemical oxygen demand is highest as a result of the pollution load received.

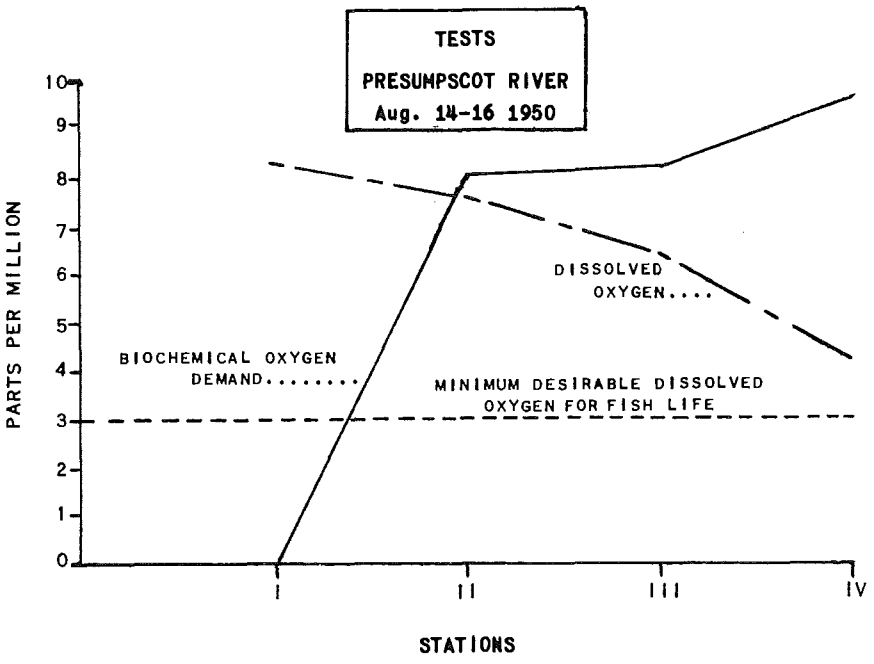


Fig. 7

The pH of the water is indicated on the second graph along with the carbon dioxide concentration showing roughly the effect of the carbon dioxide on the pH, which in the presence of water tends to lower the pH. At Station 1 the CO_2 (carbon dioxide) is high at 2.3 p.p.m., with a 6.9 pH. At Station 2, however, the carbon dioxide has been depleted and the pH has increased to 8.0, a less acidic figure.

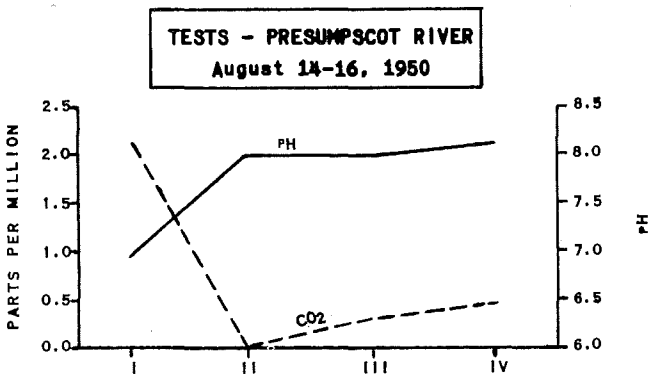


Fig. 8

The turbidity of the water on October 9th to 11th is shown on the last graph. The high degree of turbidity (70 p.p.m.) at Station 2 is indicative of considerable pollution received between Stations 1 and 2.

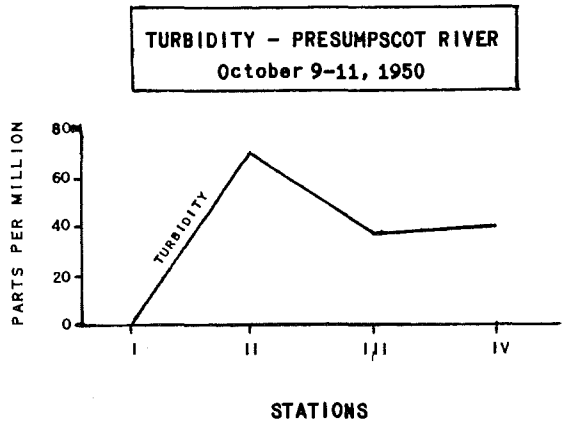


Fig. 9

Sewage Pollution

The Presumpscot River becomes so highly polluted at Westbrook that nuisance conditions prevail from there to its outlet at the ocean. Untreated sewage from over 10,500 people in Westbrook is discharged into the river which, although of unsatisfactory quality, is used to a limited degree for the watering of livestock, irrigation, game fishing, and wildlife. The only sources of pollution of consequence above Westbrook is from the town of South Windham where the sewage of approximately 460 people is emptied into the river.

Tributary waters of the Presumpscot River include Highland Lake and Stevens Brook which are polluted by the sanitary sewage of 200 and 80 people respectively at Bridgton. Long Lake receives sewage from 100 people in Naples. Approximately 300 people in Gorham contribute sewage to Tannery Brook and North Branch River. These tributaries are used chiefly as domestic water supplies and for game fishing.

The Royal River, carrying the sewage from 1,500 people in Pownal and 1,750 in Yarmouth where it discharges to the ocean, is fed by Collyer Brook which carries wastes from 40 people in Gray. Royal River and its tributaries are used for livestock, game fishing and wildlife, and in tidewater for shell fishing.

Over 3,500 people in South Portland add sewage to Fore River, while a tributary, Long Creek, receives the effluent from a septic tank serving 2,000 people in Red Bank Village. Fore River is used mainly for navigation.

Portland Harbor is polluted by the untreated sewage of over 74,000 people in the city. In Cumberland, 200 people contribute to the pollution load, and in Falmouth, 700.

The majority of towns and cities on the watercourses in this area require new treatment plants if pollution of these and tidal waters is to be reduced.

Industrial Pollution

Great quantities of varied industrial wastes are discharged to the tidewaters of Portland Harbor and Fore River. The considerable amount of water exchange, however, which occurs with the ebbing and flowing of the tide helps to maintain a far lower pollution concentration than otherwise could be maintained. Wastes discharged include fish wastes from canning, packing, fish meal, fish-liver oil plants and a variety of other industrial plants.

There are many types of industry in the area, especially along the Presumpscot River in Westbrook where considerable industrial pollution is caused by a textile mill and a large pulp and paper mill. In tributary waters of the Presumpscot River, a woolen mill and a slaughter house discharge waste products to Stevens Brook in Bridgton, while a canning plant adds some pollution to Long Lake in Harrison.

There are over 17 sawmills in Sub-basin 14, ten of which do not allow waste products to enter any watercourse; the other 7, however, discharge various amounts of sawdust to streams. These 7 include 3 mills in Waterford and 1 each in Windham, Cumberland, Casco, and Harrison.

MUNICIPAL SOURCES OF POLLUTION

Sub-basin 14

Table 14 SEPTEMBER 1950

MUNICIPALITIES*	SOURCES OF POLLUTION (IN NUMBER OF MUNICIPALITIES)	POPULATION SERVED BY SEWERAGE SYSTEM	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE)
HAVING DATA ON POLLUTION LOAD DISCHARGED TO WATERCOURSE	20 (1)	11,080	9,425
HAVING ONLY POPULATION DATA AVAILABLE (DATA ON POLLUTION LOAD TO WATERCOURSE INCOMPLETE OR NOT AVAILABLE)	2	84,500	NOT APPLICABLE
TOTAL	22	95,580	XXX

*Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 3 industries, having 285 employees, discharging sanitary sewage only.

MAJOR INDUSTRIAL SOURCES OF POLLUTION

Sub-basin 14

Table 15 SEPTEMBER 1950

INDUSTRIES	SOURCES OF POLLUTION (IN NUMBER OF PLANTS)	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE*)
PRODUCING ORGANIC WASTES	0	0
PRODUCING ORGANIC WASTES	10	UNDETERMINED
PRODUCING INORGANIC WASTES	0	NOT APPLICABLE
PRODUCING WASTES OF UNDETERMINED TYPE	0	UNDETERMINED
TOTAL	10	XXX

*The term, "population equivalent", is used to compare the strength of an industrial waste with that of domestic sewage. The latter has been found to contribute an average of 0.167 pound B.O.D. per capita per day. If the volume of flow and the 5-day B.O.D. of a given waste are determined, then: Volume (gallons per day) x p.p.m. (parts per million) B. O. D. x 0.00005 = population equivalent of waste.

EXISTING MUNICIPAL TREATMENT FACILITIES

Sub-basin 14

Table 16 SEPTEMBER 1950

DEGREE OF TREATMENT PROVIDED	NUMBER		POPULATION SERVED
	MUNICIPALITIES*	PLANTS	
PRIMARY	1	1	125
SECONDARY	2	2	2,200
NO TREATMENT	19 (1)	0	93,255

* Includes incorporated or unincorporated municipalities, sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 3 industries, having 285 employees, discharging sanitary sewage only.

EXISTING INDUSTRIAL* WASTE TREATMENT FACILITIES

Sub-basin 14

Table 17 SEPTEMBER 1950

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF INDUSTRIAL PLANTS HAVING		
		TREATMENT FACILITIES	NO TREATMENT FACILITIES	UNDETERMINED FACILITIES
FOOD AND KINDRED PRODUCTS	6	0	6	0
TEXTILE MILL PRODUCTS	3	0	3	0
PAPER AND ALLIED PRODUCTS	1	0	1	0
CHEMICAL AND ALLIED PRODUCTS				
PRODUCTS OF PETROLEUM AND COAL				
RUBBER PRODUCTS				
LEATHER AND LEATHER PRODUCTS				
PRIMARY METAL INDUSTRIES				
FABRICATED METAL PRODUCTS				
MISCELLANEOUS				

*Industries having separate outlets and discharging wastes directly to watercourse.

SUB - BASIN # 15

(Androscoggin River Watershed)

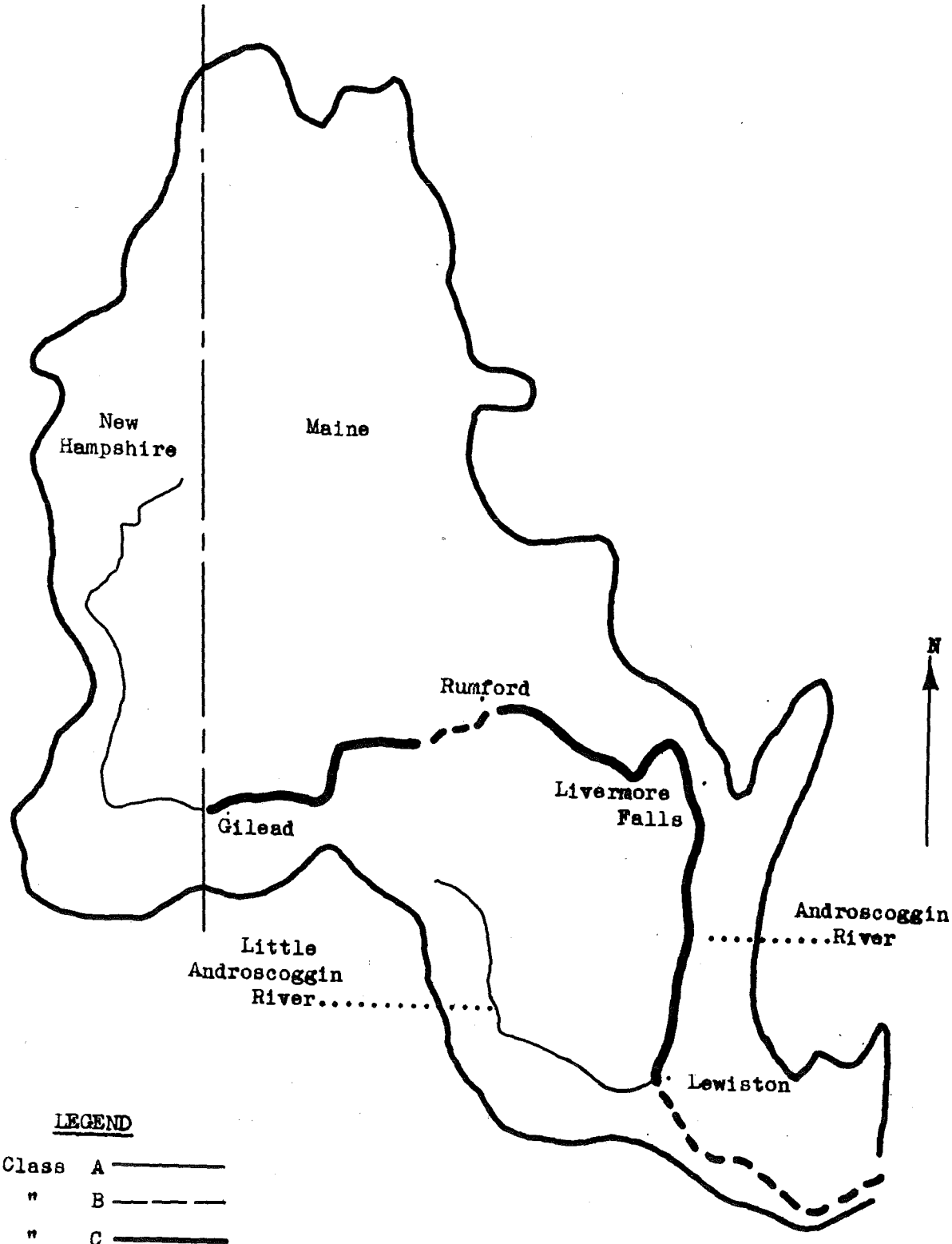


Fig. 10

SUB-BASIN 15

That portion of the Androscoggin River which lies in the Maine Section of Sub-basin 15 is about 2,992 square miles in area. It is bounded on the southwest by the Presumpscot River watershed, on the west by the State of New Hampshire, at the northern tip by Canada, and on the east by the Kennebec River watershed, Sub-basin 16. The entire sub-basin in both Maine and New Hampshire has an area of 3,776 square miles.

The land is rolling and largely devoted to farming in the southern portion but in the northern section it is mostly wooded, constituting a large forest reserve famous for recreational facilities. There are many lakes in this sub-basin, the largest, Mooselookmeguntic Lake, having an area of over 26 square miles, is one of the Rangeley Lakes chain which has a total water area of 65 square miles. This constitutes a large storage area developed for the production of electrical power.

The population of approximately 90,000 is concentrated along the main stem of the Androscoggin River in the central and southern portions of the watershed; 54,000 of whom live in the cities of Auburn and Lewiston. In New Hampshire, 19,700 people live near the river, 18,000 being located in the Berlin area. In other sections, the watershed is sparsely settled, particularly in the northern portion.

A large number of industries which include paper and textile mills are located along the Androscoggin River to take advantage of the high flow and fairly steep fall of the river (6' per mile) which provides a good source of water power.

This sub-basin consists only of the Androscoggin River watershed and no coastal areas are included. The length of the Androscoggin River from its confluence with the Kennebec at Merrymeeting Bay to Umbagog Lake, its headwaters at the Maine-New Hampshire boundary, is 174 miles. Its total fall is 1,245 feet and its watershed is 3,776 square miles in area. There are many brooks and rivers which are tributary to the Androscoggin. The largest of these is the Little Androscoggin, 47 miles long with a total fall of 585 feet and a drainage area of 350 square miles, and the Magalloway River, (partly in New Hampshire) 43 miles long, having a fall of 585 feet and a drainage area of 445 square miles.

The seriously polluted condition of the Androscoggin River over its entire length in Maine has long been recognized but no definite information concerning the sources or extent of the pollution had been obtained until the study initiated by the Sanitary Water Board in 1941 was carried out by the firm of Metcalf and Eddy of Boston, and their report published in 1942. At that time obnoxious odors emanated from the river during the warm months of the year, constituting a public nuisance particularly in the cities of Lewiston and Auburn. Similar conditions existed at other localities, the river as it entered Maine being objectionable and likewise below Rumford, Livermore Falls, Lewiston, Auburn, and Lisbon.

Due to the many and vigorous complaints from residents of the most seriously affected cities and towns, the Attorney General of the State of Maine initiated legal action against the various paper mills emptying industrial wastes into the river above Lewiston and Auburn. The results of this

case have been published previously. Prior to this time the various paper mills affected, in cooperation with the State Department of Health and Welfare had started to make an investigation of the river water to determine the conditions then prevailing and, if possible, develop remedial measures. This work had, however, not progressed beyond the investigational stage and no remedies had been developed before the starting of the above mentioned action.

Following the court action, the three paper mills involved developed a program of conducting tests at various sampling points throughout the critical period of the year, from the first of May to the fifteenth of October, with the understanding that whenever, during the period from the fifteenth of June to the first of October, critical conditions resulted from the lack of dissolved oxygen, the production of sulfite waste liquors would be curtailed proportionately to the capacity of the respective mills until the critical conditions were overcome. Normally this would occur with the increased flow and lower temperatures early in the month of September.

It was determined in 1941 that the B.O.D. of industrial wastes being discharged to the river had a population equivalent of 2,411,000, approximately 90% emanating from pulp and paper mill wastes. Ways and means were studied and developed to reduce the pollution of the river by the lagooning of pulp mill wastes from one of the paper mills during periods of low stream flow. As a result of these tests and other remedial measures, obnoxious odors have been practically eliminated and for the past two years no offensive odors have been observed in the most critical area at the cities of Lewiston and Auburn.

The Little Androscoggin River is also highly polluted. It carries the sewage of 7,700 people and various industrial wastes, and because of unpleasant odors creates nuisance conditions near its mouth at Auburn. Other tributaries of the Androscoggin River are relatively free from pollution.

ANDROSCOGGIN RIVER

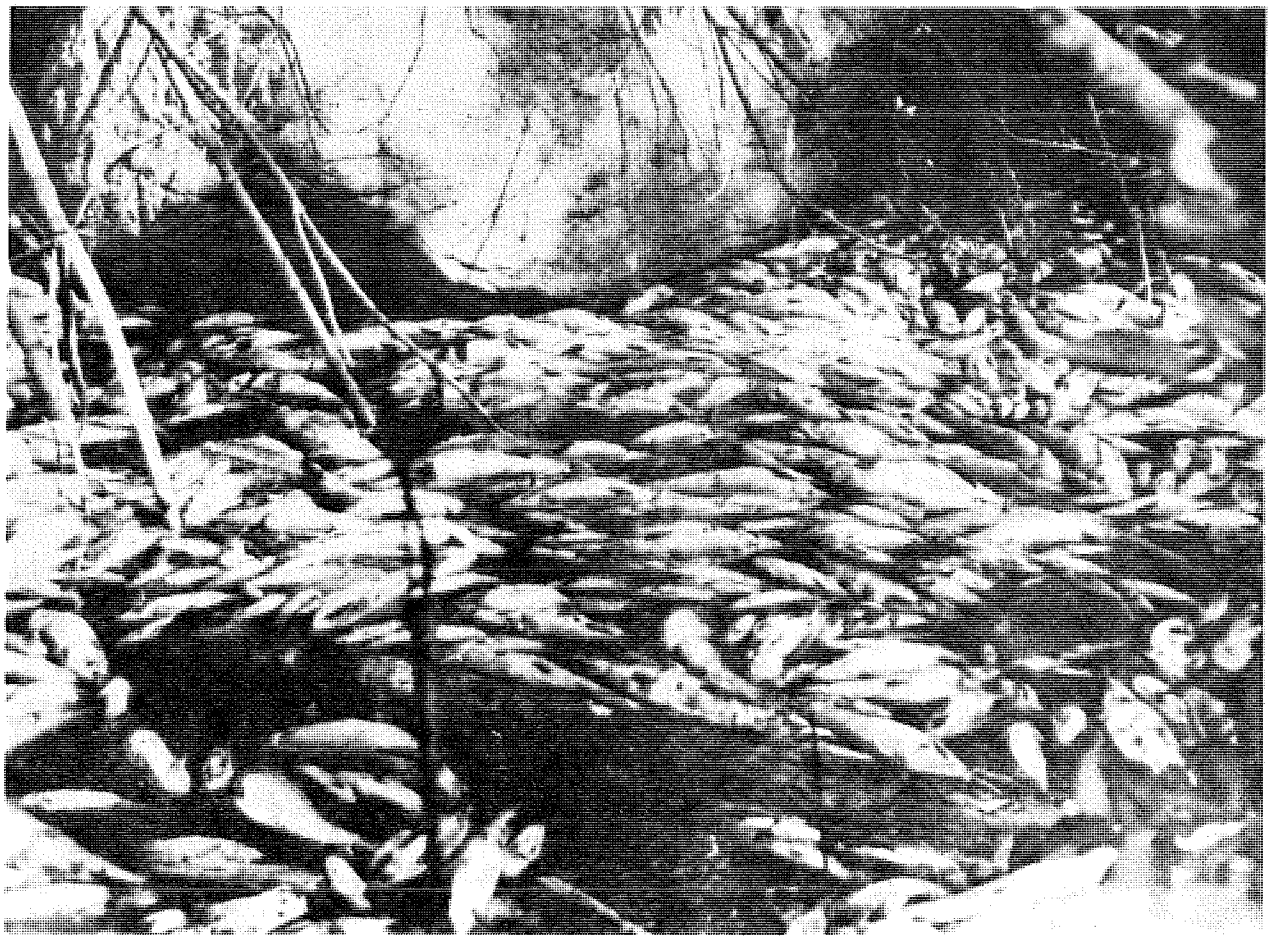
Water Sampling Stations and Test Results

Fourteen semi-permanent stations have been established along the Androscoggin River, the first two of which are located in the State of New Hampshire. The other 12 are in Maine, ranging from the town of Gilead at the western border of the state to Lisbon Falls downstream from Lewiston.

Station No.	Location	Station No.	Location
1	Bell's	8	Riley
2	Twin State	9	North Turner
3	Gilead	10	Turner Center Bridge
4	Bethel	11	Gulf Island
5	Rumford Center	11A	Deer Rips
6	Rumford	11B	Lewiston
7	Dixfield	12	Lisbon Falls

A great many tests have been made of the Androscoggin River during the past several years by chemists of the state as well as by chemists of the several paper companies located along its banks. Since 1946, weekly tests have been made during the warm months under the auspices of the Brown Paper Company, the Oxford Paper Company, and the International Paper Company. Following are the averages of 210 samples taken between May 1st and August 15th, 1950:

Station Number	Temperature Degree Cent.	pH	Dissolved Oxygen	B.O.D. p.p.m.	H_2S	Color	Tentative Classification
1	17.9	6.93	8.57	1.16	0	46	--
2	17.5	6.46	7.27	8.53	0	92	E
3	17.9	6.53	6.84	5.95	0	85	E
4	17.1	6.60	6.73	5.18	0	85	E
5	17.6	6.58	5.66	4.13	0	90	E
6	18.4	6.58	5.11	3.58	0	91	D
7	16.6	6.60	6.30	5.29	0	111	E
8	18.8	6.53	5.07	4.84	0	103	E
9	18.9	6.54	5.71	4.70	0	111	E
10	19.5	6.54	4.12	4.07	0	110	E
11	19.5	6.48	3.32	3.96	.14	111	D
11A	19.9	6.48	3.21	4.13	.09	109	E



DESTRUCTION OF FISH LIFE IN ANDROSCOGGIN RIVER DUE TO POLLUTION.

Station Number	Temperature Degree Cent.	pH	Dissolved Oxygen	B.O.D. p.p.m.	H_2S	Color	Tentative Classification
11B	19.8	6.53	3.78	3.71	Tr.	110	D
12	20.0	6.57	8.17	3.75	0	118	D

Figure No. 11 shows the weekly sulfite pulp production by hundreds of tons. Particularly noticeable is the decrease of production during the period of low stream flow in the summer months. In accordance with the afore mentioned decree, production may be curtailed when the river flow is less than 2,900 c.f.s. at Gulf Island so as to reduce the demand for oxygen in the river to a point where danger of having less than 4.0 p.p.m. of dissolved oxygen at the North Turner sampling station could be minimized. This sampling station is located downstream from all the paper mills.

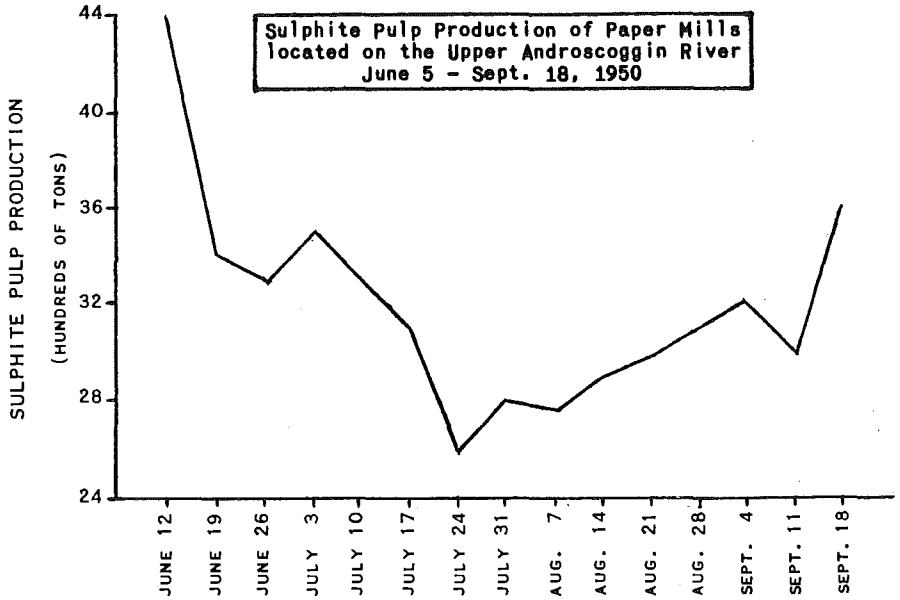


Fig. 11

Figure No. 12 shows the temperature and concentrations of dissolved oxygen and hydrogen sulphide in parts per million from July 13th to September 14th at the Gulf Island sampling station. As indicated, the temperature reaches a maximum of 24.6°C (76.3°F) on July 20th, and after a one-week lag the dissolved oxygen reaches its minimum concentration (0.0 p.p.m.) closely followed by a sharp rise in the H_2S content. As the temperature again declines it is accompanied by a gradual recovery of the dissolved oxygen concentration and reduction of the H_2S.

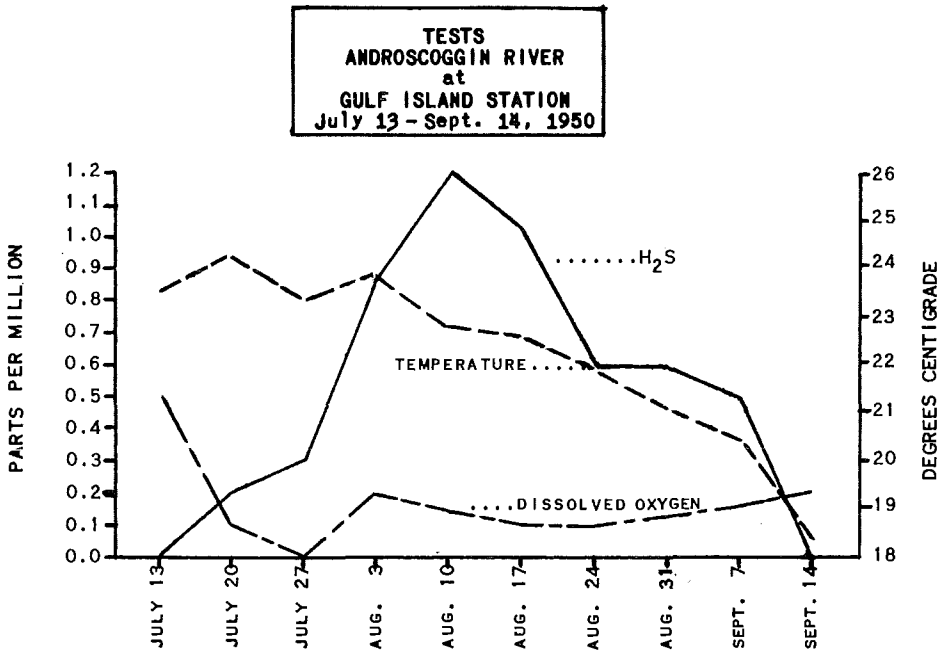


Fig. 12

Figure No. 13 shows a plot of dissolved oxygen and biochemical oxygen demand at the different stations along the river on July 27th when the minimum conditions of 1950 occurred. At stations No. 8, 10, 11, 11A and 11B this concentration is below the minimum value necessary to sustain fish life and at 11 and 11A it reaches a negligible amount. The plot indicates the relationship between the biochemical oxygen demand and the dissolved oxygen concentration. In general, a high demand is accompanied by a reduced oxygen content.

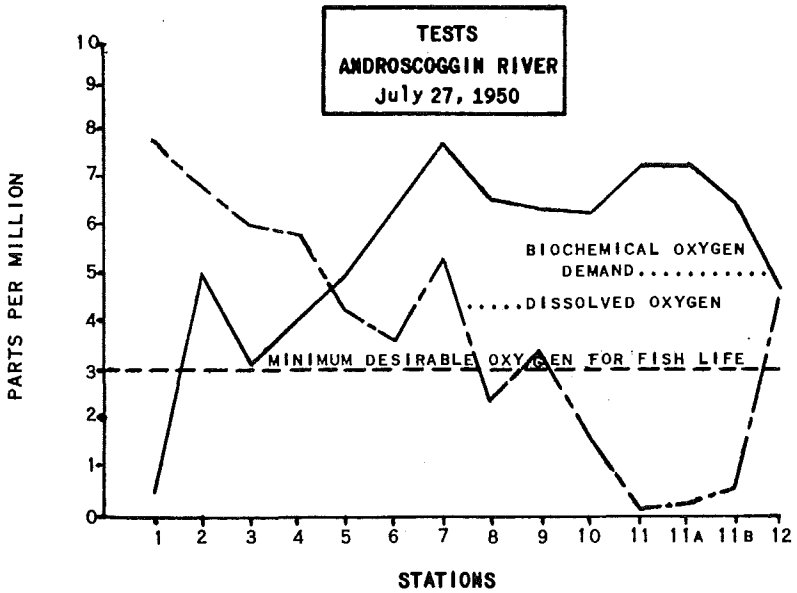


Fig. 13

Figure No. 14 shows the increase in color from a low of 43 at Station 1 to a maximum value of 160 at the last four stations.

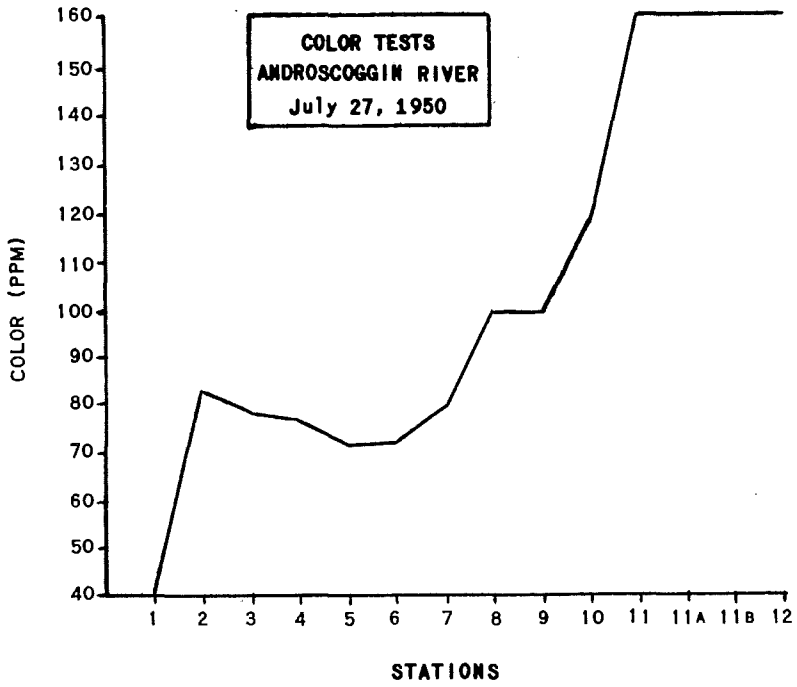


Fig. 14

Figure No. 15 indicates the odor intensities in Lewiston during the critical period from June 15th to September 15th since 1943. The intensity of the Androscoggin River odor was determined by use of the standard method of determination as described in the 1933 edition of "Standard Methods of Water Analysis", A.P.H.A.

Since 1943 daily observations have been made during the summer at eight different locations in Lewiston and Auburn. However, for purposes of comparison of different years, the numbers recorded at the three stations where the frequency of occurrence was the highest, are added together to obtain a daily number and seven such numbers constitute a weekly number. The weekly totals are evaluated as follows:

0 to 42	scarcely noticeable		49 to 58	start of nuisance
43 to 48	odor noticeable		59 up	serious conditions

These numbers are based on atmospheric evaluations made at the stations which at the north and south bridges are over thirty feet from the water, although at the canal bridge the distance is very much less.

A very substantial reduction in odor intensity is indicated as a result of various control measures, so much so that during the past two years the odor intensity has dropped below normally objectionable conditions.

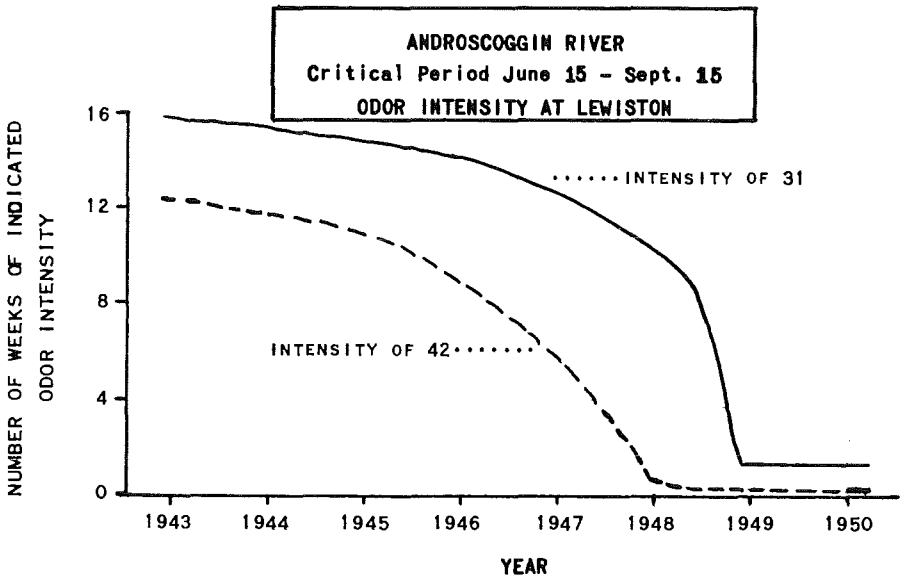


Fig. 15

Sewage Pollution

The sewage of a population of approximately 87,000 is discharged untreated to the Androscoggin River from the cities and towns along its course in Maine. In the town of Rangeley the sewage from a population of 570 is discharged to Rangeley Lake, one of the headwaters of the river. From Umbagog Lake the Androscoggin River flows westerly and southerly in the State of New Hampshire through the villages of Errol, Milan, Berlin and Gorham, so that the river as it reaches the Maine border already has a considerable pollution load.

The sewage from a population of 1,450 in Bethel and 12,710 in Rumford reaches the river untreated. Between Rumford and Lewiston, in the towns of Mexico, Dixfield, Peru, Jay, Chisholm, and Livermore Falls, a total of approximately 20,755 people discharge sewage to the water. In the cities of Auburn and Lewiston a population of over 50,000 add to the pollution by their untreated domestic sewage; downstream 16,000 in the towns of Lisbon Falls, Brunswick and Topsham likewise contribute to the pollution load. All towns and cities located on the river require new treatment plants if stream pollution is to be reduced.

Industrial Pollution

There is considerable industry in the Androscoggin River watershed, the majority of which lies along the main stem of the Androscoggin River.

Upstream from the state border, in New Hampshire, pollution, according to the report of the Maine Sanitary Water Board published in 1942, entitled "Investigation of the Pollution of the Androscoggin River and Remedial Measures", which is equivalent to a population of over 1,500,000 reached the Androscoggin River from pulp and paper mills in Berlin and Gorham. The chief causes of this pollution were sulfite wastes from two mills, one of which

discharged 3,870,000 gallons of wastes per day, having a population equivalent of 958,000 and the other 10,550,000 gallons per day, with a population equivalent of 536,000. At that time in Rumford, Maine, pollution having a population equivalent of 657,400 reached the river. Of this total, 559,000 represented the wastes from sulfite pulp digesters, and 65,000 wastes from a soda process pulp mill. This latter has been nearly eliminated by the installation of improved pulp washing facilities and evaporators of larger capacity. The remainder was principally from paper machines. Also another paper company in Livermore Falls further increased pollution in the river by wastes having a total population equivalent of 98,020 discharged to the water, of which sulfite wastes amounted to 85,000.

Although there have been considerable changes in processes since the report in 1942, yet it might be considered that, except during the critical season, the pollution load is still heavy, and nuisance conditions are averted only by constant checking of conditions, control of wastes being discharged and the addition of chemicals to supplement the dissolved oxygen content of the water.

Wastes from various industries are deposited in the river at Lewiston and Auburn. Most important among these industries are the textile mills at Lewiston and packing companies at Auburn which discharge wastes having population equivalents of 26,200 and 1,835 respectively. In Lisbon Falls a woolen textile mill and a pulpboard mill further increase pollution of the river. The population equivalent of the combined wastes was over 51,000 of which 30,000 was due to the wool scouring wastes from the textile mill. Available information indicates that the pollution load from the pulpboard mill is at present substantially the same as that indicated by the previous report.

Near the mouth of the river a textile mill in Brunswick also discharges a considerable amount of wastes to the water. Two sawmills situated on the banks of the Androscoggin River in the towns of Bethel and Mexico allow considerable sawdust to enter the water.

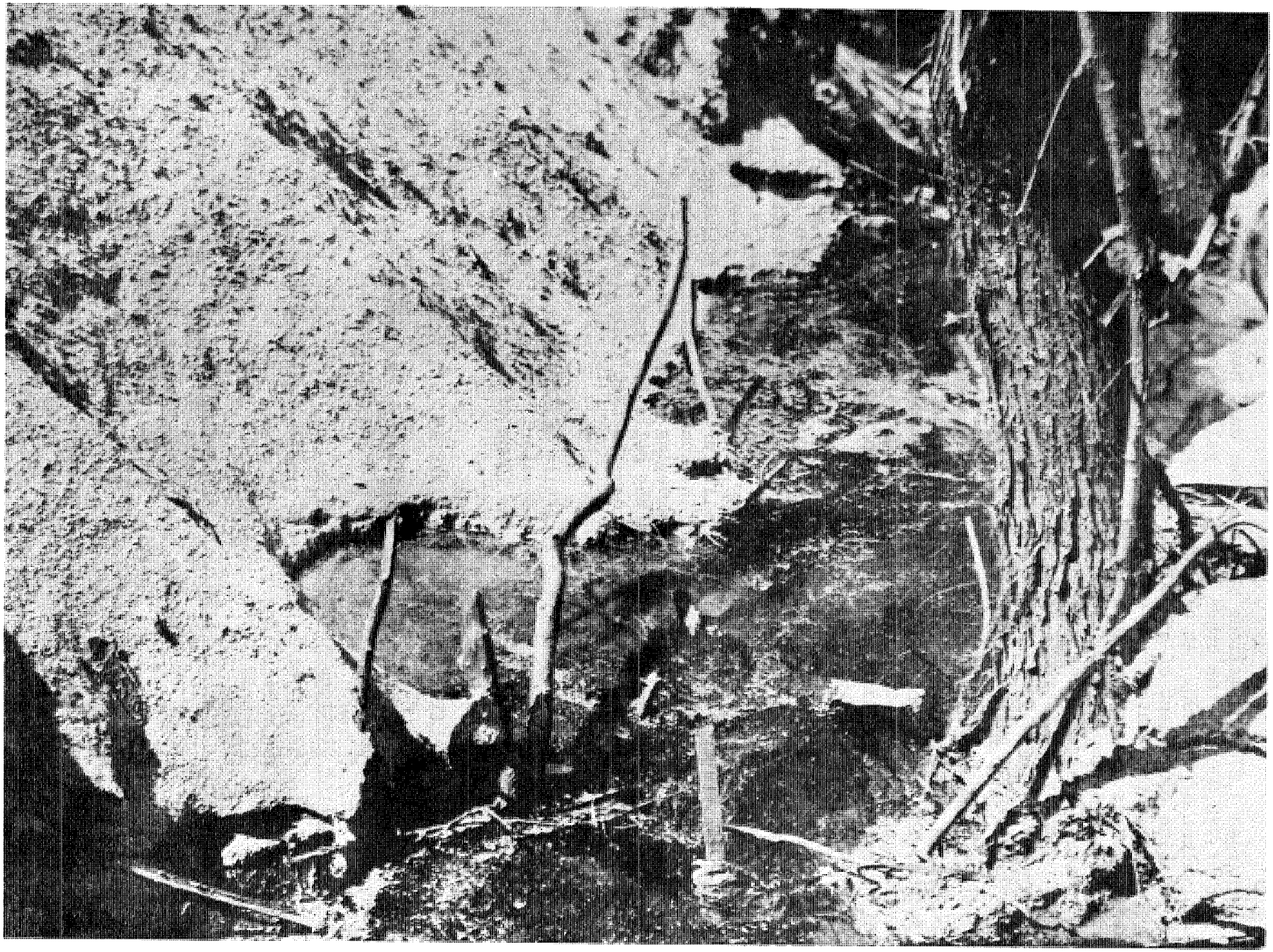
LITTLE ANDROSCOGGIN RIVER AND ITS TRIBUTARIES

The Little Androscoggin River which enters the Androscoggin at Auburn has many small tributaries, but none are of major importance.

Water Sampling Stations and Test Results

Following is a list of the eight sampling stations set up on the river together with their locations:

Station No.	Town	Location
1	Paris	Bridge on Route 26 at South Paris
1A	Paris	West bank below Baxter's Lagoon
1B	Paris	Canadian National R.R. Bridge above lagoon
2	Oxford	Bridge on Route 26 near Norway
3	Mechanic Falls	Bridge on Route 121
3A	Mechanic Falls	River bank behind sub-station
4	Minot	Poland-Minot Bridge on Route 11
5	Auburn	Bridge on old Portland road near Littlefield



SAWDUST PILE NEARLY BRIDGING STREAM. NOTE SAWDUST ON SURFACE OF WATER.

Samples taken at the various stations from 1945 to the present time have produced the following average results:

Station Number	Temperature Degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	pH	Classification
1	19	8.1	86	4.6	6.5	Insufficient Data
1A	20	6.0	65	6.5	8.0+	Available to
2	20	6.5	69	3.3	7.1+	Classify this
3	20	7.4	81	4.1	6.6	River
3A	20	8.3	98	4.0	6.6	
4	21	6.8	75	6.5	6.4	
5	21	7.2	70	4.7	6.5	

Sewage Pollution

The Little Androscoggin River is highly polluted from South Paris downstream to its mouth at Auburn. In the vicinity of Auburn the pollution is so great that odors from the river constitute a public nuisance.

Sewage from a population of 500 in South Paris is treated by means of a modern sewage treatment plant before it is discharged to the river, but wastes from 700 in the town are discharged untreated, as well as from 300 in Oxford, 2,000 in Mechanic Falls, and 1,100 in Auburn.

Tributaries of the Little Androscoggin include Pennesseewassee Lake outlet which is polluted by sewage of a population of 2,300 in Norway; Bog Brook which receives sewage from 300 in West Minot; and Taylor Brook which is polluted to a nuisance condition at Auburn by industrial wastes and sewage from an estimated population of over 500.

The Little Androscoggin and its tributaries are used as sources of industrial and livestock water supplies and for game fishing and wildlife. They are too highly polluted by sewage from the towns in the area, however, to be considered satisfactory for these uses. New treatment plants are needed in each of these towns in order to reduce pollution.

Industrial Pollution

A large number of varied types of industries are located in the Little Androscoggin River watershed. The river receives the direct discharge of wastes from canning plants, a tannery, a paper board mill, and many smaller industries located in the towns of Paris, Poland and the city of Auburn.

Some of the Little Androscoggin River tributaries are polluted near their mouths by industrial wastes such as wool scouring wastes from a woolen mill on Thompson Brook in Oxford, and some industrial wastes from a few woodworking and shoe manufacturing plants reach Penesseewassee Stream in Norway; seasonal wastes from a few canning plants are of some importance during the summer months.

Four sawmills located on the banks of the Little Androscoggin River discharge sawdust to the river in the town of Paris.

MISCELLANEOUS TRIBUTARIES TO THE ANDROSCOGGIN

Other tributaries to the Androscoggin River in Maine include the Ellis, Swift, Webb, Nezinscot, and Sabattus Rivers, as well as numerous smaller rivers and streams. All are of minor importance in relation to the Androscoggin and Little Androscoggin Rivers, where most of the industry in the sub-basin is located.

Water Sampling Stations and Test Results

Water sampling surveys in this watershed have been carried out mainly on the Androscoggin and Little Androscoggin Rivers because of the heavy pollution loads encountered there. As a result, no stations have been set up on the minor tributaries and no samples have been taken during the period of this report.

Sewage Pollution

Some of these tributaries are polluted, especially near their junction with the Androscoggin River. Alder Stream receives untreated sewage from a population of 94 in Lockes Mills. Swift River is polluted by sewage of a population of 70 in Roxbury and 600 in the town of Mexico. About 250 in Dixfield contribute sewage to the Webb River. Spear Stream, Whitney Brook, and the Nezinscot River receive sewage from populations numbering 100, 80, and 250 respectively in West Peru, Canton, and Buckfield. The Sabattus River receives the heaviest domestic sewage load of any river in this group, being polluted by populations of 120 in Sabattus, 750 in Lisbon, and is fed by No Name Brook which receives sewage from 750 in Lewiston.

Industrial Pollution

The major part of the industrial wastes reaching these tributaries is from 16 sawmills. There are 4 such mills on the Webb River, three of which cause considerable pollution. Two mills on Spear Stream allow wastes to enter the water, along with two mills on the Ellis River. There are two mills each on the Swift and Nezinscot Rivers, one of which in each case allows sawdust to enter the streams. On Bear Pond outlet, Concord River, Crooked River, and Martin Stream there are individual sawmills discharging wastes to the water. Several others are located in this sub-basin, but do not cause any significant stream pollution.

MUNICIPAL SOURCES OF POLLUTION

Sub-basin 15

Table 18 SEPTEMBER 1950

MUNICIPALITIES*	SOURCE OF POLLUTION (IN NUMBER OF MUNICIPALITIES)	POPULATION SERVED BY SEWERAGE SYSTEM	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE)
HAVING DATA ON POLLUTION LOAD DISCHARGED TO WATERCOURSE	34 (1)	47,050	45,447
HAVING ONLY POPULATION DATA AVAILABLE (DATA ON POLLUTION LOAD TO WATERCOURSE INCOMPLETE OR NOT AVAILABLE)	4	62,700	NOT APPLICABLE
TOTAL	38	109,750	XXXX

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 5 industries, having 1,917 employees, discharging sanitary sewage only.

MAJOR INDUSTRIAL SOURCES OF POLLUTION

Sub-basin 15

Table 19 SEPTEMBER 1950

INDUSTRIES	SOURCES OF POLLUTION (IN NUMBER OF PLANTS)	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE*)
PRODUCING ORGANIC WASTES	1	670,000
PRODUCING ORGANIC WASTES	19	UNDETERMINED
PRODUCING INORGANIC WASTES	0	NOT APPLICABLE
PRODUCING WASTES OF UNDETERMINED TYPE	0	UNDETERMINED
TOTAL	20	XXXX

* The term, "population equivalent", is used to compare the strength of an industrial waste with that of domestic sewage. The latter has been found to contribute an average of 0.167 pound B.O.D. per capita per day. If the volume of flow and the 5-day B.O.D. of a given waste are determined, then: Volume (gallons per day) x p.p.m. (parts per million) B. O. D. x 0.00005 =population equivalent of waste.

EXISTING MUNICIPAL TREATMENT FACILITIES

Sub-basin 15

Table 20 SEPTEMBER 1950

DEGREE OF TREATMENT PROVIDED	NUMBER		POPULATION SERVED
	MUNICIPALITIES*	PLANTS	
PRIMARY	0	0	0
SECONDARY	2	2	2,050
NO TREATMENT	36 (1)		107,700

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 5 industries, having 1,917 employees, discharging sanitary sewage only.

EXISTING INDUSTRIAL* WASTE TREATMENT FACILITIES

Sub-basin 15

Table 21 SEPTEMBER 1950

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF INDUSTRIAL PLANTS HAVING		
		TREATMENT FACILITIES	NO TREATMENT FACILITIES	UNDETERMINED FACILITIES
FOOD AND KINDRED PRODUCTS	5		5	
TEXTILE MILL PRODUCTS	3		3	
PAPER AND ALLIED PRODUCTS	8		8	
CHEMICAL AND ALLIED PRODUCTS	1		1	
PRODUCTS OF PETROLEUM AND COAL				
RUBBER PRODUCTS	1		1	
LEATHER AND LEATHER PRODUCTS	2	1	1	
PRIMARY METAL INDUSTRIES				
FABRICATED METAL PRODUCTS				
MISCELLANEOUS				

* Industries having separate outlets and discharging wastes directly to watercourse.

SUB - BASIN # 16

(Kennebec River and Adjacent Waters)

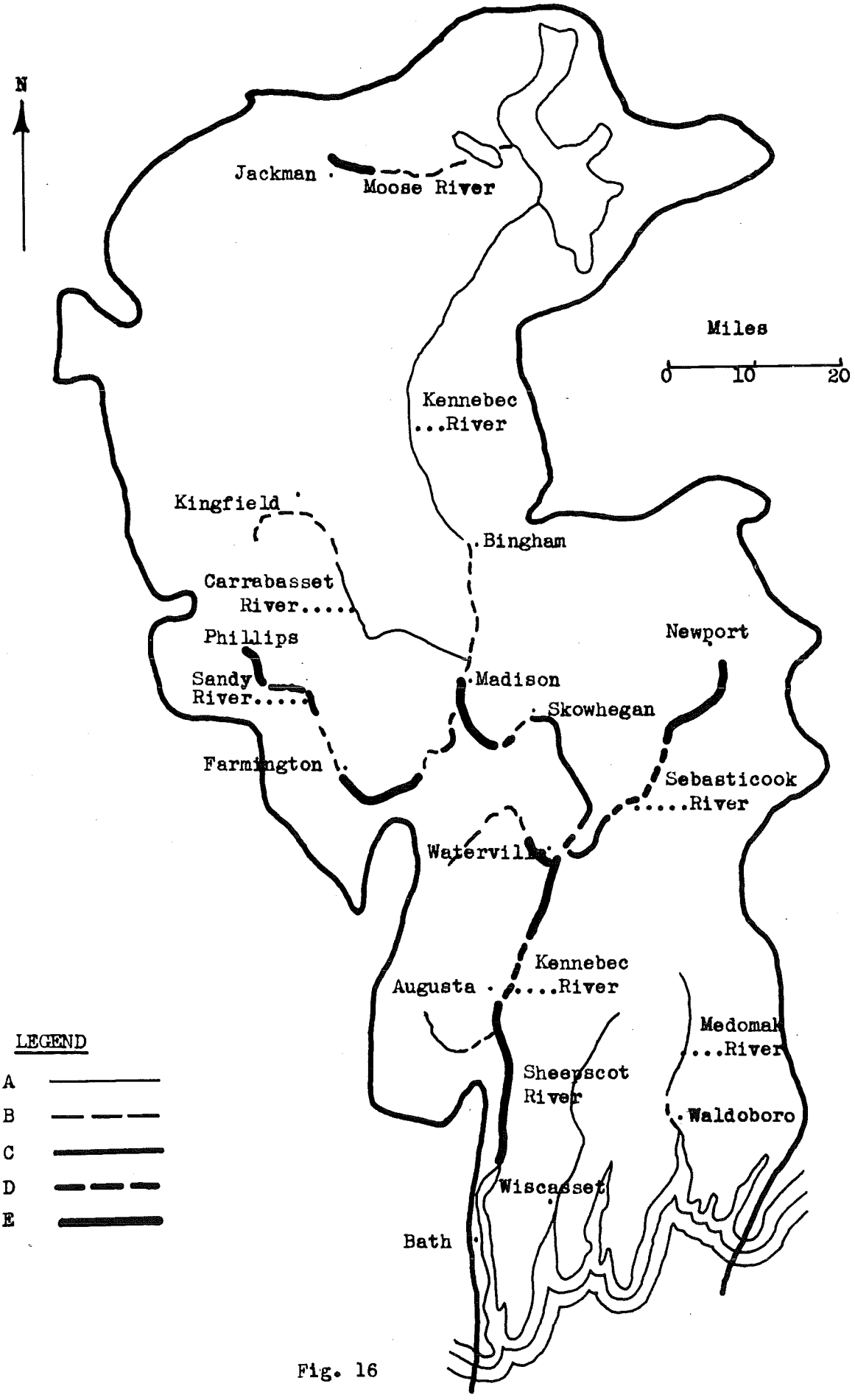


Fig. 16

SUB-BASIN 16

The Kennebec River Watershed and the drainage areas of a few coastal streams are included in this sub-basin. It is the third largest in the state, and covers about 7,090 square miles, 5,970 of which constitute the Kennebec River watershed. It is bounded on the west by the Androscoggin River watershed and Canada, on the north and east by the Penobscot River watershed, and at the southern tip by the Atlantic Ocean.

The land is rolling and moderately open in the south and central sections, and is mountainous and heavily wooded in the north. There are many large lakes in the sub-basin, especially in the extreme northern portion where Moosehead Lake, the largest lake in the state, covering 117 square miles, is located.

The population is generally concentrated along the main stem of the Kennebec River in the southern half of the sub-basin; from North Anson downstream to its mouth there is a population totaling 92,300 in the cities and towns bordering the river, including the cities of Waterville, Augusta, Gardiner and Bath having populations of 16,700, 19,400, 6,000 and 10,200 respectively. A moderately heavy rural population is distributed throughout the remainder of the lower section. In the central section of the sub-basin the population is more sparse, and in the northern part the population is practically nil.

The economy of the watershed is diversified as there is considerable manufacturing, farming, lumbering and tourist trades spread throughout the area. The textile mills in Waterville, the State Capitol in Augusta, and the shipyards in Bath are among the more important special economic influences.

The Kennebec River which has a fall of 1,028 feet, has an extent of 170 miles from its source, Moosehead Lake to its confluence with the Androscoggin River at Merrymeeting Bay. The total watershed area is 5,970 square miles. The main tributaries to the Kennebec are: the Sebasticook River, 72 miles long, falling 700 feet; Dead River 66 miles long, falling 1,277 feet; Moose River, 66 miles long with a fall of 762 feet; Sandy River, with a length of 66 miles and a fall of 1,520 feet; and the Carrabasset River, 43 miles long falling 2,447 feet.

Pollution in the Kennebec River has been found to be heaviest from Waterville downstream to Merrymeeting Bay. This gross pollution results from the accumulation of sanitary sewage and industrial wastes and reaches a maximum at Gardiner. A population of over 65,500 contribute sewage to the Kennebec and over 30,000 to its tributaries. A wide variety of industrial wastes are also present, including sulphite pulp liquors, sawdust, and from wool dying and washing.

A minor pollution problem is found in Annabessacook Lake, a tributary watercourse of Cobbosseecontee Stream, where algae growth resulting partially from pollution at Winthrop becomes a nuisance to the summer residents of the area.

The Sebasticook River is somewhat polluted over a major part of its length, as are its larger tributaries; however, the load is not sufficient to cause a public nuisance except for a few limited areas.

KENNEBEC RIVER

Water Sampling Stations and Test Results

Twenty-five sampling stations were set up along the Kennebec River. These extend from the township of Sapling at the East Outlet of Moosehead Lake to Richmond shortly upstream from the salt water area at the mouth of the river. Following is a list of these stations with a description of their locations:

Station Number	Town	Location
1E	Sapling	Face of dam at East Outlet
1F	Taunton and Raynham	Face of dam at West Outlet
1D	The Forks	Bridge on Route 201
1C	Pleasant Ridge	Rocky point near highway just north of Wyman Dam
1A	Pleasant Ridge	Face of Wyman Dam
1G	Embden	Railroad bridge above dam at Solon power station
1B	Solon-Embden line	Bridge on Route 201
1	Anson	Railroad bridge across river
2	Madison	East bank at Hollingsworth and Whitney spring near cemetary just off Route 201 near Norridgewock town line.
2A	Anson	Carrabasset River at North Anson (same as Carrabasset River station 6)
3	Norridgewock	Below confluence of the Sandy River
4	Norridgewock	Bridge on Route 201
5	Skowhegan	Bridge on Route 2 above dam
6	Fairfield-Clinton line	Bridge at Hinckley on Route 24
7	Fairfield	Keyes Fiber Co. water intake at Shawmut
8	Fairfield-Benton	Middle Bridge on Route 11
9	Winslow	At water intake of Hollingsworth & Whitney mill
10	Waterville-Winslow line	Bridge above dam on Route 201
11	Augusta	Log boom at barker of Kennebec Pulp & Paper Co.
12	Gardiner	Cobbossecontee Stream Bridge above water company (same as Cobbossecontee Stream station 6)
13	Gardiner	Cobbossecontee Stream Bridge near railroad station (same as Cobbossecontee Stream station 7)
14	Randolph	Gardiner Bridge on Route 27
15	Gardiner	Old wharf at South Gardiner
16	Richmond	Dresden Bridge on Route 197

During the period of this report many samples were taken at the various sampling stations, the analysis of which gave the following average results:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	B.Coli m.p.n.	Tentative Classification
1A	20	8.1	87	2.5	.6	6.8	43	A
1B	19	8.2	88	3.0	.7	6.6	460	B
1C	23	7.5	86	3.0	-	6.8	-	B
1D	21	8.5	95	3.0	.8	6.8	460	B
1E	20	8.5	95	2.0	.8	6.8	75	B
1G	16	8.1	83	2.0	.8	6.6	460	B
1	19	8.2	88	2.5	.5	6.7	1,100	C
2	20	7.4	86	3.0	1.4	6.7	24,000	E
2A	23	7.9	91	1.5	-	6.9	-	A
4	20	7.7	82	4.0	1.5	6.7	15,000	E
5	21	7.2	78	5.0	1.3	6.6	460	B
6	22	6.7	75	4.0	1.5	6.6	1,200	C
7	21	6.2	69	5.0	.8	6.5	240	C
8	22	7.6	84	4.0	.4	6.6	4,600	C
9	20	6.3	69	5	.7	6.5	1,100	C
10	20	6.1	64	7	2.5	6.2	11,000	E
10A	23	7.4	85	4	1.1	7.0	11,000	E
11	22	5.0	58	9	4.4	6.2	4,600	D
12	25	8.0	95	2	-	7.1	-	-
13	24	7.7	90	3	-	7.0	-	-
14	22	4.2	51	10	3.8	6.2	46,000	E
15	22	2.9	34	12	4.2	6.1	24,000	E
16	22	2.5	29	15	0.6	5.9	11,000	E

Figure No. 17 shows the concentration and percentage saturation of dissolved oxygen as well as the biochemical oxygen demand on August 31st to September 15th, 1949. This does not represent minimum conditions, but is the most recent set of data available from all stations. The water at Station 1E and 1D, located at the headwaters of the river, is in an unpolluted state. Here the dissolved oxygen content is high at 8.5 p.p.m. and the biochemical oxygen demand is low at 0.8 p.p.m. The water quality downstream gradually declines until minimum conditions are reached at Station 15. The D.O. at that point is 1.5 p.p.m., less than is required to sustain fish life, and the B.O.D. is 4.2 p.p.m. A gradual stream recovery is indicated at Station 16 with an increase in the oxygen concentration and a decrease in the B.O.D.

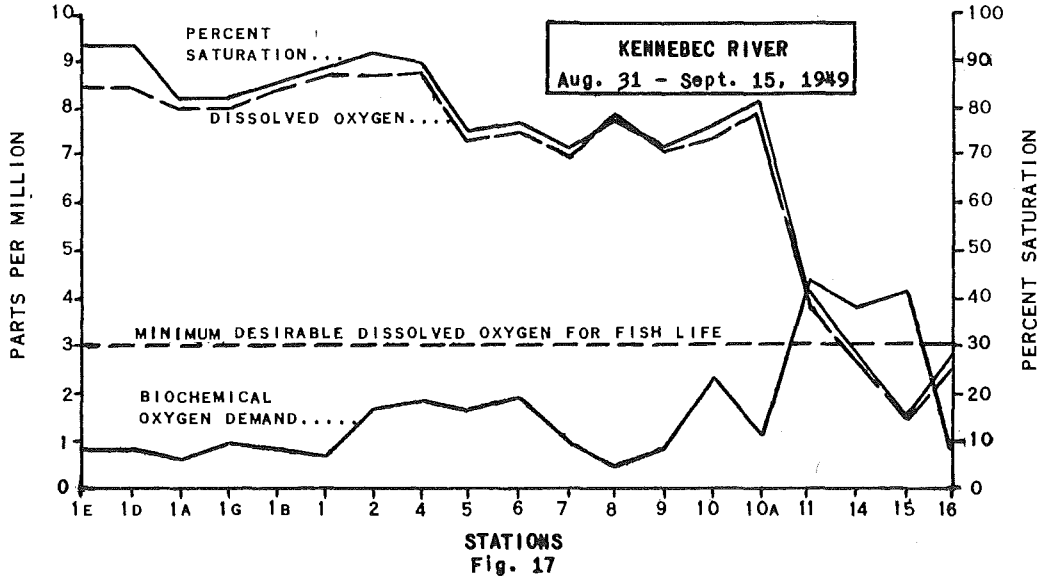


Fig. 17

On Figure No. 18 are plots of the pH and carbon dioxide concentration which indicates the relationship between the two values. When the CO_2 concentration is increased, the acidity of the water is also increased causing a decrease in the pH (the logarithm, to the base 10 of the reciprocal of the concentration of hydrogen ions in an aqueous solution).

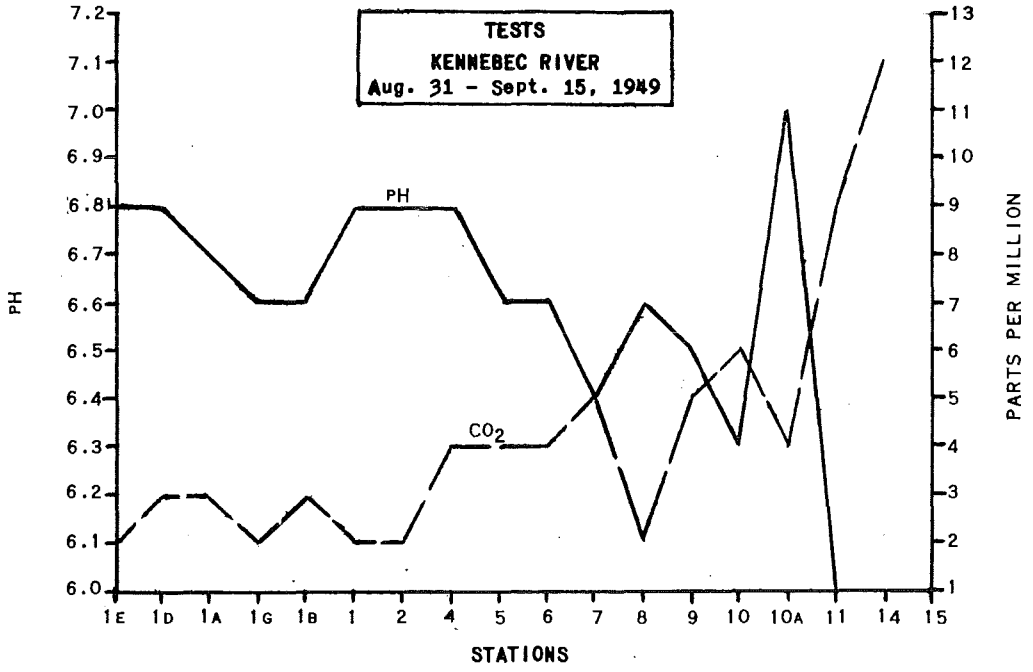


Fig. 18

Sewage Pollution

The Kennebec River receives raw sewage from a population of about 65,500 in the fifteen larger cities and towns along its banks. These range from Bingham in the north to Bath in the south.

The untreated sewage from about 550 is discharged to the river at Bingham. This load is insufficient, however, to cause appreciable pollution, therefore the river remains comparatively uncontaminated downstream to the town of Madison where additional sewage from a population of 2,750 and some industrial wastes are discharged to the water. Here the river shows evidence of pollution which continues in varying degrees of intensity downstream throughout its entire length to Merrymeeting Bay.

Upstream from Madison the river is used mainly for watering livestock, game fishing and wildlife. From there downstream as far as Richmond it serves also as a source of water for domestic and industrial uses, and for log driving.

Between Madison and Fairfield the untreated sewage of an estimated 375, 750, and 6,000 population respectively is discharged to the river from the towns of Anson, Norridgewock, and Skowhegan. Considerable quantities of industrial wastes are contributed at Norridgewock and Skowhegan.

At Fairfield the river receives the sewage of a population of 1,550, and downstream in the city of Waterville another 12,000 add to the sewage

pollution. The Kennebec River is navigable from Augusta, which has a population of 20,000, to the coast, and receives in addition sanitary sewage from a population of approximately 2,000 in Hallowell, 700 in Farmingdale, 5,000 in Gardiner, 375 in Randolph and 1,650 in Richmond. The municipal water supply for Richmond is obtained from the river, but although filtered and chlorinated, is not considered to be a satisfactory source of water supply.

Between Richmond and Bath is located a very large wild water fowl harborage which is an important factor in local economy.

At Bath a population of 11,260 contribute raw sewage to the river which is now a tidal estuary where shellfishing is an important industry but much of the area is closed to the digging of clams because of excessive bacterial contamination.

Industrial Pollution

The Kennebec River area is highly industrialized and consequently receives large quantities of industrial wastes.

At Bingham a dairy, a veneer mill, and a dowel mill discharge industrial wastes to the river. Two paper and two textile mills in Madison discharge their waste liquids through private sewers to the river. At Norridgewock there are three food canning plants and one shoe factory, all but one of which are served by private sewers which lead to the river.

Industrial pollution at Skowhegan results mainly from two textile mills, both of which discharge considerable quantities of waste chemicals. There are also three dairies, three shoe shops, and one bottling plant located in the town which contribute some industrial wastes to the water. All industries except one textile mill are served by the public sewerage system.

In the town of Fairfield there are a woolen mill, a wood fiber mill, and a dairy which discharge untreated wastes to the river through either public or private sewerage systems.

In Waterville, shoddy, pulp, woolen, and cotton mills are the main sources of pollution. All are served by the public sewerage system or have private sewers discharging into the river.

At Winslow a large pulp and paper mill contributes considerable volume of sulfite and other wastes.

In Augusta, a paper mill, nine dairies, three bottling plants, three laundries, two shoe shops, and an ice cream plant add to the industrial waste load of the Kennebec; of these, the paper mill contributes large volumes of sulfite wastes. Normally a small abattoir and rendering works contribute some wastes but at the time of the survey were not in operation.

No industrial wastes are contributed at Hallowell and at Gardiner the majority of the industrial wastes are emptied into Cobbosseconteé Stream and are discussed in connection with that tributary.

There are eight sawmills along the Kennebec River. Two of these mills

are located in both Skowhegan and Augusta, and one each in Bingham, Solon, Chelsea, and Gardiner. Only three of these allow significant amounts of sawdust or other wood wastes to enter the water.

SEBASTICOOK RIVER and TRIBUTARIES

The Sabasticook River enters the main stem of the Kennebec River at Winslow. There are ten rivers and streams in this tributary watershed which are listed below, together with their sampling stations.

Water Sampling Stations and Test Results

Station Number	Town	Location
		Sebasticook River
1A	Hartland	West bank at Baxter's water intake
1B	Hartland	Face of dam below Baxter's east side
1	Hartland	Upper bridge in village
2	Palmyra	West Bridge abutment at Thompsons
3	Palmyra	Bridge on Route 2 at West Palmyra
4	Pittsfield	Bridge on Waverly Avenue
5	Pittsfield	Bridge on Hunnewell Avenue
6	Pittsfield	Detroit town line, out Peltoma Avenue
7A	Pittsfield	Face of dam at C.M.P.C.
7	Burnham	Bridge at village
8	Clinton	Bridge at village
9	Benton	Bridge at village on Route 139
10	Winslow	Bridge on Route 100
		East Branch Sebasticook River
1A	Dexter	Bridge across Lake Wasookeag
1B	Dexter	Bridge on Lincoln Street
1	Dexter	Bridge from Grove St. to Church St.
2	Dexter	Corinna town line at bridge
3	Corinna	Bridge at Lincoln Mills
4	Corinna	Face of dam at Corundel Lake
5	Corinna	Face of dam at Moosehead Woolen Co.
6	Newport	Bridge on county road near Lake Sebasticook
7	Newport	Face of dam at Sebasticook Lake (North St.)
8	Newport	River bank about 3/4 mile below village (reached from end of Spring Street)
9	Detroit	Bridge on Route 220 at village
		Unnamed Stream at Detroit
1	Detroit	Bridge on Route 220
2	Detroit	Bridge at village just off Route 220

Station Number	Town	Location
		Sandy Stream
1	Freedom	Above dam at Freedom Lumber Co.
2	Freedom	Below Monmouth Packing Co., small bridge
2A	Freedom	Bridge on Route 137
3	Unity	Bridge above junction with Halfmoon Stream
4	Unity	Bridge below junction with Halfmoon Stream
5	Unity	Bridge on Route 139
6	Unity	Bridge over outlet of Unity Pond
7	Burnham	Bridge over Twenty-five Mile Stream
		Plymouth Pond and Martin Stream
1	Plymouth	Bridge over pond on Route 7
2	Plymouth	Bridge below village about half mile from lake
3	Newport	Bridge near cemetery
		Hall Brook
1	Thorndike	Bridge on Route 220
2	Thorndike	Bridge about 1/4 mile upstream from #1
		Beaver Brook
1	Clinton	At railroad bridge above tannery
2	Clinton	Bridge on Route 100
		Mill Stream
1	Albion	Face of dam at sawmill on Benton Road
2	Albion	About 100 yards downstream behind milk pond and about 200 yards below station #1
		Unity Pond
1	Unity	At point on small brook or drainage ditch, which carries waste of Portland Packing Company plant about 100 feet from lake where the fence crosses.

During 1948 and 1949 many tests were made on samples taken from these sampling stations. Following are the average readings of the tests made at the various stations:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	B.Coli m.p.n.	Tentative Classification
			Sebasticook					
1A	20	7.9	86	5	.4	6.8	2400	C
1B	20	7.3	78	7	2.6	6.6	240000	E
2	20	3.1	34	12	1.6	6.6	240000	E
3	20	4.0	43	9	-	6.5	430	D
4	20	6.1	66	8	-	6.8	93	C
5	21	6.6	73	6	10.6	6.8	43000	E
6	19	7.0	74	6	.8	6.9		
7A	19	7.8	84	3	1.1	7.0	1100	C
8	18	9.1	95	2	1.1	7.3	2400	C
9	18	9.1	95	1	.7	7.4	4600	C

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	B.Coli m.p.n.	Tentative Classification
			East Branch Sebasticook					
1A	20	8.3	90	4	.3	7.3	43	A
1B	21	6.5	75	4	19.0	7.3	93000	E
1	21	8.4	92	2	1.0	7.3	93	B
2	19	7.3	86	4	4.8	7.5	2400000	E
3	20	9.3	101	2	1.5	7.8	4600	E
4	22	5.8	65	6	1.8	7.1	26	A
5	22	7.5	84	42	3	7.7	1500000	E
6	21	5.3	59	7	2.8	7.2	24000	E
7	20	7.2	89	3	.6	7.2	23	A
9	21	8.2	91	5	.9	7.4	11000	E
			Unnamed Stream at Detroit					
1	19	9.9	106	3	1.3	7.4	460	B
2	19	7.8	83	5	4.7	7.0	460	E
			Sandy Stream					
1	26	4.9	60	13	.7	6.6	1100	D
2	26	6.2	76	5	.4	6.8	11000	E
2A	-	-	-	-	-	-	24000	E
3	-	-	-	-	-	-	11000	E
4	18	7.9	83	5	1.7	6.8	2400	C
5	20	8.1	88	4	1.3	7.0	460	B
6	21	7.2	80	3	.6	6.6	29	A
7	20	8.3	90	3	.8	7.0	24000	E
			Plymouth Pond and Martin Stream					
1	25	5.7	68	4	1.0	7.0	23	C
2	26	7.8	96	4	1.2	7.4	110000	E
3	26	8.7	105	4	.2	7.4	460	B
			Hall Brook					
1	26	.8	10	17	31	6.8	120	E
			Mill Stream					
1	19	8.7	93	5	2.4	7.0	240	B
2	18	7.4	77	5	7.9	7.0	24000	E
			Unity Pond (Outlet to packing co. drain)					
1	17	0	0	246	580	5.2	460000	E

Sewage Pollution

A considerable amount of sewage pollution from an estimated 10,000 population is discharged to the Sebasticook River from the larger centers of population.

From Hartland and Dexter through Winslow the river serves as an industrial and livestock water supply, as well as for game fishing and wildlife. In Hartland a population of 500 contribute raw sewage to the river; in Pittsfield 2,420 contribute raw sewage, and in Winslow, 1,380. At Pittsfield there is a small septic tank receiving sewage from a population of approximately 300, and at Clinton a similar tank serving approximately 500, the effluent from each then discharging to the river.

The East Branch of the Sebasticook River from Dexter to its mouth receives sewage from an estimated population of 5,050, of which 2,500 are located in Dexter, 1,150 in Corinna and 1,500 in Newport.

The water of Fornam Brook below Pittsfield, where it receives the sewage of a population of 1,000 is used for industrial and livestock water supply, and for game fishing and wildlife. China Lake Outlet serves the same uses below the villages of East and North Vassalboro where 790 contribute to the sewage load.

Industrial Pollution

There is a moderate amount of industrial pollution in this watershed, the major portion of which occurs along the two branches of the Sebasticook River. Of the 22 sawmills in the area, 14 are situated on tributary streams and contribute considerable quantities of sawdust and other wood wastes. The main part of the industrial pollution in the Sebasticook River originates in the towns of Hartland, Pittsfield, and Clinton, where such industries as canneries, woolen mills, slaughter houses, and a tannery contribute their respective waste products directly to the water.

Most of the industry along the East Branch of the Sebasticook River is located in the towns of Dexter, Corinna, and Newport. The most important wastes are the dye wastes from woolen mills, 6 of which empty into the river; and it also receives some pollution from canneries, bottling plants, creameries, etc.

Sandy Stream receives wastes from canneries in Freedom and Unity and some drainage from a pea viner in Thorndike. Some of the smaller streams and brooks in the area carry wastes from a few industrial establishments. In Harmony a shoe factory, yarn mill, and dairy discharge wastes into Higgin Stream; and at Plymouth a woolen mill and slaughter house, to Martin Stream. A creamery in Detroit on Unnamed Brook and a slaughter house and a creamery in Albion on Mill Stream dispose of wastes directly into the water. A woolen mill located in the town of Vassalboro contributes industrial wastes to China Lake Outlet.

There are 8 sawmills on the Sebasticook and its East Branch, three of which allow various amounts of sawdust to enter the water. There are 2 sawmills on Indian Stream and one each on Mill, Ferguson, Martin, Sandy, Alden, Stetson, Twenty-Five Mile, Carlton, and Branch Mill Streams, also at Hall

Brook, Addition Brook, and China Lake Outlet, seven of which discharge waste products into the stream on which located.

DUMP ON BANKS OF STREAM WHICH ALSO CONTAINS TANNERY WASTES.

COBBOSSECONTEE STREAM and TRIBUTARIES

Water Sampling Stations and Test Results

This small watershed tributary to the Kennebec contains Cobbossecontee Stream and Lake, Lakes Annabessacook and Maranacook, and Wilson Stream, and are listed below with their sampling stations.

Station Number	Town	Location
		Cobbossecontee Stream
1	Winthrop	Bridge at outlet of Lake Maranacook
2	Winthrop	About 400 yards downstream from mill
3	Monmouth	Wilson Stream bridge near lake
4	Monmouth	Bridge on Route 135 at East Monmouth
5	Manchester	Bridge at outlet of Cobbossecontee Lake
6	Gardiner	Bridge on Route 9 at water company
7	Gardiner	Bridge near railroad station
		Lake Annabessacook
1	Winthrop	Bridge at outlet of Lake Maranacook (same as Cobbossecontee Stream Station #1)
2	Winthrop	North bank behind last house on Morton Street (same as Cobbossecontee Stream Station #2)
3	Winthrop	East side of lake, well off shore, about 1/3 mile from inlet
4	Winthrop	East side of lake, well off shore, about opposite Locke's cottage
5	Winthrop	Middle of lake at narrows
6	Winthrop	West side in front of Sandy Beach
		Wilson Stream
1	Monmouth	Gate at dam at Wilson Pond at North Monmouth
2	Monmouth	Bridge on old Route 100 near No. Monmouth
3	Monmouth	Dam at outlet of Cochnewagan Pond
4	Monmouth	Bridge on Route 135 one mile below village
5	Monmouth	Bridge across stream near Lake Annabessacook (same as Cobbossecontee Stream Station #3)

Following are the average results of the various tests made on samples from this watershed:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	B.Coli m.p.n.	Tentative Classification
			Cobbossecontee Stream					
1	20	8.7	95	2.0	1.3	7.0	210	B
2	21	7.2	80	63	7.2+	4.6	46,000	E
3	21	6.8	70	6	2.2	6.4	1,500	C
4	22	8.5	96	4	2.7	7.0	43	B
5	23	7.1	82	4	.3	6.8	73	A
6	22	7.9	90	3	.4	7.0	240	B
7	22	7.8	88	4	3.3	7.0	24,000	E
			Lake Annabessacook					
2	21	7.2	-	63	7.2+	4.6	46,000	E
6	21	6.3	-	6	2.2	6.4	15,000	E
7	22	8.5	-	4	2.7	7.0	43	B
			Wilson Stream					
1	20	7.6	82.8	2.5	0.3	6.7	43	A
2	20	7.6	82.8	3	1.5	6.8	110,000	E
3	19	8.3	92.4	2	0.6	7.0	24,000	E
4	19	7.6	81.3	5	0.9	6.7	240,000	E
5	21	6.3	70	6	2.2	6.4	1,500	C

Sewage Pollution

A population of approximately 3,430 in the towns of Winthrop and Monmouth and the city of Gardiner contribute untreated sewage to the waters of the Cobbossecontee drainage area. Of this number 2,165 are located in Gardiner on Cobbossecontee Stream. In Winthrop, the wastes from 1,015 reach Lakes Annabessacook and Maranacook and Mill Stream. Wilson Stream in Monmouth is polluted by the sewage from approximately 250.

Except for water in the above areas, this tributary watershed of the Kennebec River is relatively unpolluted. Water here serves a wide variety of uses: as a municipal, industrial, and livestock water supply, game fishing, wildlife, swimming, and other recreation.

Because of the heavy waste load and relatively small flow of Cobbossecontee Stream at Gardiner, it becomes highly polluted from the center of the city to its mouth at the Kennebec River.

The sanitary sewage, together with some industrial wastes, such as dye wastes from the woolen mills, have caused discoloration of Lake Annabessacook near the inlet and promoted the growth of algae, which has caused an objectionable condition. In recent years summer residents along the shores of the lake have been annoyed by the algae growths causing undesirable characteristics of the water.

Industrial Pollution

The main sources of industrial pollution in this drainage area originate from the localities of Gardiner, Winthrop and Monmouth. Except for these and seven sawmills, there are no other sources of industrial wastes in the watershed. There are two sawmills each on small streams in Manchester, Readfield and Litchfield, and one located in Monmouth. The mill in Monmouth and one of those in Manchester are the only two which allow a noticeable amount of waste products to enter the streams.

In Gardiner there are two paper mills and two shoe factories, a plastic plant, and a winery which are all situated on Cobbossecontee Stream and dispose of waste products to the water.

Woolen, oil cloth and linoleum mills, and a cannery located in Winthrop contribute some industrial wastes, of which spent dye wastes are the most objectionable. A cannery and felt mill located in Monmouth discharge some waste products to Lake Annabessacook.

SANDY RIVER

Water Sampling Stations and Test Results

This tributary enters the Kennebec River between Madison and Norridgewock and consists mainly of the Sandy River and Wilson Stream. Sampling stations are located at the following twelve locations:

Station Number	Town	Location
		Sandy River
1	Phillips	Penstalk above dam in village
2	Strong	Bridge just off Route #4
3	Farmington	Bridge on Route 4 above the town
4	Farmington	Bridge on Route 2
5	Farmington	Chesterville town line bridge (Farmington Falls just off Route 2)
6	New Sharon	Bridge on Route 2
7	Norridgewock	Dam at power station
		Wilson Stream
1	Wilton	Bridge at outlet of Wilson Pond (in park)
2	Wilton	Foot bridge near Davis Court
3	Wilton	Bridge at East Wilton
4	Chesterville	Bridge at North Chesterville
5	Chesterville	Bridge on Route 156 near Farmington Falls

Following are the results of tests made on water samples taken at the various stations during 1949:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	B.Coli m.p.n.	Tentative Classification
			Sandy River					
1	21	8.8	97	13	1.3	6.4	24,000	E
2	19	8.5	91	3	.1	6.8	4,600	C
3	21	8.5	94	4	.4	6.8	240	B
4	21	7.6	84	4	2.8	6.8	240,000	E
5	22	8.0	90	5	2.2	6.8	24,000	E
6	21	8.1	90	4	1.9	6.8	43,000	E
7	22	8.5	96	3	1.2	7.2	150	B
			Wilson Stream					
1	19	8.1	86	3	.4	6.8	9	A
2	21	6.5	67	1.5	25.6	7.7	25,000	E
3	22	2.0	21	9.0	11.8	6.6	28,500	E
4	20	4.0	44	9.0	2.8	6.4	240	D
5	19	7.5	80	8.0	4.0	6.6	460	D

Sewage Pollution

A comparatively small population contributes sanitary sewage to the Sandy River drainage area. The Sandy River itself receives sewage from an estimated population of 4,445; 175 in Philips, 220 in Strong, 3,850 in Farmington, and 200 in New Sharon. Wilson Stream in Wilton receives the sewage of about 2,506. Lemon Stream in Starks and Valley Brook in Strong receive wastes from a population of 75 and 150 respectively.

All waters in this area are used for livestock water supply, game fishing, wildlife, and bathing. Sandy River below Farmington, however, and Wilson and Lemon Streams are considered to be too highly polluted to be satisfactory for these uses.

Industrial Pollution

With the exception of sawmills and canneries, the industrial pollution of the Sandy River is almost negligible. There are thirteen sawmills in this small watershed, one of which, located in Chesterville, directly pollutes the Sandy River with sawdust wastes.

On the tributary streams and brooks there are two mills each in Strong, Farmington, Chesterville, New Sharon, and Wilton; and one each in Mercer and Starks. Of these twelve sawmills, three add considerable amounts of sawdust to the water, five cause slight pollution, and four do not discharge any wastes to nearby waters. Other industrial wastes consist of wash waters from 4 canneries and a dairy in Farmington.

One cannery in Chesterville, a cannery and a dairy in New Sharon add to pollution of the Sandy River, as do two canneries, a shoe factory, and a

woolen mill located on Wilson Stream in Wilton.

CARRABASSET RIVER

This tributary enters the Kennebec River at North Anson.

Water Sampling Stations and Test Results

Eight sampling stations have been set up on the Carrabasset River and Gilman Stream.

Station Number	Town	Location
		Carrabasset River
1	Kingfield	River bank about one mile above village
2	Kingfield	Bridge over West Branch at village
3	Kingfield	Bridge over river on Route 142
4	New Portland	Old suspension bridge near New Portland
5	New Portland	Bridge on Route 146 at East New Portland
6	Anson	Bridge on Route 201 at North Anson
		Gilman Stream
1	New Portland	Bridge at North New Portland
2	New Portland	Bridge near East New Portland

During 1949 the following results were determined from tests made on various samples of water taken from the above sampling stations:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	B.Coli m.p.n.	Tentative Classification
			Carrabasset River					
1	23	9.4	108	5	.9	7.0	240	B
2	23	8.2	95	5	.4	6.8	460	B
3	24	7.6	89	3	.4	7.0	1,500	C
4	23	8.1	93	3	1.3	7.2	23	A
5	23	8.6	99	3	.9	7.2	23	A
6	25	7.8	93	3	.8	7.2	1,500	C
			Gilman Stream					
1	24	8.1	95	3	1.5	6.8	460	B

Sewage Pollution

The Carrabasset River is polluted by the raw sewage from a population of 900 in Kingfield and 305 in North Anson, where Mill Stream also receives sewage from over 250. The water of this drainage area is used as a livestock water supply and for game fishing.

Industrial Pollution

Significant industrial wastes in the Carrabasset Watershed are contributed by only one sawmill on the Carrabasset River in North Anson.

OTHER TRIBUTARIES of the KENNEBEC RIVER

A great many small rivers, streams, and brooks are tributary to the Kennebec River. Some of the more important are Moose River, Dead River, Wesserunset Stream, Carrabasset Stream, Messalonskee Stream, and Togus Brook.

Water Sampling Stations and Test Results

The four sampling stations set up on the Moose River are as follows:

Station Number	Town	Location
1	Jackman	Bridge on Route 201
2	Jackman	North river bank about one mile downstream
3	Rockwood	South river bank on point near old shed in pasture on Route 15
4	Rockwood	South river bank, float at Lincoln Camps

It appears desirable in evaluating the test results to refer to the classification system described in the discussion on Inland Surveys. Under this classification the analysis of water samples from Moose River taken at each of the four stations along its course shows a Class E, or highly polluted condition of the water at Jackman, which recovers to a Class B or relatively unpolluted condition at Long Pond. While the Moose River covers a large drainage area, it is considered a minor tributary because of the small population served and relatively low flow rate.

The drainage area covered by the Dead River is also large in size. It contains the villages of Eustis and Stratton. All water samples taken from this river indicate a Class B condition.

Wesserunset Stream is mainly Class B and Class C except for a Class E condition at Skowhegan. Carrabasset Stream ranges from Class A at its headwaters to Class C at its mouth at the Kennebec River.

From Oakland, through Waterville, to the Kennebec, Messalonskee Stream is highly polluted. It ranges from Class C to Class E in the populated areas. Togus Brook reaches Class E pollution at Randolph, just upstream from its mouth at the Kennebec River.

Sewage Pollution

A population of 700 contribute untreated sewage to the Moose River at Jackman. Messalonskee Stream receives sewage from populations of 1,500 and 5,680 in Oakland and Waterville, respectively.

Industrial Pollution

The only industry polluting these rivers and streams to any extent is the sawmill industry which contributes significant amounts of wastes.

SAWDUST BED COVERING SURFACE OF CLAM FLAT IN TIDEWATER.

MUNICIPAL SOURCES OF POLLUTION

Sub-basin 16

Table 22 SEPTEMBER 1950

MUNICIPALITIES*	SOURCES OF POLLUTION (IN NUMBER OF MUNICIPALITIES)	POPULATION SERVED BY SEWERAGE SYSTEM	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE)
HAVING DATA ON POLLUTION LOAD DISCHARGED TO WATERCOURSE	68 (1)	75,521	74,894
HAVING ONLY POPULATION DATA AVAILABLE (DATA ON POLLUTION LOAD TO WATER COURSE INCOMPLETE OR NOT AVAILABLE)	7	25,430	NOT APPLICABLE
TOTAL	75	100,951	XXX

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 16 industries, having 2,946 employees, discharging sanitary sewage only.

MAJOR SOURCES OF INDUSTRIAL POLLUTION

Sub-basin 16

Table 23 SEPTEMBER 1950

INDUSTRIES	SOURCES OF POLLUTION (IN NUMBER OF PLANTS)	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE*)
PRODUCING ORGANIC WASTES	0	0
PRODUCING ORGANIC WASTES	45	UNDETERMINED
PRODUCING INORGANIC WASTES	0	NOT APPLICABLE
PRODUCING WASTES OF UNDETERMINED TYPE	0	UNDETERMINED
TOTAL	45	XXX

* The term, "population equivalent", is used to compare the strength of an industrial waste with that of domestic sewage. The latter has been found to contribute an average of 0.167 pound B.O.D. per capita per day. If the volume of flow and the 5-day B.O.D. of a given waste are determined, then: Volume (gallons per day) x p.p.m. (parts per million) B.O.D. x 0.00005 = population equivalent of waste.

EXISTING MUNICIPAL TREATMENT FACILITIES

Sub-basin 16

Table 24 SEPTEMBER 1950

DEGREE OF TREATMENT PROVIDED	NUMBER		POPULATION SERVED
	MUNICIPALITIES*	PLANTS	
PRIMARY	4	4	1,005
SECONDARY	0	0	0
NO TREATMENT	71 (1)	0	99,946

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 16 industries, having 2,946 employees, discharging sanitary sewage only.

EXISTING INDUSTRIAL* WASTE TREATMENT FACILITIES

Sub-basin 16

Table 25 SEPTEMBER 1950

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF INDUSTRIAL PLANTS HAVING		
		TREATMENT FACILITIES	NO TREATMENT FACILITIES	UNDETERMINED FACILITIES
FOOD AND KINDRED PRODUCTS	18	0	18	0
TEXTILE MILL PRODUCTS	18	0	18	0
PAPER AND ALLIED PRODUCTS	6	0	6	0
CHEMICAL AND ALLIED PRODUCTS				
PRODUCTS OF PETROLEUM AND COAL				
RUBBER PRODUCTS				
LEATHER AND LEATHER PRODUCTS	2	1	1	0
PRIMARY METAL INDUSTRIES				
FABRICATED METAL PRODUCTS				
MISCELLANEOUS	1	0	1	0

* Industries having separate outlets and discharging wastes directly to watercourse.

SUB - BASIN # 17

(Penobscot River and Adjacent Waters)

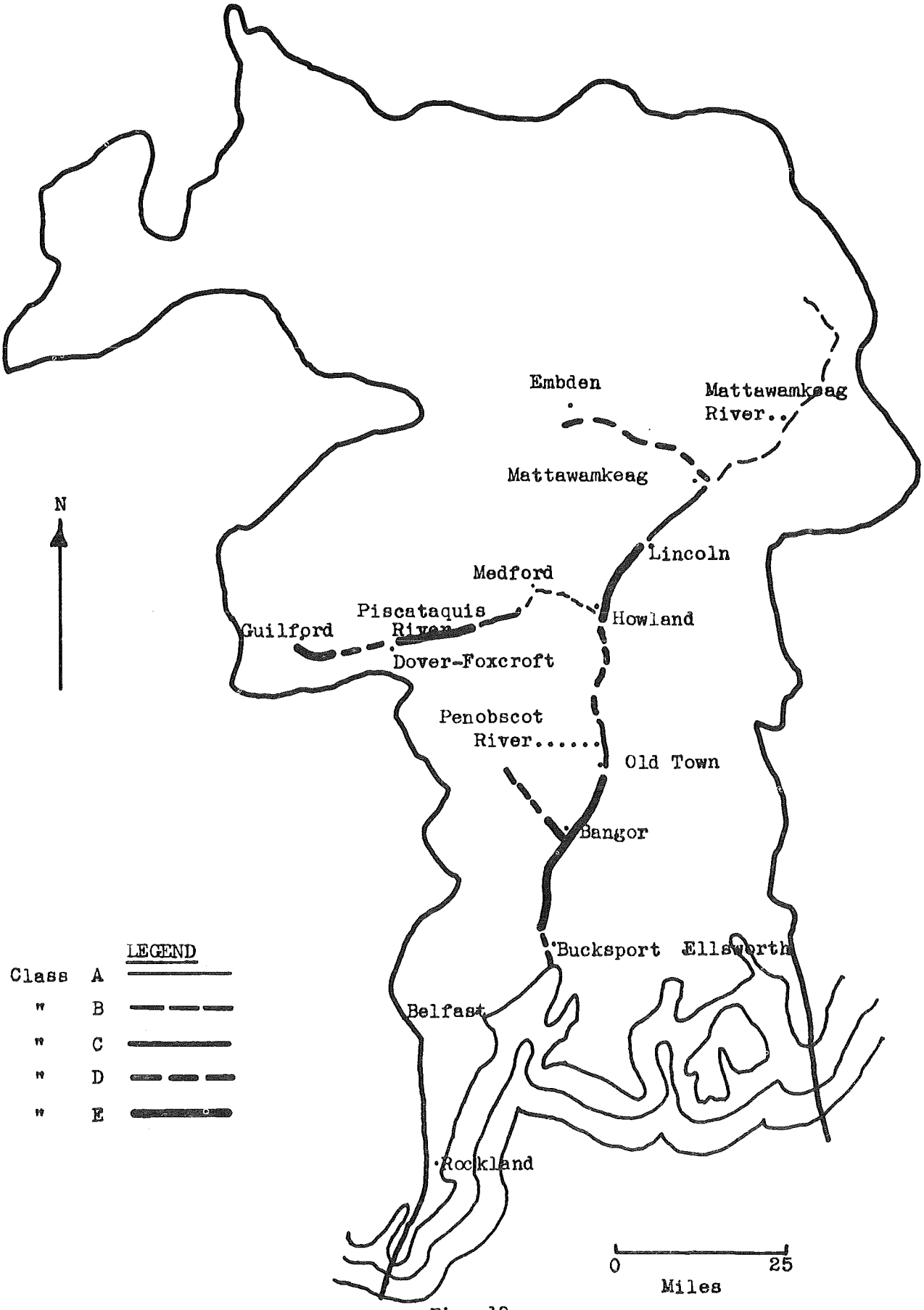


Fig. 19

SUB-BASIN 17

Sub-basin 17 has a total area of about 10,390 square miles, more than a quarter of the entire state. The watershed of the Penobscot River is 8,570 square miles, constituting the major part of the sub-basin. The basin is bounded on the west by the Kennebec River watershed and the watershed of the St. Lawrence River at the Canadian boundary line, on the north by the St. John River watershed, on the east by the St. Croix and Machias River watersheds, and on the south by the Atlantic Ocean.

The numerous lakes in this basin have a combined area of 407 square miles, about 90% of which is forest area which has produced a number of successive growths of long lumber and pulp wood. The lower part of the basin, the Piscataquis River valley and the extreme northeastern corner, are fairly open and are extensively used for agriculture. The rest of the area, particularly west of Millinocket, is forest wilderness.

Most of the population of this basin is concentrated in the lower Penobscot River valley. Here the largest and most important manufacturing and trading center is Bangor with a population of 29,822. Except for the coastal cities of Belfast, Ellsworth and Rockland, and the towns of Bar Harbor, Bucksport, Camden, Castine, Dover-Foxcroft and Guilford, the lower and central portions of the sub-basin are sparsely populated. The north and northwestern sections are relatively uninhabited.

The economic factors of this sub-basin are widely varied. Large quantities of pulp and paper are manufactured at different locations along the larger rivers. Fishing and the tourist trade are economically basic to the coastal areas. In the open sections of the south, central, and northeastern parts of the basin, farming is important. Considerable lumbering and pulp cutting is done in the wooded areas.

The Penobscot River at a point 99 miles from its mouth divided into 2 branches known as the West and East Branches, which add another 141 and 52 miles respectively to its total length. Its principal tributaries consist of the following: Mattawamkeag River, 84 miles long and draining 1,520 square miles; Piscataquis River, 68 miles in length with a drainage area of 1,500 square miles; Passadumkeag Stream, 45 miles long with a drainage area of 394 square miles; and Kenduskeag Stream, 34 miles in length and having a drainage area of 214 square miles.

This sub-basin also contains some smaller coastal rivers and streams. The largest, Union River, is 39 miles long, has a watershed of 496 square miles and a fall of 277 feet. It discharges to Blue Hill Bay at Ellsworth. Pollution in this basin is located mainly in the Penobscot River from Lincoln through Howland and from Old Town downstream to Penobscot Bay. It is not sufficient however, to cause nuisance conditions. The principal sources of pollution are industrial wastes from fifteen pulp and paper mills and sanitary sewage from a population of over 77,000 located along the river and its tributaries.

The Piscataquis River receives the sewage from a population of about 10,445 and wastes from woolen and lumber mills. Kenduskeag Stream is somewhat of a public nuisance in the vicinity of its mouth at Bangor where the sewage of an estimated 15,000 is discharged untreated to its waters. The Mattawamkeag, and lesser tributaries to the Penobscot, and coastal rivers

and streams in the area are relatively unpolluted.

PENOBSCOT RIVER

Water Sampling Stations and Test Results

Along the main stem of the Penobscot, thirty-two sampling stations have been established. These range from Ferguson Lake at Millinocket in the north to the Waldo-Hancock Bridge in Prospect near the mouth of the river. Following is a list of the Stations giving their exact location:

Station Number	Town	Location
1	Millinocket	Ferguson Lake at Great Northern Paper Co. intake
2	TA - R7	Rice Farm boom in front of cottage
3	E. Millinocket	Face of Dolby Dam
4	E. Millinocket	Face of Great Northern Paper Co. mill
5	Medway	Face of Rockabema Dam
6	Medway	Bridge over East Branch Penobscot River (Route 157)
7	Medway	East bank of river near dead end road above Salmon Stream
7A	Mattawamkeag	Face of Mattaseunk Dam
8	Mattawamkeag	East bank of river at old crossing just north of sawmill
9	Winn	Log boom back of pasture of H. Gordon about 3 miles below village
10	Lincoln	East bank of old ferry site at Lincoln Center
11	Lincoln	East bank back of sawdust house of Stowell-MacGregor Corp. plant at South Lincoln
12	Enfield	Bangor Hydro-Electric Co. dam at West Enfield
13	Howland	Bridge over Piscataquis River on Route 16
14	Howland	Howland-Enfield bridge over Penobscot (middle span)
14A	Passadumkeag	East bank about three miles below village at Bangor Hydro-Electric Co. pole #833
15	Milford	End of old wharf at Costigan
15A	Milford	Bangor Hydro-Electric Co. dam
15B	Old Town	East bank of Stillwater River at dam gate at Gilman Falls
15C	Orono	Head gate of Bangor Hydro-Electric Co. dam on Stillwater River off Mill Street, Orono
16	Old Town	Intake at Penobscot Chemical Fiber Co. mills at Great Works
16A	Orono	West bank at old ferry slip site at Webster
17	Orono	Water intake of old pulp mill on Ayers Island
18	Veazie	Intake at Bangor Hydro-Electric Co. power station
19	Bangor	Above dam at Bangor Water Works
19A	Brewer	East bank at Bangor Salmon Pool (near club)
20	Bangor	Bangor-Brewer bridge over river on Route 1
21	Bangor	Railroad bridge over Kenduskeag stream
22A	Orrington	East bank at old wharf on private road west from Snow's corner
23	Hampden	West bank at old ferry slip at Hampden Highlands
25	Bucksport	Coal wharf at Northeast Coal Sales Co. 1 mile above St. Regis Paper Co.
26	Prospect	Prospect-Verona - Waldo-Hancock Bridge

Several tests have been made on samples from the various stations during the summer of 1949. Following are the average results together with the suggested water classifications:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	B.Coli m.p.n.	Tentative Classification
1	11	8.4	76	6	1.7	6.7	59	B
2	10	7.9	79	9	3.5	6.1	2,530	D
3	11	7.6	57	12	3.6	5.9	3,050	D
4	11	6.3	56	13	3.5	5.9	3,500	D
5	12	6.0	55	13	3.2	6.0	2,200	E
6	11	10.6	94	4	2.0	7.0	59	B
7	11	6.9	62	11	3.8	6.1	1,305	D
7A	12	6.6	59	10	3.2	6.2	1,320	D
8	12	6.5	69	9	1.8	6.1	1,320	C
9	11	9.0	43	6	2.3	6.7	597	C
10	10	8.2	71	6	3.6	6.5	605	D
11	11	7.4	66	11	6.5	5.9	2,850	E
12	11	6.8	59	10	4.0	6.1	1,750	E
13	11	9.0	79	6	2.0	6.6	350	B
14	11	8.1	72	7	3.6	6.2	925	D
14A	12	8.7	80	7	3.1	6.5	980	D
15	12	8.0	74	7	2.6	6.4	350	C
15A	13	8.4	78	6	3.9	6.6	7,800	E
15B	13	8.2	76	6	2.9	6.6	350	C
15C	12	8.4	76	7	5.0	6.4	14,300	D
16	12	8.6	79	6	5.0	6.6	35,000	E
16A	14	7.5	71	7	4.8	6.7	60,000	E
17	12	9.6	88	5	3.5	6.7	6,950	D
18	10	9.1	79	6	5.5	6.6	4,450	E
19	11	8.7	77	7	4.3	6.5	4,215	E
19A	13	9.3	86	6	4.4	6.5	11,400	E
20	12	9.1	83	5	4.3	6.7	17,600	E
21	11	8.6	77	6	4.5	6.7	88,800	E
22A	12	7.1	85	9	4.9	6.4	16,100	E
23	12	6.4	57	9	4.6	6.7	61,100	E
25	12	4.7	43	29	1.4	7.3	3,420	D
26				14		7.4	460	B

Figure No. 20 shows the water characteristics in the river from the period beginning October 10th to October 21st, 1949. The most recent data available was utilized and does not necessarily show minimum conditions. The graph indicates the biochemical oxygen demand and the concentration and per cent of saturation of the dissolved oxygen. It will be noted that the figures for the dissolved oxygen tend to vary inversely with the biochemical oxygen demand. Both of these show the effect of stream recovery in that the biochemical oxygen demand does not continue to increase and the dissolved oxygen does not continue to decrease over the course of the river as further increments of pollution are received. The dissolved oxygen in all cases is above the minimum required for maintaining fish life.

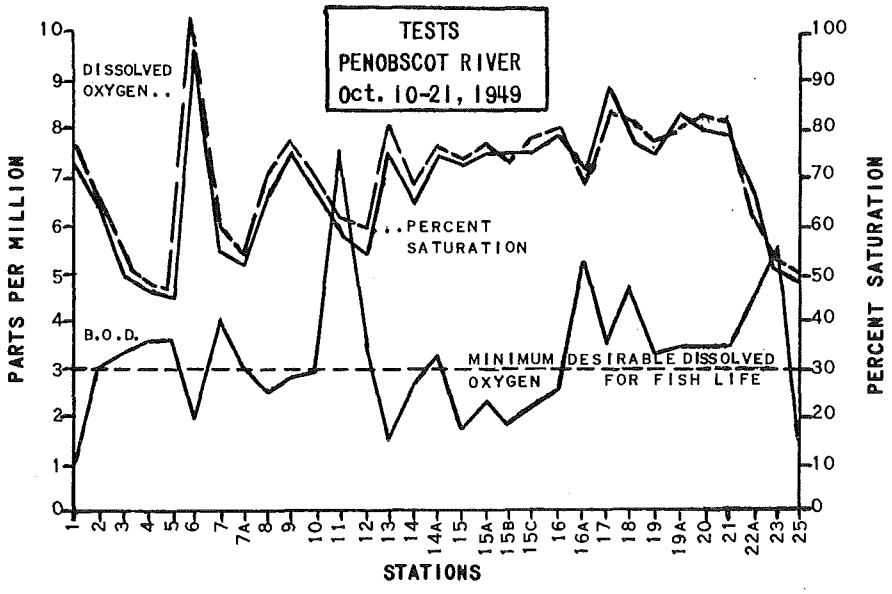


Fig. 20

Sewage Pollution

The untreated sewage of a population of approximately 32,140 is discharged to the Penobscot River by the sewerage systems of the larger towns and cities along its banks. Including the tributary rivers and streams, 78,960 contribute sewage to the waters of this watershed.

Sewage from a population of 6,000 enters the river from the town of Millinocket and approximately 1,600 at East Millinocket. Very little additional sewage enters the river between there and Lincoln where untreated sewage from a population of about 3,000 drains to the river. Throughout this area the river is used for watering livestock, game fishing, wildlife, and recreation.

At South Lincoln, West Enfield, and Howland a population of approximately 500 contribute sewage to the river and at these towns the river is used as an industrial water supply and from here to Old Town is likewise used for wildlife, watering livestock, and recreation.

Through Old Town, Milford, Bradley, and Orono to Veazie, the river is used as domestic, industrial, and livestock water supplies; also for game fishing, wildlife, and recreation. From Old Town downstream to the ocean, the river becomes so polluted that it is considered undesirable for its accustomed uses. It receives sewage from a population of 5,000 in Old Town, 850 in Milford, 100 in Bradley, 1,130 in Orono and 350 in Veazie.

A heavy pollution load is received at Bangor, where a population of 13,900 contribute untreated sanitary sewage; another 5,000 from Brewer across the river also discharge sewage to the water. Immediately downstream from these cities to Winterport, the river serves chiefly as a source of water supply for livestock, for navigation, and for wildlife.

In Winterport a population of 800 discharge sewage to the river. From this town through Bucksport to the ocean commercial fishing becomes a major water use, and after entering Penobscot Bay below Bucksport, shellfishing becomes important.

Industrial Pollution

Industrial pollution of the Penobscot River is moderately heavy, especially downstream from the larger towns and cities along its course.

A large paper mill located in Millinocket discharges considerable quantities of sulfite wastes together with sanitary sewage directly to the river. Another paper mill at Lincoln discharges sulfite wastes and other mills similarly at Howland, Old Town and Brewer. Additional wastes are received at Old Town from a woolen mill and to a lesser degree from 3 shoe factories and 2 canoe factories. At Orono a shoddy mill causes some pollution and also chemical wastes from the laboratories at the University of Maine are discharged to the river.

At Bangor and Brewer the wastes from several dairies and laundries, a shoe factory, woolen mill, meat packing and two bottling plants increase the industrial waste load of the river. The great volume of liquids reaching the river here create a considerable degree of pollution.

Downstream at Bucksport another paper mill and a tannery add to the pollution load.

Twelve sawmills are situated along the Penobscot, three of which are located in Enfield, two each in Howland, Milford, and Bradley; and one each in Lincoln, Old Town, and Winn. All of these sawmills, except one in Enfield and one in Lincoln allow various amounts of sawdust to enter the water.

PISCATAQUIS RIVER and TRIBUTARIES

Water Sampling Stations and Test Results

This tributary watershed of the Penobscot River is made up of the Piscataquis River and its tributaries of Pleasant River and Sebec River with its tributaries of Wilson and Monson Streams. The following sampling stations have been set up on these watercourses:

Station Number	Town	Location
		Piscataquis River
1	Shirley	Face of dam at Shirley Mills
2	Blanchard	Bridge at village
3	Abbot	Bridge at Abbot village
3A	Abbot	Bridge on Route 15 at Abbot Village, Kingsbury Stream
4	Guilford	South bank back of garden near Abbot-Guilford town line
5	Guilford	Guilford-Sangerville bridge near Sangerville village

Station Number	Town	Location
		Piscataquis River - continued
6	Guilford	Guilford-Sangerville covered bridge and guaging station
7	Dover-Foxcroft	South bank at power line crossing near junction of Pleasant Street and South Main Street
8	Dover-Foxcroft	Bridge at East Dover
9	Atkinson-Sebec	Highway bridge near South Sebec
10	Milo	North bank at end of Ferry Road
11	Milo	Bridge on Route 155
12	Medford	South bank at Bangor & Aroostook railroad bridge
13	Howland	Bridge on Route 116 (same as Penobscot River Sta. 13)
		Pleasant River
1	Brownville	Bridge about 3 miles above Brownville Junction
2	Brownville	Bridge at Brownville Junction
3	Brownville	East bank at Playground back of Grange hall at Brownville
4	Milo	Bridge on Route 16
		Sebec River
1	Sebec	Face of dam at Sebec
2	Milo	Bridge on Route 16
3	Milo	Just above last Derby sewer outfall
		Monson Stream
1	Monson	Bridge on Route 15 at village
2	Monson	Bridge on discontinued road below village
3	Willimantic	Bridge near Route 150 below Davis Brook
		Wilson Stream
1	Willimantic	Bridge at village
2	Willimantic	Bridge at Bill Early's Camps at Sebec Lake

Many samples of water were taken at the various sampling stations. These samples were tested giving the following results and suggested water classifications:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	B.Coli m.p.n.	Tentative Classification
			Piscataquis River					
1	14	8.9	86	4	1.8	6.8	21	A
2	12	10.4	94	3	1.3	7.0	3	A
3	13	10.5	99	3	1.3	7.0	15	A
3A	7	11.8	97	2	2.2	7.2	43	B
4	7	10.3	85	4	1.4	7.0	240	B
5	7	10.3	85	5	4.2	7.0	15,000	E
6	6	10.0	80	3	2.1	7.0	1,100	C
7	9	10.4	90	6	4.0	7.0	110,000	E
8	6	11.0	88	2	2.1	7.2	11,000	E
9	8	12.2	103	2	2.5	7.4	75	B
11	15	8.9	88	4	2.6	7.0	4,600	C
12	13	10.3	97	2	1.7	7.2	150	B
			Pleasant River					
1	12	9.9	91	3	1.0	7.0	9	A
2	12	10.6	97.8	2	1.6	7.0	15,000	E
3	14	10.1	97	3	1.9	6.8	2,400	C
4	13	10.5	99	4	1.5	7.0	2,400	C
			Sebec River					
1	9	9.9	86	2	1.2	7.0	93	B
2	7	9.8	81	4	1.2	6.8	240	B
3	7	10.5	86	3	2.7	6.6	4,600	C
			Monson Stream					
1	14	9.1	87	3	2.0	6.6	4,600	C
2	14	9.6	93	2	1.6	6.8	3,900	C
3	9	9.7	92	5	1.3	6.8	23	A
			Wilson Stream					
2	13	10.9	103	2	1.6	7.0	23	A

Sewage Pollution

A population estimated at 10,445 discharge sewage to the Piscataquis River and its main tributaries. The river receives the sewage of a population of 1,050 in Guilford, 3,850 in Dover-Foxcroft, and 1,500 in Howland. Over the major part of its length it is used for pulpwood driving and as a source of industrial water supply.

Pleasant River receives the sewage from a population of 1,765, of which 1,200 are located in Brownville Junction, 365 in Brownville and 200 in Milo. An estimated 1,200 in Milo and 300 in Derby add to pollution of the Sebec River. Water in both these rivers is used for game fishing, wildlife, and pulp driving. Pleasant River serves also as a source of water for industrial processes at and below Brownville Junction.

The Sebec River is practically uncontaminated until it reaches Milo where it is used as a source of municipal water supply, but below Milo after receiving the sewage load, is unsuitable for watering of domestic animals or similar usage and remains so until its confluence with the Piscataquis River. The Piscataquis River, although receiving a considerable pollution load at Guilford, Sangerville, and Dover-Foxcroft, is used as a source of industrial water supply, and for wildlife and recreation.

Carleton stream receives the sewage from a population of 780 in Sangerville and is used as an industrial water supply.

New treatment plants are necessary in all towns in order to reduce pollution of the watercourses.

Industrial Pollution

There are few industrial plants in this area that contribute to stream pollution, with the exception of sawmills, woodworking mills and woolen mills.

There are thirteen sawmills and woodworking mills located on streams in the Piscataquis River drainage area. Three of these, one of which is in Brownville and two in Guilford, are on the Piscataquis River; four in Brownville, three in Guilford, and one each in Abbot, Blanchard, Medford, Milo, Monson and Willimantic are located on tributaries. Three of these mills allow considerable quantities of sawdust to enter local streams.

Wastes from the woolen mills are of considerable importance, two being located in Sangerville on Carleton Stream and one each in Dover-Foxcroft and Guilford on the Piscataquis River. All are served by private sewer lines which discharge directly to the water.

MATTAWAMKEAG RIVER and TRIBUTARIES

This tributary watershed of the Penobscot River consists of both branches of the Mattawamkeag River and their tributaries, - the most important of which are Molunkus, Mattakeunk, Baskehegan and Fish Stream.

Water Sampling Stations and Test Results

The following sampling stations are located along the respective streams:

Station Number	Town	Location
		Mattawamkeag River
1	Haynesville	Bridge on alternate Route 2

Station Number	Town	Location
		Mattawamkeag River - continued
2	Bancroft	Bridge at South Bancroft
3	Drew Plt.	Bridge on Route 171
4	Kingman	Bridge on Route 170
5	Mattawamkeag	Bridge on Route 2
		East Branch Mattawamkeag River
1	Smyrna	West bank at old mill site above Smyrna Mills
2	Oakfield	Highway bridge at Oakfield village
3	Oakfield	Old bridge to gravel pit about 1 mile below station 2
		West Branch Mattawamkeag River
1	Island Falls	Bridge on Route 159
2	Island Falls	East bank at end of road just east of Dyer Brook
		Molunkus Stream
1	Stacyville Plt.	Bridge over West Branch on Route 11 at Sherman Station
2	Sherman	Bridge on Route 158 at Sherman Mills
3	Macwahoc Plt.	Bridge on Route 2
		Mattakeunk Stream
1	Lee	Bridge over dam at foot of lake near village
2	Lee	Face of dam at pond in village
3	Lee	Face of dam at Mallett's sawmill
		Baskahegan Stream
1	Danforth	Face of dam at lake outlet - west side
2	Danforth	East bank behind house about opposite last hydrant and about 300 yards below bridge
3	Bancroft	North bank at old fort near Mattawamkeag River
		Fish Stream
1	Patten	South bank at old sawmill site above village
2	Patten	Bridge on road to Crystal near potato houses
3	Island Falls	Bridge on Route 159

Tests made on water samples from the various stations show water qualities ranging from Class A to Class E at the locations shown:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	B.Coli m.p.n.	Tentative Classification
			Mattawamkeag River					
1	6	12.0	96	3	2.6	7.0	48	B
2	17	9.1	94	5	1.4	7.0	23	A
3	16	9.2	93	4	1.2	7.0	93	B
4	17	8.9	91	5	1.1	7.0	9	A
5	16	9.5	96	3	1.4	7.0	93	B
			East Branch Mattawamkeag River					
1	14	9.9	96	5	1.1	7.0	4	A
2	14	9.9	96	4	1.4	7.2	15,000	E
3	13	10.1	95	5	1.6	7.2	1,500	C
			West Branch Mattawamkeag River					
1	14	9.5	91	4	1.8	7.2	460	B
2	13	9.4	89	4	1.2	7.2	240	B
			Molunkus Stream					
1	14	9.0	87	6	1.7	7.2	240	B
2	15	9.2	90	4	1.6	7.4	460	B
3	6	12.0	96	3	2.8	7.2	210	B
			Mattakeunk Stream					
1	8	10.7	90	3	1.7	7.0	210	B
2	8	11.1	94	4	3.2	7.0	15,000	E
3	7	10.0	82	5	2.0	7.0	200	B
			Baskahegan Stream					
1	17	8.9	92	5	1.3	6.6	240	B
2	16	9.0	91	5	1.9	6.2	46,000	E
3							93	B
			Fish Stream					
1	15	9.8	97	4	3.0	7.2	43	B
2	14	9.4	90	4	3.0	7.2	4,600	C
3	14	10.1	98	2	1.2	7.4	1,100	B

Sewage Pollution

A small population of only 1,648 contributes wastes to the waters of this area. Sewage from the most of the town of Mattawamkeag is discharged directly into the Penobscot but sewer outfalls serving 200 however, lead to the Mattawamkeag River.

The West Branch of the Mattawamkeag at Island Falls receives pollution from a population of 400, Mattakeunk Stream at Lee from 240, Baskahegan Stream at Danforth from 350, Fish Stream at Patten from 50, and Webb Brook also at Patten from 400. The water of this drainage area is used as an industrial water supply, for wildlife, fishing, bathing, other recreation, and is considered satisfactory for all such uses.

Industrial Pollution

Negligible amounts of industrial wastes other than sawdust reach the Mattawamkeag. Some of the nine sawmills on watercourses in the area cause pollution. Five of them allow very little or no sawdust to enter the streams; the others, however, discharge varying amounts of wood wastes. Two of these mills are located in both Winn and Patten, and there is one each in Crystal, Danforth, Island Falls, Lee, and Sherman.

KENDUSKEAG STREAM and TRIBUTARIES

Kenduskeag Stream enters the Penobscot River at Bangor. It is a relatively minor tributary, but is highly polluted near its mouth by the industries and sewers of Bangor.

Water Sampling Stations and Test Results

Twelve sampling stations have been established extending from Garland downstream to Bangor. Following is a list of the stations giving their locations:

Station Number	Town	Location
1	Garland	Bridge below village (2nd below lake)
2	Garland	Bridge at Twin Brook
3	Exeter	Bridge over French Stream just off Route 43
4	Corinth	Bridge across Crooked Brook on Route 43
5	Corinth	Bridge near Pierce Paul Brook
6	Kenduskeag	Bridge at village
7	Levant	Black Stream Bridge at village
8	Kenduskeag	Bridge on Route 15
9	Bangor	Bridge at Sixmile Falls
10	Bangor	Bridge on Valley Avenue near Holland St.
11	Bangor	Bridge on Franklin St.
12	Bangor	Railroad bridge near Penobscot River (same as Penobscot River Station 21)

The following results have been found in tests made on samples taken from the various stations during the summer of 1949:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	B.Coli m.p.n.	Tentative Classification
1	6	12.0	96	5	2.3	7.4	240	B
2	4	12.1	92	5	2.9	7.0	2,400	C
3	4	12.7	97	8	3.1	7.2	460	C
4	6	12.4	99	6	3.7	7.0	1,100	C
5	5	12.2	95	7	3.0	7.2	4,600	C
6	4	12.7	97	6	3.6	7.2	1,500	C
7	4	11.2	85	7	3.2	6.6	2,400	C
8	3	12.3	91	6	3.7	7.0	2,400	C
9	4	12.6	96	6	4.3	7.0	390	D
10	3	13.8	100	4	5.4	7.0	2,400	E
11	5	13.6	101	6	5.8	7.2	29,000	E

Sewage Pollution

Sewage from a population of approximately 14,540 is discharged into Kenduskeag Stream at and near Bangor. Slightly upstream from Bangor, ice is harvested in the stream during the winter, and there is swimming in the summer. In Bangor it is used as an industrial water supply.

The stream is relatively unpolluted above Bangor but in the city the additional sewage load increases pollution to such an extent that nuisance conditions are created.

Industrial Pollution

In the Kenduskeag Stream, upstream from Bangor, there is little industrial pollution, other than that from sawmills. Such industrial pollution discharged to this stream from the city of Bangor has not been differentiated in this report from that discharged directly into the Penobscot River.

At present there are seven sawmills on the Kenduskeag and its tributaries. All but two are on the main stem of the stream. Three of these are located in Garland, one in Kenduskeag, and one in Levant. The mill in Levant is located on Black Stream and that in Exeter on Allen Stream. Only three of these mills discharge sawdust wastes to the adjacent watercourses.

A pea viner in Exeter and a slaughter house in Levant are the only important sources of pollution upstream from Bangor. Both of these plants dispose of waste liquids directly to Kenduskeag Stream.

OTHER TRIBUTARIES of the PENOBSCOT RIVER

There are many smaller tributaries of the Penobscot River. Some of the more important are Sourdabscook Stream, Marsh Stream, Passadumkeag River, Orland River, Moosehorn Creek, Pushaw Stream, and Mattanawcook Stream, which enter the Penobscot at various points from Lincoln in the north to Orland in the south.

Water Sampling Stations and Test Results

Five sampling stations were established on the Sourdabscook and the

Marsh Streams, and three on each of the five other watercourses. Following is a list of the stations together with their locations:

Station Number	Town	Location
		Sourdabscook Stream
1	Carmel	Bridge at Damascus at the outlet of Etna Pond
2	Carmel	Bridge on Route 2
3	Herman	Bridge on Route 2 between Sourdabscook Stream and Black Stream - usual flow toward Black Stream
4	Hampden	Bridge between Herman Pond and Hammond Pond
5	Hampden	Bridge on Route 1 above dam of water company
		Marsh Stream
1	Brooks	Bridge at village (above dam)
2	Jackson	Bridge on North Branch below village
3	Monroe	Bridge at village on Route 139
4	Winterport	Winterport-Frankfort bridge just off Route 139 at West Winterport
5	Frankfort	Bridge on Route 1 at village (above dam)
		Passadumkeag River
1	Lowell	Face of dam near bridge at Lowell
2	Passadumkeag	Bridge about 2 miles above village
3	Passadumkeag	Bridge on Route 2
		Orland River
1A	Orland	Face of dam at Toddy Pond at East Orland
1	Orland	Bridge on Route 175
2	Orland	Behind dam at Orland village (west bank)
		Moosehorn Creek
1	Holden	Bridge over Phillips Lake outlet at East Holden near Route 1
2	Dedham	Bridge on Route 175 at village
3	Bucksport	Bridge on Route 175 below Long Pond
		Pushaw Stream
1	Hudson	Bridge on Route 221
2	Alton	Bridge on Route 43 (below Dead Stream)
3	Old Town	Bridge on Route 43
		Mattanawcook Stream
1	Lincoln	Gate at dam on Mattanawcook Lake
2	Lincoln	Dam at Eastern Corp. mill
3	Lincoln	Bridge on road to dump below mill

Water samples taken at the various stations yielded the following results:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	B.Coli m.p.n.	Tentative Classification
			Sourdabscook Stream					
1	18	11.0	115	2	1.2	7.4	1,100	A
2	Bacteria only						240	B
3	Dry - no flow							
4	17	8.2	84	4	1.6	7.0	43	A
5	17	8.7	89	5	1.1	7.4	150	B
			Marsh Stream					
1	3	11.7	87	6	3.6	6.6	1,100	C
2	4	11.8	90	6	2.7	6.8	93	B
3	3	12.6	94	5	4.0	7.0	93	D
4	3	11.8	88	7	3.1	6.8	460	C
5	4	12.4	94	7	3.3	6.8	390	C
			Passadumkeag River					
1	15	9.3	92	4	1.4	7.0	9	A
2	13	9.6	91	5	1.9	6.8	43	A
3	14	8.7	84	5	1.2	6.8	240	B
			Orland River					
1A	18	8.9	93	3	.7	7.2	23	A
1	20	8.2	90	3	.9	6.8	43	A
2	19	9.5	102	2	1.6	7.2	1,100	C
			Moosehorn Creek					
1	20	8.3	91	4	.8	6.6	460	B
2	20	8.3	91	3	1.5	7.0	240	B
3	18	8.5	89	4	1.0	6.8	390	B
			Pushaw Stream					
1	6	9.7	78	5	2.1	6.8	23	B
2	4	10.6	81	5	2.3	6.6	20	B
3	4	10.3	78	3	2.0	6.7	23	B
			Mattanawcook Stream					
1	9	10.4	90	3	1.8	6.6	460	B
2	9	11.0	95	3	7.9	6.6	1,100	E
3	10	7.6	67	18	21.2	5.6	24,000	E

Sewage Pollution

Pollution of the minor tributaries of the Penobscot River due to sewage is comparatively light, as a rule. Streams which enter the river at or near

the larger towns and cities situated along its course, however, do become highly polluted in those areas. An example of this is Mattanawcook Stream, which enters the Penobscot River at Lincoln. From this town it receives sewage discharged by a population of 3,950, and becomes so highly polluted as to constitute a nuisance condition from there to the Penobscot.

Sourdabscook Stream receives pollution from a population of 450 at Hampden, and Marsh Stream from 170 at Frankfort and 100 at Brooks. The major use of the water of these and the other small tributaries is for wildlife, bathing, and watering livestock.

Industrial Pollution

As previously stated, the industrial pollution of the small tributaries is very light, except at the larger population centers near the Penobscot.

There are three sawmills on Marsh Stream, two of which cause some pollution, and one each on the Sourdabscook Stream, Mattanawcook Stream and Rollins Brook (a tributary of Pushaw Stream) allow wastes to enter their adjacent watercourse. The only other industry which causes significant pollution is a woolen mill which discharges sewage and chemical wastes into Mattanawcook Stream at Lincoln.

SAWDUST PILE EXTENDING INTO LAKE

PENOBSCOT WATERSHED COASTAL AREA

The Atlantic coastline from Bristol in the southwest to Winter Harbor in the northeast is included in Sub-basin 17. Its many small rivers and streams, therefore, are incorporated in this section.

Water Sampling Stations and Test Results

Only one sampling station has been set up in the area to the east of the Penobscot River. It is at an old bridge in Ellsworth Falls on the Union River. This is upstream from the city of Ellsworth, therefore the tests made on water samples taken at the station indicate relatively unpolluted water.

In the area to the west of the Penobscot, three stations were established on both the St. George and the Megunticook Rivers, and two on the Medomak River. Water samples taken at the various stations indicate relatively uncontaminated water.

Sewage Pollution

In the coastal section east of the Penobscot, Frenchman's Bay around the town of Bar Harbor is polluted by the untreated sewage from an estimated population of 10,000. Pollution in the Union River results from the sewage of a population of approximately 3,000 in the city of Ellsworth. Wastes of 2,000 enter Bagaduce River at Castine. At Blue Hill 300 contribute to Mill Brook and 75 to an unnamed stream. At East Franklin sewage from 120 is discharged to another unnamed stream, and at South Penobscot from 100 to Winslow Stream.

The majority of the larger towns in the coastal area west of the Penobscot are located at the sea shores, and discharge sewage directly to the ocean. Examples of this are Rockland with a sewerage system serving a population of 7,500, Camden's sewerage system serving 3,130, St. George (including Port Clyde and Tenant's Harbor) 740, and Belfast 640. The principal fresh watercourse in the western area is the St. George River which receives the sewage load of Thomaston, Warren, and South Union. Over 2,000 add pollution to the St. George River at Thomaston, as well as 200 at Warren and 60 at South Union.

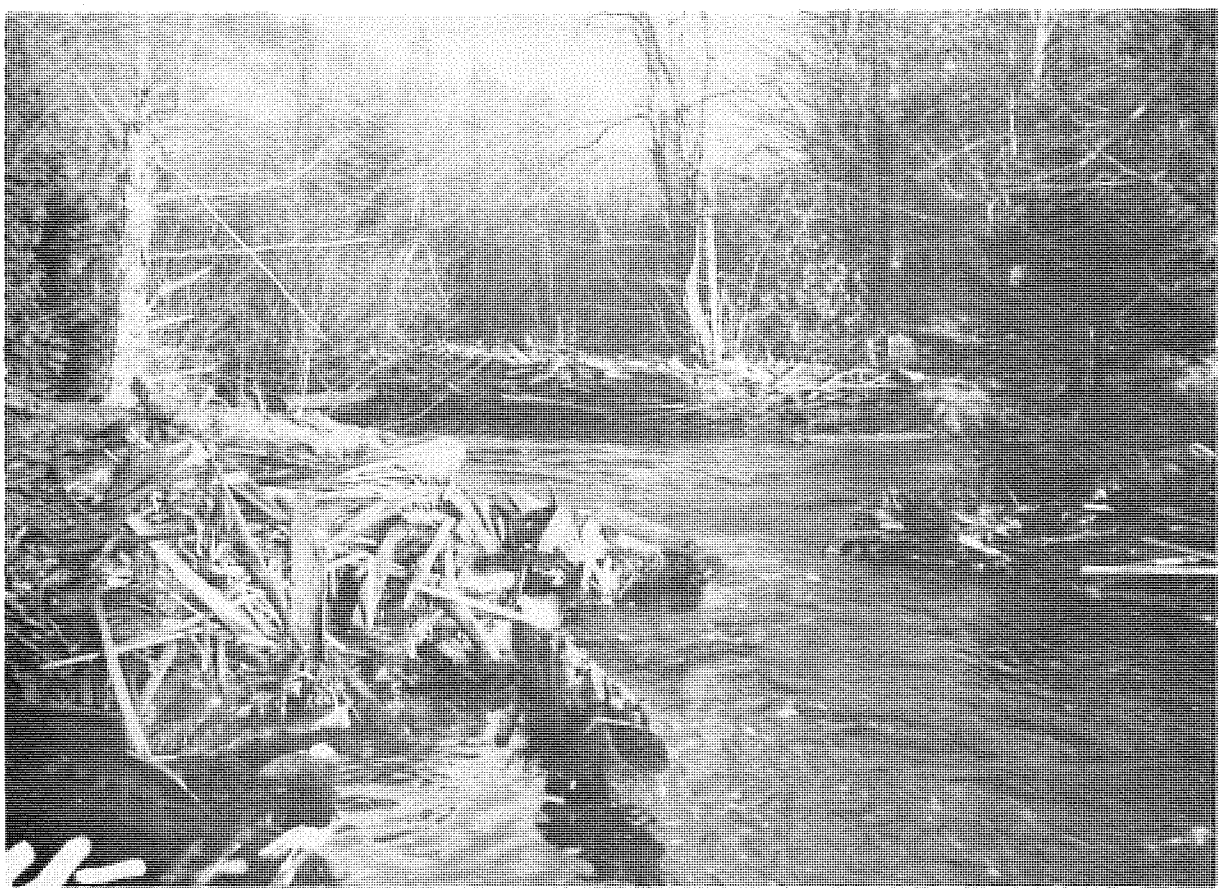
The fresh watercourse in both the eastern and western sections is used mainly for boating, bathing and fishing. The adjacent sea water area is used for commercial and game fishing, shellfishing, and navigation.

Industrial Pollution

The larger industries of lime and cement manufacture contribute little or no pollution, but the many sawmills and fish packing plants in these coastal areas contribute most of the industrial wastes. There are 24 sawmills along the coastal streams and rivers of Sub-basin 17. Ten of these mills allow considerable amounts of sawdust and other wastes to enter the water, four discharge only slight amounts, and the other ten cause negligible pollution.

There are nine fish canning and three fish packing plants located

east of the Penobscot. One fish canning plant, a creamery, bottling plant, and packing house located in Ellsworth are served by the public sewerage system, which discharges to the Union River. There are two fish canneries in Tremont, and one each in Bar Harbor, Brooklin, Penobscot, Sargentville, Stonington and Southwest Harbor where two fish packing plants are also located. The majority dispose of fish wastes and sewage directly to the ocean.



DEBRIS FROM SAWMILL WASTES DISCHARGED TO STREAM

MUNICIPAL SOURCES OF POLLUTION

Sub-basin 17

Table 26 SEPTEMBER 1950

MUNICIPALITIES*	SOURCES OF POLLUTION (IN NUMBER OF MUNICIPALITIES)	POPULATION SERVED BY SEWERAGE SYSTEM	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE)
HAVING DATA ON POLLUTION LOAD DISCHARGED TO WATERCOURSE	66 (1)	56,260	55,630
HAVING ONLY POPULATION DATA AVAILABLE (DATA ON POLLUTION LOAD TO WATERCOURSE INCOMPLETE OR NOT AVAILABLE)	11	49,900	NOT APPLICABLE
TOTAL	77	106,160	XXXX

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 13 industries, having 1,640 employees, discharging sanitary sewage only.

MAJOR INDUSTRIAL SOURCES OF POLLUTION

Sub-basin 17

Table 27 SEPTEMBER 1950

INDUSTRIES	SOURCES OF POLLUTION (IN NUMBER OF PLANTS)	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE*)
PRODUCING ORGANIC WASTES	0	0
PRODUCING ORGANIC WASTES	41	UNDETERMINED
PRODUCING INORGANIC WASTES	1	NOT APPLICABLE
PRODUCING WASTES OF UNDETERMINED TYPE	0	UNDETERMINED
TOTAL	42	XXX

* The term, "Population equivalent", is used to compare the strength of an industrial waste with that of domestic sewage. The latter has been found to contribute an average of 0.167 pound B.O.D. per capita per day. If the volume of flow and the 5-day B.O.D. of a given waste are determined, then: Volume (gallons per day) x p.p.m. (parts per million) B.O.D. x 0.00005 = population equivalent of waste.

EXISTING MUNICIPAL TREATMENT FACILITIES

Sub-basin 17

Table 28 SEPTEMBER 1950

DEGREE OF TREATMENT PROVIDED	NUMBER		POPULATION SERVED
	MUNICIPALITIES*	PLANTS	
PRIMARY	2 (1)	2	1,900
SECONDARY	0	0	0
NO TREATMENT	76 (2)	0	104,260

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant insitituions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Part of sewage at one school receives no treatment.

(2) Includes 13 industries, having 1,640 employees, discharging sanitary sewage only.

EXISTING INDUSTRIAL* WASTE TREATMENT FACILITIES

Sub-basin 17

Table 29 SEPTEMBER 1950

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF INDUSTRIAL PLANTS HAVING		
		TREATMENT FACILITIES	NO TREATMENT FACILITIES	UNDETERMINED FACILITIES
FOOD AND KINDRED PRODUCTS	24	0	24	0
TEXTILE MILL PRODUCTS	9	0	9	0
PAPER AND ALLIED PRODUCTS	7	0	7	0
CHEMICAL AND ALLIED PRODUCTS				
PRODUCTS OF PETROLEUM AND COAL				
RUBBER PRODUCTS				
LEATHER AND LEATHER PRODUCTS				
PRIMARY METAL INDUSTRIES	1	1	0	0
FABRICATED METAL PRODUCTS				
MISCELLANEOUS				

* Industries having separate outlets and discharging wastes directly to watercourse.

SUB - BASIN # 18

(Machias River and Adjacent Waters)

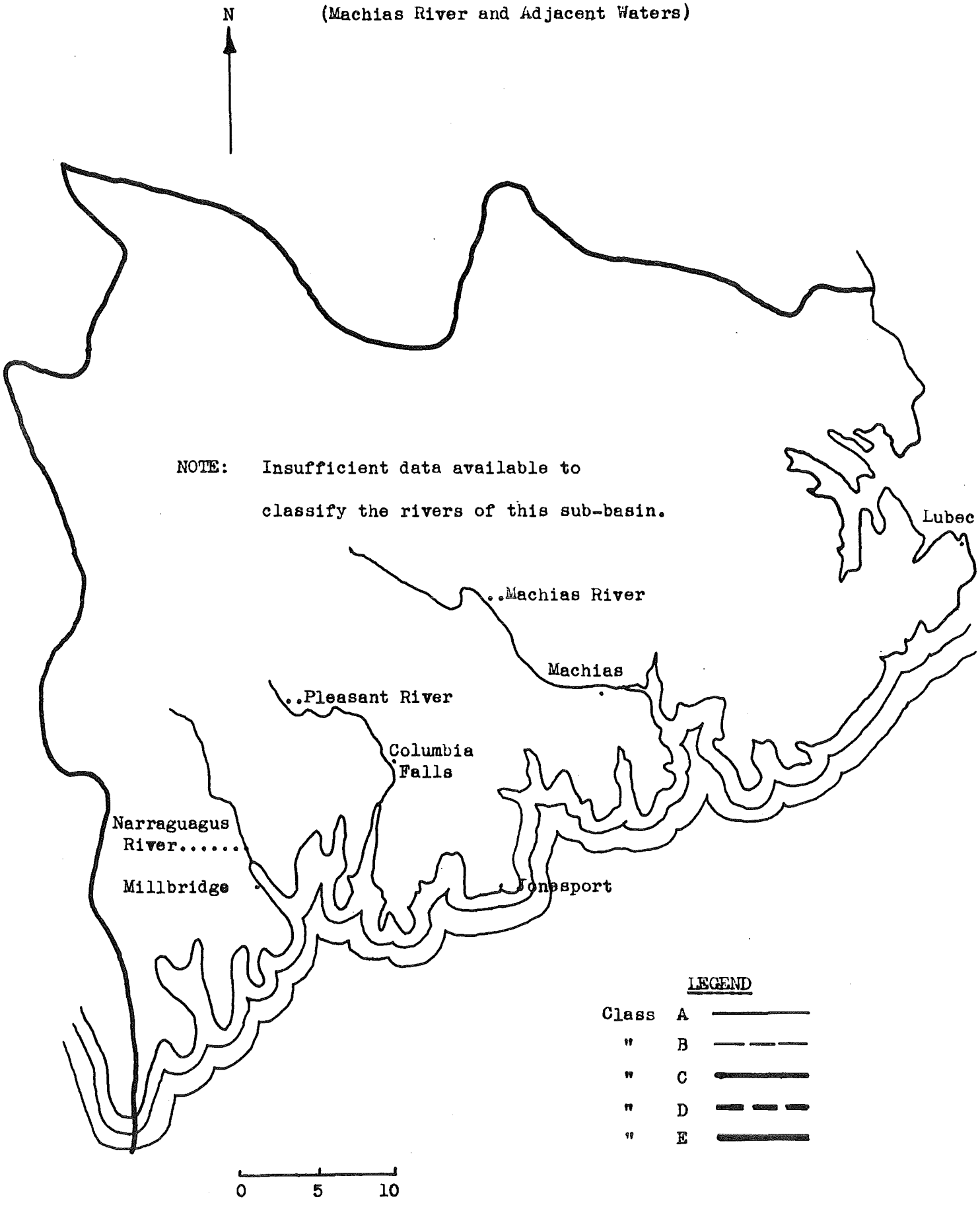


Fig. 21

SUB-BASIN 18

About 1,988 square miles of land surface are included in Sub-basin 18. It is located in the eastern end of the state, and is bounded on the west by Sub-basin 17, on the north by the St. Croix River watershed, on the east by Passamaquoddy Bay, and on the south by the Atlantic Ocean.

Several small watersheds are located here, the largest of which is the Machias River watershed, 450 square miles in area. The river itself is 46 miles in length, discharging to Machias Bay at Machiasport. The next largest watershed in the sub-basin is that of the Narraguagus River, 214 square miles in area. The Narraguagus is 49 miles long and has a fall of 406 feet. Pleasant River, which is also included in this watershed, is 36 miles long and has a drainage area of 85 square miles. The land is relatively flat and wooded.

The population of the area is concentrated along the coast, especially at the eastern end of the sub-basin; 6,500 living in Eastport and Lubec constitute almost one-quarter of the entire population. Machias, having a population of 1,954, is the only other large town in the area.

The economy of the sub-basin depends primarily on the fishing industry and agriculture, the cultivation of blueberries being the major agricultural enterprise. There are seventeen fish canning factories in Eastport and Lubec. Lumbering is also economically important.

The major water pollution problem in Sub-basin 18 exists in tidewater along the shores of Eastport and Lubec, where domestic sewage of a population of 7,035, and industrial wastes consisting mainly of fish wastes from 17 packing plants and canneries is discharged directly to the harbor. The rivers and streams of the area are relatively free from pollution.

MACHIAS RIVER WATERSHED and ADJACENT COASTAL WATERSHEDS

Water Sampling Stations and Test Results

One sampling station has been set up on each of eight small coastal rivers in this sub-basin. They are located as follows:

River	Town	Location
Dennys	Dennysville	Bridge on Route 1
Orange	Whitney	Dam at sawmill near head of tide
East Machias	Machias	Bridge on Route 1 at East Machias
Machias	Machias	East bank near pumping station of water company
Chandler	Jonesboro	West bank near head of tide, off Route 1
Pleasant	Columbia Falls	Bridge on Route 1
Narraguagus	Cherryfield	Upper bridge at village
Union	Ellsworth	Old bridge near Ellsworth Falls

Following are the average results of tests made on samples from six of the stations:

River	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	pH	Tentative Classification
Dennys	24	7.6	89	4.3	6.7	Insufficient Data
Chandler	21	7.2	80	5.0	7.6	Available to
Narraguagus	23	7.7	89	3.3	6.7	Classify this
Pleasant	22	7.5	86	4.3	6.5	River
E. Machias	23	7.0	81	7.0	6.3	
Machias	23	6.8	78	6.8	6.2	

Sewage Pollution

The Machias River receives more sewage than any other river in the sub-basin, domestic sewage being discharged into it from a population of 140 in Whitneyville, 1,310 in Machias, and 410 in Machiasport. Its two major tributaries are Middle River and East Machias River which carry sewage of 100 in Machias and 140 in East Machias, respectively.

Among other rivers in the area, the Narraguagus receives sewage from a population of 485 in Cherryfield and 810 in Milbridge. Over 300 contribute to the sewage load of Pleasant River from the towns of Columbia Falls and Addison. Harrington and Chandler Rivers receive wastes from a population of 250 in Harrington and 60 in Jonesboro respectively. The sewage from a population of 155 in Pembroke is discharged to the Pennamaquan River, and 120 in Dennysville contribute sewage to the Cathance River. Tidewater of Passamaquoddy Bay receives wastes from a population of 4,025 in Eastport and 3,010 in Lubec.

Most of the rivers mentioned above, because of their small flow, become polluted by their sewage load, and therefore many clam flats at their mouths have been closed because of the unsatisfactory water quality for shellfishing. All towns discharging sewage to streams in Sub-basin 18 require new treatment plants if pollution is to be reduced.

Industrial Pollution

The principal industrial plants are sawmills, canneries, and fish packing plants. There are at least sixteen sawmills in the area, eight of which allow waste products to enter the water; two of which are located in Steuben and one each in the towns of Cherryfield, Columbia Falls, Crawford, Cutler, Marshfield, and Whiting.

There are several fish packing and canning plants in Machiasport, Eastport, and Lubec. Those in Eastport and Lubec discharge wastes to tidewater, which at times creates objectionable conditions. Blueberry canneries in Cherryfield, Harrington, and East Machias cause some pollution during a part of the summer season. In Machias a slaughter house and rayon mill contribute wastes to the Machias River.

MUNICIPAL SOURCES OF POLLUTION

Sub-basin 18

Table 30 SEPTEMBER 1950

MUNICIPALITIES*	SOURCES OF POLLUTION (IN NUMBER OF MUNICIPALITIES)	POPULATION SERVED BY SEWERAGE SYSTEM	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE)
HAVING DATA ON POLLUTION LOAD DISCHARGED TO WATERCOURSE	17 (1)	2,590	2,340
HAVING ONLY POPULATION DATA AVAILABLE (DATA ON POLLUTION LOAD TO WATERCOURSE INCOMPLETE OR NOT AVAILABLE)	0	0	NOT APPLICABLE
TOTAL	17	2,590	XXX

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 2 industries, having 210 employees, discharging sanitary sewage only.

MAJOR INDUSTRIAL SOURCES OF POLLUTION

Sub-basin 18

Table 31 SEPTEMBER 1950

INDUSTRIES	SOURCES OF POLLUTION (IN NUMBER OF PLANTS)	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE*)
PRODUCING ORGANIC WASTES	0	0
PRODUCING ORGANIC WASTES	10	UNDETERMINED
PRODUCING INORGANIC WASTES	0	NOT APPLICABLE
PRODUCING WASTES OF UNDETERMINED TYPE	0	UNDETERMINED
TOTAL	10	XXX

* The term, "population equivalent", is used to compare the strength of an industrial waste with that of domestic sewage. The latter has been found to contribute an average of 0.167 pound B.O.D. per capita per day. If the volume of flow and the 5-day B.O.D. of a given waste are determined, then: Volume (gallons per day) x p.p.m. (parts per million) B.O.D. x 0.00005 = population equivalent of waste.

EXISTING MUNICIPAL TREATMENT FACILITIES

Sub-basin 18

Table 32 SEPTEMBER 1950

DEGREE OF TREATMENT PROVIDED	NUMBER		POPULATION SERVED
	MUNICIPALITIES*	PLANTS	
PRIMARY	3 (1) (2)	3	360
SECONDARY	0	0	0
NO TREATMENT	14	0	2,230

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Septic tanks only.

(2) Includes 2 industries, having 210 employees, discharging sanitary sewage only.

EXISTING INDUSTRIAL* WASTE TREATMENT FACILITIES

Sub-basin 18

Table 33 SEPTEMBER 1950

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF INDUSTRIAL PLANTS HAVING		
		TREATMENT FACILITIES	NO TREATMENT FACILITIES	UNDETERMINED FACILITIES
FOOD AND KINDRED PRODUCTS	10	0	10	0
TEXTILE MILL PRODUCTS				
PAPER AND ALLIED PRODUCTS				
CHEMICAL AND ALLIED PRODUCTS				
PRODUCTS OF PETROLEUM AND COAL				
RUBBER PRODUCTS				
LEATHER AND LEATHER PRODUCTS				
PRIMARY METAL INDUSTRIES				
FABRICATED METAL PRODUCTS				
MISCELLANEOUS				

*Industries having separate outlets and discharging wastes directly to watercourse.

SUB - BASIN # 19

(St. Croix River Watershed)

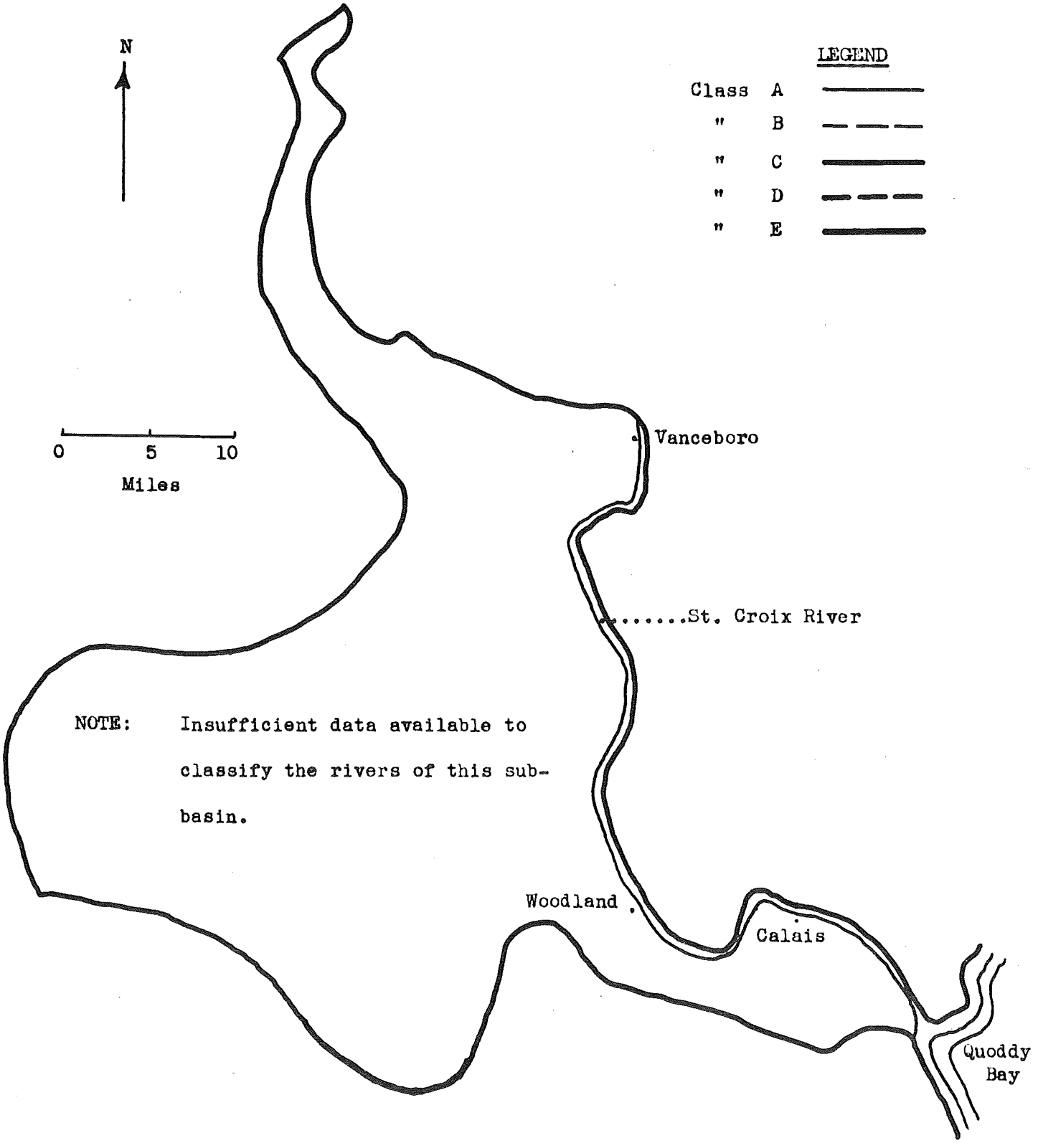


Fig. 22

SUB-BASIN 19

The Maine section of Sub-basin 19, the St. Croix River watershed contains about 984 square miles, the balance of the watershed being in Canada with an area of approximately 489 square miles. The St. Croix River is the international boundary between Maine and the Province of New Brunswick, Canada, on the east, and the sub-basin is bounded on the south by the Machias River and adjacent coastal watersheds, on the west by the Penobscot River watershed.

The land is flat, low-lying, and heavily wooded. The many large lakes in the basin cover over 136 square miles, more than one-tenth of the entire surface area, which is approximately the amount of land that is used for farming. The population is concentrated along the lower twenty miles of the St. Croix River, about 8,200 living in Calais, Baileyville, and Princeton, which is approximately 80% of the population of the entire area.

The economy of this sub-basin depends primarily on the lumbering industry, especially pulp cutting and pulp and paper manufacture, a large pulp and paper mill being located in the town of Baileyville.

The St. Croix River, forming a section of the international border for 69 miles, originates north of Vanceboro and discharges to Passamaquoddy Bay. It has a watershed of 1,473 square miles and a total fall of 540 feet. Its principal tributary is Tomah Stream, 29 miles long.

The St. Croix River, although somewhat polluted by domestic sewage at Woodland in the town of Baileyville, is used as an auxiliary water supply at Calais and for industrial purposes. Below Calais the river is a tidal estuary and is used for commercial and game fishing, for shellfishing, wildlife, and recreation.

ST. CROIX RIVER

Water Sampling Stations & Test Results

Five sampling stations have been established on the St. Croix River and are located as follows:

Station Number	Town	Location
1	Baileyville	Boom shack above dam (apparently sometimes at Water intake)
2	Baileyville	West bank below town sewer outlet (opposite second house on Elm Street)
3	Baileyville	West bank behind form just north of Stony Brook
4	Baring	International Bridge
5	Calais	International Bridge at Milltown

Samples taken at the stations during 1947 showed the following average results:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	B.O.D. p.p.m.	pH	Tentative Classification
1	24	6.1	72	5.7	.7	6.3	Insufficient Data
2	23	4.9	57	8.3	2.0	6.2	Available to
3	24	4.9	58	6.3	2.4	6.2	Classify this
4	25	5.3	63	7.5	1.7	6.2	River
5	24	4.9	57	7.0	1.5	6.2	

Sewage Pollution

In Maine the St. Croix River receives the sewage from a population of 1,200 in the town of Baileyville, from 4,000 at Calais and from 100 at Robbinston. Across the river from Calais a sewage load from a population of approximately 5,000 adds to the pollution.

In order to reduce the pollution of this river, new sewage treatment plants should be provided by the city of Calais, the villages of Woodland and Robbinston and the Canadian town of St. Stephen.

Industrial Pollution

There are very few industries in the St. Croix River basin. One large paper mill is located in the town of Baileyville and discharges an average of 90,000 gallons per day of sulfite digester waste liquor. A large cotton mill located at Milltown, New Brunswick, contributes some spent dye wastes to the water. Of the four sawmills located in the area, none allow any appreciable amount of wastes to enter the water.

MUNICIPAL SOURCES OF POLLUTION

Sub-basin 19

Table 34 SEPTEMBER 1950

MUNICIPALITIES*	SOURCES OF POLLUTION (IN NUMBER OF MUNICIPALITIES)	POPULATION SERVED BY SEWERAGE SYSTEM	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE)
HAVING DATA ON POLLUTION LOAD DISCHARGED TO WATERCOURSE	4	10,400	10,400
HAVING ONLY POPULATION DATA AVAILABLE (DATA ON POLLUTION LOAD TO WATERCOURSE INCOMPLETE OR NOT AVAILABLE)	3	230	NOT APPLICABLE
TOTAL	7	10,630	XXX

*Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

MAJOR INDUSTRIAL SOURCES OF POLLUTION

Sub-basin 19

Table 35 SEPTEMBER 1950

INDUSTRIES	SOURCES OF POLLUTION (IN NUMBER OF PLANTS)	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE*)
PRODUCING ORGANIC WASTES	0	0
PRODUCING ORGANIC WASTES	28	UNDETERMINED
PRODUCING INORGANIC WASTES	1	NOT APPLICABLE
PRODUCING WASTES OF UNDETERMINED TYPE	0	UNDETERMINED
TOTAL	29	XXX

* The term, "population equivalent", is used to compare the strength of an industrial waste with that of domestic sewage. The latter has been found to contribute an average of 0.167 pound B.O.D. per capita per day. If the volume of flow and the 5-day B.O.D. of a given waste are determined, then: Volume (gallons per day) x p.p.m. (parts per million) B.O.D. x 0.00005 = population equivalent of waste.

EXISTING MUNICIPAL TREATMENT FACILITIES

Sub-basin 19

Table 36 SEPTEMBER 1950

DEGREE OF TREATMENT PROVIDED	NUMBER		POPULATION SERVED
	MUNICIPALITIES*	PLANTS	
PRIMARY	0	0	0
SECONDARY	0	0	0
NO TREATMENT	7	0	10,630

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

EXISTING INDUSTRIAL* WASTE TREATMENT FACILITIES

Sub-basin 19

Table 37 SEPTEMBER 1950

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF INDUSTRIAL PLANTS HAVING		
		TREATMENT FACILITIES	NO TREATMENT FACILITIES	UNDETERMINED FACILITIES
FOOD AND KINDRED PRODUCTS	27	0	27	0
TEXTILE MILL PRODUCTS	0			
PAPER AND ALLIED PRODUCTS	1	0	1	0
CHEMICAL AND ALLIED PRODUCTS	0			
PRODUCTS OF PETROLEUM AND COAL	0			
RUBBER PRODUCTS	0			
LEATHER AND LEATHER PRODUCTS	0			
PRIMARY METAL INDUSTRIES	0			
FABRICATED METAL PRODUCTS	1	0	1	0
MISCELLANEOUS	0			

* Industries having separate outlets and discharging wastes directly to watercourse.

SUB - BASIN # 20

(St. John River Watershed)

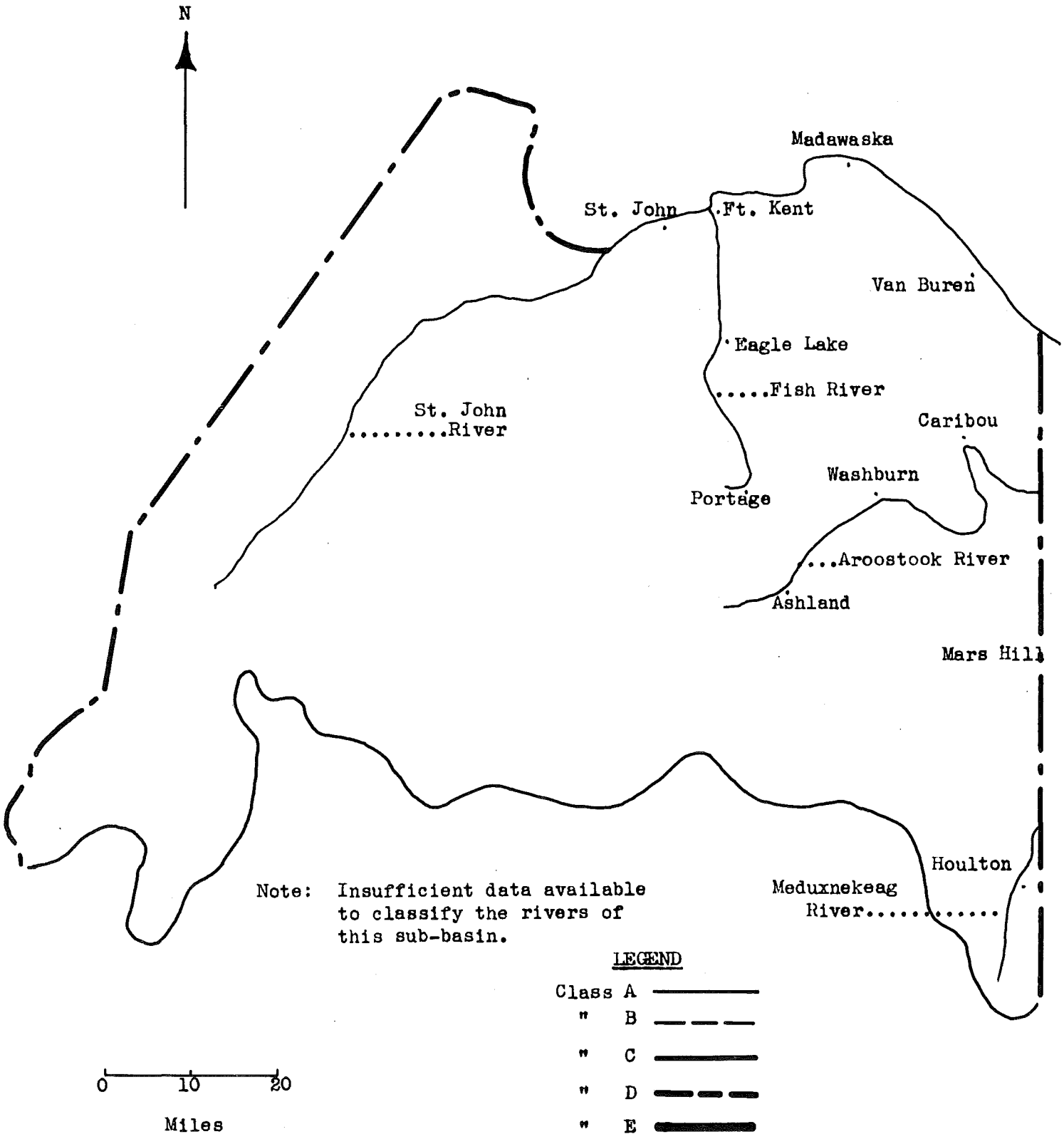


Fig. 23

SUB-Basin 20

The St. John River watershed is over 18,800 square miles in area, of which 7,331 square miles are in Sub-basin 20 in Maine and 1,179 square miles in Canada above the point where the river leaves the Maine boundary. This sub-basin is located in the northern part of the state and is bounded on the west, north, and east by Canada and on the south by the Penobscot River watershed.

The eastern part of this sub-basin is open, rolling country suitable for large scale farming. The central and western parts of the area are hilly to mountainous and heavily wooded. There is a population of about 85,000 in the entire sub-basin, most of which are located in the eastern section, the principal centers being Houlton, Presque Isle, Caribou and Fort Fairfield. The remainder of the population is spread throughout the farming belt.

The main economic influences of the sub-basin are the forests of the central and western sections where considerable lumbering, especially pulpwood cutting, is carried out, and the farmlands of the eastern section where great quantities of potatoes are raised commercially each year.

The St. John River is 331 miles in length. It rises in the mountainous regions of western Maine near the Canadian border and flows within the state for a distance of about 90 miles to its junction with the St. Francis River at St. Francis Plantation. From here to Hamlin Plantation at the northeastern corner of the state, it forms about 70 miles of the international border. At Hamlin the river leaves the boundary and flows southeasterly through New Brunswick, entering the Bay of Fundy at St. John.

Tributaries of the St. John River lying wholly or partly in Maine, include the Aroostook, Allagash, Fish, St. Francis, and Meduxnekeag Rivers. The Aroostook River is 100 miles long and has a drainage area of 2,290 square miles. The Allagash and Fish Rivers are the only major tributaries which lie wholly within the state. They are 69 and 63 miles long, draining 1,240 and 890 square miles respectively. The St. Francis River is 60 miles in length with a drainage area of 570 square miles, and forms about 30 miles of the international border upstream from its junction with the St. John River. The Meduxnekeag River is 43 miles long and drains 479 square miles.

Stream pollution in this sub-basin is due mainly to domestic sewage and wastes from starch factories and, in years of surplus, from potato dumps. Long Lake, one of the headwaters of the Fish River, receives considerable pollution from a starch factory near St. Agatha and the river is further contaminated by two starch factories at Fort Kent. The Aroostook River and its tributaries receive domestic sewage from a total population of 10,625 and the wastes from eight potato starch factories. A population of approximately 7,890, together with six potato starch factories, contribute wastes to the Meduxnekeag River and its tributaries.

BURNING DUMP LOCATED ON BANK OF STREAM

ST. JOHN RIVER and MINOR TRIBUTARIES

Of the many sampling stations which have been established in the St. John River watershed, only a few stations are on the main stem of the river and minor tributaries in the Maine section of the watershed. The three major tributaries which lie wholly or partly in the state are treated in separate sub-divisions. They are the Fish, Aroostook, and Meduxnekeag Rivers.

Water Sampling Stations, and Test Results

Six sampling stations are maintained on the St. John River. They are located as follows:

Station Number	Town	Location
1	Hamlin	South bank behind gravel pit near U.S. Customs
2	Van Buren	International Bridge
3	Madawaska	International Bridge
4	Fort Kent	International Bridge
4A	Allagash	Bridge over Allagash River
5	Allagash	South bank at Dickey Ferry

The average results of tests made on samples taken at the various stations are as follows:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	O_2 Consumed p.p.m.	pH	Tentative Classification
1	11	7.8	69	9.8	13.8	7.0	Insufficient Data
1A	11	10.4	91	3.0	11.2	7.6	Available to
1B	11	9.2	92	6.8	8.0	7.3	Classify this
2	11	9.2	82	7.3	9.2	7.3	River
3	12	10.7	99	2.8	7.6	7.5	
4	13	10.6	100	3.0	7.2	7.4	
4A	13	10.7	100	2.5	6.4	7.5	
5	13	10.2	97	4.3	3.8	7.3	

Sewage Pollution

A population of over 475 in Fort Kent discharges untreated sewage to the St. John River. Downstream it serves as a domestic, industrial and livestock water supply, and is used for game fishing, wildlife, swimming and other recreation. At Madawaska the pollution load is increased by sewage from a population of approximately 4,000 on the American side and from approximately 6,000 at Edmundston, Canada. From here to Van Buren, 25 miles downstream, very little additional sewage enters the river, but at that point untreated sewage from a population of approximately 6,000 is added. At Frenchville, Daigle and Bourgoin Brooks are polluted near their mouths by the sewage from a population of 400.

New sewage treatment plants need to be constructed for the towns mentioned if pollution of the St. John River is to be reduced.

Industrial Pollution

There are few industries in this section of the watershed. Two starch factories in Fort Kent and a large paper mill in Madawaska are the only sources of any considerable amount of industrial wastes. There are no sawmills here which allow any appreciable amount of wastes to enter the water.

LARGE QUANTITY OF SURPLUS POTATOES DUMPED IN STREAM AND ON ITS BANKS

FISH RIVER

Water Sampling Stations and Test Results

Four sampling stations are located along the Fish River.

Station Number	Town	Location
1	Fort Kent	Bridge on Route 1 at Fort Kent
2	Fort Kent	Bridge at Fort Kent Mills
3	Wallagrass	Bridge at Soldier Pond
4	Eagle Lake	Bridge on Route 1 near town line

Following are the average results of tests made on water samples collected at the four stations:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	O_2 Consumed p.p.m.	pH	Tentative Classification
1	12	10.8	99	2.5	3.0	7.4	Insufficient Data
2	12	10.6	98	2.0	2.6	7.4	Available to
3	13	9.3	86	3.0	4.0	7.2	Classify this
4	14	10.5	101	2.5	4.6	7.3	River

Sewage Pollution

The amount of wastes added to the water in this drainage area is relatively small and the water is satisfactory for use as domestic, industrial, and livestock water supplies, and for game fishing, wildlife, swimming, and other recreation.

The Fish River receives the sewage from a population of 200 in the town of Eagle Lake and Long Lake from 300 in the town of St. Agatha.

Industrial Pollution

There is very little industry in the Fish River drainage area. A starch factory in St. Agatha discharges wastes to Long Lake. This causes a nuisance condition in the vicinity of the factory but due to natural processes a rapid recovery to normal conditions is evident within about a mile from the plant. The five sawmills in the watershed do not cause any appreciable amount of pollution.

AROOSTOOK RIVER

Water Sampling Stations, and Test Results

Many sampling stations are maintained along the Aroostook River and its tributaries. They are located as follows:

Station Number	Town	Location
		Aroostook River
1	Fort Fairfield	South bank at R.R. crossing near international boundary
2	Fort Fairfield	Bridge across river
3	Fort Fairfield	North bank back of gravel pit just west of Murphy road and Maley Island
4	Caribou	Bridge across river
5	Caribou	Face of dam at power company
6	Presque Isle	Bridge across river on Route 1
7	Washburn	Aroostook Valley R.R. bridge near Crouseville
8	Washburn	Highway bridge across river
8A	Washburn	Dam at swimming pool, Salmon Brook
9	Ashland	Bridge across river on Route 11
9A1	Ashland	Bridge to Garfield-Machias River
9A2	Ashland	Above old dam site - Machias River
10	Masardis	Bridge across river on back road to Garfield
		Potter Brook
1	Fort Fairfield	Face of dam near South Street
2	Fort Fairfield	Monson Mill Stream bridge near border
		Little Madawaska River
1	Caribou	Highway bridge at Grimes Mill
2	Caribou	Highway bridge on Route 223
3	Caribou	Highway bridge about 2 miles above station 2
4	Connor	Highway bridge on Route 1
5	Stockholm	Bridge at village
6	Stockholm	Highway bridge on Route 161
		Presque Isle Stream
1	Presque Isle	Railroad bridge near Aroostook River
2	Presque Isle	Bridge on Park Street
3	Presque Isle	Bridge on State St. (Route 163)
4	Presque Isle	South bank near intake of water district
5	Mapleton	West bank at end of farm road near Chapman town line above confluence with north branch.
		North Branch Presque Isle Stream
1	Mapleton	Bridge on Route 163 at Brennan
2	Mapleton	Bridge on Route 163 at Mapleton
		Limestone Stream
1A	Limestone	Blaisdell Brook Bridge, Route 165
1	Limestone	Bridge 3 miles below Limestone
2	Limestone	Bridge on road leading east by potato houses
3	Limestone	Face of dam near Route 165

Samples taken at the various stations during 1947 showed the following average results:

Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	pH	O_2 Consumed p.p.m.	Tentative Classification
			Aroostook River				
1	13	8.6	82	7.5	7.1		Insufficient Data Available to Classify this River
2	14	9.6	92	5.6	7.2		
3	13	10.3	96	2.8	7.8		
4	13	9.3	88	8.5	7.0		
5	13	9.6	94	3.8	7.3		
6	15	9.5	92	5.5	7.1		
7	14	9.9	94	2.3	7.5		
8	11	11.1	100	2.5	7.3		
8A	10	11.6	102	7.0	7.9		
9	11	10.6	94	3.3	7.2		
9A1	9	11.9	103	2.0	7.3		
9A2	9	11.8	102	2.5	7.3		
10	11	10.9	98	2.0	7.3		
			Pattee Brook				
1	13	10.9	103	3.8	7.8		
2	13	10.1	94	2.5	7.8		
			Little Madawaska River				
1	11	11.0	99	0	8.5		Insufficient Data Available to Classify this River
2	11	10.8	97	1.3	8.1		
3	11	10.6	95	2.8	7.6		
4	12	10.4	95	3.0	7.4		
5	12	9.4	87	4.5	7.1		
6	11	10.8	97	3.5	7.3		
			Presque Isle Stream				
1	15	4.4	63	19.6	6.8	9.6	
2	13	8.5	80	8.6	7.2	28.0	
3	13	10.0	95	4.0	7.3	6.8	
4	14	8.5	80	6.7	7.3	9.0	
5	16	9.6	96	5.3	7.3	10.8	
			North Branch Presque Isle Stream				
1	13	10.4	96	3.5	7.7	3.6	
2	14	11.8	114	4.5	7.9	3.6	
			Limestone Stream				
1A	6	12.0	96	6.5	8.1		
1	14	7.6	74	12.0	7.2		
2	13	7.9	73	11.7	7.2		
3	12	8.7	77	8.3	7.4		

RIVER RECEIVING WASTES FROM POTATO ALCOHOL PLANT

Sewage Pollution

A population of over 50 at Masardis discharges sewage to the Aroostook River, and about 2,800 at Caribou and 700 at Fort Fairfield add to the sewage load. A population of approximately 600 in Washburn contribute pollution to Salmon Brook. Presque Isle Stream receives domestic sewage from 75 in Mapleton and from over 5,000 in Presque Isle where the sewage is treated by means of an Imhoff tank. At Limestone the sewage of a population of 500 is treated by a primary settling tank and is chlorinated before being discharged to Greenlaw Brook. Bryant Brook receives pollution from 300 in Fort Fairfield, and Limestone Stream from 600 at Limestone.

Water in this part of the St. John watershed is used primarily for watering livestock, game fishing, wildlife, swimming, and other forms of recreation, and on the whole is satisfactory for such uses.

Industrial Pollution

The majority of industrial plants contributing to stream pollution in this area are potato starch factories, of which there are two in both Limestone and Fort Fairfield and one each in Woodland, Presque Isle, Washburn and Ashland. These plants cause a considerable amount of pollution in their respective localities by the discharge of so-called protein water and potato pumice. A potato alcohol plant and a yarn mill in Caribou also contribute industrial wastes.

MEDUXNEKEAG RIVER

Water Sampling Stations and Test Results

Fifteen sampling stations have been established along the Meduxnekeag River and Prestile Stream. They are as follows:

Station Number	Town	Location
		Meduxnekeag River
1	Houlton	Bridge near Smith Brook about 4 miles below town
2	Houlton	North Street Bridge
2A	Houlton	Bridge across B Stream on Route 2
2B	Houlton	Bridge to gravel pit above town
3	Houlton	Bridge across South Branch Meduxnekeag River at Carys Mills
4	Hodgdon	Highway bridge at village
4A	Houlton	Bridge across Meduxnekeag River at Carys Mills
		Prestile Stream
1A	Bridgewater	Whitney Brook - bridge below sawmill at village
1	Bridgewater	Highway bridge at boundary
2	Blaine	Highway bridge at Robinson
3	Mars Hill	Foot bridge to Pleasant Street
3A	Mars Hill	Face of dam at village
4	Westfield	East bank about 1 mile below village
5	Easton	Bridge below old starch factory
6	Easton	About 1 mile upstream on road east of R.R.

The average results of tests made during 1947 are as follows:

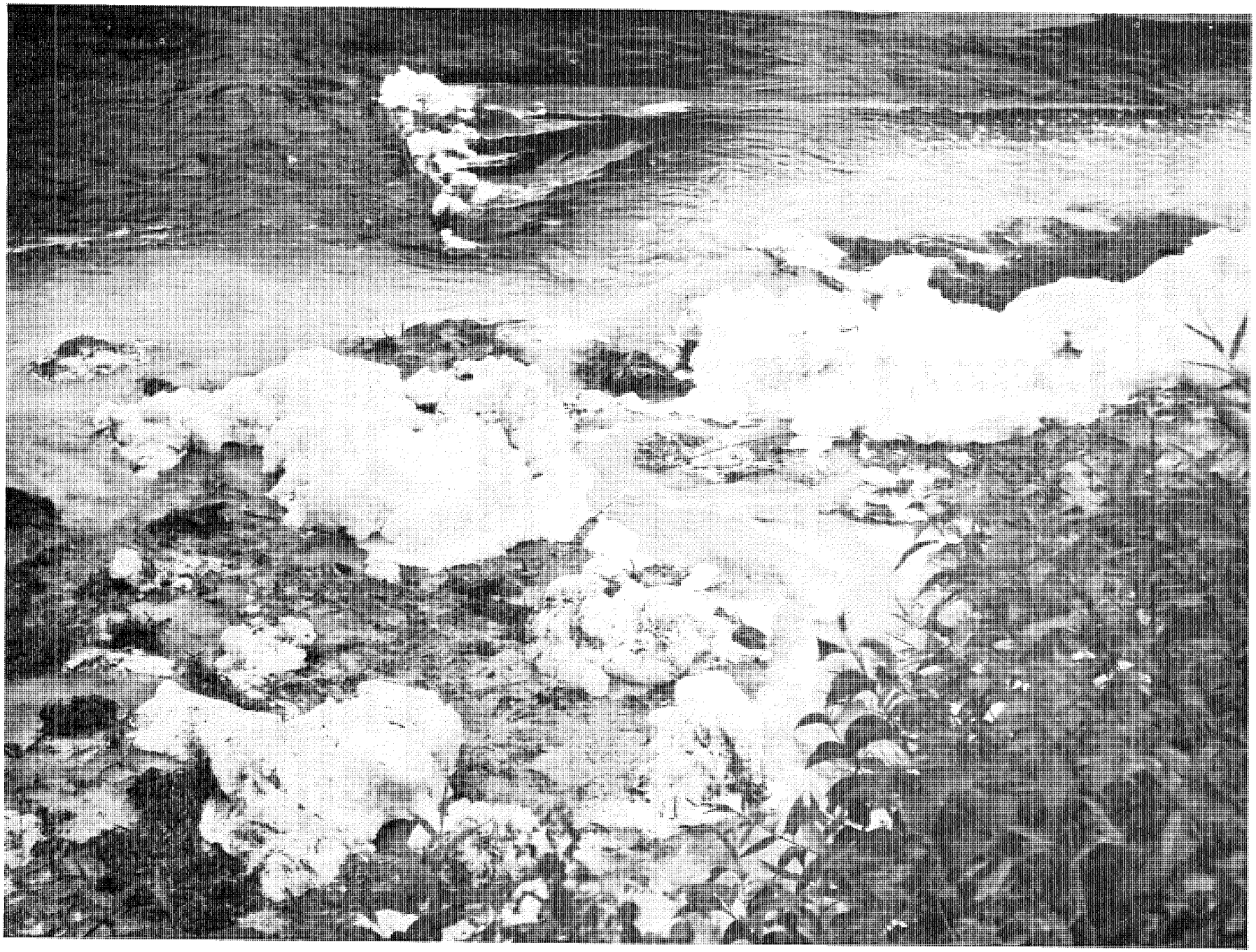
Station Number	Temperature degree Cent.	Dissolved Oxygen p.p.m.	Dissolved Oxygen %	CO_2 p.p.m.	pH	O_2 Consumed p.p.m.	Tentative Classification
			Meduxnekeag River				
1	21	9.5	104	3.7	7.9	7.8	Insufficient Data Available to Classify this River
2	19	7.2	77	6.3	7.3	8.8	
2A	18	9.0	95	3.6	7.5	4.0	
2B	19	9.7	80	2.3	7.9	9.2	
3	19	8.1	93	5.7	7.5	13.0	
4	18	8.0	87	5.8	7.3	15.4	
4A	18	8.5	89	3.0	7.4	-	
			Prestile Stream				
1A	17	8.7	90	6.4	7.5	4.0	Insufficient Data Available to Classify
1	12	11.6	109	1.5	7.7	6.0	
2	13	9.1	84	5.2	7.5	8.0	
3	12	10.3	93	4.8	7.6	10.3	
3A	19	9.2	99	4.9	7.9	2.6	
4	13	11.6	111	1.4	8.3	5.5	
5	14	10.3	99	4.5	7.7	7.7	
6	12	12.5	106	1.8	8.2	5.2	

Sewage Pollution

The Meduxnekeag River receives sewage from a population of 6,610 at Houlton, and from 250 at Hodgdon. The Prestile Stream receives sewage from 1,000 at Mars Hill, and Whitney Brook from 30 at Bridgewater. The water in these streams is used mainly for livestock, wildlife, swimming and other recreation. New treatment plants are needed in Houlton and Mars Hill if pollution is to be reduced.

Industrial Pollution

The main industrial sources of stream pollution in this section are from potato starch and woodworking wastes. Two starch factories in both Houlton and Monticello and one each in Mars Hill and Westfield discharge wastes to the Meduxnekeag or tributaries. A cannery and plywood mill in Houlton also contribute waste products to the water. Three sawmills located in Houlton, Hodgdon, and Bridgewater contribute sawmill wastes to the Meduxnekeag River, North Bridge of Meduxnekeag River and Whitney Brook respectively.



FOAM AND DISCOLORATION IN STREAM CAUSED BY DISCHARGE OF EFFLUENT FROM STARCH FACTORY SETTLING TANK.

MUNICIPAL SOURCES OF POLLUTION

Sub-basin 20

Table 38 SEPTEMBER 1950

MUNICIPALITIES*	SOURCES OF POLLUTION (IN NUMBER OF MUNICIPALITIES)	POPULATION SERVED BY SEWERAGE SYSTEM	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE)
HAVING DATA ON POLLUTION LOAD DISCHARGED TO WATERCOURSE	20 (1)	8,247	7,470
HAVING ONLY POPULATION DATA AVAILABLE (DATA ON POLLUTION LOAD TO WATERCOURSE INCOMPLETE OR NOT AVAILABLE)	4	20,300	NOT APPLICABLE
TOTAL	24	28,547	XXX

* Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 2 industries, having 122 employees, discharging sanitary sewage only.

MAJOR INDUSTRIAL SOURCES OF POLLUTION

Sub-basin 20

Table 39 SEPTEMBER 1950

INDUSTRIES	SOURCES OF POLLUTION (IN NUMBER OF PLANTS)	AMOUNT OF POLLUTION DISCHARGED TO WATERCOURSE (IN TERMS OF EQUIVALENT NUMBER OF PEOPLE*)
PRODUCING ORGANIC WASTES	0	0
PRODUCING ORGANIC WASTES	32	UNDETERMINED
PRODUCING INORGANIC WASTES	0	NOT APPLICABLE
PRODUCING WASTES OF UNDETERMINED TYPE	0	UNDETERMINED
TOTAL	32	XXX

* The term, "population equivalent", is used to compare the strength of an industrial waste with that of domestic sewage. The latter has been found to contribute an average of 0.167 pound B.O.D. per capita per day. If the volume of flow and the 5-day B.O.D. of a given waste are determined, then: Volume (gallons per day) x p.p.m. (parts per million) B.O.D. x 0.00005 = population equivalent of waste.

EXISTING MUNICIPAL TREATMENT FACILITIES

Sub-basin 20

Table 40 SEPTEMBER 1950

DEGREE OF TREATMENT PROVIDED	NUMBER		POPULATION SERVED
	MUNICIPALITIES*	PLANTS	
PRIMARY	5	5	6,370
SECONDARY	0	0	0
NO TREATMENT	19 (1)	0	22,177

*Includes incorporated or unincorporated municipalities; sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewerage systems.

(1) Includes 2 industries, having 122 employees, discharging sanitary sewage only.

EXISTING INDUSTRIAL* WASTE TREATMENT FACILITIES

Sub-basin 20

Table 41 SEPTEMBER 1950

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF INDUSTRIAL PLANTS HAVING		
		TREATMENT FACILITIES	NO TREATMENT FACILITIES	UNDETERMINED FACILITIES
FOOD AND KINDRED PRODUCTS	31	0	31	0
TEXTILE MILL PRODUCTS	1	0	1	0
PAPER AND ALLIED PRODUCTS	0			
CHEMICAL AND ALLIED PRODUCTS	0			
PRODUCTS OF PETROLEUM AND COAL	0			
RUBBER PRODUCTS	0			
LEATHER AND LEATHER PRODUCTS	0			
PRIMARY METAL INDUSTRIES	0			
FABRICATED METAL PRODUCTS	0			
MISCELLANEOUS	0			

*Industries having separate outlets and discharging wastes directly to watercourse.

COASTAL SURVEYS

Three pollution surveys along the Maine coast have been conducted to date by the Sanitary Water Board and the Division of Sanitary Engineering. The most recent of these is the coastal sewer survey, which is still in progress at the present time (November, 1950). The other two surveys, one on the pollution of bathing beaches and the other on closed clam flat areas of the State, were completed in 1946 and 1947, respectively; the latter being carried out jointly by the Sanitary Water Board, and the State Departments of Health and Welfare, Agriculture, and Sea and Shore Fisheries.

COASTAL SEWER SURVEY

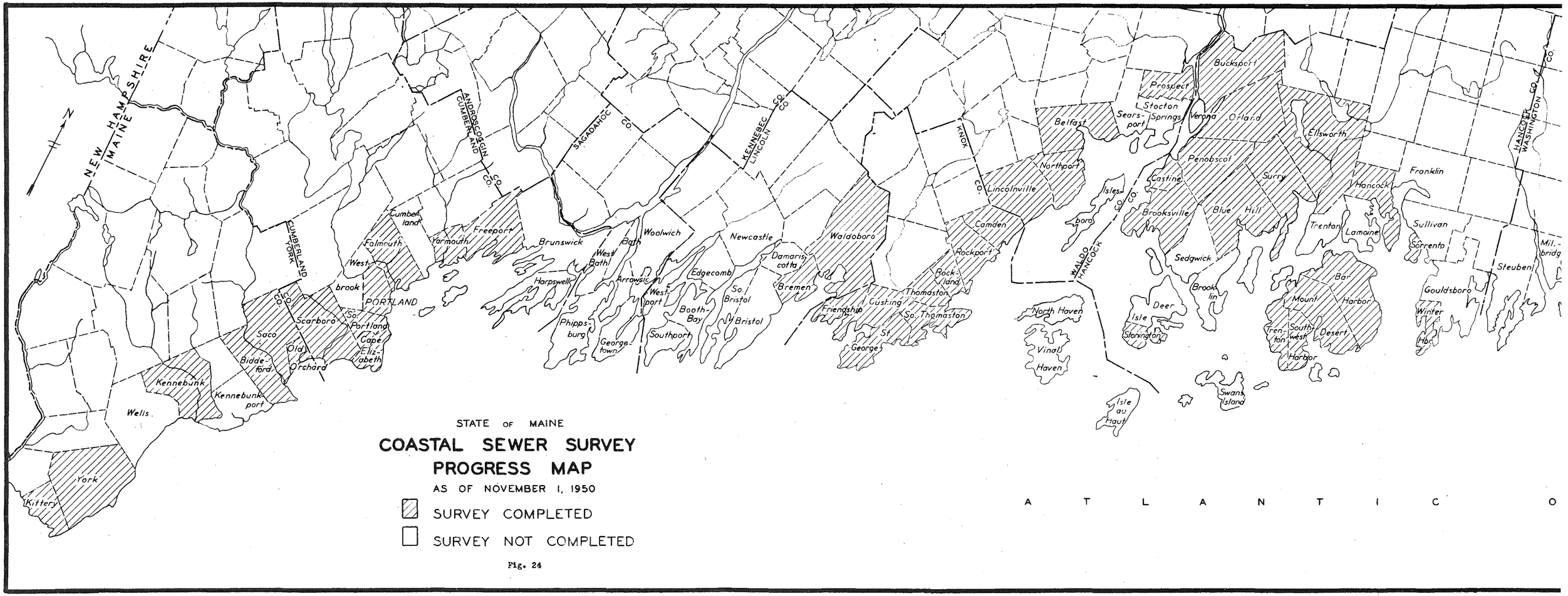
In January, 1950, a survey of the entire coastline of Maine was started, the object of which was to locate all sewer outfalls and other significant sources of pollution along the coast. The study was instigated as in the majority of the cities and towns sewers have been installed year after year without keeping any records or plans, so that in the majority of communities no information was available either as to the size, location or population served, of the various sewers entering the ocean in the respective areas.

The data resulting from this survey will be consolidated with information obtained from previous studies of bathing beaches and clam flats, as well as with studies being conducted by the Sea and Shore Fisheries Department of the waters over closed clam flat areas.

Two employees of the Sanitary Water Board and one from the Division of Sanitary Engineering, the latter financed by federal grant, succeeded in surveying nearly one-half of the coast line during the first nine months of this activity. All coastal areas which were inhabited or contained possible sources of pollution were covered on foot in an effort to find all outfalls. Information concerning location of the outfall, size of pipe, number of buildings or population served, was obtained at the site, and such additional information as to whether or not it was public or private property was obtained from local authorities or residents of the various areas.

Maps of each area have been prepared indicating the location of the various sewer outfalls for each city and town and the information has been corrected so far as the investigation has made possible up to November 1, 1950.

The following two pages include a map that was too large to be scanned as a single image. To view the print version of the map, please visit the Maine Law and Legislative Reference Library.



STATE OF MAINE

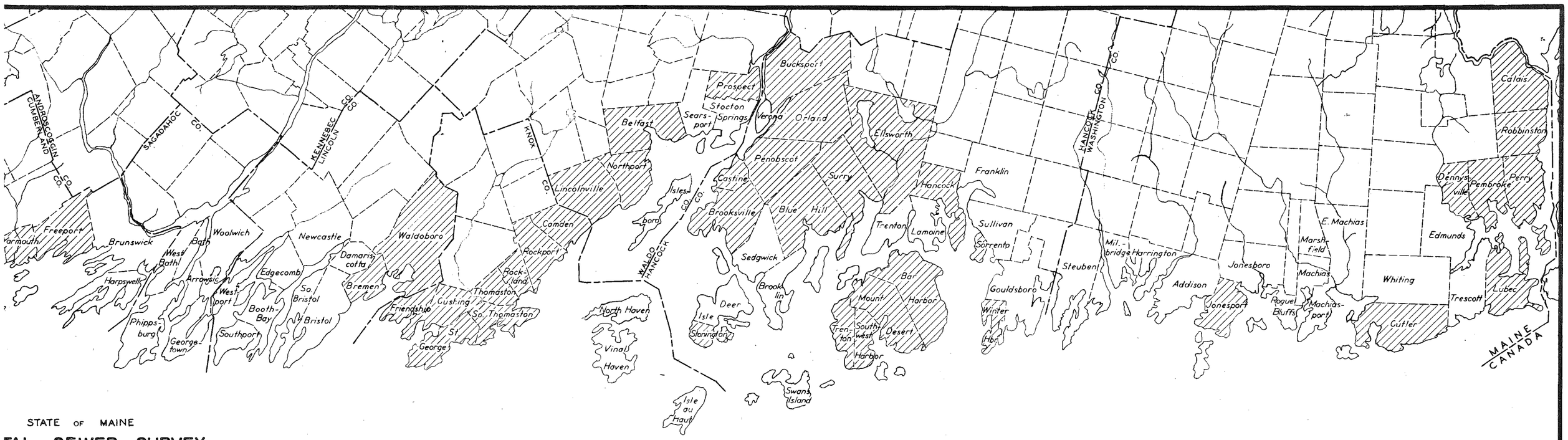
COASTAL SEWER SURVEY PROGRESS MAP

AS OF NOVEMBER 1, 1950

SURVEY COMPLETED

SURVEY NOT COMPLETED

Fig. 24



STATE OF MAINE

TAL SEWER SURVEY PROGRESS MAP

AS OF NOVEMBER 1, 1950

SURVEY COMPLETED

SURVEY NOT COMPLETED

Fig. 24

TOWN OF KITTERY

The sewage from a population of over 9,300 discharging from Kittery, the Navy Yard, Kittery Point, and part of South Eliot pollutes the tidal waters at Kittery. Sewage from approximately 1,800 people receives treatment at the Admiralty Village Treatment Plant, and the remainder reaches the water untreated. A population of about 225, however, is served by private septic tanks and cesspools.

There are 272 sewer outfalls in the area, 4 of which are public sewers. These serve over 1,200 buildings, half of which are included in the treatment system at Admiralty Village.

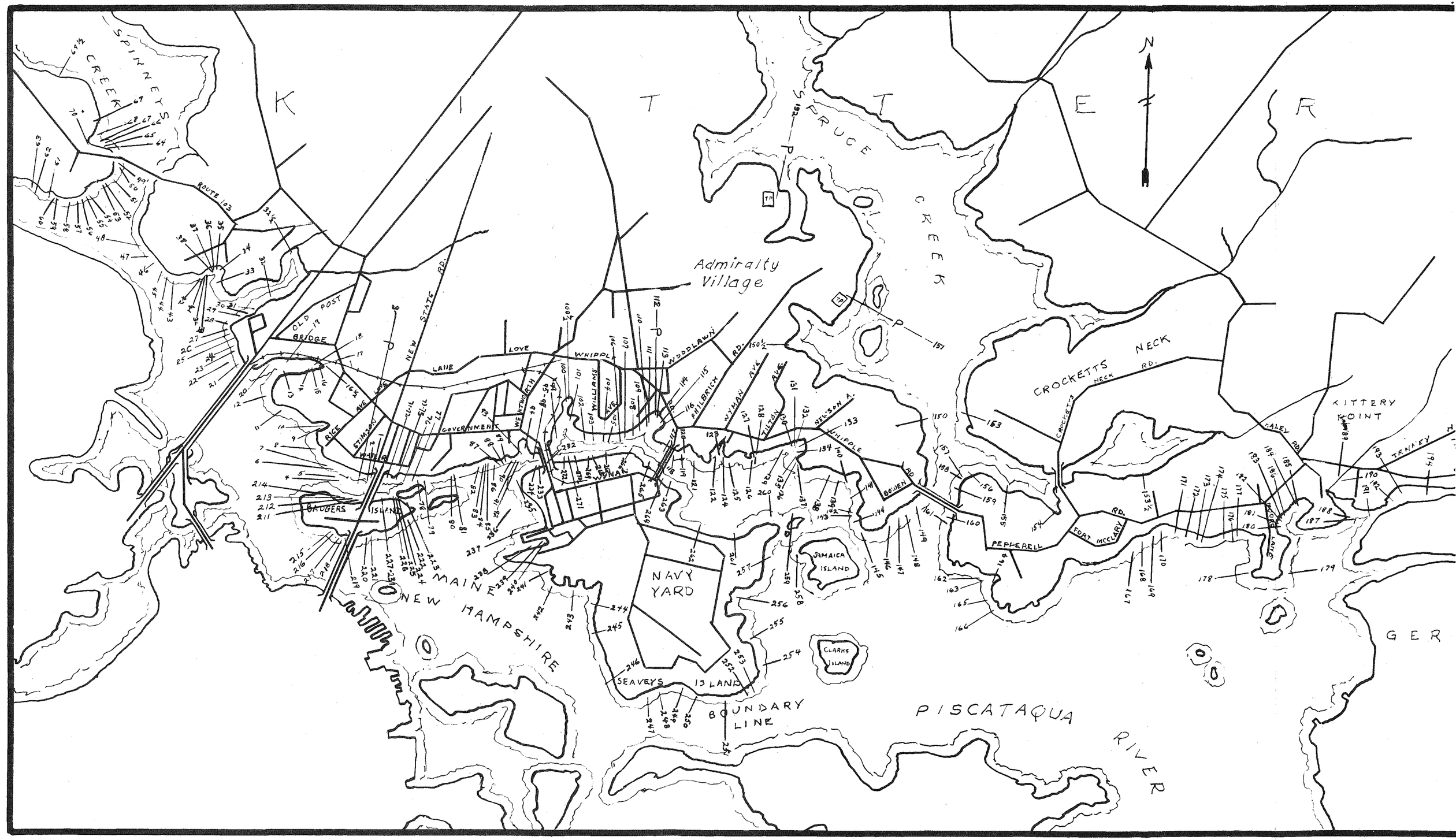
The 4 public sewer outfalls as indicated on the Kittery map are located as follows:

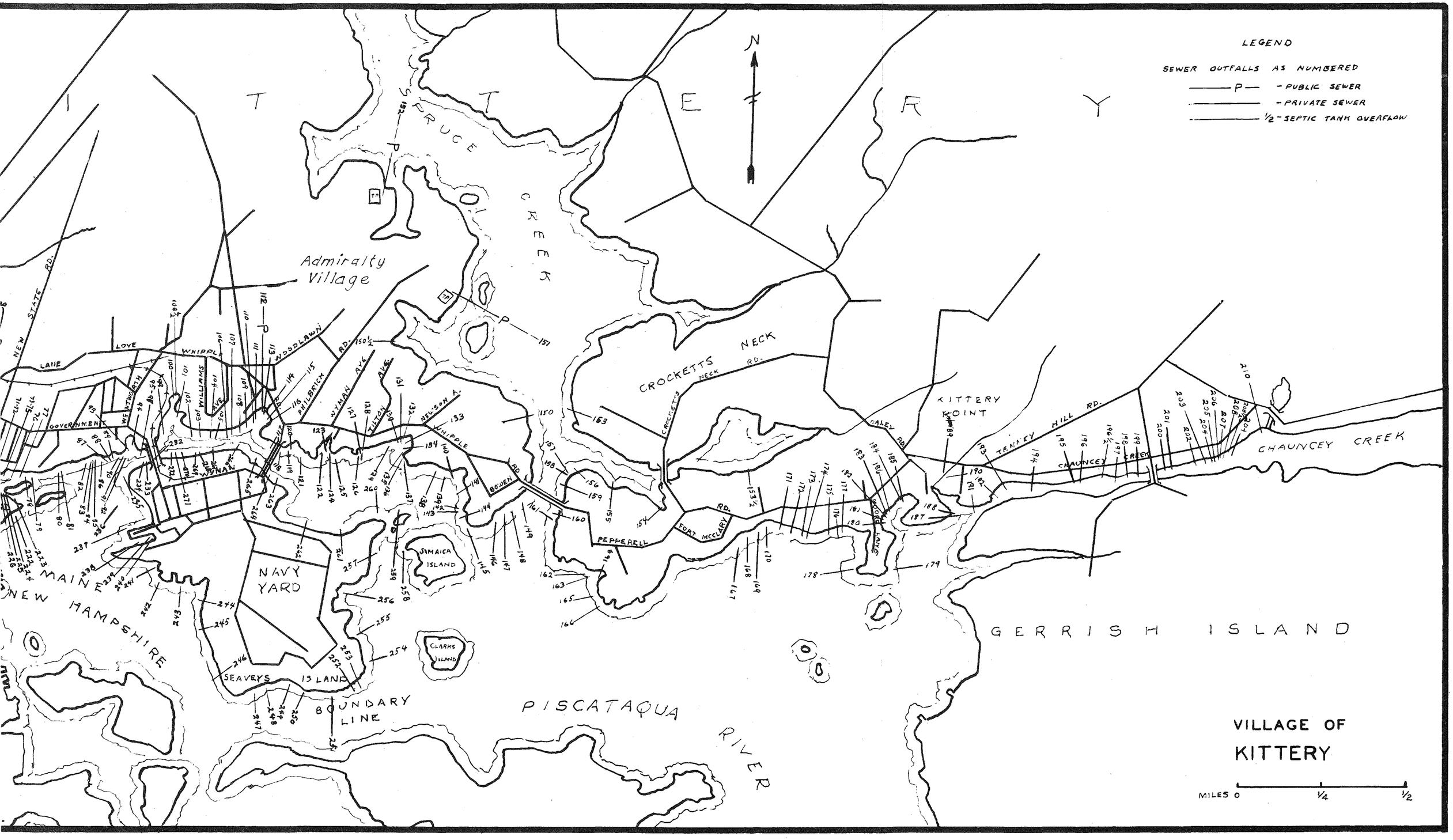
Index No.	Description
3	This outlet discharges to deep water between Badger's Island and Kittery, about 250-300 feet west of Memorial Bridge. It serves a total of 23 buildings on Stimson, Government, New March, and Water Streets, including the Wentworth-Dennett School.
112	The second town sewer serves from 27 to 32 buildings in the area around Locke's Cove, between Navy Yard entrances 1 and 2, and empties to the cove. It was designed to lead to deep water at low tide, but at present the outlet is clogged, causing the sewer to discharge to flats near high tide. The area served includes Woodlawn Street and Whipple Road.
151-152	The 600 housing units at Admiralty Village are served by these 2 sewer outfalls. The main outlet (152) carrying only chlorinated liquid, from which solids have been removed in an Imhoff tank, empties to deep water in Spruce Creek at low tide, about 400 feet north of Phelps Street, and about opposite the treatment plant. An emergency outfall (151) discharges to Spruce Creek about 2,000 feet southeast of 152.

Sewage other than that emptied through the public sewers just described is discharged untreated from a number of group and individual private sewers to the Piscataqua River and surrounding waters:

1, 2, 4-8 incl.	From Memorial Bridge to the inlet about 200 feet west of Rice Avenue, there are 7 private sewer outfalls serving 8 dwellings.
9-11 incl.	Fifteen houses are served by 3 lines which empty into the inlet directly west of Rice Avenue.
12-17 incl.	Near the end of Mendum Street, off Prince Street, 6 outfalls serve 11 houses.

The following two pages include a map that was too large to be scanned as a single image. To view the print version of the map, please visit the Maine Law and Legislative Reference Library.


SPINNEYS CREEK
K I T T E R Y
ROUTE 103
OLD POST BRIDGE
NEW STATE RD.
Admiralty Village
SPRUCE CREEK
LOVE LANE
WHIPPLE
WOODLAWN
RD.
GOVERNMENT
RICE
STINSON
WILLIAMS
SOUTH
PHILBRICK
WYMAN
NELSON A.
WHIPPLE
BOJEN
RD.
CROCKETTS NECK
CROCKETTS NECK RD.
KITTERY POINT
TALEY RD.
TENNEY
FORT McCLARY RD.
PEPPERELL
BADGERS ISLAND
MAINE
NEW HAMPSHIRE
NAVY YARD
SEAVEYS ISLAND
JAMAICA ISLAND
CLARKS ISLAND
BOUNDARY LINE
PISCATAQUA RIVER
N
E R
GER


LEGEND
SEWER OUTFALLS AS NUMBERED
P — PUBLIC SEWER
PRIVATE SEWER
½ - SEPTIC TANK OVERFLOW
N
ITTERY
SPRUCE CREEK
Admiralty Village
NEW STATE RD.
LOVE LANE
WHIPPLE
WOODLAWN
GOVERNMENT
WENTWORTH
WILLIAMS
WYMAN
PHILBRICK
NELSON
BOUDEN RD.
CROCKETTS NECK
CROCKETTS NECK RD.
KITTERY POINT
FORT McCLARY RD.
PEPPERELL
JAMAICA ISLAND
NAVY YARD
CLARKS ISLAND
SEAVEYS ISLAND
BOUNDARY LINE
MAIN
NEW HAMPSHIRE
PISCATAQUA RIVER
CALEY RD.
TENNEY HILL RD.
CHAUNCEY CREEK
GERRISH ISLAND
VILLAGE OF
KITTERY
MILES 0 1/4 1/2

Index No.	Description
18-20 incl.	Along Bridge Street, west to the turnpike, 20 houses are served by 3 outfalls.
21-32 incl.	From the west side of the turnpike to the peak of the first tidal inlet, there are 12 outlets serving a total of 14 houses.
33-48 incl.	Sixteen outfalls serve 17 buildings from the first tidal inlet to the Kittery-South Eliot Bridge over Spinney's Creek, discharging near three quarters or high tide.
49-70 incl.	Included on the Kittery map (northwest corner) is a small section of South Eliot. Twenty-two outfalls, discharging from individual dwellings, serve this section.
71-78 incl.	Eight outfalls serve 31 houses from Hunter Avenue east along Water Street to about 100 feet beyond Pleasant Street.
79-82 incl.	Twenty-eight houses are served by 4 outlets which extend eastward about 460 feet from a point near the west side of Old Armory Way.
83-92 incl.	Ten outfalls from the coal company wharf to the foot of Government Street near the town landing serve 13 buildings, including Lobster House Wharf.
93-94 incl.	One outfall (93) serving 52 buildings and houses, some of which are located in the center of town, empties into the water at the town way at the foot of Government Street. The second outfall (94) serves 13 dwellings.
95-98 incl.	Four outfalls, west of Navy Yard Entrance #1, serve individual homes.
99-117 incl.	Nineteen sewer outfalls, located between Entrances #1 and #2 of the Navy Yard, serve 27 dwellings.
118-149 incl.	Thirty-two outfalls, serving a total of 46 buildings, lie between Entrance #2 of the Navy Yard and the bridge to Kittery Point.
150 153-159 incl.	Eight private sewers, serving approximately 15 houses, discharge to Spruce Creek upstream from the Kittery-Kittery Point Bridge.
160-166 incl.	Seven outfalls serve 15 buildings from the Kittery Point Bridge to Fort McClary.
167-186 incl.	Twenty sewer outfalls are located along the shore from Fort McClary to a point directly south of the intersection of Haley and Pepperell Roads. Twenty-five buildings are served by these lines.

Index No.	Description
187-210 incl.	From the cove south of the intersection of Haley and Pepperell Roads, up Chauncey Creek to the town line, there are a total of 24 sewer outfalls, along with drainage from approximately 15 septic tanks and cesspools.
211-231 incl.	Twenty-one sewer outfalls on Badger's Island serve 28 buildings.
232-272 incl.	Forty-one sewer outfalls at the Navy Yard on Seavey's and Jamaica Islands empty to near low tide. They serve 5,884 personnel and carry a few industrial wastes such as oil and acid wastes. There are 123 buildings on the two islands covered by the sewer systems. The outfalls range in size from 2 to 36 inches in diameter, and serve from 1 to 11 buildings each.

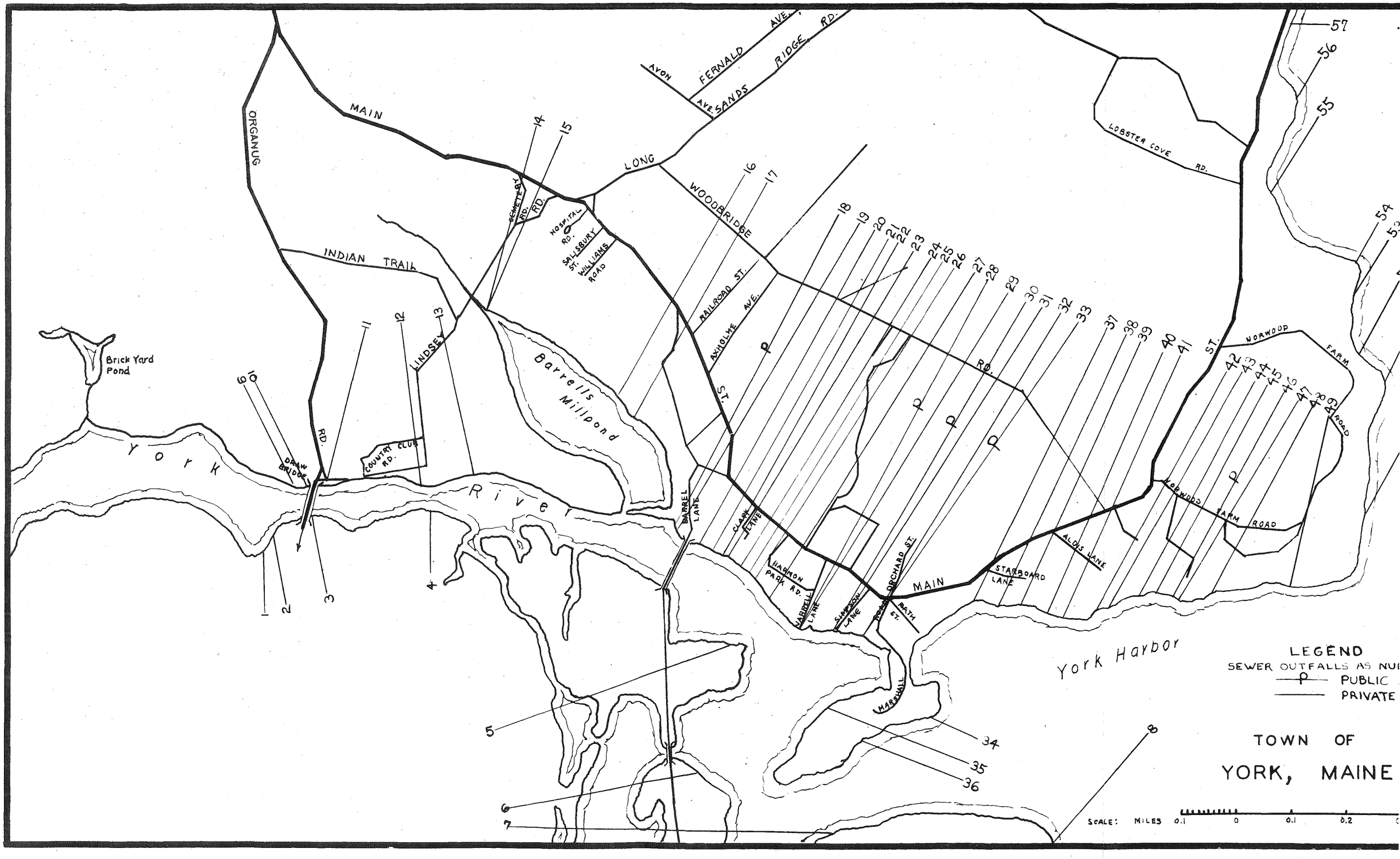
TOWN OF YORK

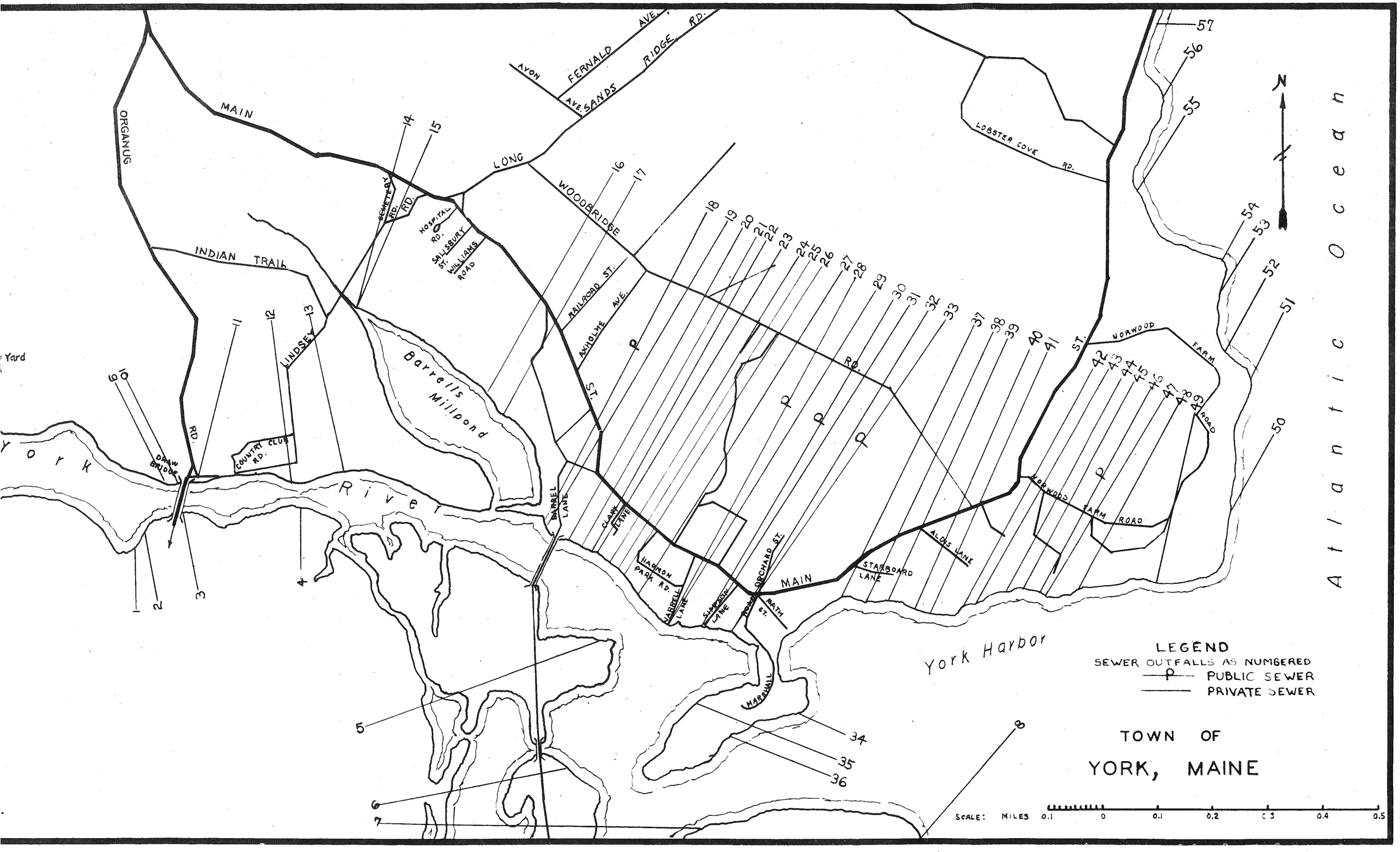
York Harbor, York River, and other tidal waters adjacent to the town of York receive pollution from 5 public sewers serving 117 buildings or approximately 468 people, and 58 private outlets serving 118 buildings including 2 hotels or about 672 people. Approximately 70% of York's population is comprised of summer residents -- the majority of whom are served by private sewers.

Information relating to the 63 outfalls in York is summarized as follows:

Index No.	Description
1-8 incl.	On the south shore of the York River from a point 500 feet above the drawbridge on Route 103 downstream to the mouth of the river there are 11 private outfalls serving 11 houses.
9-35 incl.	From a point on the north bank, 200 feet west of the drawbridge on Route 103 to the east side of Marshall House Point there are 24 private sewers serving 43 houses and a hospital. Four public sewers serving 99 houses also are found in this area. They include: #18, serving 34 houses; #28, serving 31 buildings; #30, serving 14 buildings, and #33, serving about 20 buildings.
36-54 incl.	From the east side shore of Marshall House Point to the shore north of Norwood Farm Road, there are 23 private sewers serving 58 buildings and one town sewer, #46, serving 18 buildings.

The following two pages include a map that was too large to be scanned as a single image. To view the print version of the map, please visit the Maine Law and Legislative Reference Library.


MAIN
ORGANUG
INDIAN TRAIL
LINDSEY
Brick Yard Pond
Barrells Millpond
YORK
RIVER
DRAW BRIDGE
RD.
COUNTRY CLUB RD.
CEMETERY RD.
HOSPITAL RD.
SALISBURY ST.
WILLIAMS ROAD
LONG
WOODBRIDGE
AVON
FERNALD AVE.
SANDS
RIDGE RD.
LOBSTER COVE RD.
RAILROAD ST.
ANNOLME AVE.
ST.
RD.
WORWOOD FARM ROAD
BARREL LANE
CLARK LANE
HARMON PARK RD.
LARRELL LANE
SIMPSON LANE
ORCHARD ST.
MAIN
BATH ST.
STARBOARD LANE
ALDIS LANE
MARSHALL
York Harbor
LEGEND
SEWER OUTFALLS AS NU
PUBLIC
PRIVATE
TOWN OF
YORK, MAINE
SCALE: MILES 0.1 0 0.1 0.2



LEGEND

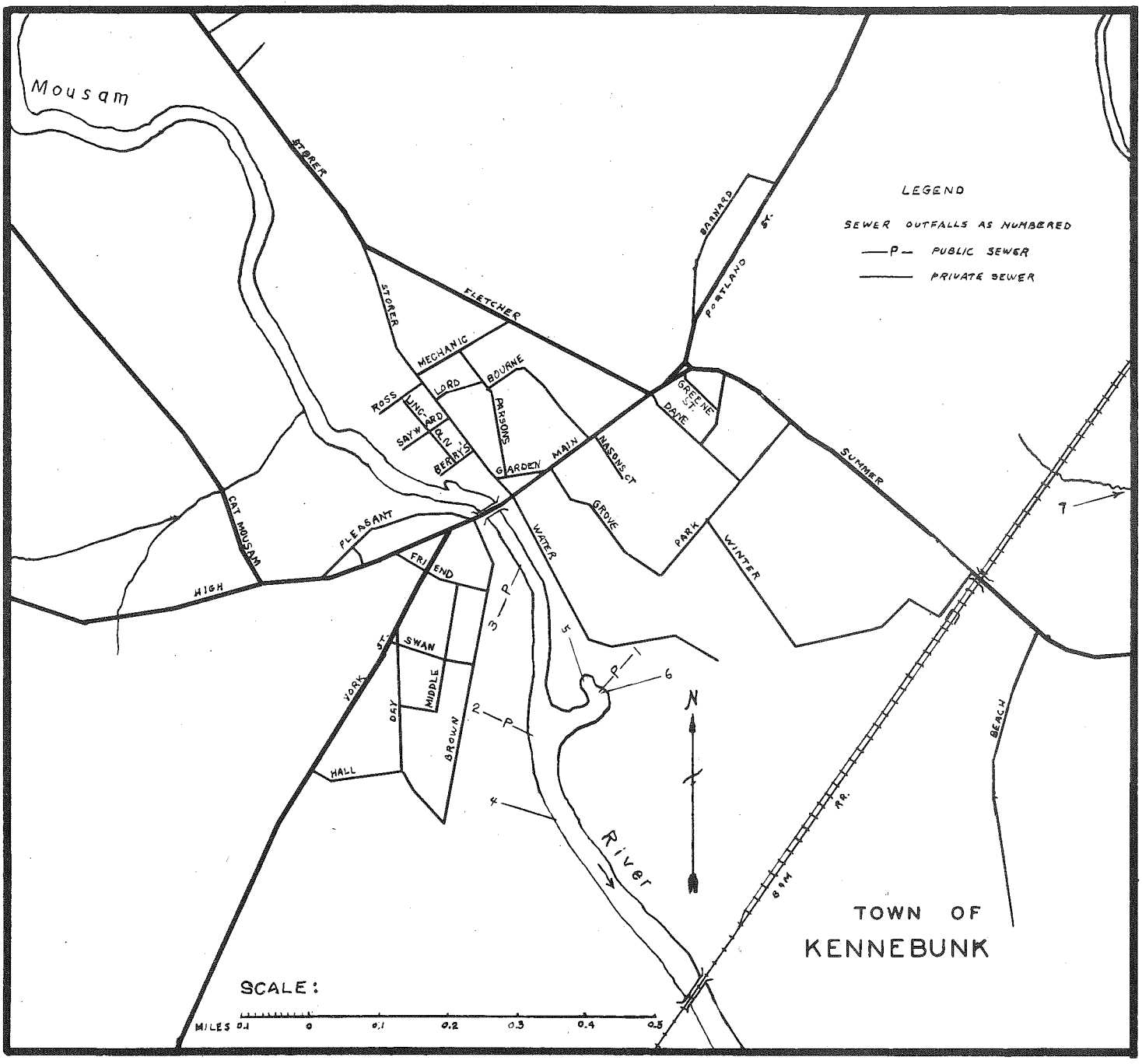
SEWER OUTFALLS AS NUMBERED

—p— PUBLIC SEWER

——— PRIVATE SEWER

TOWN OF YORK, MAINE

SCALE: MILES 0.1 0 0.1 0.2 0.3 0.4 0.5

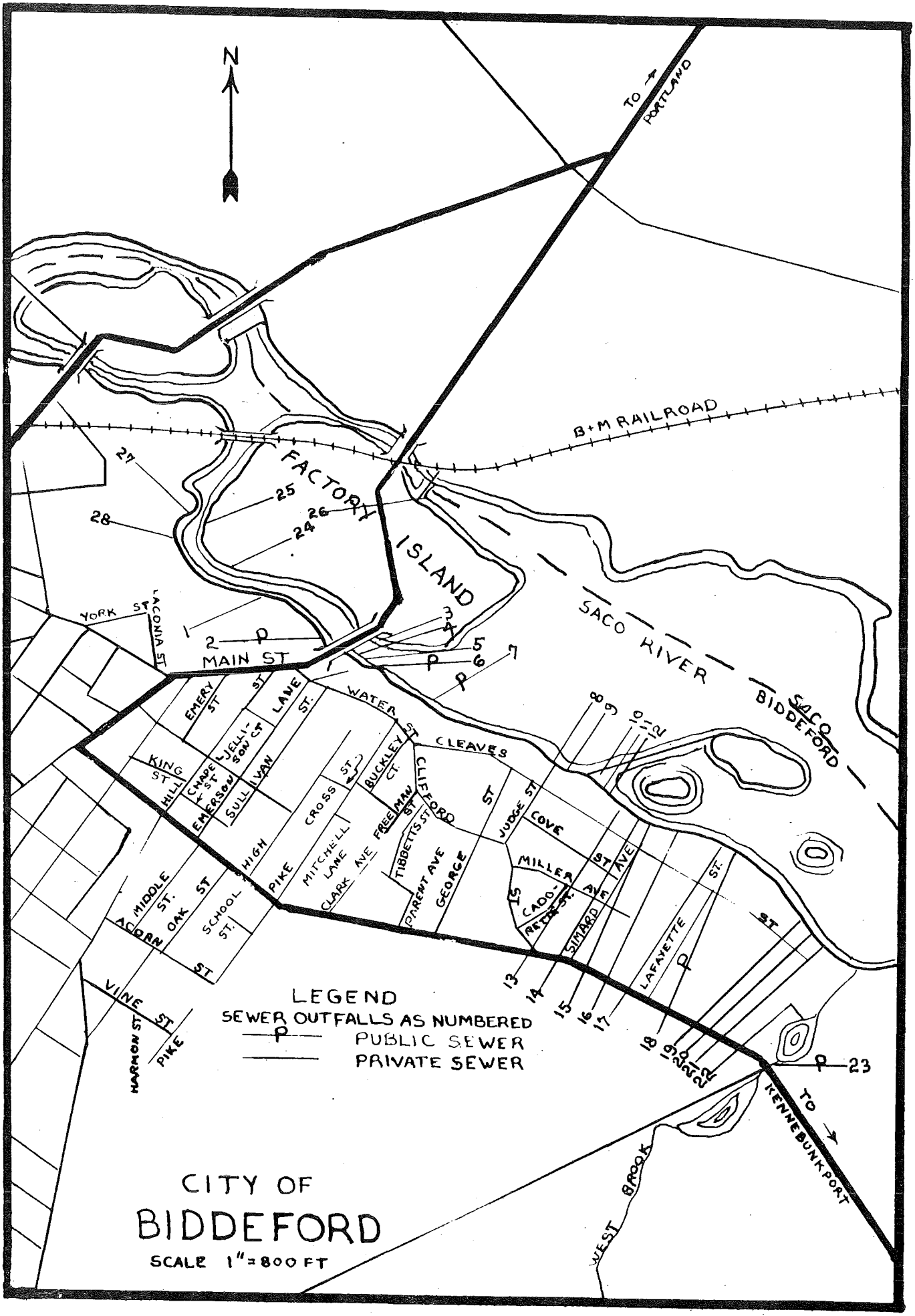

Mousam
STORER
FLETCHER
MECHANIC
LORD
BOURNE
ROSS
LINCOLN
SAYWARD
RAYNES
BERRY'S
PARSONS
GARDEN
MAIN
NASONS CT
GREENE ST.
DANE
BARNARD ST.
PORTLAND
SUMMER
GROVE
PARK
WINTER
WATER
CAT MOUSAM
PLEASANT
FRIEND
HIGH
SWAN
YORK
DAY
MIDDLE
BROWN
HALL
River
B&M R.R.
BEACH
N
LEGEND
SEWER OUTFALLS AS NUMBERED
—P— PUBLIC SEWER
PRIVATE SEWER
TOWN OF
KENNEBUNK
SCALE:
MILES 0.1 0 0.1 0.2 0.3 0.4 0.5

TOWN OF KENNEBUNK

The sewage from a population of approximately 1,050 in Kennebunk is discharged, untreated, to the tidal waters of the Mousam River. In addition, the discharge from many cesspools and septic tanks reaches the Mousam or Kennebunk Rivers through open ditches and brooks.

As shown on the accompanying map of Kennebunk, there are 7 sewer outfalls in the area, 3 of which are public sewers. Following are brief descriptions of the outfalls, which serve about 380 buildings.

Index No.	Description
1	A public sewer on the northeast side of the Mousam River empties to tidewater about 200 feet southeast of the turn in Water Street. This outlet serves 229 buildings in the area bounded by Water, Park, Summer, Main, Fletcher, and Storer Streets. It empties about 10 feet into the river at a point about 6 inches below high tide.
2	A public sewer on the west side of the river serves 27 houses on Brown, York, Friend, Middle, Day, and Swan Streets. It discharges about 20 feet into the river, near low tide water, at a point about 600 feet south of Swan Street.
3	A public sewer outfall located on the west side of the river about 500 feet southeast of the Mousam River Bridge serves 43 houses on Pleasant, York, High, and Brown Streets. It discharges into the river about 10 feet from the water's edge, and at a level about 1 foot above normal high water.
4	A brook receiving the overflow from an undetermined number of cesspools and septic tanks, as well as raw sewage from about 9 houses, flows into the Mousam River near the intersection of Brown and Day Streets.
5	A canal which receives sewage from about 60 employees of a fibre company flows into the Mousam River at a point about 150 feet south of the first turn in Water Street.
6	A stream which receives discharge from about 15 houses on Winter, Depot, and Summer Streets empties into the river near the outlet of the large public sewer at the end of Water Street.
7	Sewer outlets from at least 14 buildings enter a stream which flows to the Kennebunk River at a point about 2,500 feet downstream from the Maine Central Railroad bridge.


N
TO → PORTLAND
B+M RAILROAD
FACTORY ISLAND
SACO RIVER
SACO
BIDDEFORD
TO → KENNEBUNKPORT
WEST BROOK
YORK ST
LACONIA ST
MAIN ST
EMERY ST
LANE ST
WATER ST
CLEAVES ST
BUCKLEY CT.
CLIFFORD ST
JUDGE ST
COVE ST
KING ST
HILL ST
CHAPEL ST
JELLISON CT
EMERSON ST
SULLIVAN ST
CROSS ST
FREEMAN ST
TIBBETTS ST
PARENT AVE
GEORGE ST
MILLER ST
CADORETTE ST
SIMARD AVE
BIRCH AVE
LAFAYETTE ST
HIGH ST
PIKE ST
MITCHELL LANE
CLARK AVE
MIDDLE ST.
ACORN ST
OAK ST
SCHOOL ST.
VINE ST
HARMON ST
PIKE
1 2 P 3 4 5 P 6 P 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 P 23
24 25 26 27 28
LEGEND
SEWER OUTFALLS AS NUMBERED
P PUBLIC SEWER
PRIVATE SEWER
CITY OF
BIDDEFORD
SCALE 1" = 800 FT

CITY OF BIDDEFORD

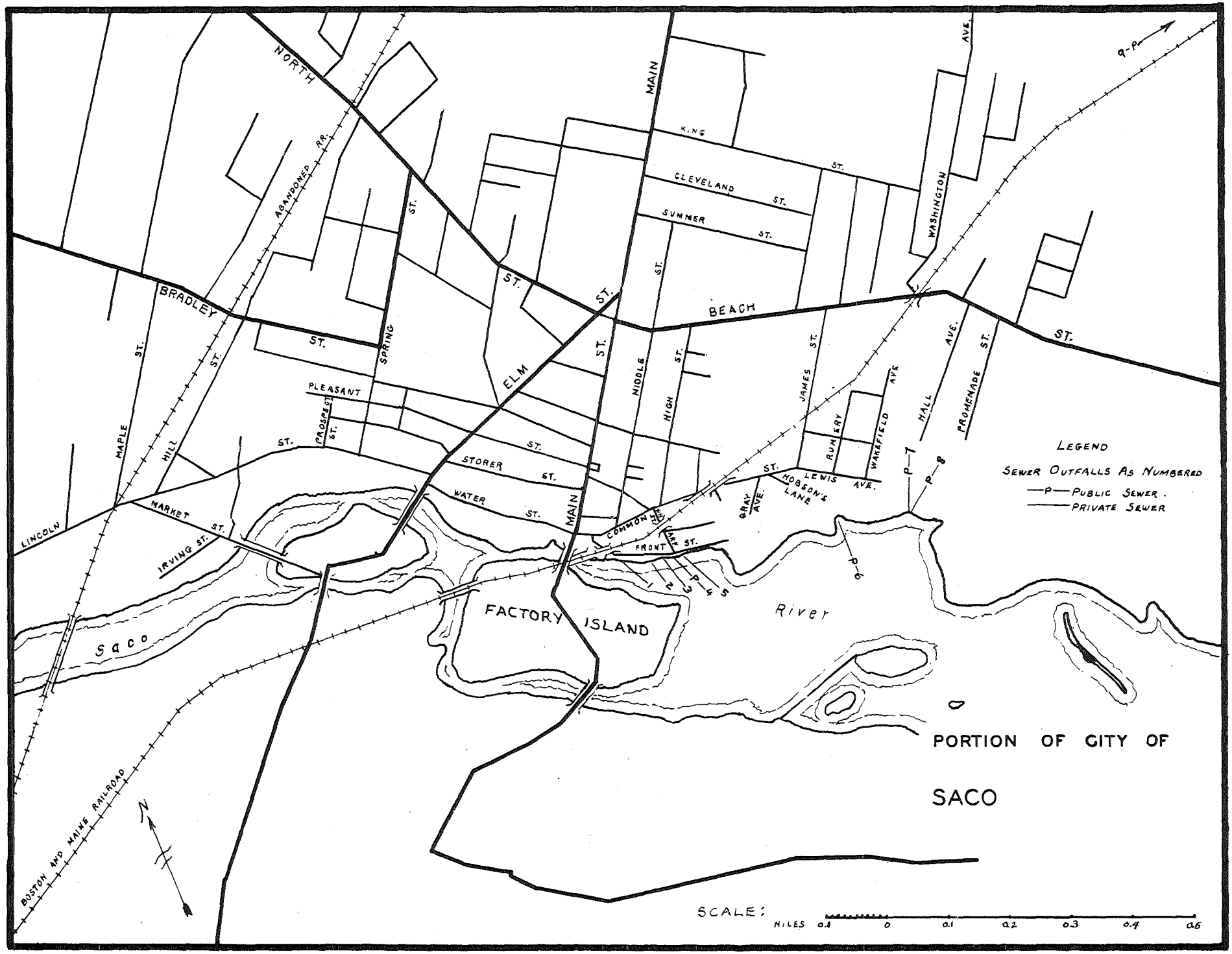
The city of Biddeford is one of the relatively large industrial cities in the State of Maine. Two textile mills and one large machine shop employ a total of approximately 4,000 workers. The textile mills discharge considerable quantities of dye house wastes, synthetic detergents, bleach water, and small amounts of sodium sulfate into the Saco River.

Four public sewers, one storm drain, and 26 private outfalls discharge waste into the Saco River from 1,228 buildings and 3 large manufacturing plants. The total number of city residents and factory workers served by sewers in Biddeford is approximately 11,500. The majority of the private sewer outfalls are located along Cleaves Street and empty to the river bank about 10 to 100 feet above the high water mark.

Factory Island, on which a textile mill and machine shop are located, is actually a part of the city of Saco, but since it is shown on the accompanying map, it has been included in this report.

Generalized descriptions of the various sewer outfalls indicated on the map include the following:

Index No.	Description
1	At a point about 450' west of the Main Street Bridge, a large Textile plant discharges various wastes, such as dyes, synthetic detergents, bleach, and sodium sulfate into the Saco River.
2-5 incl.	One storm water drain and 3 private sewers serving 1 building each, are located between the southwest corner of the Main Street Bridge and a point about 150 feet east of the bridge.
6-7 incl.	Two public sewer outfalls located between the ends of Buckley and Sullivan Streets serve 948 and 157 buildings, respectively.
8-17 incl.	Along the south bank of the Saco River between the ends of Judge and Lafayette Streets there are 13 private outlets serving 16 buildings.
18	A city sewer serving about 92 buildings discharges at the end of Lafayette Street.
19-23 incl.	From Lafayette Street to West Brook, 6 buildings are served by 1 public and 4 private sewers.
24-25 incl.	Two outlets, about 800' and 100' west of the Main Street Bridge, carry all sewage from a large textile mill employing 1,400 people and the sewage from some 400 workers of a machine shop.
26	The wastes from 35 people in a large apartment house and 2 other buildings is discharged to the river on the northwest side of Factory Island.
27-28 incl.	The effluent from 2 septic tanks carrying sewage from 2 machine shops discharge to the river bank west of Factory Island. The outfalls serve 900 and 300 employees, respectively.


NORTH
MAIN
KING
ST.
CLEVELAND
ST.
SUMMER
ST.
WASHINGTON
AVE.
ABANDONED RR.
BRADLEY
ST.
BEACH
ST.
SPRING
ELM
MIDDLE
HIGH
JAMES
HALL
AVE.
PROMENADE
PLEASANT
PROSPECT
MAPLE
HILL
STORER
WATER
MARKET
LINCOLN
IRVING
COMMON
FRONT
LEWIS
HOBSON'S
LANE
GRAY
AVE.
RUMERY
WAKEFIELD
AVE
P-1
P-2
P-3
P-4
P-5
P-6
P-7
P-8
q-p
FACTORY ISLAND
Saco
River
BOSTON AND MAINE RAILROAD
N
LEGEND
SEWER OUTFALLS AS NUMBERED
—P— PUBLIC SEWER.
——— PRIVATE SEWER
PORTION OF CITY OF
SACO
SCALE:
MILES 0.1 0 0.1 0.2 0.3 0.4 0.5

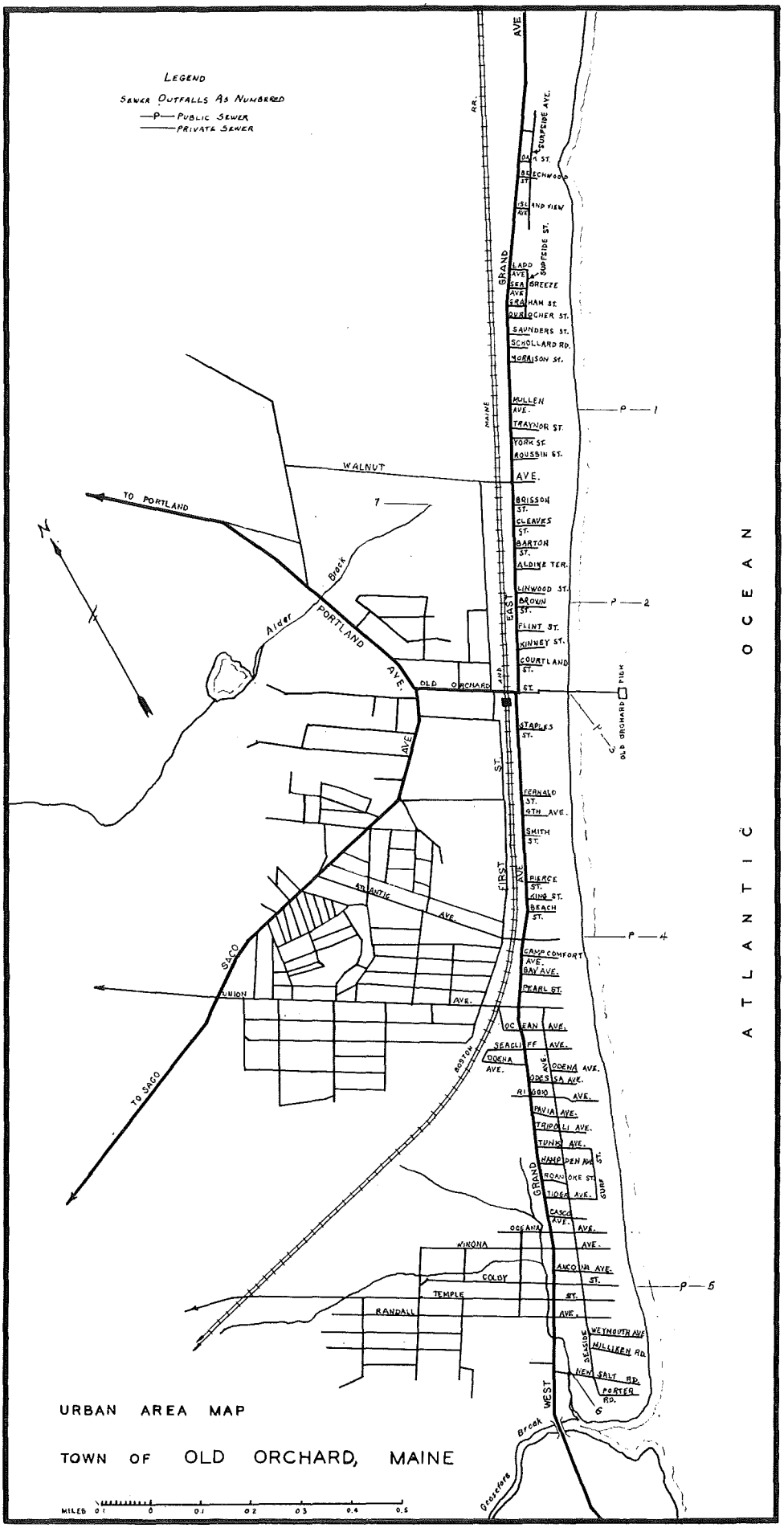
CITY OF SACO

Sanitary sewage of approximately 4,000 people out of a total population of 8,631 in the city of Saco reaches tidewater in either the Saco River or Goosefare Brook. There are 9 sewer outfalls in the city, 5 of which are public.

The principal sources of industrial waste in the area are on the Biddeford side of the river and on Factory Island, which is included as a part of the Biddeford report.

The outfalls, which are indicated on the accompanying map of Saco, are described as follows:

Index No.	Description
1-3 incl.	Three small private sewers, each serving one house, discharge to the Saco River between the Main Street Bridge and the end of Wharf Street.
4-5 incl.	At the south end of Wharf Street, there are two outfalls, the first of which is a large public sewer serving approximately 162 buildings and the second, #5, a small private line serving one house.
6	There is one public sewer outfall south of Rumery Street, 20 inches in diameter and serving 65 buildings.
7-8 incl.	Two public sewer outfalls are located on the shore south of Hall Avenue. Number 7 is an 18-inch line serving 132 buildings; and number 8 is a smaller line serving about 26 buildings.
9	An open ditch north of the Boston and Maine Railroad tracks carries sewage from 6 public sewers to tidewater in Goosefare Brook, about one-half mile northeast of town. An estimated population of 1,750 people is served by this system.



URBAN AREA MAP

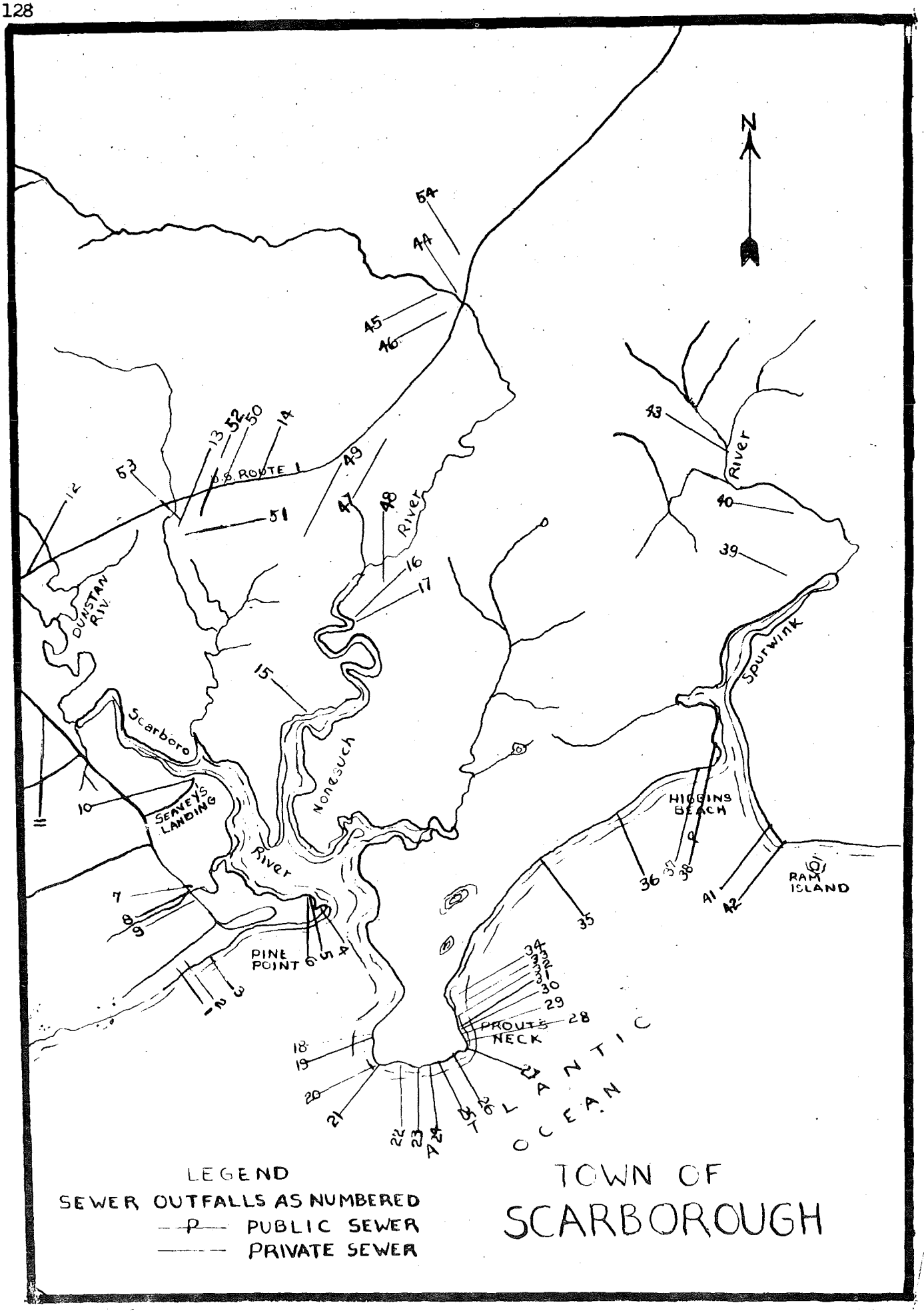
TOWN OF OLD ORCHARD, MAINE

TOWN OF OLD ORCHARD BEACH

An estimated summer population of 40,000 people and a permanent population of about 5,000 are served by 5 large public sewer outfalls in Old Orchard. The sewage in each of these lines is treated in large septic tanks before being discharged to deep water off the beach. There are two areas in town where the drainage from private cesspools and septic tanks, serving a total of about 130 buildings, reaches tidal brooks.

The following describes the sewer outfalls which are indicated on the accompanying map of Old Orchard.

Index No.	Description
1	An outfall serving about 200 buildings, including 8 hotels, discharges to the shore off Mullen Avenue.
2	The sewage from about 200 buildings, including 19 hotels, is discharged to tidewater between the ends of Linwood and Brown Streets.
3	Approximately 484 buildings, including 11 hotels, are served by the line discharging at the south side of Old Orchard Street.
4	An outlet located about opposite the south end of Atlantic Avenue serves approximately 849 buildings, including 7 hotels.
5	At the end of Colby Street a sewer serving approximately 220 buildings, including 7 hotels, discharges to the ocean. Due to the low land in this area it is necessary to pump the sewage through this line.
6	Drainage from private septic tanks and cesspools serving at least 100 buildings between Seacliff and Casco Avenues reaches a small tributary to Goosefare Brook at New Salt Road.
7	Inland, between public outfalls #1 and #2, about 30 houses and camps near Portland and Walnut Avenues contribute sewage to Alder Brook.


N
54
44
45
46
13
52
50
14
53
12
U.S. ROUTE 1
51
49
47
48
River
43
River
40
39
16
17
DUNSTAN RIV.
15
Scarboro
Nonesuch
Spurwink
10
SEAVEY'S LANDING
River
HIGGINS BEACH
36
37
38
41
42
RAM ISLAND
7
8
9
PINE POINT
6
5
4
3
35
34
33
32
30
29
PROUTS NECK
28
18
19
20
21
22
23
24
25
26
27
ATLANTIC OCEAN
LEGEND
SEWER OUTFALLS AS NUMBERED
— P — PUBLIC SEWER
- - - - PRIVATE SEWER
TOWN OF
SCARBOROUGH

TOWN OF SCARBORO

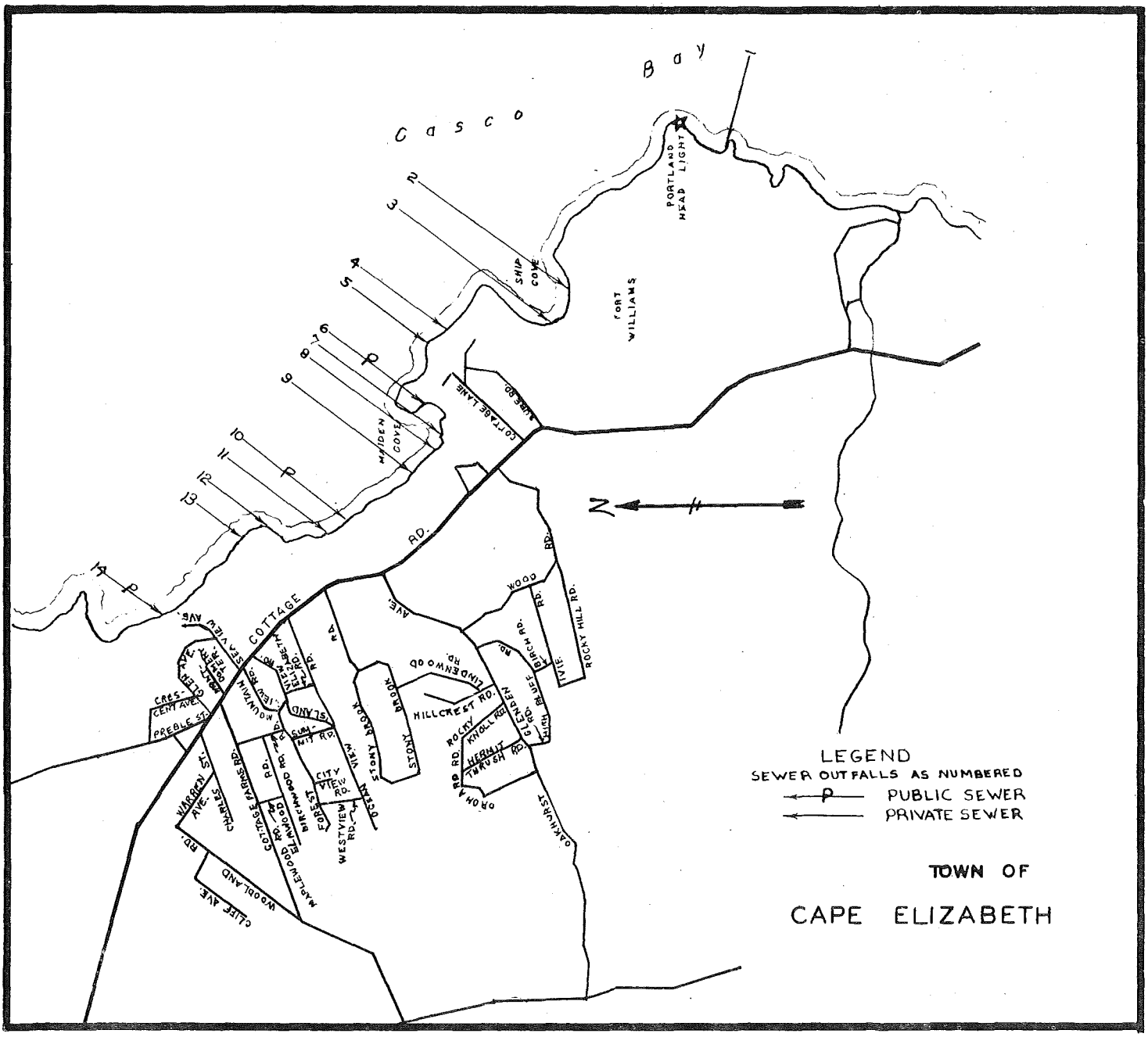
A total population of about 2,100, of which 70% are summer residents, contribute to the pollution of the Scarboro area.

Only two industries dispose of their wastes in this section: a seafood canning plant and a potato chip factory.

Most of the pollution in this area is caused by seepage directly or indirectly from septic tank overflows, cesspools, and house drains. A total of 174 buildings, including 2 hotels, contribute septic tank effluent to tidewater; whereas only 84 buildings, including 4 hotels, dispose of their wastes directly through 39 private outfalls. Ninety-two buildings, including one hotel, are served by a public sewer.

A resume of the sewer outfalls and sources of pollution includes the following:

Index No.	Description
1-8 incl.	From the shore south of Pine Point along the bank of the Scarboro River to a point 50 feet from the bridge on the Pine Point road, 6 outlets serve 10 buildings; while 53 buildings cause pollution to tidal waters by seepage.
9	Three drains from a seafood canning plant discharge to a stream approximately 200 feet from tidewater. Two are 20 feet above and below the bridge, and one is 150 feet southeast of the bridge. Industrial wastes and the sewage from 75 employees constitute the pollution from this source.
10-14 and 50-53 incl.	Upstream from Seavey's Landing, in the Scarboro and Dunston Rivers, there are 6 outfalls serving 9 buildings. In addition, 51 buildings, including one hotel, contribute septic tank seepage to the Scarboro River and its tributaries.
15-17 and 44-49 incl. 54	In the immediate area of the Nonesuch River extending upstream from the end of Winnocks Neck Road to the west side of Route 1 near the South Portland line, 5 sewers serving 8 buildings discharge to the river, along with direct or indirect seepage from 22 buildings. A potato chip plant on Route 1 (#45) contributes sanitary wastes of 12 employees, plus considerable process water containing starch, to the waters of the Nonesuch River.
18-37 and 39-42 incl.	From the yacht club building on Prouts Neck, along the shore and upstream in the Spurwink River, there are 35 buildings, including one hotel, that cause pollution by seepage, and 64 buildings, including 4 hotels, that are served by 18 outfalls.
38	The town sewer at Higgins Beach receives the effluent of a large septic tank, which serves a total of 92 buildings, including one hotel, and empties to a small inlet 400 feet northwest of the river's mouth.
43	The sanitary sewage from 147 houses in Elizabeth Park enters branch of the Spurwink River.


Casco Bay
PORTLAND HEAD LIGHT
SHIP COVE
FORT WILLIAMS
WIDEN COVE
COLTRANE LANE
2
3
4
5
6
7
8
9
10
11
12
13
14
P
N
RD.
WOOD
AVE.
ROCKY HILL RD.
COTTAGE
SEAVIEW AVE.
CRES.
CEMT AVE.
PREBLE ST.
MOUNTAIN
SLAND
CITY VIEW RD.
FOREST
WESTVIEW RD.
STONY BROOK
HILLCREST RD.
LINDENWOOD
ROCKY KNOLL RD.
WREN THRUSH RD.
GLEN GLEN
BLUFF
OAKHURST
WARREN AVE.
CHARLES
COTTAGE FARMS RD.
MAPLEWOOD
BIRCHWOOD
WOODLAND
CLIFF AVE.
LEGEND
SEWER OUTFALLS AS NUMBERED
PUBLIC SEWER
PRIVATE SEWER
TOWN OF
CAPE ELIZABETH

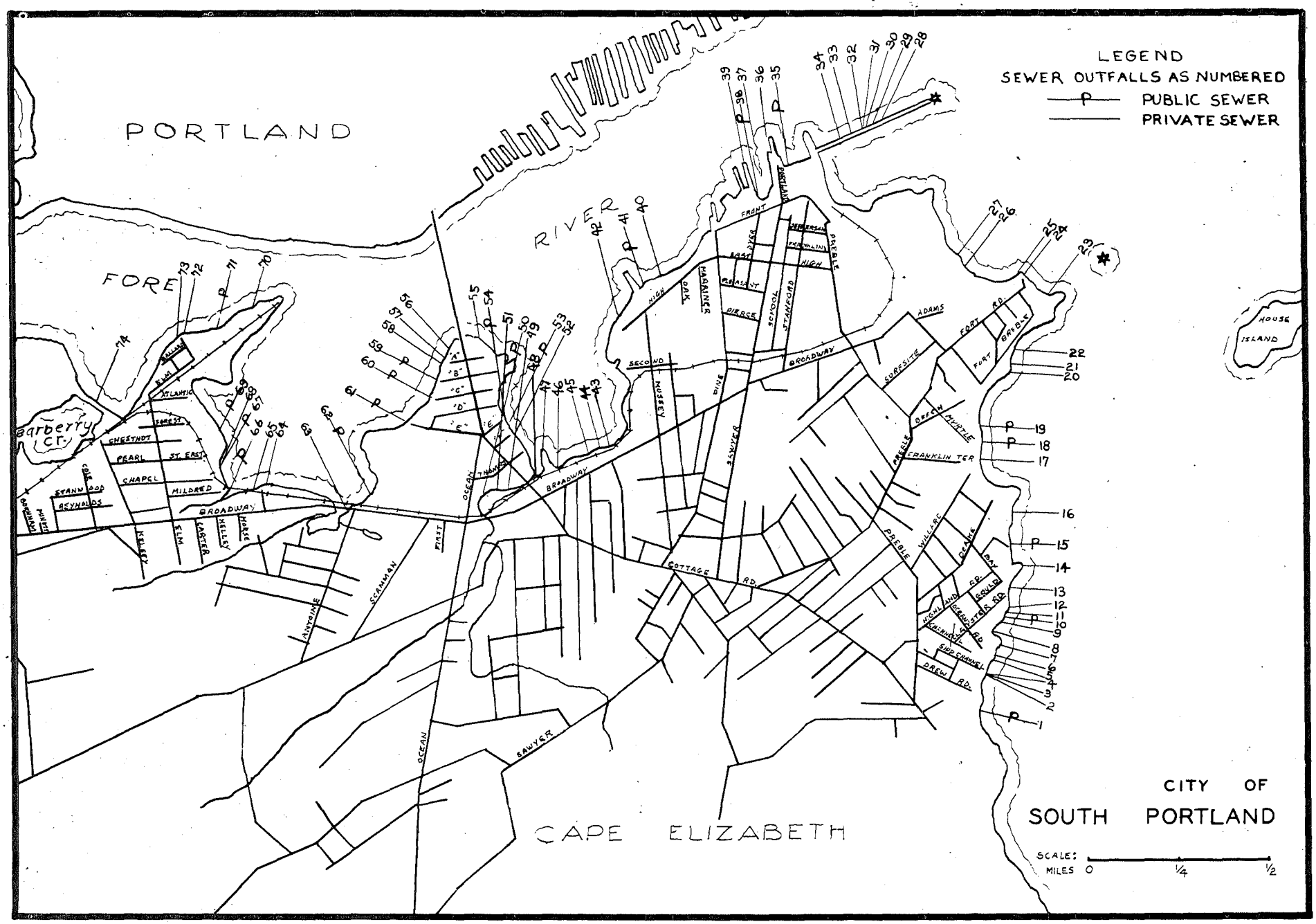
TOWN OF CAPE ELIZABETH

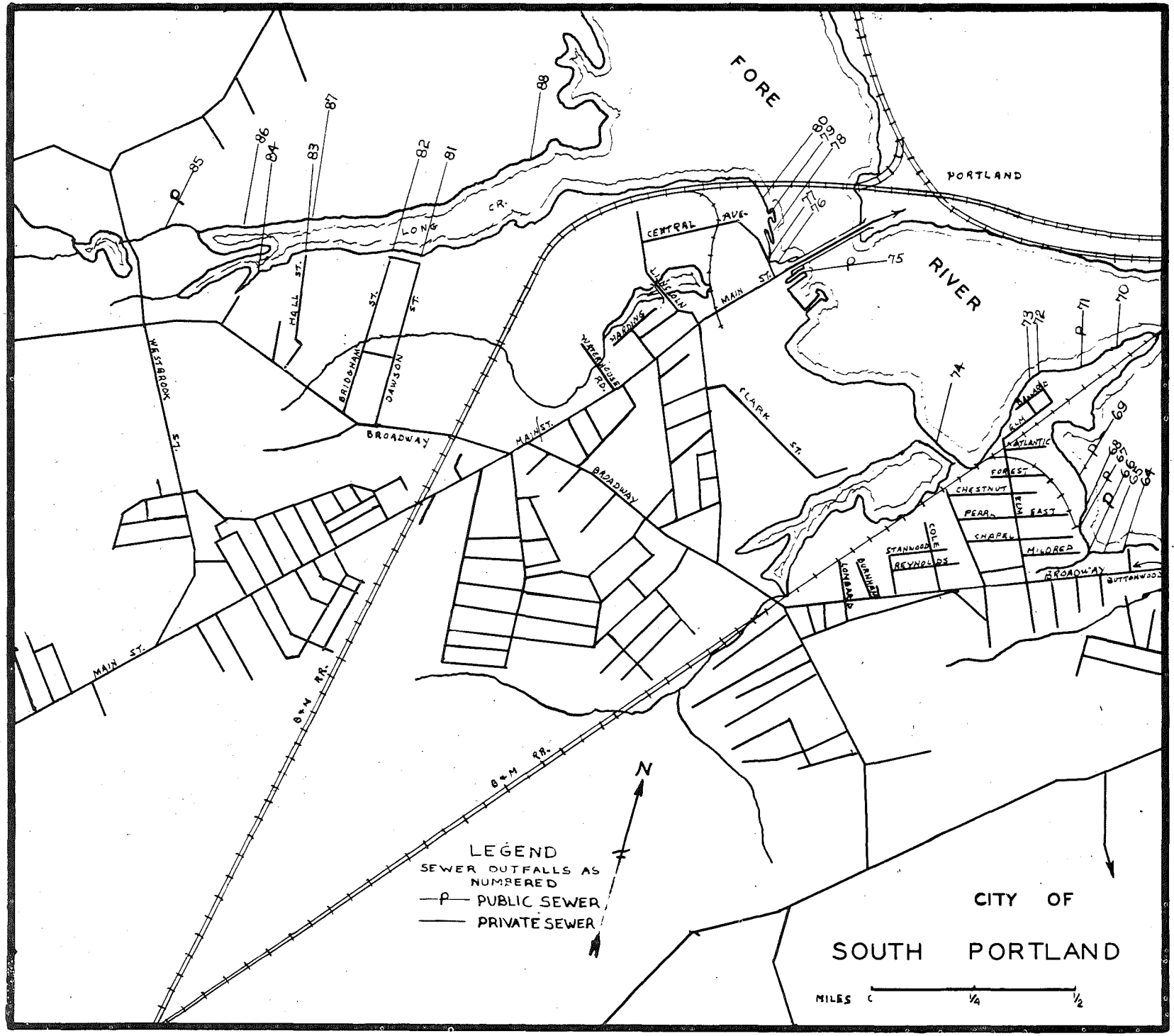
Sanitary wastes are apparently the only sources of pollution from the town of Cape Elizabeth, and are quite constant in volume, as only a small percentage of the total population served are summer residents. The bathing areas in this community are affected by this pollution, since the largest of the three public sewers in the town empties only 200 feet from the beach on Seaview Avenue.

The domestic sewage from 275 buildings and one school are discharged into Casco Bay by a total of 14 sewers, of which 3 are public and 11 private. In addition, the outfall of the Elizabeth Park housing project discharges the sewage from 147 buildings into Spurwink River; but since that outlet is located beyond the range of the accompanying map, it is shown on the map of the Scarboro area.

A summarized grouping of the Cape Elizabeth sewer outfalls is as follows:

Index No.	Description
1-5 incl.	From a point 300 feet south of the Portland Headlight to the shore at the end of Cottage Lake there are 5 private outlets, of which 3 serve 53 buildings in Fort Williams and 2 serve 7 private residences.
6	A public sewer serving 37 buildings empties to deep water near center of Maiden Cove.
7-13 incl.	From the southwest end of the sandy beach along Maiden Cove to the shore near the north end of Ocean View Road there are 6 private outfalls serving 9 houses.
14	About 300 feet northwest of the end of Seaview Avenue, a 24-inch public sewer discharges wastes from 141 buildings, including one school. This outfall is only 200 feet northwest of the beach near the end of Seaview Avenue.


LEGEND
SEWER OUTFALLS AS NUMBERED
PUBLIC SEWER
PRIVATE SEWER
PORTLAND
RIVER
FORE
CAPE ELIZABETH
CITY OF
SOUTH PORTLAND
SCALE: MILES 0 1/4 1/2
Barberry Cr.
BROADWAY
COTTAGE RD.
OCEAN
SAWYER
SCAMMAN
EAST
HIGH
PINE
SECOND
NUSSEY
FRANKLIN TER
PREBLE
ADAMS
FORT
SURFSIDE
OREGON
MYRTLE
WILLARD
BAY VIEW
HIGHLAND
GRANSTER RD
SPRING
SPRING CHANNEL
DREW RD
ATLANTIC
CHESTNUT
PEARL
CHAPEL
MILDRED
REYNOLDS
KELLEY
ELM
LESTER
KELLEY
MORSE
ANTOINE
HOUSE ISLAND


FORE
RIVER
PORTLAND
LONG
CR.
CENTRAL AVE.
MAIN ST.
LINCOLN
JARDINE
WHEELWRIGHT RD.
CLARK ST.
HALL ST.
BRIDGHAM ST.
DAWSON ST.
WESTBROOK ST.
BROADWAY
MAIN ST.
B&M RR.
B&M RR.
ATLANTIC
FOREST
CHESTNUT
ELM
EAST
PEARL
CHAPEL
MILDRED
BROADWAY
SUTTONWOOD
STANWOOD
COLE
REYNOLDS
LONGFELLOW
BURNHAM
N
LEGEND
SEWER OUTFALLS AS NUMBERED
PUBLIC SEWER
PRIVATE SEWER
CITY OF
SOUTH PORTLAND
MILES
1/4
1/2

CITY OF SOUTH PORTLAND

Pollution of the tidal waters at South Portland includes the sanitary wastes from an estimated population equivalent of about 22,000 people. Nineteen public sewers serve approximately 4,490 buildings, with an estimated population equivalent of about 18,250 persons; while 77 private sewers serve about 620 buildings (including 500 housing units in Redbank Village), with a total estimated population equivalent of 3,750. Sixteen of the private sewers handle combined sanitary and industrial wastes from a winery, a canning plant, 3 fish processing plants, a crabmeat processing plant, and a copper products company. The cannery and seafood plants operate on a seasonal basis only. Considerable quantities of oil are sometimes discharged from tankers in the harbor, and some acid wastes are discharged by the copper products company.

The 19 public and 77 private sewers, as indicated on the South Portland map, are briefly described as follows:

Index No.	Description
1	A 10" outlet is located approximately 150' south of the end of Drew Street and serves about 51 buildings.
2-9, 11-14 16, 17, and 20-25 incl.	From the shore near the end of Ship Channel Road, to a point about 250' west of the end of Fort Road, there are 20 private sewers serving 21 buildings. Also served (by Nos. 22 and 24) are an undetermined number of now-vacant buildings at Fort Preble.
10, 15	These two sewers, emptying into deep water, are located opposite the ends of Clayster Street and Highland Road and serve 37 and 14 buildings respectively.
18, 19	At No. 18 an outfall serving about 836 buildings, including one school, empties into deep water at a point opposite the end of Willard Street. No. 19 is a surface and storm water drain.
26	This 12" outlet serves about 9 buildings, including a winery from which it receives some floor and tank washings. It empties halfway out on the long pier at the northwest end of the ship drydocks.
27-34 incl.	Thirteen private outfalls are located between a point 150 feet northwest of the long pier and the shore near the westernmost of a group of four wharves located at the northern end of the shipyard. These lines serve 9 buildings, including 2 fish processing plants which employ a total of 288 people and discharge considerable quantities of fish wastes into the water during their seasonal operations.
35	Located 200 feet southwest of the new Pocahontas Pier, a 36-inch sewer serves approximately 411 buildings including 2 schools.

Index No.	Description
36	About 450 feet southwest of the new Pocahontas Pier, tankers, after delivering their cargoes to the pipeline storage area, usually steam out their tanks and dump the oily waste overboard into the harbor.
37	A canning company having 200 employees, located 600 feet southwest of Pocahontas Pier, has 4 outlets - 2 carrying sanitary wastes and 2 carrying various process wastes.
38	This 18-inch sewer outfall is located about 150 feet southwest of the Seaboard Packing Company pier and serves about 152 buildings.
39, 40, 42-49, 51-53, 55-59, 63-65, 68, 70, 72-74, 76-82 incl.	From the outfall on the southeast corner of the Marine Railway shop to a point opposite the end of Brigham Street, there are 31 private outfalls serving a total of 70 buildings. Index No. 63 represents a brook which receives the septic tank effluent from 24 houses.
41	A 17-inch sewer serving 586 buildings empties into the water about 20 feet beyond the fence at the southern boundary of the Coast Guard Station.
50, 54, 60, 66, 67, 69, and 75	Following the shore line from a point 400 feet northwest of Broadway and 400 feet east of Ocean Street, to a point under the east side of Vaughan's Bridge, there are 7 public sewers serving 195 buildings. No. 50, the largest of these, serves 73 buildings.
61	One hundred feet north of the end of "E" Street, a 24-inch outfall serving approximately 109 people discharges in the Fore River near the low water line.
62	A 3-foot wooden box outfall serving 418 buildings empties into the Fore River near the low water line about 50 feet west of the end of Anthoine Street
71	The largest outfall in South Portland empties into deep water about 450 feet north of the end of Ballard Street and serves approximately 1,680 buildings, including 2 schools.
83	Two outlets opposite the end of Hall Street include the septic tank overflow and some fish wastes from a crabmeat processing factory.
84, 86-88	Four outfalls on Long Creek carry domestic sewage from a population of about 400. Nos. 86, 87, and 88 serve 5 buildings at the Maine State School for Boys, where the wastes from about 285 people are discharged untreated.
85	No. 85 indicates a point where the effluent from an Imhoff tank at Redbank Village reaches tidewater in Long Creek. Five hundred housing units are located here, occupied by 1,837 residents. Lime (4 to 5 tons a year) is used for treatment, and the solids are dried and hauled away. The effluent flows into the creek, about 400 feet east of the Westbrook Street Bridge.

CITY OF PORTLAND

Heavy concentrations of sanitary sewage and industrial wastes are discharged to tidewaters in the vicinity of Portland, the largest city in Maine. Over 60,000 people, or a major part of the 75,000 population, are served by 50 public and 179 private sewer outfalls. There are no sewage treatment plants in Portland, consequently all wastes are deposited untreated to the harbor, except the effluent from one public outfall, #69, which receives chlorination.

A small part of Falmouth is included in this section of the survey showing 15 sewer outfalls serving a population of 675. Peak's Island, a segment of the city of Portland, is not included in this section, but is covered individually on a separate report.

The sewer outfalls, which are described by groups in the following paragraphs, are indexed on the accompanying map of Portland.

Index No.	Description
1-14 incl.	One public and 13 private sewer outfalls discharge from the banks of Fore River upstream from a point near the western end of Fenway Street. A total of 48 houses are served by the sewers of this group. Number 13 is a public line serving 6 buildings. Numbers 1, 10, 11, 12, and 14 are private lines serving 2, 6, 10, 8 houses respectively. The others are private lines from individual buildings.
15	At the western end of Fenway Street a large city sewer discharges to Fore River. It is 3 by 4 feet in cross section, and serves 1,671 buildings including 7 schools and a hospital.
16-22 incl.	From Fenway to the shore off Sewall Street there are 7 sewer outfalls. Number 22 is a public line 12 inches in diameter and serving 145 buildings including 1 school. Numbers 18 and 20 each serve 4 houses. All others serve one or two buildings each.
23-31 incl.	There are 9 outfalls along the shore between the end of Sewall Street and the US Route 1 bridge across Fore River. Four of those numbers, 25, 26, 27, and 29, are public sewers serving a total of 163 buildings. The largest is number 29 which serves 53 buildings, and the smallest number, 25, serving 21 buildings. Number 23 is a private line from a gas company employing 70 people.
32-42 incl.	Between US Route 1 bridge and Brackett Street bridge there are 4 public and 7 private sewer outfalls. Number 42 is a large public line 3 feet in cross section and serving 879 buildings, including 1 school and a hospital. Numbers 37 and 38 are public lines about 2 feet in diameter and serving 132 and 239 buildings respectively. The other public line, number 35, is a 15-inch surface and storm water drain. The private outfalls in this group serve 1 building each.

The following two pages include a map that was too large to be scanned as a single image. To view the print version of the map, please visit the Maine Law and Legislative Reference Library.

PRESUMPSCOT RIVER

N

FALMOUTH

MACKWORTH ISLAND

BACK COVE

ALLEN AVE

FOREST AVE

WASHINGTON

FALL

OCEAN AVE

BROOK

PRESUMPSCOT EAST

BLVD

WATER

OCEAN

GEORGE

MACKWORTH

BAXTER

CHENERY

CODMAN

HERSEY

SAVANNAH

CLIFTON

AVE

CLIFTON

COYLE

BELMONT

DARTMOUTH

BAXTER

BLVD

CAROLINE

MARGINAL WAY

ANDERSON

WASHINGTON

NORTH

WALNUT

EASTERN

PROMENADE

CENTER

MORNING

VESPER

BECKETT

HUNTOY

ATLANTIC

LAWRENCE

WATERVILLE

KELLOGG

SHERIDAN

RUBY

AVE

FOREST

STEVENS

BRIGHTON

LEERING

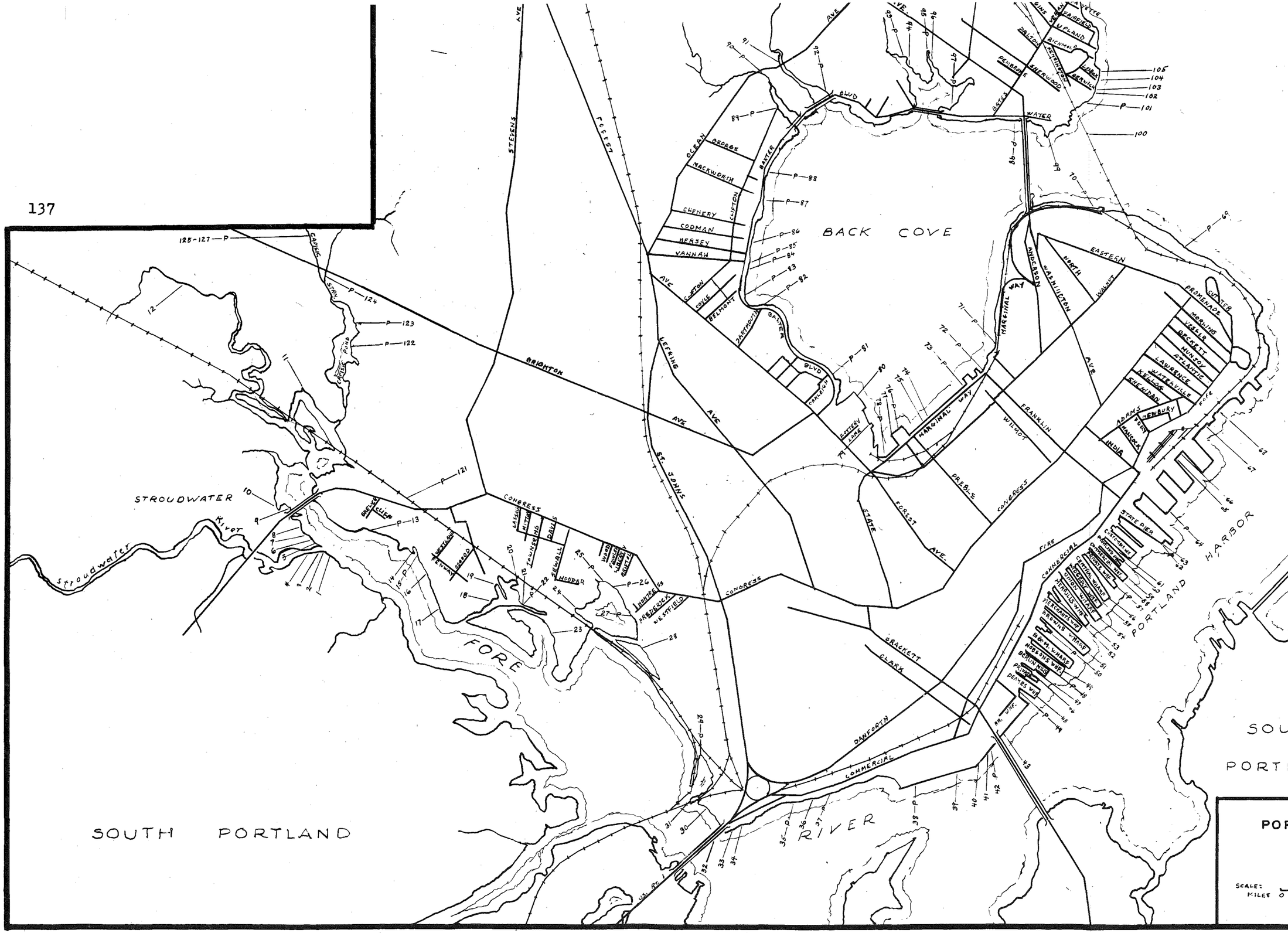
CAPISIC

SIMPSON

CAPISIC POND

L37

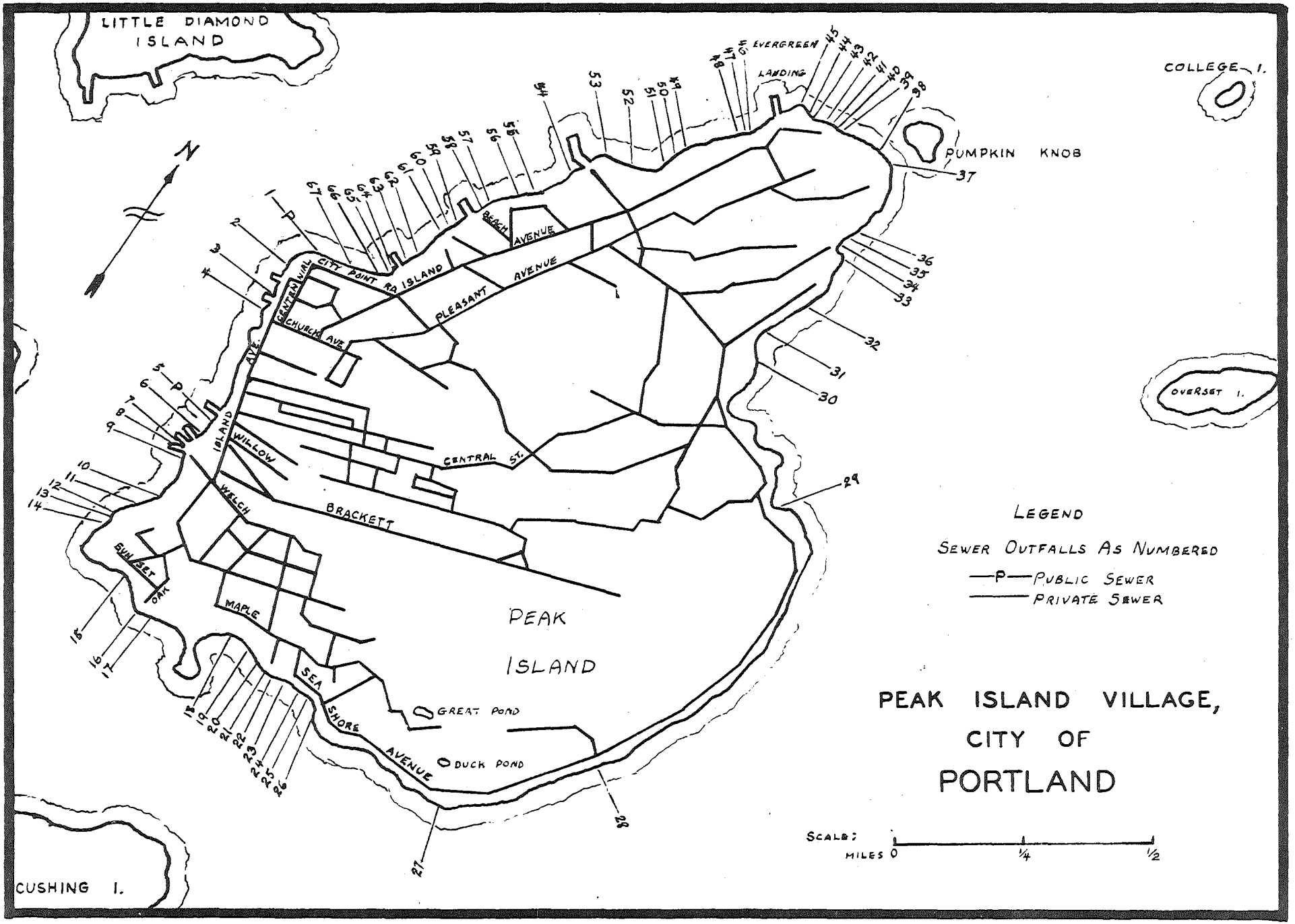
137


BACK COVE
STROUDWATER River
Stroudwater
FORE
RIVER
SOUTH PORTLAND
SOUTH PORTLAND
HARBOR
PORTLAND
PORTION OF CITY O
PORTLAND
SCALE: MILES 0 1/4 1/2
STEVENS AVE
FOREST
BRIGHTON
AVE
CAPISIC
STROUDWATER
CONGRESS
BRACKETT
CLARK
DANFORTH
COMMERCIAL
STATE FOREST AVE.
PREBLE
CONGRESS
BLVD
BAXTER
OCEAN
GEORGE
MACKWORTH
CLIFTON
CHENERY
CODMAN
HERSEY
YANNAH
CARLETON
COKLE
BELMONT
DARTMOUTH
CARLEIGH
EASTERN PROMENADE
MORNING
VESLER
BECKETT
MUNJOY
ATLANTIC
LAWRENCE
WATERVILLE
KELLOG
SHEWDAN
ADAMS
NEWBURY
FORE
MONUMENT
INDIA
STATE PIER
COMMERCIAL
FIRE
MARGINAL WAY
EASTERN
NORTH
WALNUT
WASHINGTON
ANDERSON
FRANKLIN
WILMOT
EASTERN PROM
WATER
PALFREY
RICHMOND
WESTERVELT
SHERWOOD
DEERING
LOWELL
HERCULES
UPLAND
GANS
FAIRFIELD
LAFAYETTE
HUNNEWELL
DAVIS
HOOPER
FREDERICK
WESTFIELD
HOWARD
ALLEN
LOCKE
CURTIS
EASTMAN
CONGRESS
MARKET
TOWNSEND
SHEPLEY
WESTBROOK
CENTRAL WHARF
CUSTOM HOUSE WHARF
PORTLAND PIER
UNION WHARF
MERRILLS WHARF
BROWNS WHARF
S. & M. WHARF
ROBSONS WHF
BERRY WHF
POWERS WHF
PALMERS WHF
RR. WHF.

Index No.	Description
43-49 incl.	There are 17 outfalls from Brackett Street to Hobsons Wharf. Two of these, numbers 44 and 48, are city storm water drains. Index number 45 designates 6 sanitary outlets on Deakes Wharf, and number 47, 6 outlets on Berlin Wharf. Fish canning plants are located on both wharves and discharge wastes directly to the salt water.
50	A large city sewer discharges between the Boston & Maine Brown's wharves. It serves 608 buildings, including 3 schools, 2 hospitals, and a hotel.
51-54 incl.	From Brown's Wharf to Union Wharf there are 22 outfalls. On Brown's Wharf, number 51, there are 9 outfalls. These carry the sanitary sewage and industrial wastes from 3 fish packing plants employing about 500 people and a machine company employing about 35. The 8 outfalls on Union Wharf, number 54, serve 2 fish packers employing about 110 people. There is another fish company located on Merchant's Wharf, number 52, where 3 outfalls are located.
55-56 incl.	Pollution from Widgery Wharf, number 55, consists of floor washings from a fish packing plant. At Central Wharf, number 56, there are 14 private outfalls serving an estimated 240 people and carrying industrial wastes from 4 fish companies, 1 machine shop, and a cold storage plant.
57-58 incl.	A large public outfall, 6 feet square is located under Long Wharf. It serves about 758 buildings or 3,032 people. There are also two private outfalls, at number 58, serving 25 people employed on the wharf.
59	There are 14 outfalls at Commercial Wharf serving 8 buildings. Two of these buildings house fish packing plants which discharge fish wastes directly to the harbor.
60	There are 28 outfalls located at Portland Pier serving such industries as a clam packing plant, a crabmeat plant, a fish wholesaler, and a restaurant. All sanitary sewage and wastes are discharged directly to the water.
61-63 incl.	From Portland Pier to the State Pier there are 5 outfalls. Number 62 is a public line serving as a storm drain and sanitary sewer for 16 buildings. The 4 private outfalls serve 2 stores and the State Pier.
64	A city sewer discharges to the harbor between Franklin and India Streets. It is 5 feet square in cross section and serves 746 buildings including 2 schools.
65-68 incl.	There are 7 outfalls between India and Atlantic Streets, all private lines serving from 1 to 4 buildings each. The first three outlets, number 65, serve up to 200 employees in a railroad yard. Outfalls number 67 and number 68 serve 8 buildings or approximately 156 people.

Index No.	Description
69	A city sewer 4 feet square in cross section and serving about 400 buildings discharges to the shore between the ends of Congress and Walnut Streets. It is the city's only chlorinated outfall.
70	One of the largest city sewers discharges between Walnut Street and the Washington Avenue bridge. It is 4 feet in diameter and serves about 3,132 buildings, more than are serves by any other sewer in the city.
71-73 incl.	In Back Cove, near the end of Franklin Street, there are 3 public outfalls serving respectively 142, 74, and 292 buildings.
74-77 incl.	There are 4 outfalls discharging to Back Cove from a point near the end of Preble Street. About 219 buildings are served by public outfall number 76. The others are small private lines serving 1 house each.
78	A 10-foot square city sewer discharges near the intersection of Forest Avenue and Marginal Way. It is the largest in size of any sewer in the city, serving 2,386 buildings.
79-85 incl.	About 228 buildings are served by 7 outfalls located along the shore from a point near Pottery Lane to the end of Hersey Street. Outfalls number 82 to number 85 are public lines, 2 to 3 feet in diameter and serving 129, 25, 35, and 37 buildings respectively. The other 3 outfalls are private sewers serving a food canning plant employing 95 people.
86-90 incl.	From Hersey Street to the mouth of the westernmost tidal brook on Back Cove, there are 5 public sewer outfalls, serving a total of 421 buildings. The first 4 range from 12 to 36 inches in diameter and serve from 37 (#88) to 195 buildings (#89) each. The last outfall, #90, is a 4-foot storm water drain.
91-97 incl.	There are 7 outfalls discharging to the shore from Fall Brook to the end of Bates Veranda. Numbers 95 and 97 are city sanitary sewers serving about 235 buildings each. At #91, Fall Brook carries the sewage from about 23 houses to Back Cove. Numbers 92 and 93 are storm water drains.
98-105 incl.	From the southern end of Bates Veranda to the shore off Upland Street, there are 2 public and 6 private outfalls. The largest of these is #98, a public line serving 385 buildings. Public outfall #101 serves 35 buildings. The largest of the private lines is #99, which carries industrial wastes and sanitary sewage from a large fish packing plant employing approximately 388 people. Number 103 is a private group sewer serving 23 houses.
106-114 inc.	Northwest of Whittier Street there are 9 sewer outfalls, all private lines except #106, which is a city sanitary sewer serving 145 houses. The private outfalls serve a total of 14 buildings, including 1 hospital, (#107).

Index No.	Description
115-120 incl.	Upstream from Whittier Street on the Portland side of the Presumpscot River there are 6 outfalls. Numbers 116 and 118 are public lines, the former being a sanitary sewer serving 52 buildings and the latter a storm water drain. Number 119 carries sanitary sewage and industrial wastes from 10 buildings, which house a fish meal plant and an abbatoir. At number 120 wastes from a rendering company are discharged to the river.
121	A storm water drain discharges to a gully on the western side of town north of the railroad crossing at Congress Street. Drainage from this line seeps to Fore River.
122-127 incl.	Six storm water overflows discharge to Capisic Pond and Capisic Stream, a tributary to Fore River.
128-141 incl.	In that section of the town of Falmouth near the Bates-Veranda bridge, there are 15 private sewer outfalls serving a total of 166 houses. Sewage from 31 houses is treated in a large septic tank before being discharged from outfall #134.

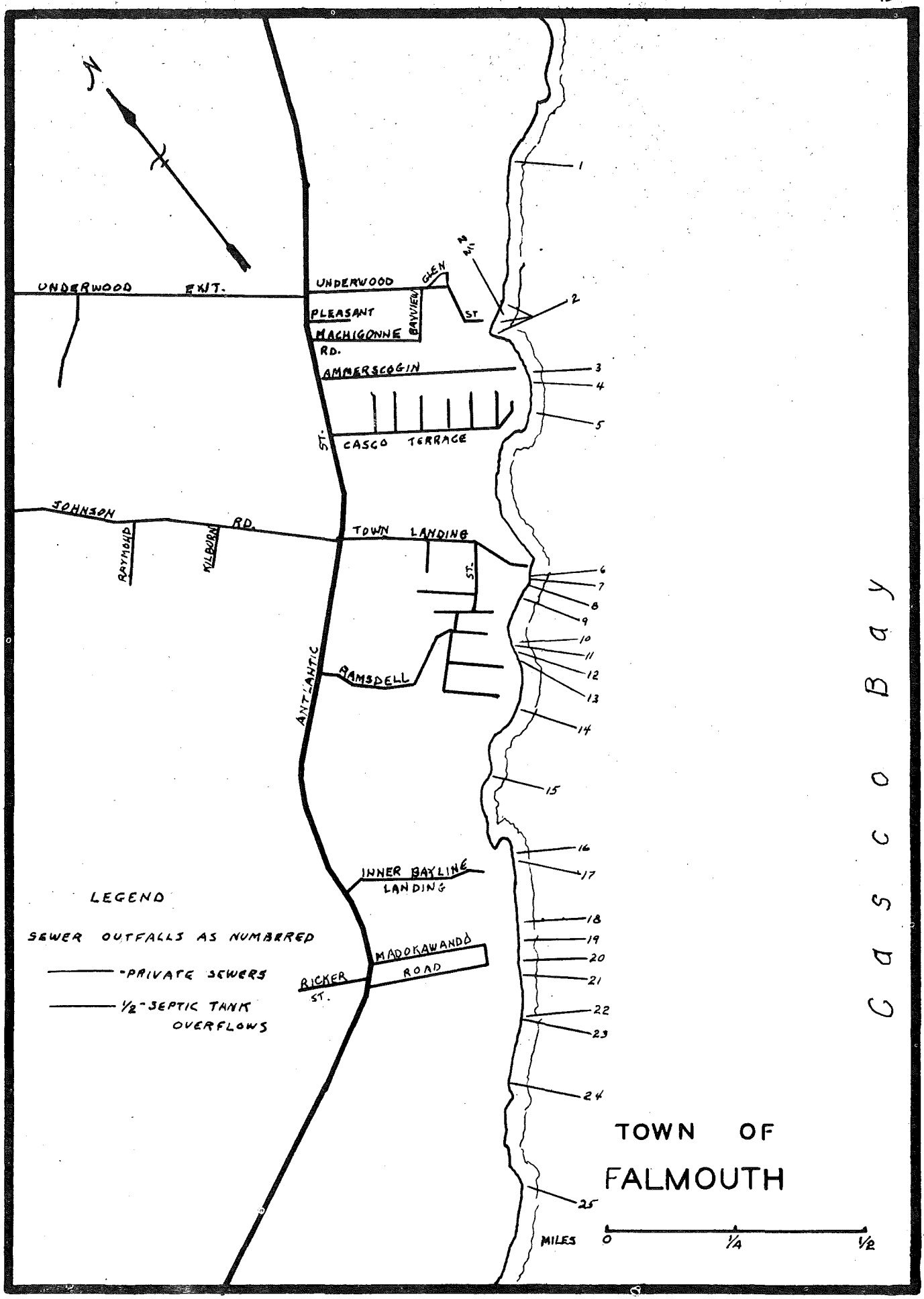

LITTLE DIAMOND ISLAND
COLLEGE I.
PUMPKIN KNOB
OVERSET I.
CUSHING I.
N
EVERGREEN LANDING
BEACH AVENUE
CITY POINT RA ISLAND
PLEASANT AVENUE
CHURCH AVE
GRATER WHARF
ISLAND AVE
WILLOW
CENTRAL ST.
WELCH
BRACKETT
SUNSET
OAK
MAPLE
SEA SHORE AVENUE
GREAT POND
DUCK POND
PEAK ISLAND
LEGEND
SEWER OUTFALLS AS NUMBERED
—P— PUBLIC SEWER
——— PRIVATE SEWER
PEAK ISLAND VILLAGE,
CITY OF
PORTLAND
SCALE:
MILES 0 1/4 1/2

CITY OF PORTLAND
VILLAGE OF PEAK'S ISLAND

On Peak's Island in Portland Harbor, there are 67 sewer outfalls serving approximately 1,100 people, about 50% of which are summer residents only. There are no industrial wastes discharged to the ocean in this area because the island is mainly residential in nature.

Following are brief descriptions of the outfalls which are designated on the accompanying map of Peak's Island:

Index No.	Description
1	A city sewer 15 inches in diameter and serving 50 buildings discharges to the shore at the north end of Centennial Street.
2-4 incl.	West of Centennial Street there are 3 private outfalls. Number 2 serves 2 buildings, and numbers 3 and 4 serve 1 house each.
5	A public sewer 15 inches in diameter serving 108 buildings discharges to deep waters west of Willow Street.
6-14 incl.	From Willow to Sunset Streets, there are 9 outfalls. Numbers 7 and 13 serve 6 and 3 houses respectively. All others are individual sewer lines except #9, which is a surface water drain.
15-26 incl.	There are 12 private outfalls from Sunset Street to the shore south of Duck Pond. They serve 1 house each except #15 which serves 3 buildings.
27-37 incl.	There are 11 outfalls along the shore by Duck Pond to a point near Pumpkin Knob Island. Number 27 carries the run-off from Duck Pond, which receives sewage seepage from 9 houses. The remainder serve 1 house each, with the exception of #33 which serves 2 buildings.
38-45 incl.	From Pumpkin Knob Island to Evergreen Landing there are 8 outfalls, each serving 1 house except #45, which serves 4 houses and 1 hotel.
46-58 incl.	There are 13 sewer outfalls from Evergreen Landing to Beech Street. Numbers 56 and 57 serve 3 and 2 houses respectively. All others serve 1 building each.
59-67 incl.	Between Beach and Centennial Streets, there are 9 outfalls, serving 16 buildings. Number 62 serves 3 buildings, and the others 1 or 2 each.

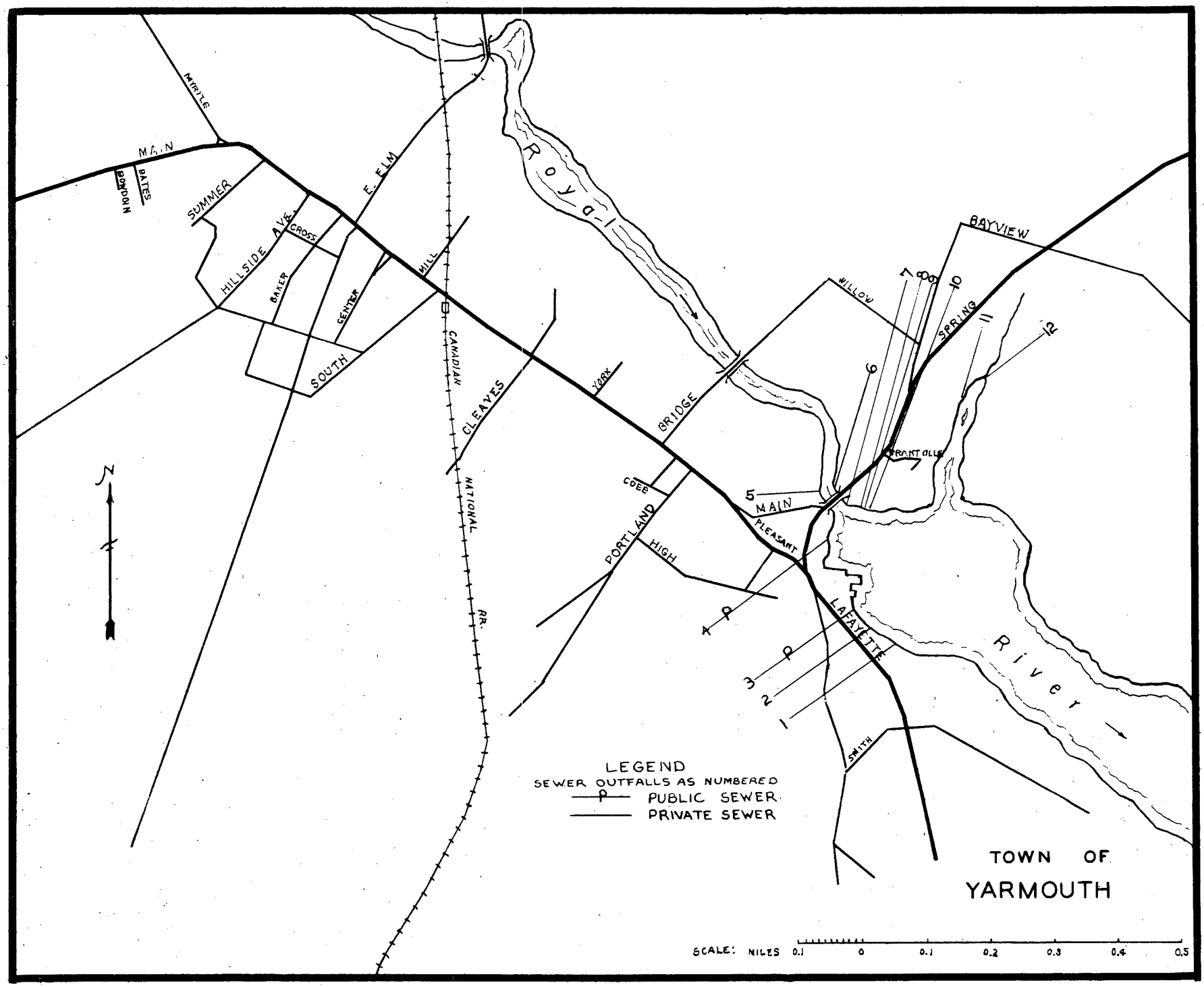

N
UNDERWOOD EXT.
UNDERWOOD
GLEN
PLEASANT
BAYVIEW
ST
MACHIGONNE
RD.
AMMERSCOGIN
ST.
CASCO TERRACE
JOHNSON
RD.
RAYMOND
KILBURN
TOWN LANDING
ST.
ATLANTIC
RAMSDELL
INNER BAYLINE
LANDING
MADOKAWANDA
ROAD
RICKER
ST.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
LEGEND
SEWER OUTFALLS AS NUMBERED
-PRIVATE SEWERS
1/2"-SEPTIC TANK OVERFLOWS
Casco Bay
TOWN OF
FALMOUTH
MILES
0
1/4
1/2

TOWN OF FALMOUTH

Untreated sewage from approximately 650 persons, together with the effluent from numerous septic tank installations, is discharged to the tidal waters at Falmouth. There are no public sewers in this area, and all lines are privately owned. They serve from 1 to 63 buildings each. Although about half of the sewers discharge near the low water mark, many of the outfalls discharge above high tide.

As shown on the accompanying map of Falmouth, there are 25 sewer outfalls discharging to the coastal waters in the vicinity. Following is a brief description of the outfalls and locations:

Index No.	Description
1	Located 350 feet south of the town line, this outfall serves 2 houses and empties below the low water mark.
2	Located near the end of Underwood Street, 3 separate lines intersect to form 1 sewer carrying the wastes from 63 buildings and discharging to deep water. About 40 of these buildings are camps, 20 of which are used the year around.
3-6 incl.	These 4 lines serve a total of 60 houses, including 27 houses discharging to sewer #5, and 24 houses discharging to Sewer #6. The first 3 sewers in this group lie between the ends of Ammerscogin Street and Casco Terrace. Sewer #6 is located just south of Town Landing.
7-13 incl.	Thirty buildings are served by these 7 sewers. Sewer #10, the largest, serves 9 houses. All 7 outfalls lie between Town Landing and the end of the southernmost street off Ramsdell Street and empty above the tide level.
14	Stanley or Norton sewer empties to deep water nearly opposite the southernmost street at the foot of Ramsdell Street and about 200 feet north of Portland Yacht Club. It serves 19 buildings, including the Yacht Club.
15-25 incl.	These 11 sewers serve 39 buildings, including 11 buildings served by sewer #16, and 14 buildings served by sewer #21. These sewer outfalls are located in an area between points about 700 feet north of Inner Bayline Landing and almost one-half mile south of Madokawando Road. Several discharge above high tide level. An undetermined number of cesspools and septic tanks, overflowing along Underwood Extension, Johnson Road, Depot Road, Atlantic Street near Mill Creek, and Edgewater Road, contribute to the total pollution in this area.


MYRTLE
MAIN
BATES
LEONARD
SUMMER
HILLSIDE AVE.
CROSS
BAKER
CENTER
SOUTH
E. ELM
MILL
CANADIAN NATIONAL RR.
CLEAVES
YORK
BRIDGE
ROYAL
WILLOW
BAYVIEW
SPRING
FRONT
COEB
PORTLAND
HIGH
5
MAIN
PLEASANT
LAFAYETTE
SMITH
RIVER
1
2
3
4
6
7
8
10
11
12
N
LEGEND
SEWER OUTFALLS AS NUMBERED
PUBLIC SEWER
PRIVATE SEWER
TOWN OF
YARMOUTH
SCALE: MILES 0.1 0 0.1 0.2 0.3 0.4 0.5

TOWN OF YARMOUTH

Pollution to the tidal waters at Yarmouth consists of the sanitary wastes of approximately 824 people, spent dye wastes from a rug processing plant, and fish wastes from clam and sardine processing plants. All these wastes empty to the tide waters of the Royal River. Although located in a resort area, summer residents are few in number, and there is little seasonal change in the volume of sewage.

Along the Royal River in Yarmouth, there are 12 outfalls, 3 of which are public sewers. The outfalls are briefly described and summarized as follows:

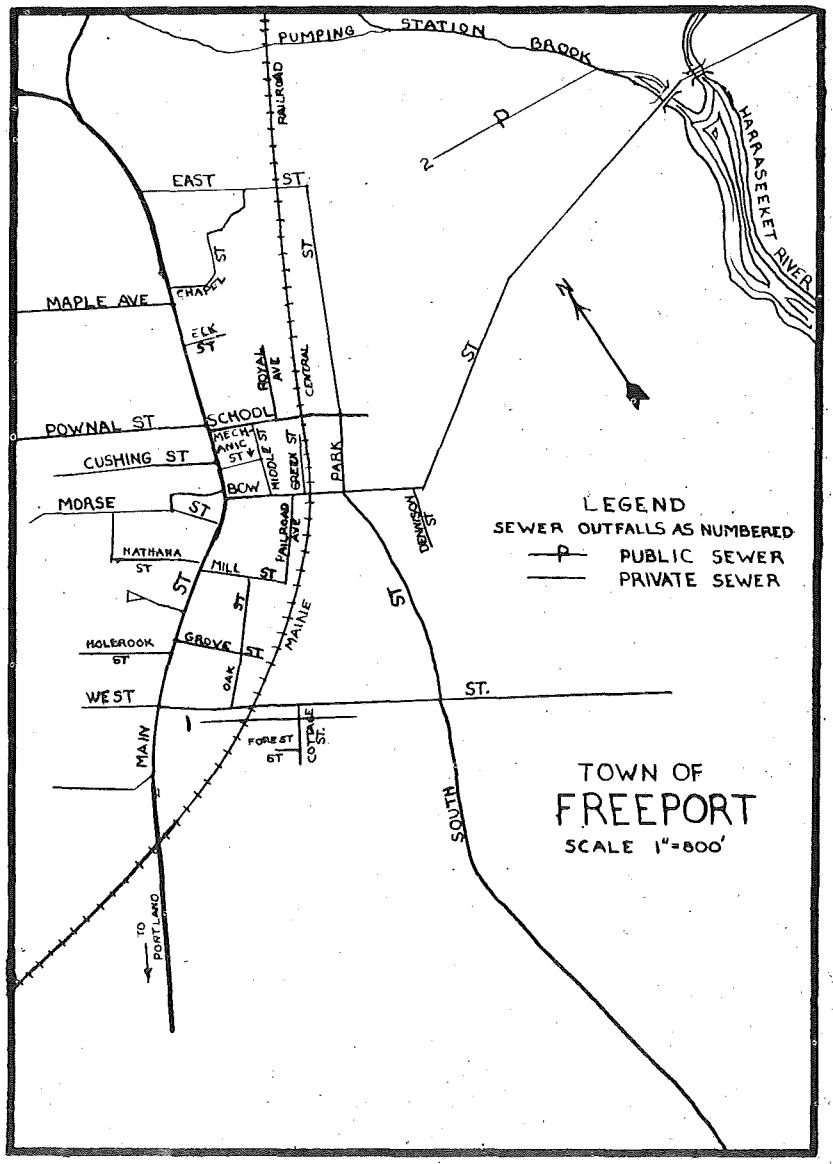
Index No.	Description
1	Two outfalls carrying sanitary and fish wastes from a sardine factory discharge to tide water under a wharf.
2	A small brook located under a parking area of the sardine plant carries septic drainage from 4 buildings which include a cleaning establishment.
3-4 incl.	Two town sewers, 1 of which is located 200 feet northwest of #2 and the other on the shore halfway between Main and Pleasant Streets, serve 32 and 74 buildings respectively.
5-6 incl.	Two outfalls on opposite shores of the river 150 feet upstream from the Main Street Bridge discharge respectively a waste dye solution from a rug processing plant and wastes from a clam processing plant.
7	Located 75 feet southeast of the Main Street Bridge, a sewer serves 44 buildings.
8-12 incl.	From a point 250 feet downstream from #7 to a small brook entering the north end of the tidal creek, 5 private sewers serve 4 homes and 21 camps. The brook itself receives fairly direct seepage from 3 buildings.

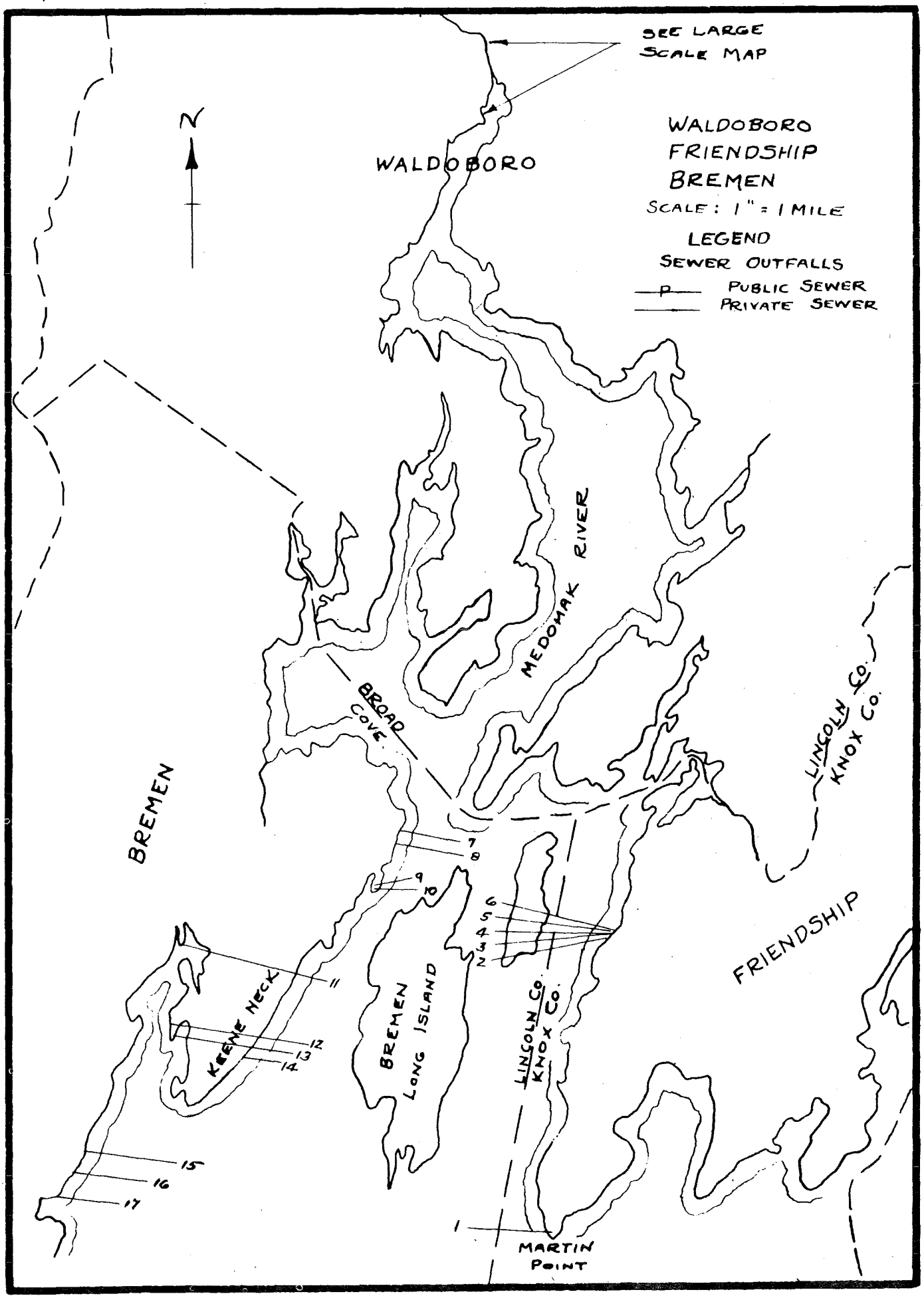
TOWN OF FREEPORT

The town of Freeport is one of the few towns in Maine that has installed a modern sewage treatment plant. Of approximately 340 building units served by public sewers, wastes from an estimated 335 units are treated in an Imhoff tank, the effluent from which discharges to tidewater. The effluent from septic tanks and cesspools serving 5 individual dwellings is also discharged to tidewater.

The following is a brief description of the sources of pollution:

Index No.	Description
1	Halfway between South and Cottage Streets, the effluent from cesspools and septic tanks serving 5 houses, discharges directly to a ditch containing surface water drainage.
2	The effluent from an Imhoff Tank serving 335 buildings discharges to Pumping Station Brook at a point approximately 0.1 mile upstream from the Bow Street bridge.



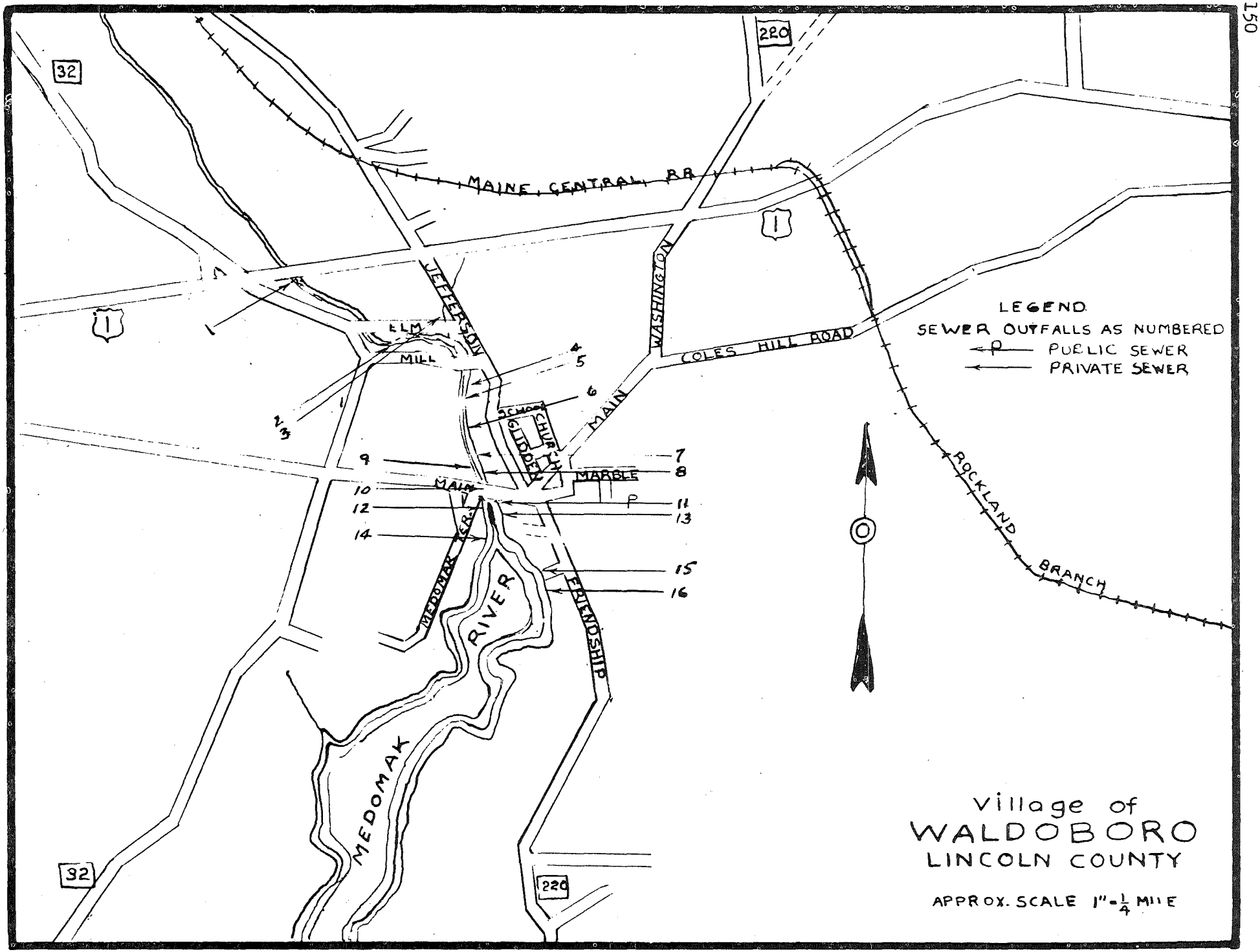

SEE LARGE SCALE MAP
N
WALDOBORO
WALDOBORO
FRIENDSHIP
BREMEN
SCALE: 1" = 1 MILE
LEGEND
SEWER OUTFALLS
P PUBLIC SEWER
PRIVATE SEWER
MEDOMAK RIVER
BROAD COVE
BREMEN
LINCOLN CO.
KNOX CO.
FRIENDSHIP
KEENE NECK
BREMEN LONG ISLAND
LINCOLN CO.
KNOX CO.
MARTIN POINT
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17

MARTIN POINT IN FRIENDSHIP to the BREMEN-BRISTOL TOWN LINE

The coastal area from Martin Point in Friendship to the Bremen-Bristol town line appears to be relatively free from pollution except for that area designated in the Waldoboro report which includes Waldoboro Village and the section adjoining the Medomak River, approximately one mile downstream from the village.

Seventeen outfalls, serving 17 dwellings and 1 hotel, are sources of tidal water pollution in this area.

Index No.	Description
1	A 6-inch private sewer serving a hotel having a capacity of 35 persons discharges at the southern tip of Martin Point.
2-6 incl.	In the western part of Friendship, north of Martin Point, 5 sewer outfalls serve individual homes.
7-10 incl.	In the area between Broad Cove and Keene Neck in Bremen, 4 sewer outfalls discharge to tidewater.
11-14 incl.	In the vicinity of Keene Neck, there are 4 sewers serving individual dwellings.
15-17 incl.	In Bremen, south of Keene Neck, 3 outfalls, serving 4 buildings, discharge from the shore.

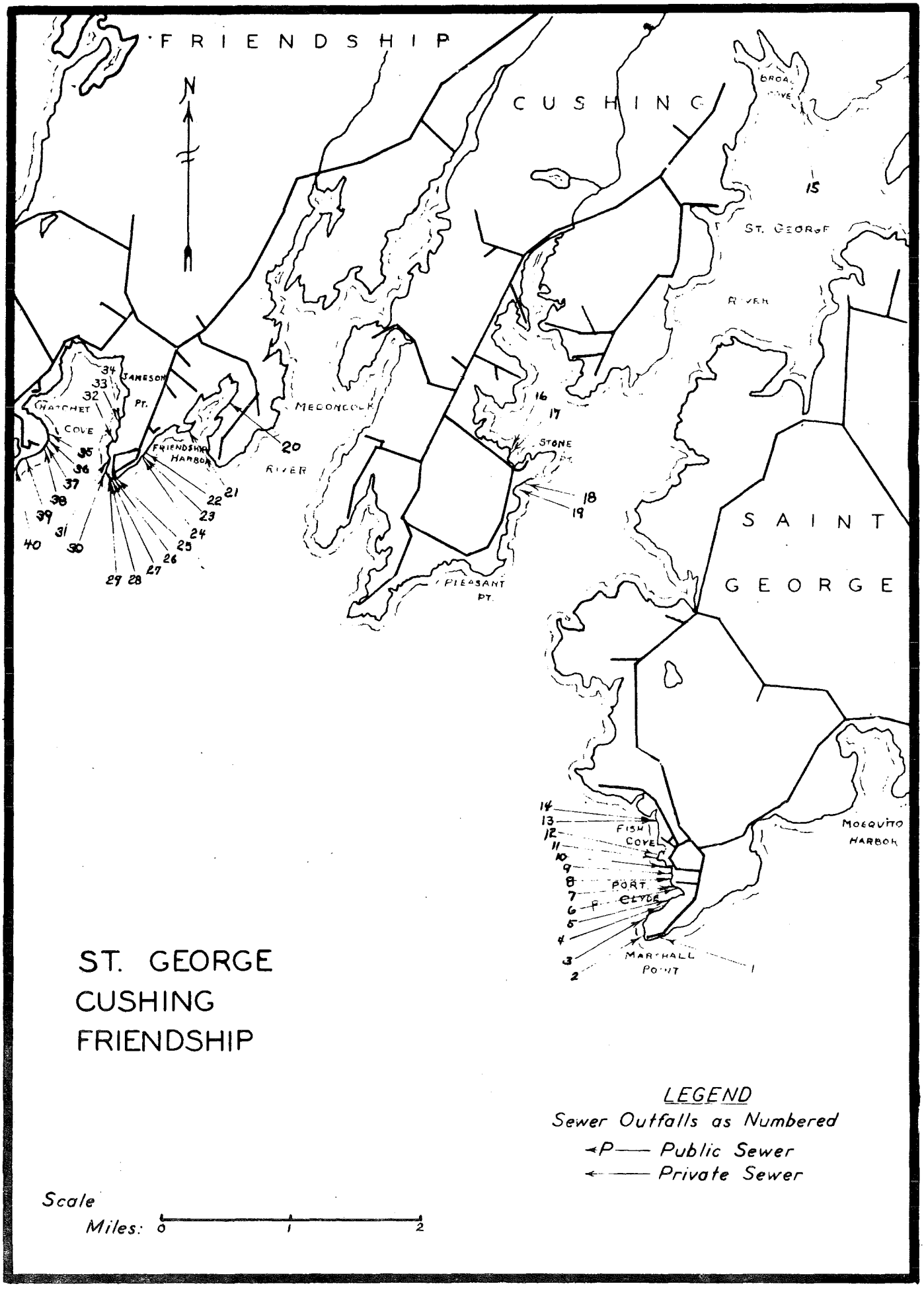

32
220
MAINE CENTRAL RR
1
JEFFERSON
WASHINGTON
ELM
MILL
COLES HILL ROAD
MAIN
SCHOOL
CHURCH
LIBRARY
MARBLE
MAIN
MEDOMAK TER.
EPWORTH
MEDOMAK RIVER
ROCKLAND BRANCH
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
P
LEGEND
SEWER OUTFALLS AS NUMBERED
P PUBLIC SEWER
PRIVATE SEWER
Village of
WALDOBORO
LINCOLN COUNTY
APPROX. SCALE 1" = 1/4 MILE

TOWN OF WALDOBORO

An estimated population of 450 persons in the town of Waldoboro, plus a poultry slaughter house and a button factory, discharge wastes to the Medomak River. This pollution originates from 16 sources, and while the total volume of sewage contributed by this area is relatively small, it should be noted that the flow of the Medomak River is also small, and the tidal prism may not give enough dilution to prevent pollution of the clam flats.

Following are brief descriptions of the outfalls by groups, as are indicated on the accompanying map of Waldoboro:

Index No.	Description
1-10 incl.	From a point 70 feet downstream from the bridge on Route #1 to a point 40 feet upstream from the Main Street Bridge, 10 private outfalls ranging in size from 4 to 8 inches, discharge wastes to the Medomak River from 9 private homes, 2 apartment houses and a poultry slaughter house, which employs 40 persons and allows all processing wastes to enter the river.
11	Approximately 30-feet downstream from the Main Street Bridge, an 8-inch tile public sewer outfall discharges wastes from a population equivalent of 350 people. An undesirable condition exists here where the sewer discharges to the bank about 100 feet from the water.
12-16 incl.	Below the public sewer, there are 5 private outfalls, including an outfall from a button factory, (#15), serving 66 employees and carrying some sulfuric acid as an industrial waste.



ST. GEORGE
CUSHING
FRIENDSHIP

LEGEND

Sewer Outfalls as Numbered

P—— Public Sewer

←—— Private Sewer

Scale

Miles: 0 1 2

MOSQUITO HARBOR IN ST. GEORGE TO HATCHET COVE IN FRIENDSHIP
(Except the area adjacent to Thomaston and that part of Cushing previously reported.)

The area from Fairy Wharf in Port Clyde to Fish Cove is noticeably polluted, but pollution in the area adjacent to Cushing is negligible. The area in the town of Friendship from the Medoncook River to Hatchet Cove appears to be free from pollution, except for a small, localized condition on the west side of Jameson Point.

A total of 40 sewer outfalls, only 1 of which is public, serve the whole area. Following are brief descriptions of the outfalls by groups:

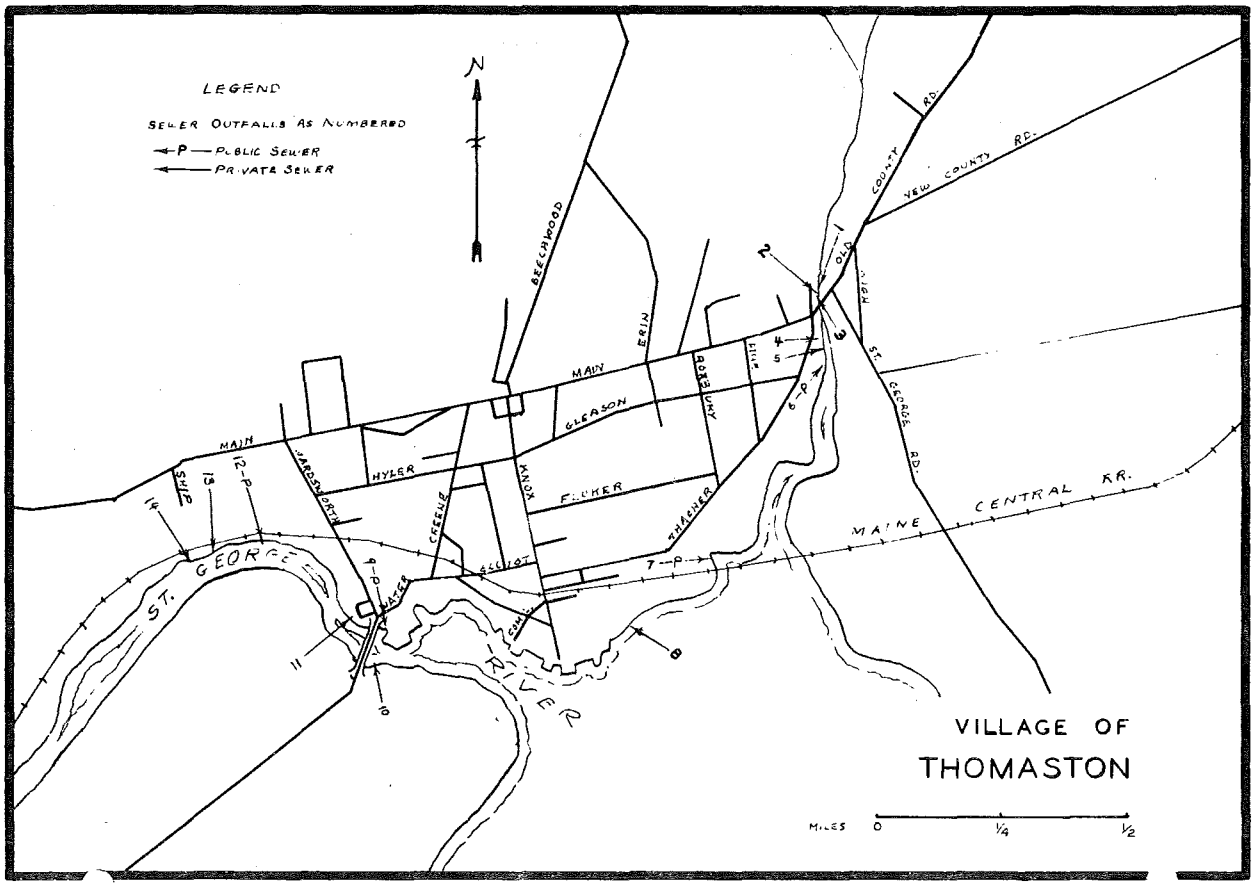
Index No.	Description
1-14 incl.	There are 14 private sewers and 1 public sewer in the Port Clyde area of St. George. The private sewers range in size from 4 inches to 12 inches, and serve 19 houses plus a sardine packing plant with 150 employees. Number 11 indicates two 6" tile sewers from a fish packing plant. The public sewer, #6, is 10 inches in diameter and serves an estimated population of 95 persons.
15-19 incl.	In the Cushing area, between Broad Cove and Pleasant Point, there are 5 four-inch sewers serving individual houses.
20-34 incl.	In Friendship, from the east side of Friendship Harbor to the west side of Jameson Point, there are 15 sewers serving individual dwellings.
35-40 incl.	On the west side of Hatchet Cove, 6 sewers serve 6 dwellings.

TOWN OF THOMASTON

Sewage from the town of Thomaston, having a population of about 2,000 people, is discharged to the St. George River by 14 sewer outfalls, 5 of which are public sewers and the others private lines.

Following are brief descriptions of the outfalls which are designated on the accompanying map of Thomaston:

Index No.	Description
1-6 incl.	From the north end of St. George Road to the shore near Gleason Street, 6 sewers discharge to Mill River. Number 6 is a public line, serving an estimated population of 150.
7-10 incl.	There are 4 outfalls discharging to the St. George River from the shore near the Maine Central Railroad Bridge to the Water Street bridge. Numbers 7 and 9 are public lines serving 250 and 50 persons respectively. Number 8 carries canning factory waste plus the sanitary sewage from approximately 60 persons.
11-14 incl.	Upstream from the Water Street Bridge to the shore off Ship Street there are 4 sewer outfalls, 1 of which (#12) is a 10-inch public line serving a population of over 500. Outfalls numbers 13 and 14 serve the State Prison, which has about 300 inhabitants.

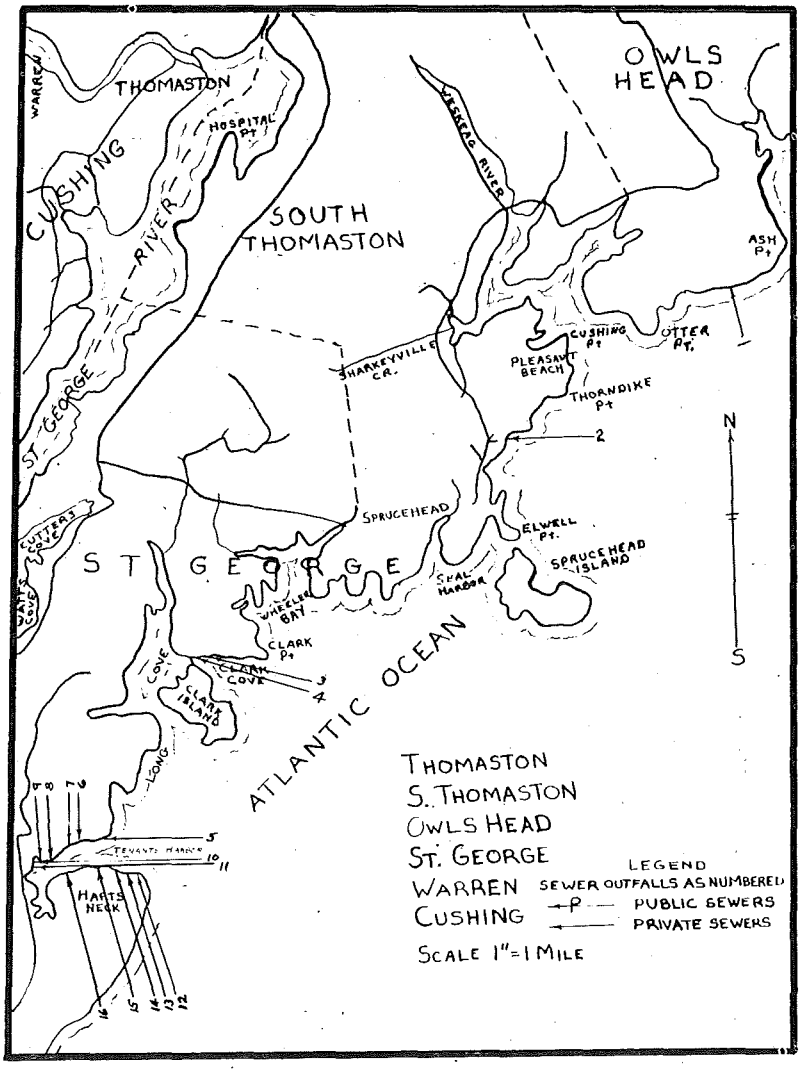


ASH POINT, OWLS HEAD, to TENANTS HARBOR IN ST. GEORGE

The coastal area from Ash Point to Tenants Harbor in St. George is relatively free from pollution, except for a small area near the northwest corner of the bridge to Clark Island, and the north side of Tenants Harbor.

As shown on the accompanying map, there are 16 outfalls in this area, all of which are private sewers. A brief description of the outfalls follows:

Index No.	Description
1	A 4-inch sewer located 1 mile up the coast from Otter Point, is the only known outfall from Ash Point to the South Thomaston town line.
2	In South Thomaston, or about 1/2 mile south of Thorndike Point, there is 1 sewer outfall serving a single house.
3-16 incl.	From the northwest corner of the bridge to Clark Island, to a point 800 feet down the coast from the last wharf on the south side of Tenants Harbor, there are 14 sewers serving 11 homes and 2 hotels. A school in Tenants Harbor, having 180 pupils, is served by a septic tank, the effluent from which reaches the water.

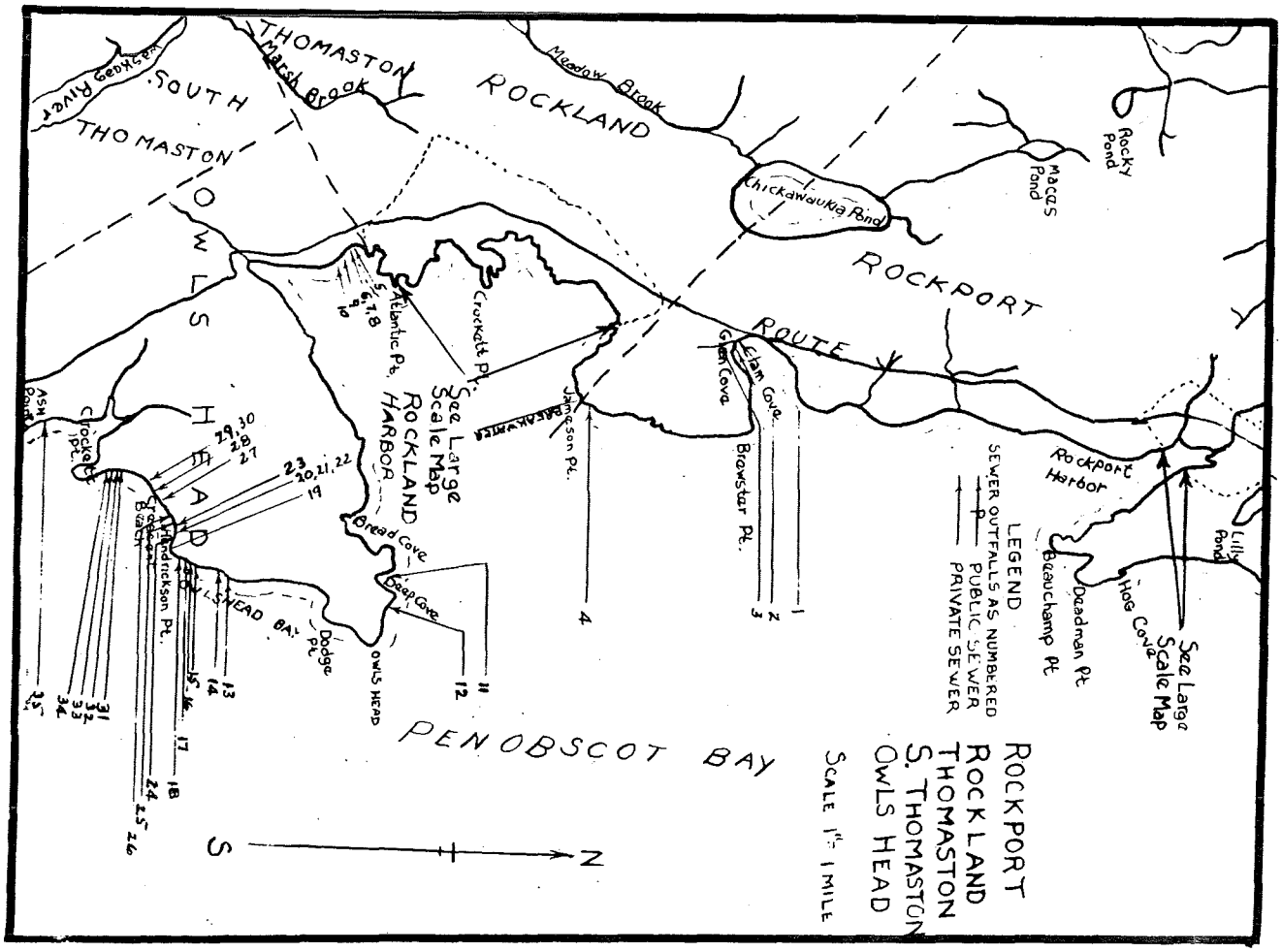


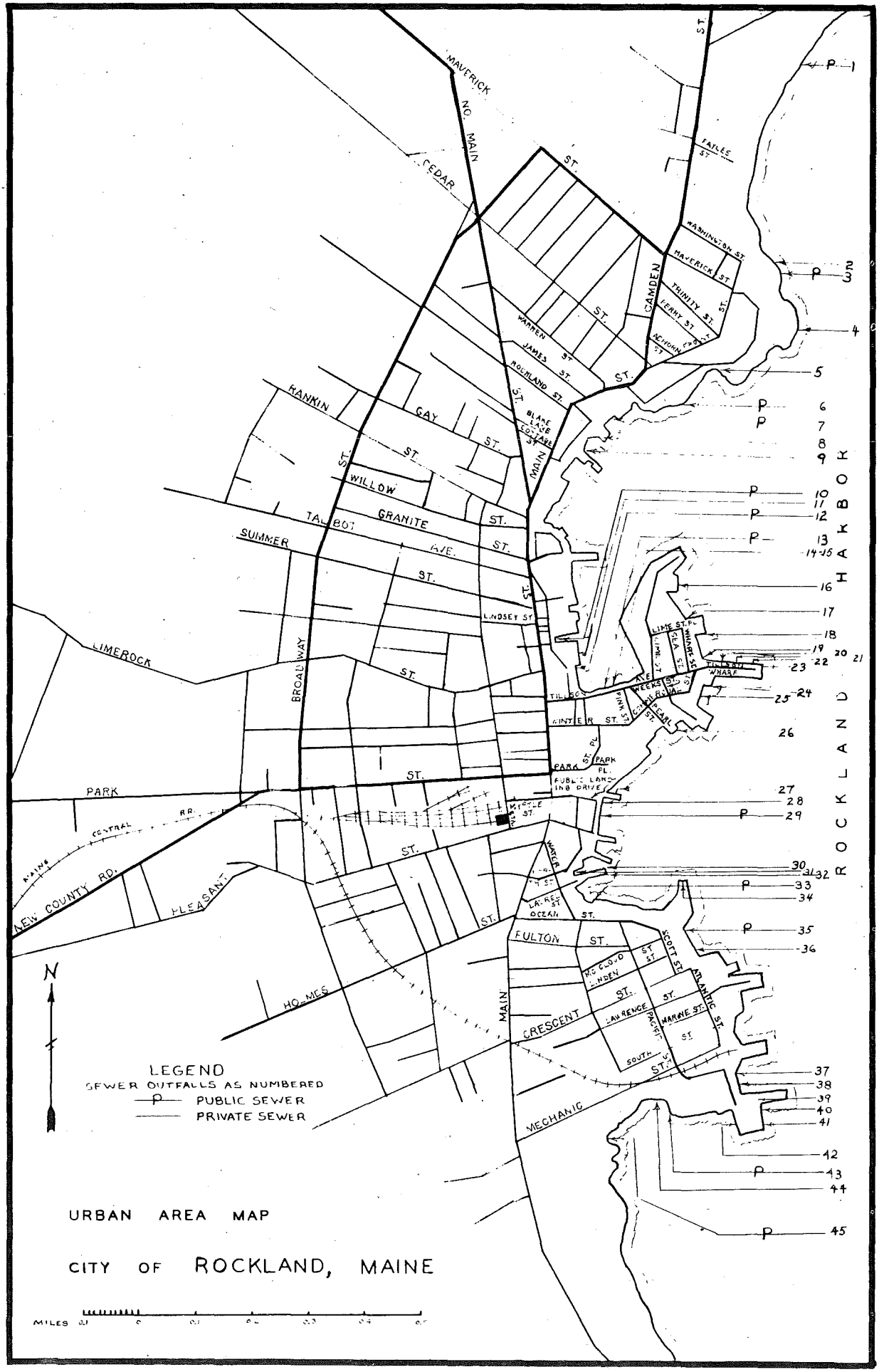
GLEN COVE IN ROCKPORT TO ASH POINT IN OWLS HEAD
(with exception of the urban area of Rockland)

Along the coastal area extending from Glen Cove to Ash Point, with the exception of the urban area of Rockland, there are 35 sources of coastal water pollution, the majority of which are concentrated in the Owls Head section.

Following is a brief description of the sewer outfalls by groups:

Index No.	Description
1-3 incl.	In the Glen Cove area, there are 3 sewer outfalls serving individual houses.
4	Approximately 300 feet up the coast from the Rockland breakwater, a private sewer serving a 300-guest summer hotel between the months of June and September, discharges sewage to tidewater.
5-12 incl.	Between the urban area of Rockland and the tip of Owls Head, 8 sewer outfalls discharge to tidewater. Outfalls #11 and #12 serve 50 to 70 persons at a summer camp.
13-35 incl.	Twenty-three sanitary sewers discharge to tide water in the area between Dodge Point and Ash Point. Numbers 29 and 30 indicate 2 sewers which serve a summer hotel having an estimated population of 45. The other sewers in this group serve one house each.




MAVERICK
NO. MAIN
ST.
CEDAR
TATLES ST.
WASHINGTON ST.
MAVERICK ST.
TRINITY ST.
FERRY ST.
ACHORN ST.
CAMDEN
WARREN ST.
JAMES ST.
HOLMLAND ST.
BLAKE LANE
COTTAGE ST.
MAIN ST.
RANKIN ST.
GAY ST.
WILLOW ST.
GRANITE ST.
TALBOT AVE.
SUMMER ST.
LINDSEY ST.
LIMEROCK ST.
BROADWAY
LIME ST.
SEA ST.
WHARF ST.
TILLSON WHARF
WEEKS WHARF
TILLSON AVE.
WINTER ST.
PEARL ST.
PARK ST.
PARK PL.
PUBLIC LANDING DRIVE
MIDDLE ST.
WATER ST.
MAINE CENTRAL R.R.
NEW COUNTY RD.
PLEASANT ST.
HO-MES
FULTON ST.
ST. CLOUD ST.
LINDEN ST.
LAWRENCE ST.
MAINE ST.
SOUTH ST.
SCOTT ST.
ATLANTIC ST.
PACIFIC ST.
MAIN
CRESCENT
MECHANIC
ROCKLAND HARBOR
N
LEGEND
SEWER OUTFALLS AS NUMBERED
P PUBLIC SEWER
PRIVATE SEWER
URBAN AREA MAP
CITY OF ROCKLAND, MAINE
MILES

CITY OF ROCKLAND

The area from the breakwater in Rockland Harbor north of the city to the Owls Head town line is heavily polluted. An estimated 8,000 persons and 23 industrial establishments are served by 12 public and 33 private sewers. The industries employ about 1,900 persons and consist mainly of various seafood processing and canning plants, and also include 2 kelp processing plants, a poultry slaughter house, an ice cream manufacturer, and a lime company.

All of the sewers discharge into Rockland Harbor and are briefly described as follows:

Index No.	Description
1-9 incl.	Along the Rockland shore north of the intersection of Main and North Main Streets, there are 4 public sewers serving approximately 1,475 persons, including 175 employees of a bathrobe manufacturing plant; and 5 private sewers serving 2 homes and 3 industries, including 2 fish processing plants and a lime company.
10	A large public sewer reaching the shore approximately 500 feet south of Lindsey Street, serves an estimated 2,500 persons.
11-15 incl.	In the cove west of Lime Street, there are 5 sewer outfalls, 2 of which (#12 and #13) are public lines serving 200 and 500 persons respectively. A poultry slaughter house and an ice cream plant also discharge wastes through public sewer #13.
16-19 incl.	Along the shore from the northern end of Lime Street to Tilsons Wharf, there are 4 sources of pollution. Number 16 designates the location of several outfalls carrying the effluent from a septic tank and process water from a kelp processing plant which has 25 employees. Four additional outfalls at #18 and one at #19 carry sanitary and industrial wastes from a lobster pound, a fish liver oil and fish meal factory, and a filleting plant.
20-23 incl.	Discharging from Tillsons Wharf, 6 outfalls carry sanitary and industrial wastes. Five of these (3 of which are grouped at #21), serve a large fish canning plant employing 250 people. The other outlet carries wastes from a fish processing plant.
24-28 incl.	Five sources of pollution to tidewater are located between Tillsons Wharf and the shore off Public Landing Drive. These include 2 fish processing plants employing approximately 410 persons, 2 hotels, and a lobster pound. These establishments are served by one or more sewer lines each.
29	A 16-inch sewer discharges the wastes of 2,500 people into the harbor approximately 200 feet north of the public wharf. It is noteworthy that a nearby lobster pound utilizes water from the immediate area.
30-36 incl.	Along the shore between the eastern ends of North and Linden Streets, there are 7 sources of pollution. These include 2 public sewers, (#33 and #35 serving 320 and 120 persons respectively), 2 private sewers which carry sewage from 5 houses, and a sardine factory, a kelp processing plant, and a lobster pound, employing 250, 25, and 10 people respectively.

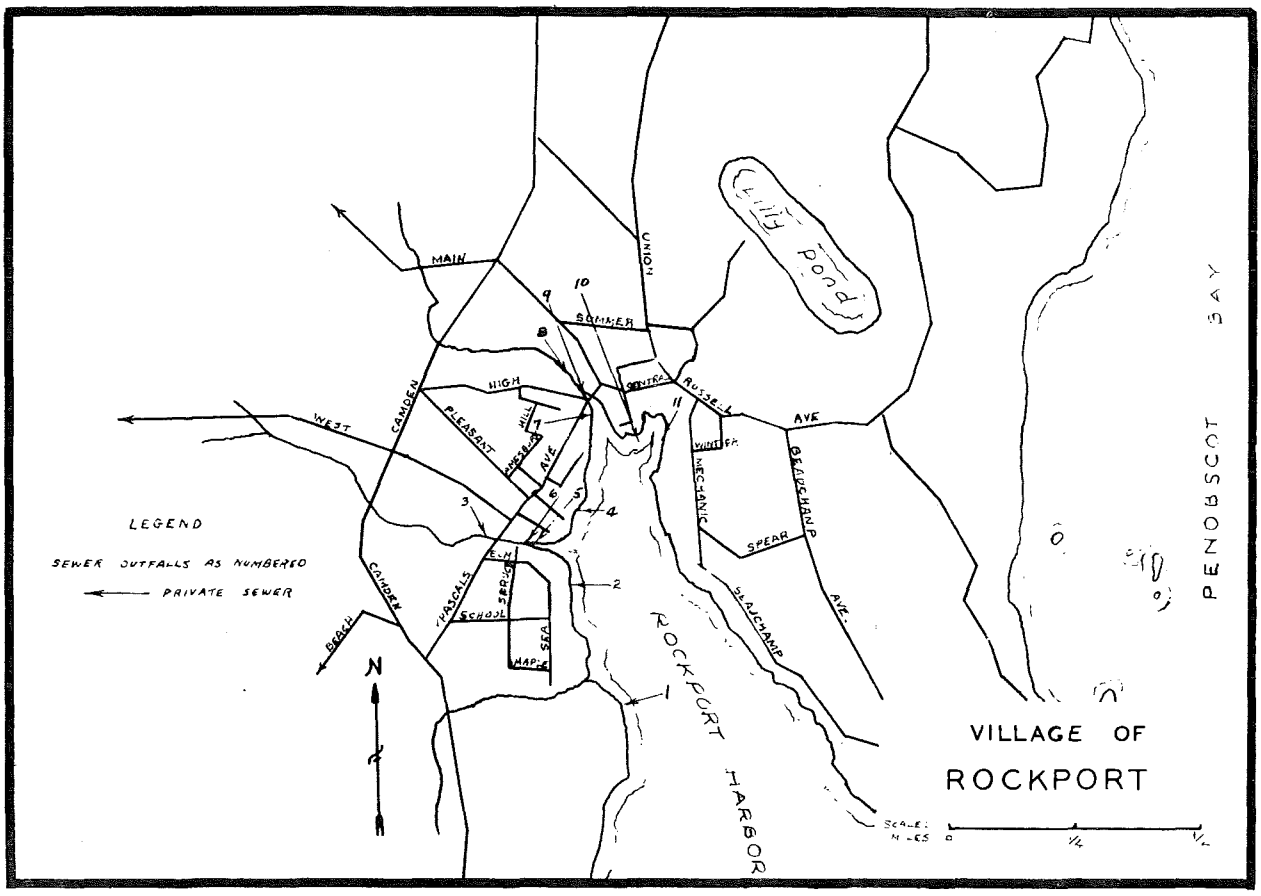
Index No.	Description
37-45 incl.	Along the shore south of Mechanic Street, there are 9 outfalls. These include 2 public sewers (#43 and #45 serving an estimated 90 and 200 persons respectively), and 6 private lines, 5 of which serve 150 employees of a shipyard, and the other, 1 house.

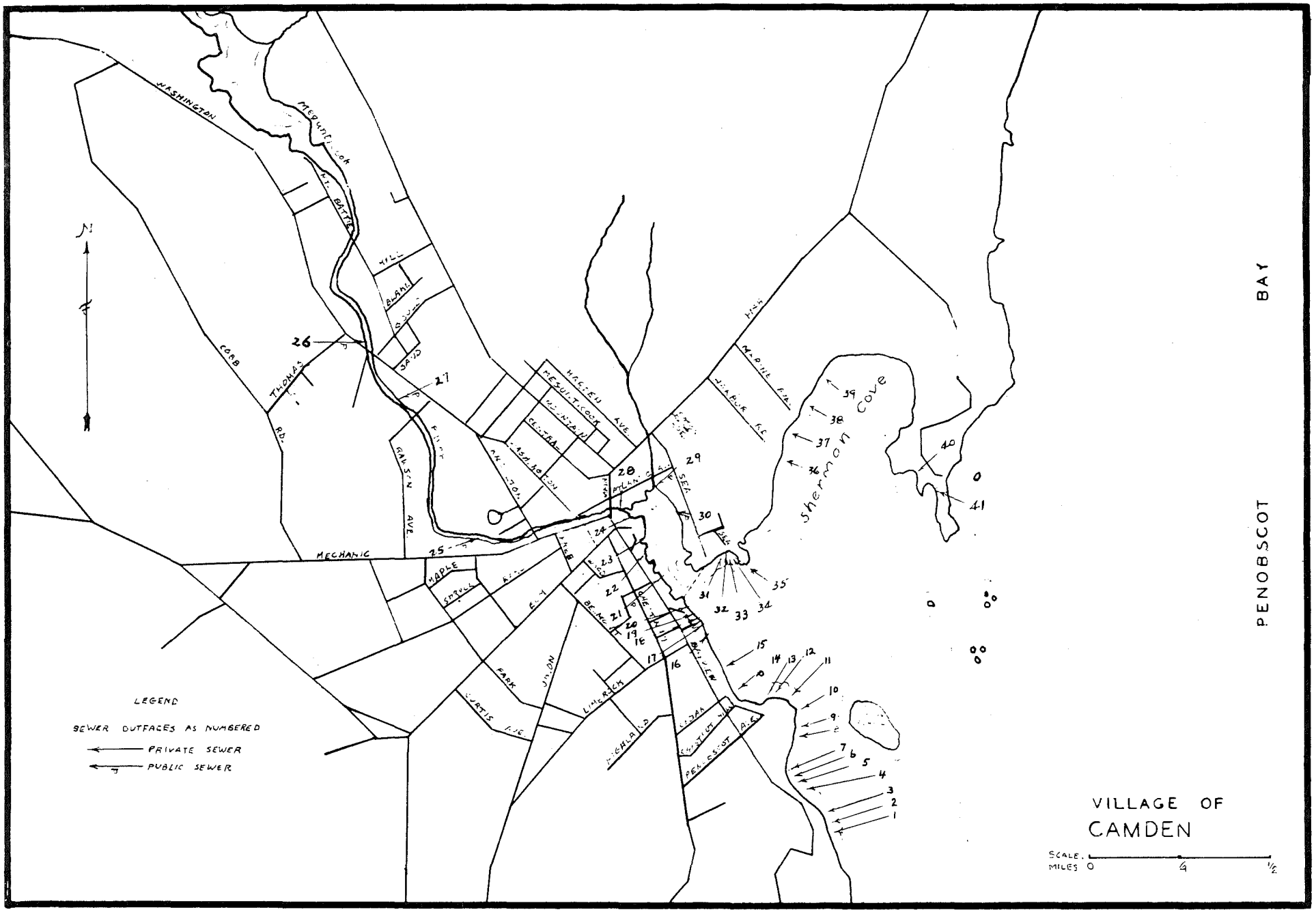
TOWN OF ROCKPORT

The area along the coast of Rockport appears to be relatively free from pollution. It is estimated that the pollution load of this town, based on population, is approximately 370. There are no public sewers in Rockport, although 11 private sewers lead to the harbor.

The 11 sewer outfalls are located as follows:

Index No.	Description
1-7 incl.	On the western side of Rockport Harbor, 7 sewer outfalls serve 7 houses, a fish packing plant, and a store.
8-11 incl.	Four outfalls along the north and east sides of the harbor serve a sea food company, a lodge hall, a school, and several dwellings.




WASHINGTON
MEGUNTICOOK R.
MT. BATTIE
HILL
ADAMS
SCHOOL
SAID
CORB
THOMAS
RD.
26
27
GALSON AVE
MECHANIC
MAPLE
SPRUCE
ELM
PARK
CURTIS AVE
UNION
LIMEROCK
HIGHLAND
MEGUNTICOOK AVE
MEGUNTICOOK
CENTRAL
ELM ST.
ATLANTIC
SEA
HIGH
MAPLE AVE
HARBOR AVE
Sherman Cove
BAY
PENOBSCOT
BEACH
BAYVIEW
CEDAR
WINSLOW
PERKINS ST
PARK
N
LEGEND
SEWER OUTFACES AS NUMBERED
PRIVATE SEWER
PUBLIC SEWER
VILLAGE OF
CAMDEN
SCALE.
MILES 0
1/2

TOWN OF CAMDEN

The area of the harbor indicated on the map between Washington, Atlantic, and Sea Streets, the outer extent of which is shown by a broken line near the end of Sea Street, is heavily polluted.

The principal source of pollution is sewage from a population estimated at 3,300, 5 woolen mills, and 1 shirt factory. There are 7 public sewer outfalls and 34 private sewer lines in Camden.

The 41 sewer outfalls indicated on the Camden map are located as follows:

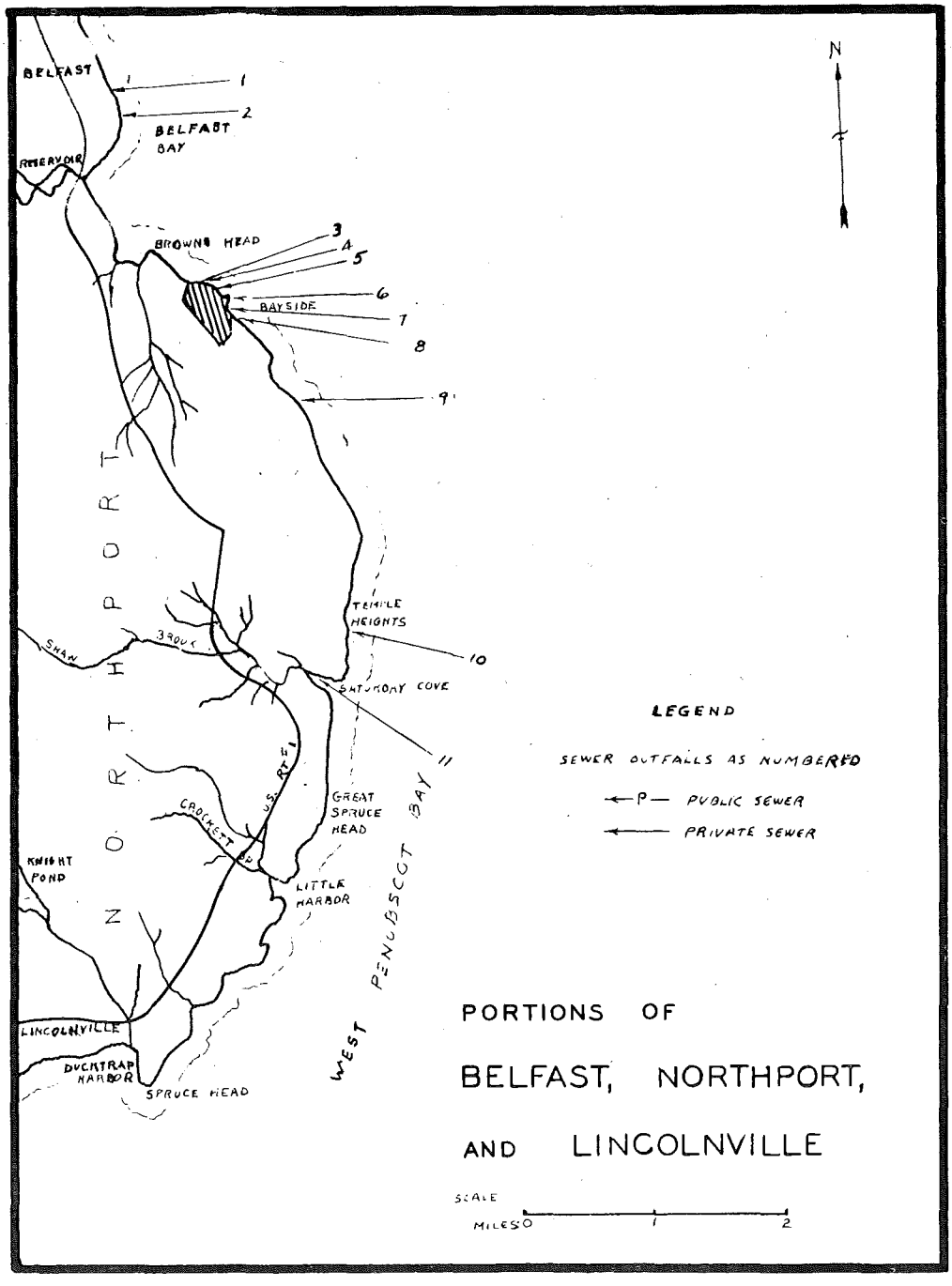
Index No.	Description
1-13 incl.	Thirteen 4-inch private sewer outfalls, each serving 1 house, discharge to the water in the area extending 600 feet south of Rocky Point up the coast to a point 200 feet from Chestnut Hill Road.
14	A public sewer serving approximately 350 people is located near the end of Cedar Street.
15-20 incl.	Six outfalls ranging in size from 4 to 8 inches and serving a yacht club, summer hotel, and several houses, lie between Cedar Street and the concrete pier.
21	This is a major public sewer located in line with Frye Street, serving an estimated population of 2,200.
22-24 incl.	Three private sewers serving approximately 30 people and 2 stores are located in the area extending from the northernmost wharf on Bayview Street to Main Street Bridge over the Megunticook River.
25-27 incl.	Two city sewers serving about 300 and 125 people, respectively, discharge to the Megunticook River between Knowlton and Washington Streets. Another public sewer, #27, located on the upstream side of Rawson Avenue, serves approximately 200 people.
28	At the bridge on Main Street, a sewer system serves 6 stores and a restaurant.
29-30 incl.	Two city sewers, 12 inches in diameter, serve approximately 300 and 150 people respectively and discharge to the cove beyond Atlantic and Sea Streets.
31-41 incl.	Eleven private sewers, ranging in size from 3 to 8 inches in diameter, serve 8 houses, an estate, and a shipyard and discharge to the water in the area extending from the foot of Sea Street, around Sherman Cove, to Northeast Point.

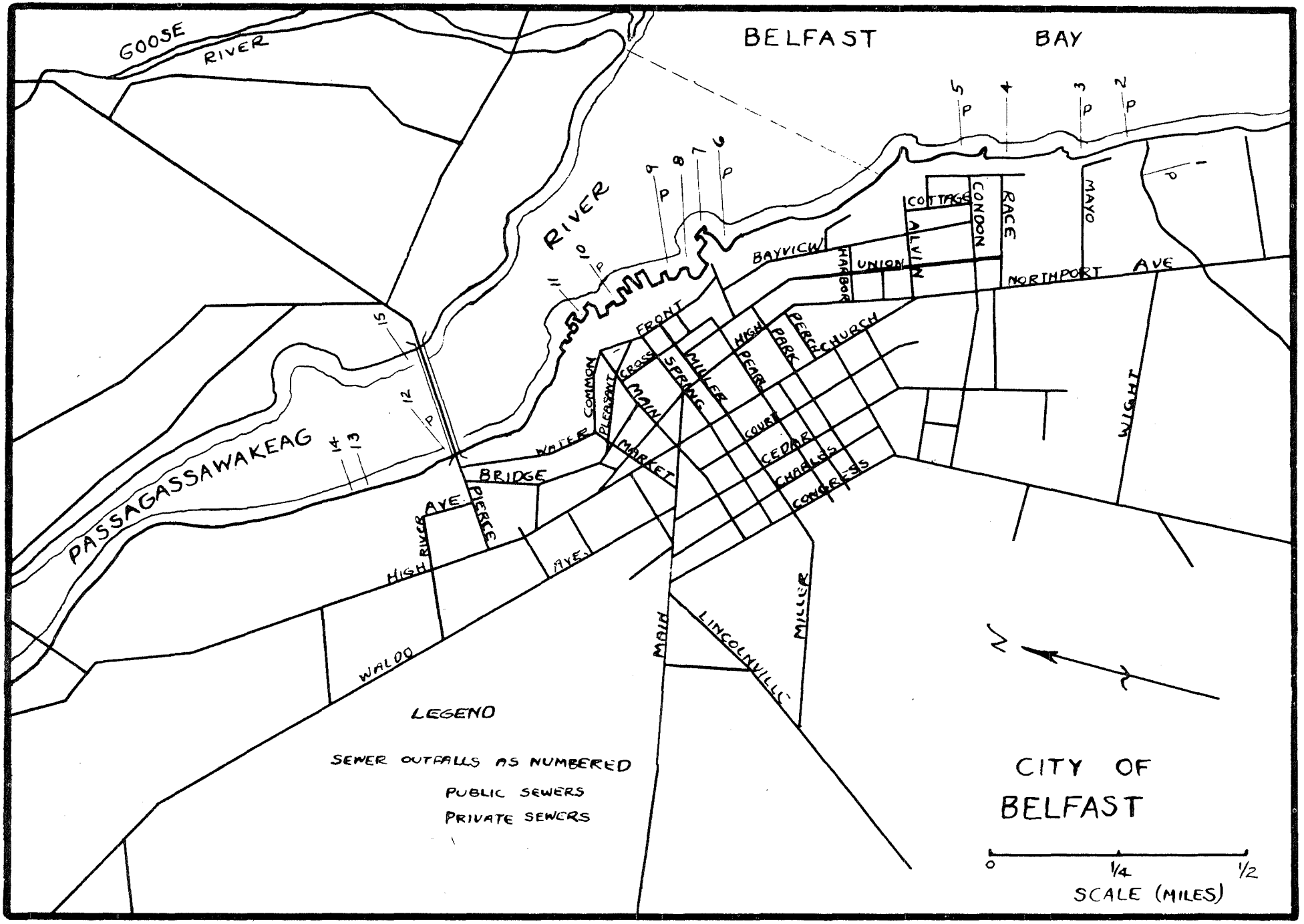
CITY OF BELFAST TO THE TOWN OF ROCKPORT

This area is relatively free from pollution except for a small section in Bayside where 2 large sewers serve a summer population of 950. Sewers in the Camden and Rockport areas are shown on separate maps of those villages.

The sewer outfalls are indicated on the accompanying map of Belfast, Northport, and Lincolnville.

Index No.	Description
1-11 incl.	Numbers 6 and 8 indicate sewer outfalls, 12 and 10 inches in size, which serve the Bayside section. The other sewers are either 4 or 6 inches in size and serve one house each.




GOOSE RIVER
BELFAST BAY
RIVER
PASSAGASSAWAKEAG
BRIDGE
WATER
COMMON
PLEASANT
CROSS
MAIN
MARKET
FRONT
SPRING
MILLER
HIGH
PEARL
COURT
PARK
PERCH
CHURCH
CEDAR
CHARLES
CONGRESS
BAYVIEW
HARBOR
UNION
ALVIN
COTTAGE
CONDON
RACE
MAYO
NORTHPORT AVE
WIGHT
HIGH RIVER AVE.
PIERCE AVE.
WALDO
MAIN
LINCOLNVILLE
MILLER
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
P
LEGEND
SEWER OUTFALLS AS NUMBERED
PUBLIC SEWERS
PRIVATE SEWERS
CITY OF
BELFAST
0
1/4
1/2
SCALE (MILES)

164

CITY OF BELFAST

The area shown on the accompanying map of Belfast between the broken line and Pierce Street Bridge over the Passagassawakeag River, is highly polluted with sewage, slaughter house waste, and refuse. The principal sources of pollution are sewage from a population of 3,500 and wastes from two poultry slaughter houses and one sardine canning factory.

There are 6 private and 9 public sewers in Belfast. Following are brief descriptions of the outfalls by groups:

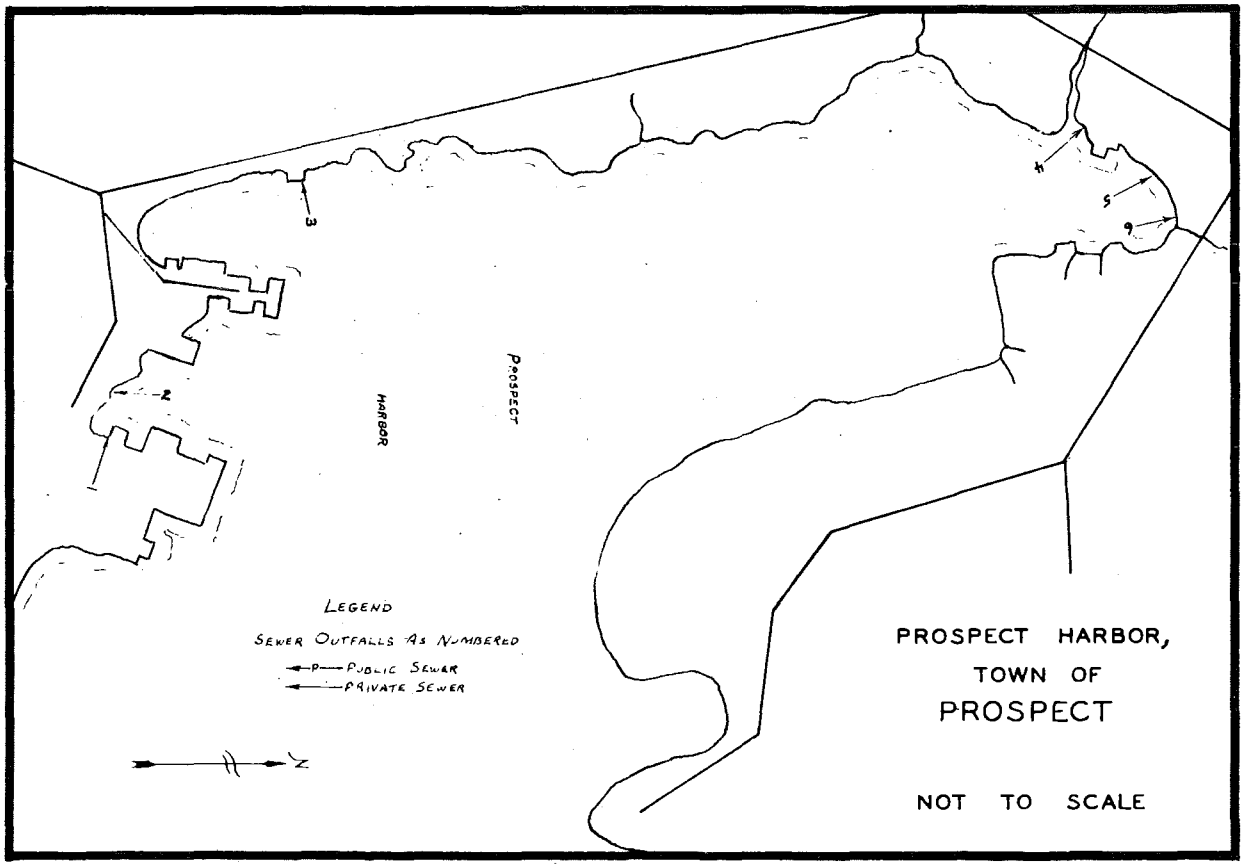
Index No.	Description
1-5 incl.	Five sewers are located in the area between City Park and the foot of Condon Street. All are public sewers except #4 which serves 1 family and discharges east of Rice Street. Sewers #1 and #2 are from the City Park toilets and bathing pool. Sewers #3 and #5 are 10-inch lines carrying mainly storm water and some sanitary wastes.
6-11 inch.	Located between the end of Commercial Street and the Route 1 highway bridge, are 2 city sewer outfalls, (#6 and #9) and 4 private outfalls. The city sewers have 16 and 18-inch outlets, and at the time of the survey the flow was observed to be small for the size of the sewers. The private outfalls serve a dance hall, a slaughter house, a laundry, and an undetermined number of dwellings.
12-14 incl.	These 3 outfalls are located upstream of the Route 1 highway bridge. Sewer #12 is a public sewer of large, but undetermined, size, located 50 feet up the river from the bridge. Sewers #13 and #14 are private sewers located about 500 feet up the river from the bridge and carry considerable sanitary and slaughter house wastes.
15	Located on the east bank of the Passagassawakeag River, about 66 feet upriver from the bridge is one 4-inch private sewer.

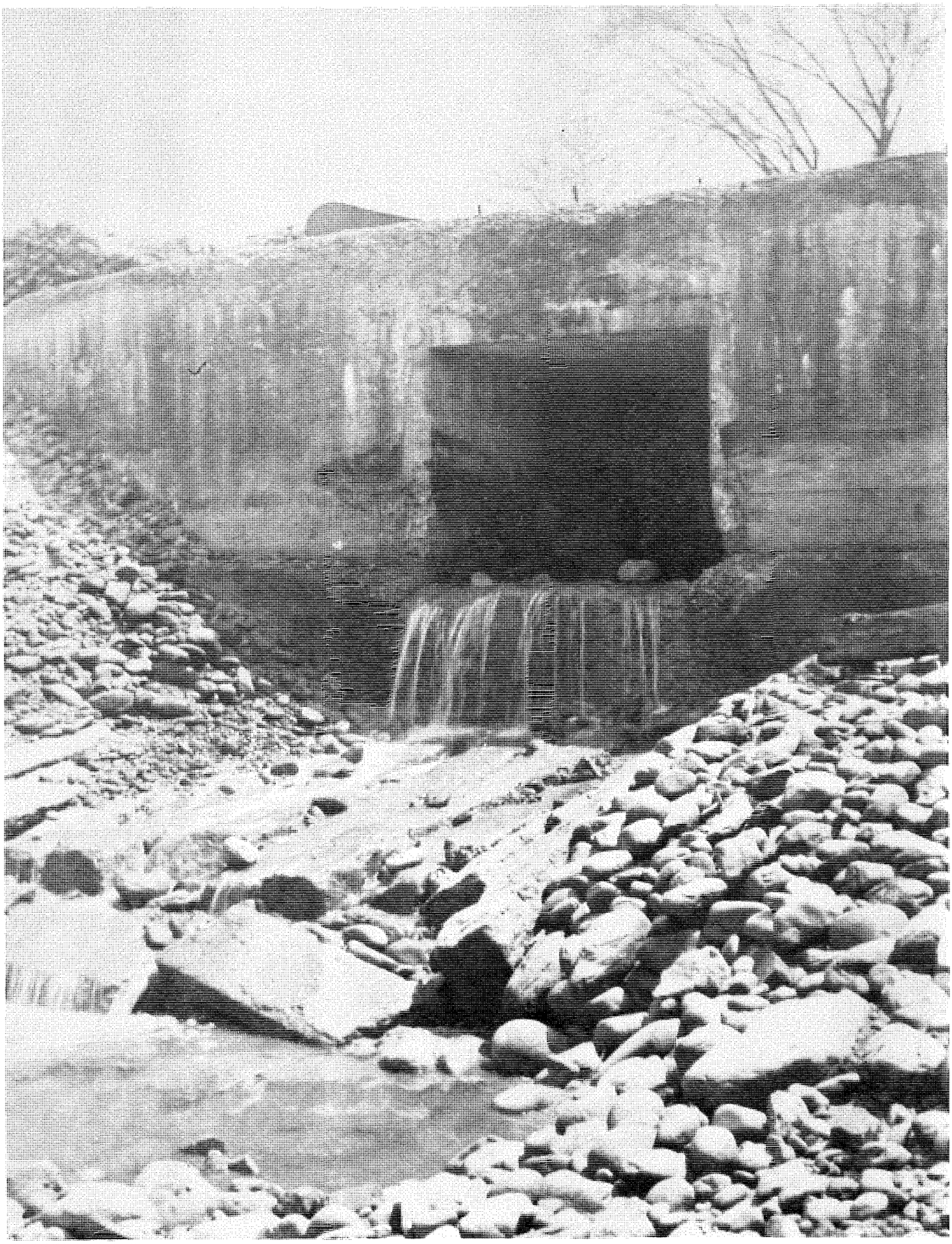
TOWN OF PROSPECT

Prospect Harbor receives little sanitary sewage and the industrial waste from one fish canning plant. There is a total of 6 private sewer outfalls discharging to the harbor.

Following is a brief description of the outfalls:

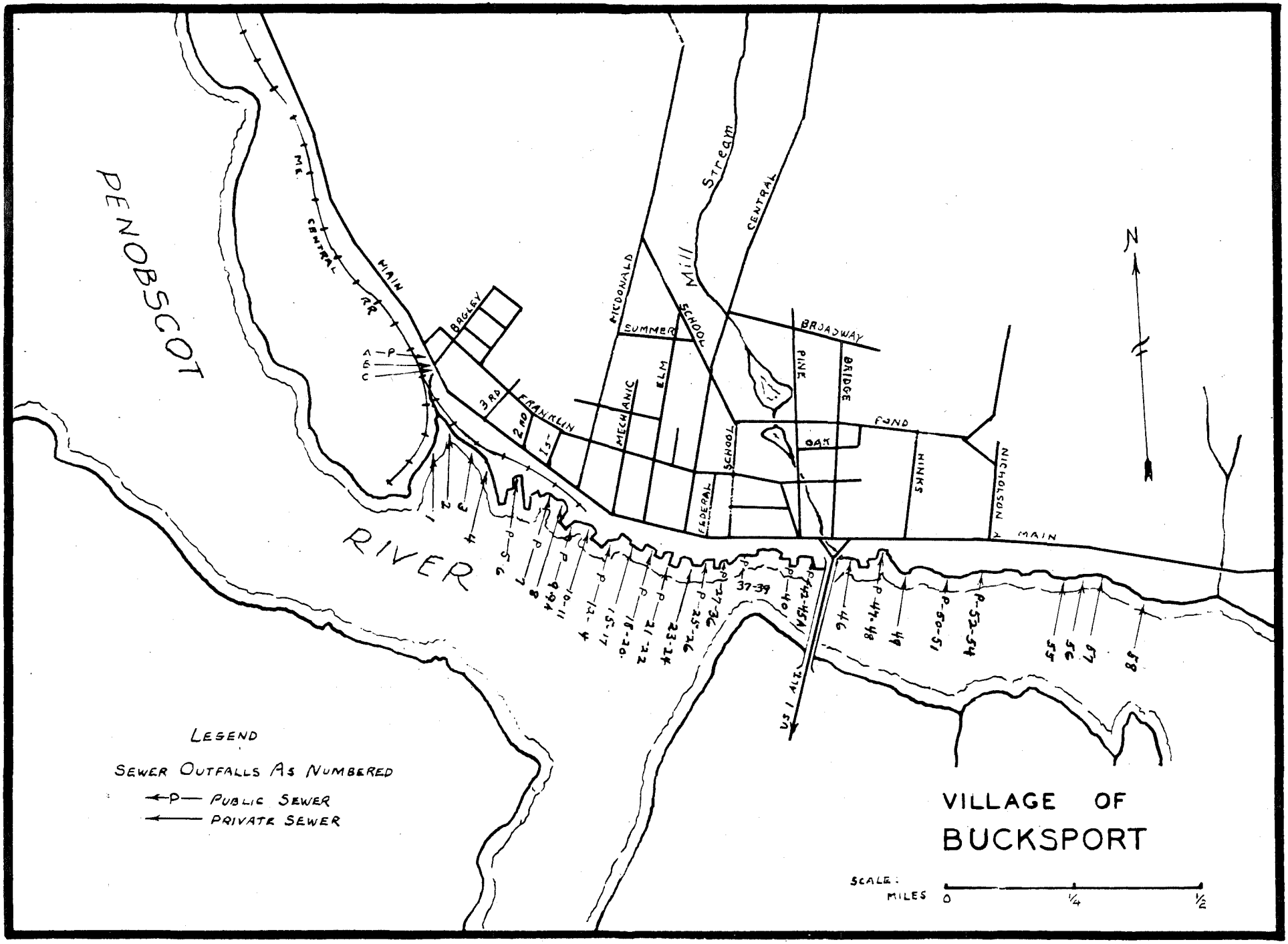
Index No.	Description
1-3 incl.	Along the southern half of the harbor there are 3 outfalls. A fish canning company is located on a pier just east of the outfall #1. It has several floor drains which discharge to the harbor. Numbers 2 and 3 are 3 and 4-inch lines respectively.
4-6 incl.	There are 3 outfalls on the north side of the harbor, all of which are 4-inch sewers.





4 x 5 FOOT PUBLIC SANITARY AND STORM SEWER, AT PERIOD OF VERY LOW FLOW, DISCHARGING TO BANK OF PENOBSCOT RIVER.

TEN INCH PUBLIC SEWER OUTFALL DISCHARGING SANITARY
WASTES TO TIDEWATER AT MOUTH OF PENOBSCOT RIVER.


PENOBSCOT
RIVER
ME. CENTRAL RR
MAIN
BAGLEY
3RD
2ND
FRANKLIN
1ST
MECHANIC
ELM
SCHOOL
FEDERAL
SCHOOL
MCDONALD
SUMMER
MILL
STREAM
CENTRAL
BROADWAY
PINE
BRIDGE
FUND
OAK
HINKS
NICKERSON
MAIN
US 1 ALT
N
LEGEND
SEWER OUTFALLS AS NUMBERED
←P— PUBLIC SEWER
←— PRIVATE SEWER
VILLAGE OF
BUCKSPORT
SCALE: MILES
0
1/4
1/2

TOWN OF BUCKSPORT

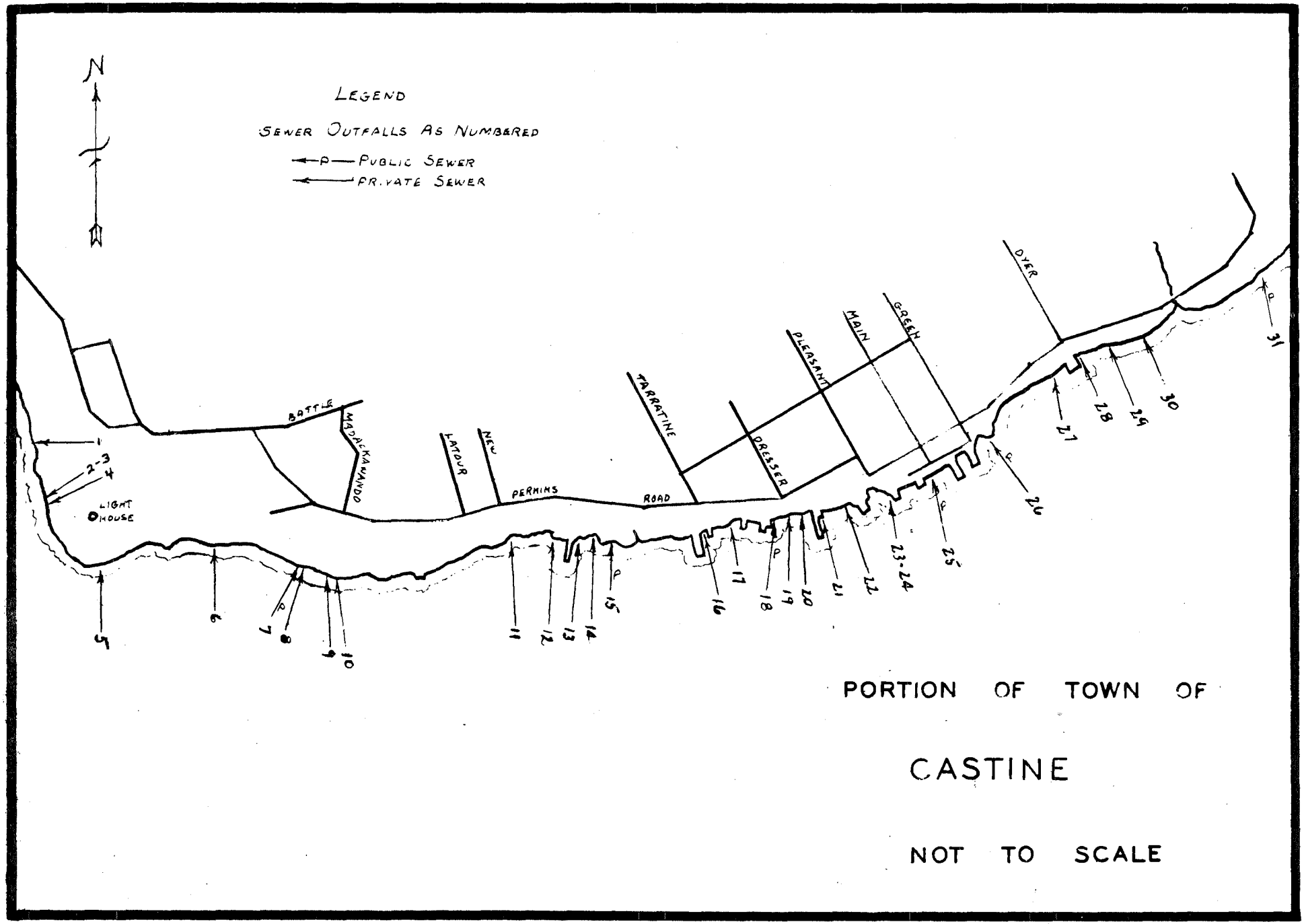
The untreated sewage from a population of over 2,900 reaches tidewater in the Penobscot River at Bucksport. There are 63 sewer outfalls in the town, 16 of which are public lines.

Following is a brief description of the outfalls, which are indicated on the accompanying map of Bucksport:

Index No.	Description
A, B, C	At the foot of Bagley Street, near the Penobscot River on the western side of the town, there are 3 outfalls discharging to a small stream. They discharge within the yard of a large paper mill, and carry industrial water as well as sanitary sewage. The first of these, (A), is a 12-inch public line serving about 40 houses.
1-4 incl.	Four sewers discharge to the Penobscot River between Bagley and Second Streets. The first of these, (#1), is a cement culvert 5 feet in diameter through which the stream carrying water from outfalls, A, B, and C passes. The next two outfalls (#2 and #3), are private group lines serving 30 and 20 houses respectively.
5-8 incl.	From Second to McDonald Streets, four outfalls serving over 55 houses discharge to the river. Numbers 6 and 7 are public lines, the first of which serves an estimated 30 houses.
9-17 incl.	Ten outfalls discharge to the river between McDonald and Elm Streets. They range in size from 4-inch drains to a 4 by 5-foot stone public sewer, (#13), one of two public outfalls in this section. The other public line (#9A), is a 6-inch tile sewer.
18-24 incl.	Between Elm and Federal Streets there are 7 outfalls, two of which, (#19 and #21), are public lines, the latter serving an estimated 50 houses.
25-36 incl.	Twelve outfalls discharge between Federal and School Streets. Of these, #25 and #28 are public sewers, and the majority of the others are 4-inch private lines.
37-45A incl.	From the end of School Street to the U.S. Route 1 bridge, there are 10 sewers, four of which (#37, #40, #43, and #45A), are public lines.
46-58incl.	There are 13 outfalls from the U.S. Route 1 bridge east along the shore parallel to Main Street. The largest of these is #47 which is a 4-foot square concrete culvert serving as a land drain and also carrying some sanitary sewage. Numbers 48, 51, and 54 are public sewers ranging in diameter from 8 to 10 inches.

TOWNS OF ORLAND AND PENOBSCOT

No sewers causing tidewater pollution were found along the shores of Orland or Penobscot.


N
LEGEND
SEWER OUTFALLS AS NUMBERED
P PUBLIC SEWER
PR. VATE SEWER
BATTLE
MADACKAMANDO
LATOUR
NEW
PERKINS
ROAD
TARRATINE
DRESSER
PLEASANT
MAIN
GREEN
DYER
LIGHT HOUSE
1
2-3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23-24
25
26
27
28
29
30
31
PORTION OF TOWN OF
CASTINE
NOT TO SCALE

TOWN OF CASTINE

The 25 private and 6 public sewer lines which discharge to Penobscot Bay from the town of Castine carry sewage from a population of about 700 winter and 2,000 summer residents.

Following is a brief description of the outfalls indicated on the accompanying map of Castine:

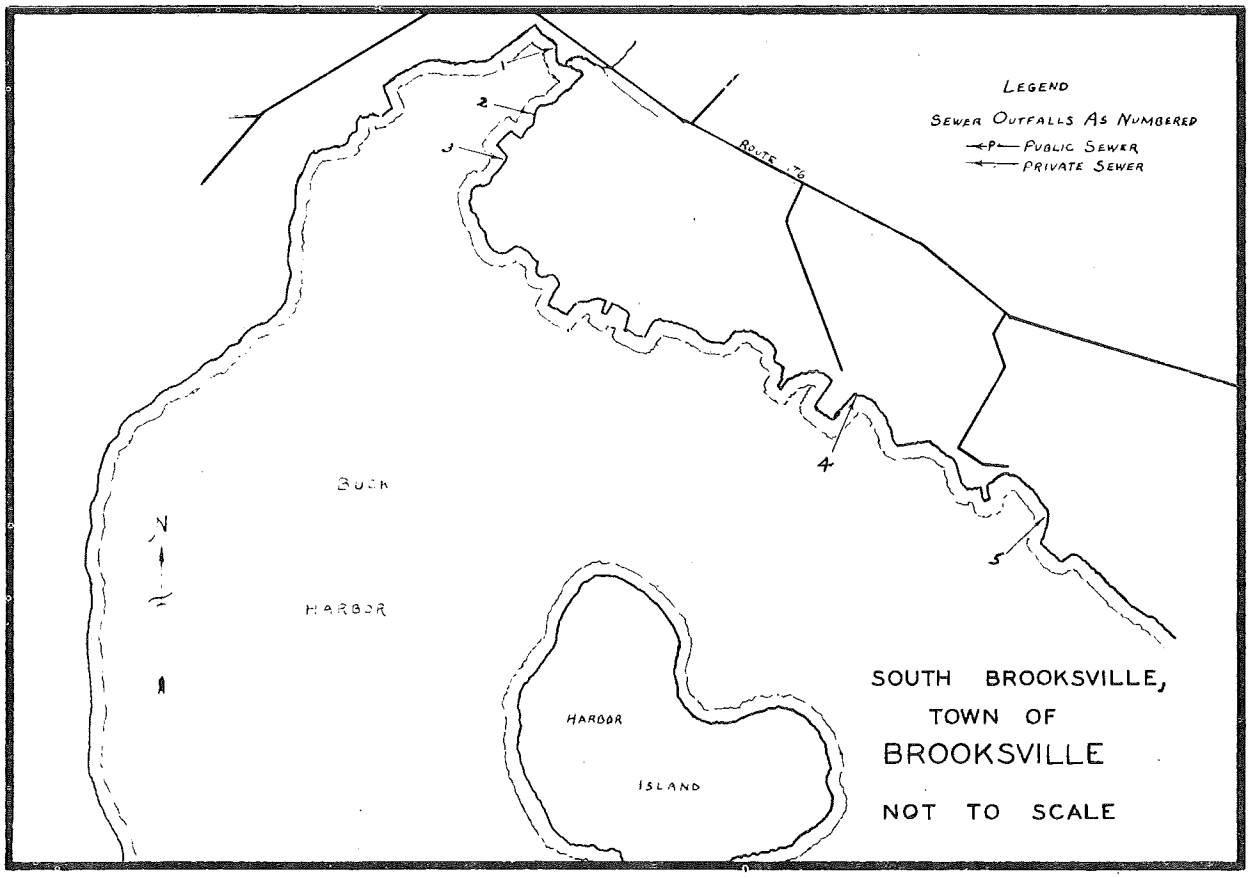
Index No.	Description
1-4 incl.	Four private sewer outfalls 3 and 4 inches in diameter discharge to the shore west of the lighthouse.
5-10 incl.	From the lighthouse eastward along the shore to a point near the end of Madackawando Road, there are 6 outfalls, all of which are 4-inch private lines except #7 which is a larger public sewer.
11-15 incl.	Four private sewer outfalls and 1 12-inch public sewer (#15), discharge to the shore between New and Tarratine Streets.
16-22 incl.	Seven sewer outfalls, one of which, (#18), is a 10-inch public line, are located in the coastal area between the ends of Tarratine and Pleasant Streets.
23-26 incl.	From the end of Pleasant Street to a point on the shore near Green Street, there are 2 public and 2 private sewer outfalls. The public sewers (#25 and #26) are large lines, approximately 15 inches in diameter. Number 25 serves the Maine Maritime Academy and part of the village.
27-31 incl.	From the shore near Dyer Street to the eastern end of the village, 5 outfalls discharge to tidewater. The last, (#47) is an 8-inch public line.

TOWN OF BROOKSVILLE
VILLAGE OF SOUTH BROOKSVILLE

There are no industrial wastes and very little sanitary waste discharged to Buck Harbor. All sewage that reaches the harbor is discharged from 5 sewer outfalls located in South Brooksville Village.

Following is a brief description of the outfalls indicated on the accompanying map of South Brooksville:

Index No.	Description
1-5 incl.	Five 4 to 6-inch sewer outfalls are located in the village of South Brooksville.

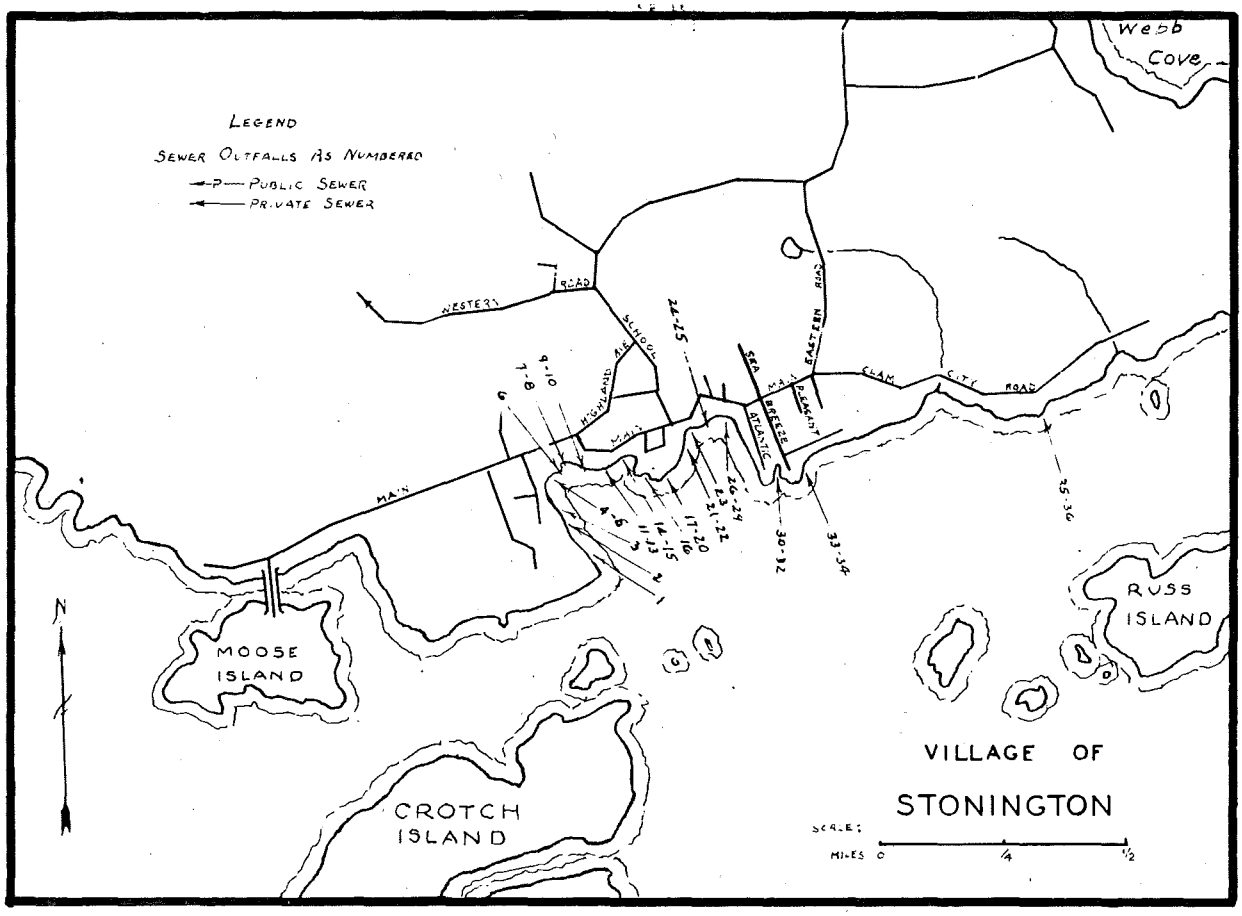


TOWN OF STONINGTON

The sewage from a major part of the 1,500 population of Stonington reaches tidewater through private sewers.

The outfalls are indicated on the accompanying map of Stonington.

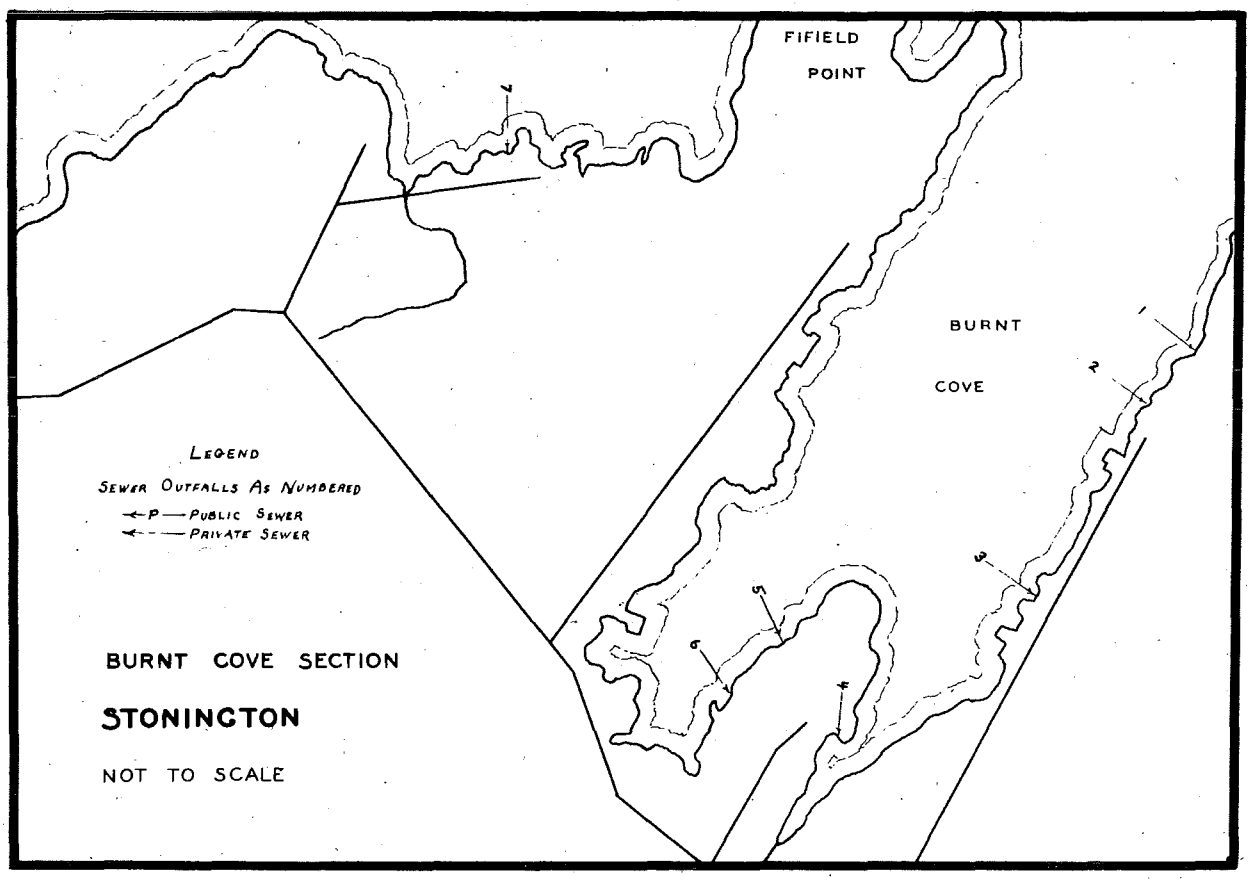
Index No.	Description
1-36 incl.	Thirty-six sewer outfalls, ranging in size from 3-inch tile to 10-inch concrete, serve from one to several houses each.



TOWN OF STONINGTON
BURNT COVE SECTION

There are seven private sewers which discharge to the Burnt Cove section of Stonington. They are described as follows:

Index No.	Description
1-7 incl.	Six sewer outfalls are located in the Burnt Cove area, and 1 on the south side of Fifield Point, all of which are 4-inch lines.

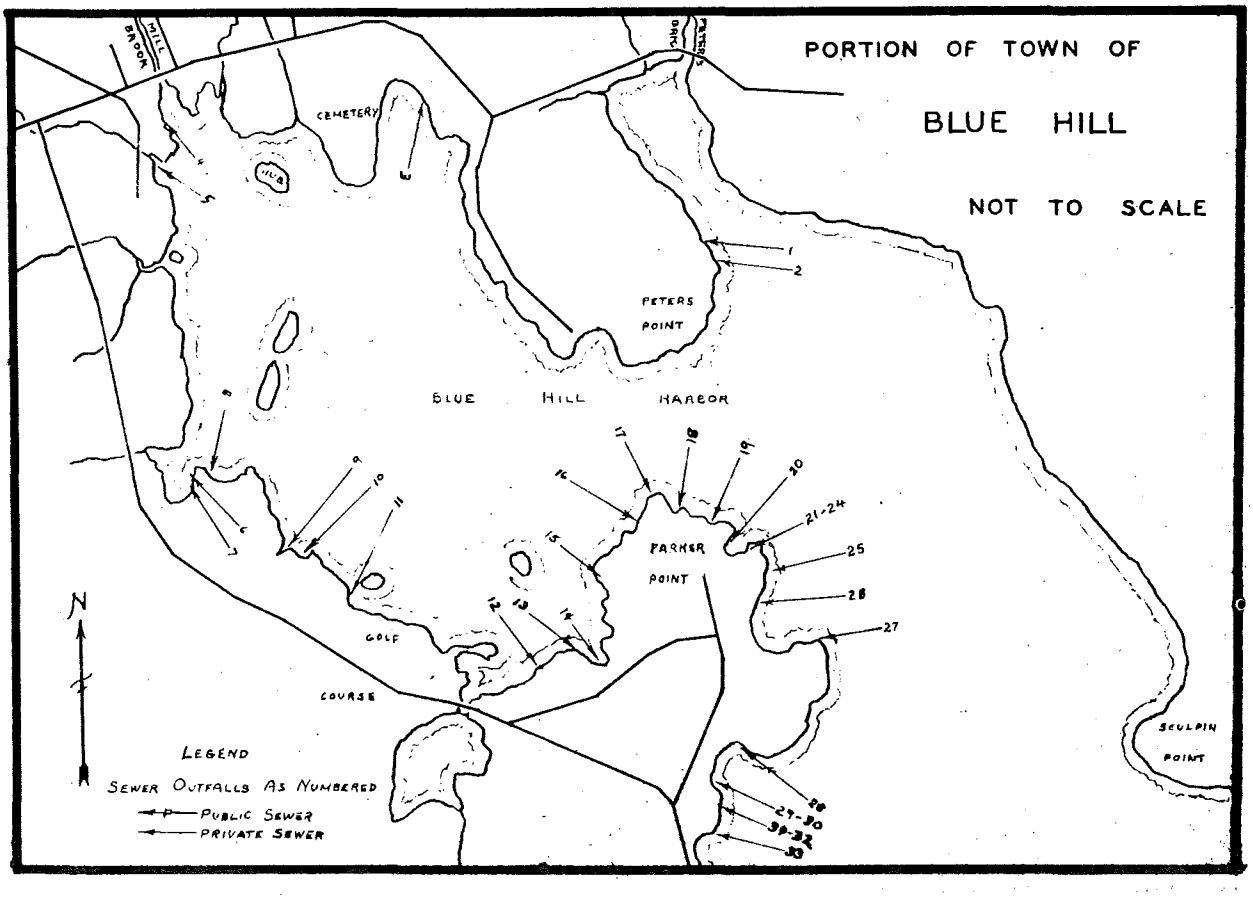


TOWN OF BLUE HILL

The 33 private sewer outfalls in Blue Hill serve a population of about 1,300 permanent residents. There is no public water supply, nor sewer system in the town. The only major industrial pollution in the area is caused by shingle mill waste.

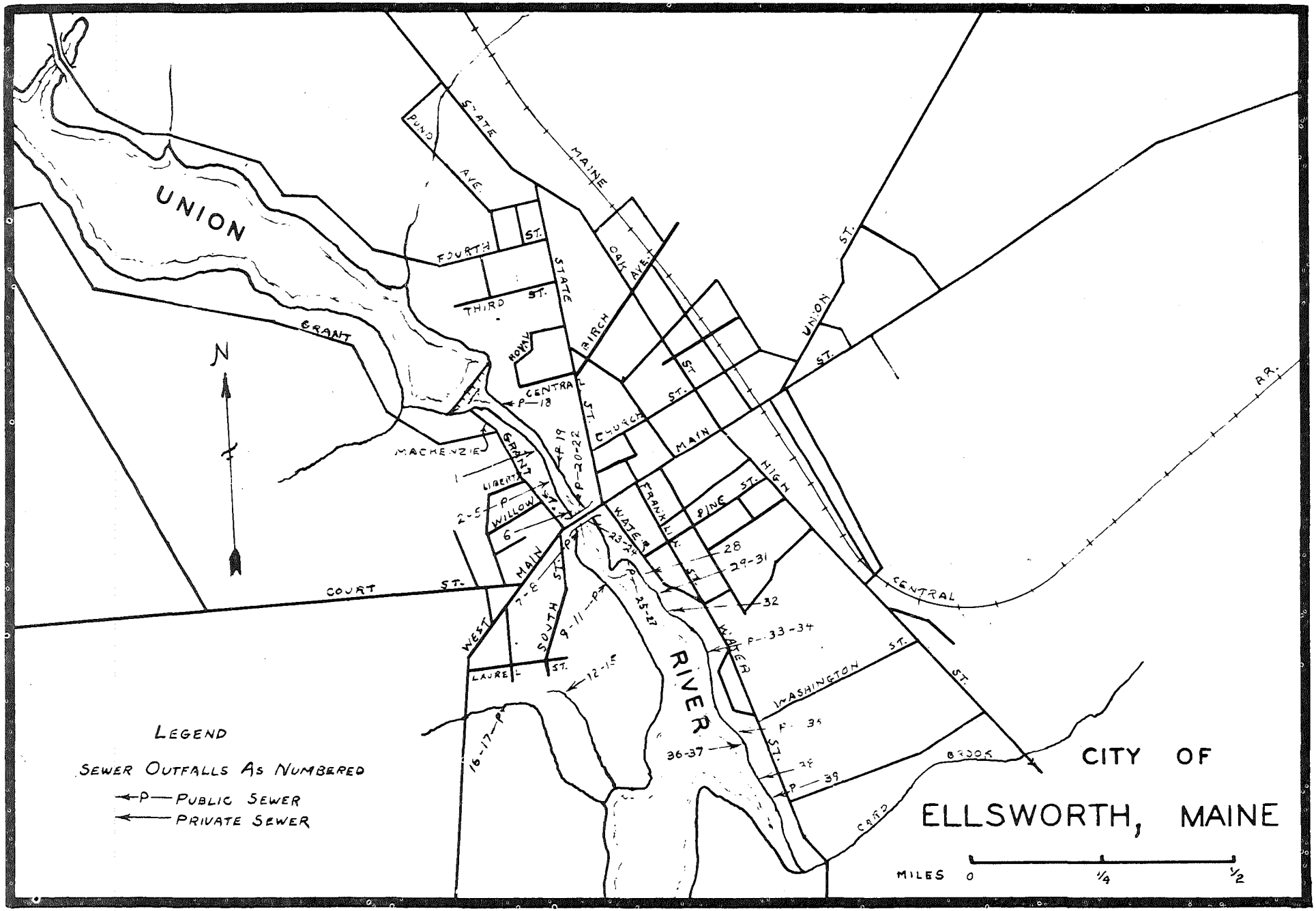
Following is a brief description of the outfalls which are indicated on the accompanying map of Blue Hill:

Index No.	Description
1-3 incl.	Three outfalls, 4 inches in diameter, discharge to the north side of Blue Hill Harbor from Peter's Point to Mill Brook.
4-11 incl.	On the west side of the harbor from Mill Brook to the golf course, there are 8 sewer outfalls ranging from 4 to 10 inches in diameter. Mill Brook, which reaches the shore in this area, receives the septic tank effluent from a 7-room school and the untreated sewage from 10 houses. Two other streams between outfalls #5 and #6 carry sewage from about 12 houses.
12-17 incl.	Sewage is discharged from six 4-inch outfalls on the west side of Parker Point. The last three, #15, #16, and #17, serve summer cottages.
18-33 incl.	Sixteen outfalls, 13 of which serve summer cottages, discharge sewage from the east side of Parker Point. The shore between outfalls #28 and #29 is thickly littered with shingle mill waste.



TOWN OF SURRY

The town of Surry has a population of about 500, but contributes only a negligible amount of wastes to tidal waters. There are no major industries which contribute industrial wastes. The town has no public sewer system, and since none of the houses in Surry Village are located near the water, practically no wastes enter the ocean in the area. The only source of pollution in this locality was a 4-inch private outfall discharging to the shore of Weymouth Point.

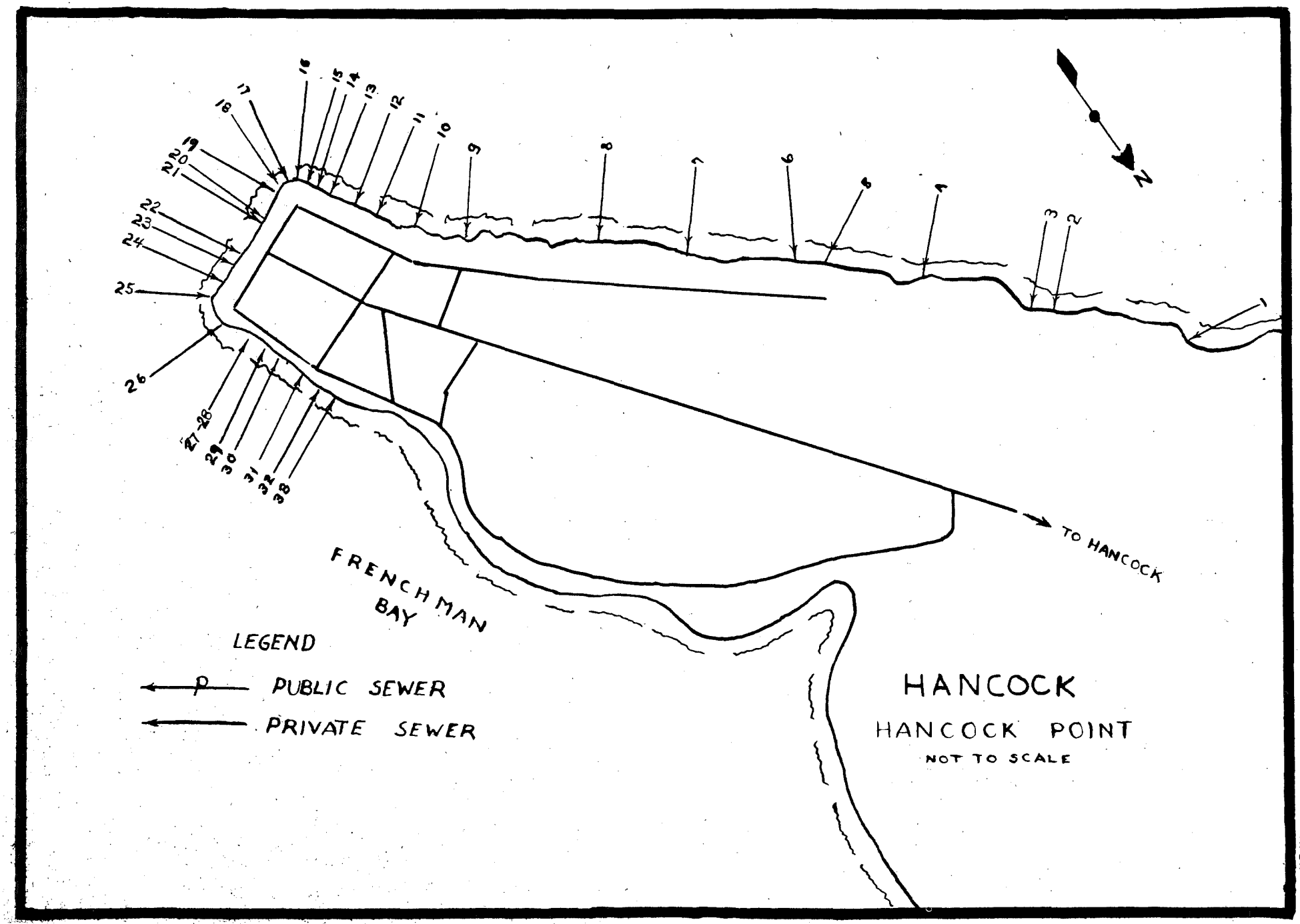

UNION
POND
STATE
AVE.
MAINE
FOURTH
ST.
THIRD
ST.
STATE
OAK
AVE.
BIRCH
ROW
CENTRAL
P—18
GRANT
MACKENZIE
1
LIBERTY
2-5—P
WILLOW
ST.
6
P 19
P—20-22
CHURCH
ST.
MAIN
ST.
UNION
ST.
ST.
R.R.
HIGH
PINE
ST.
FRANKLIN
ST.
WATER
P—23-24
28
29-31
32
P—33-34
P—25-27
CENTRAL
WATER
ST.
WASHINGTON
ST.
P—35
36
P—39
BROOK
CARD
COURT
ST.
MAIN
ST.
7-8
P
SOUTH
ST.
9-11—P
WEST
LAUREL
ST.
12-15
16-17—P
RIVER
36-37
N
LEGEND
SEWER OUTFALLS AS NUMBERED
←P— PUBLIC SEWER
← PRIVATE SEWER
CITY OF
ELLSWORTH, MAINE
MILES 0 1/4 1/2

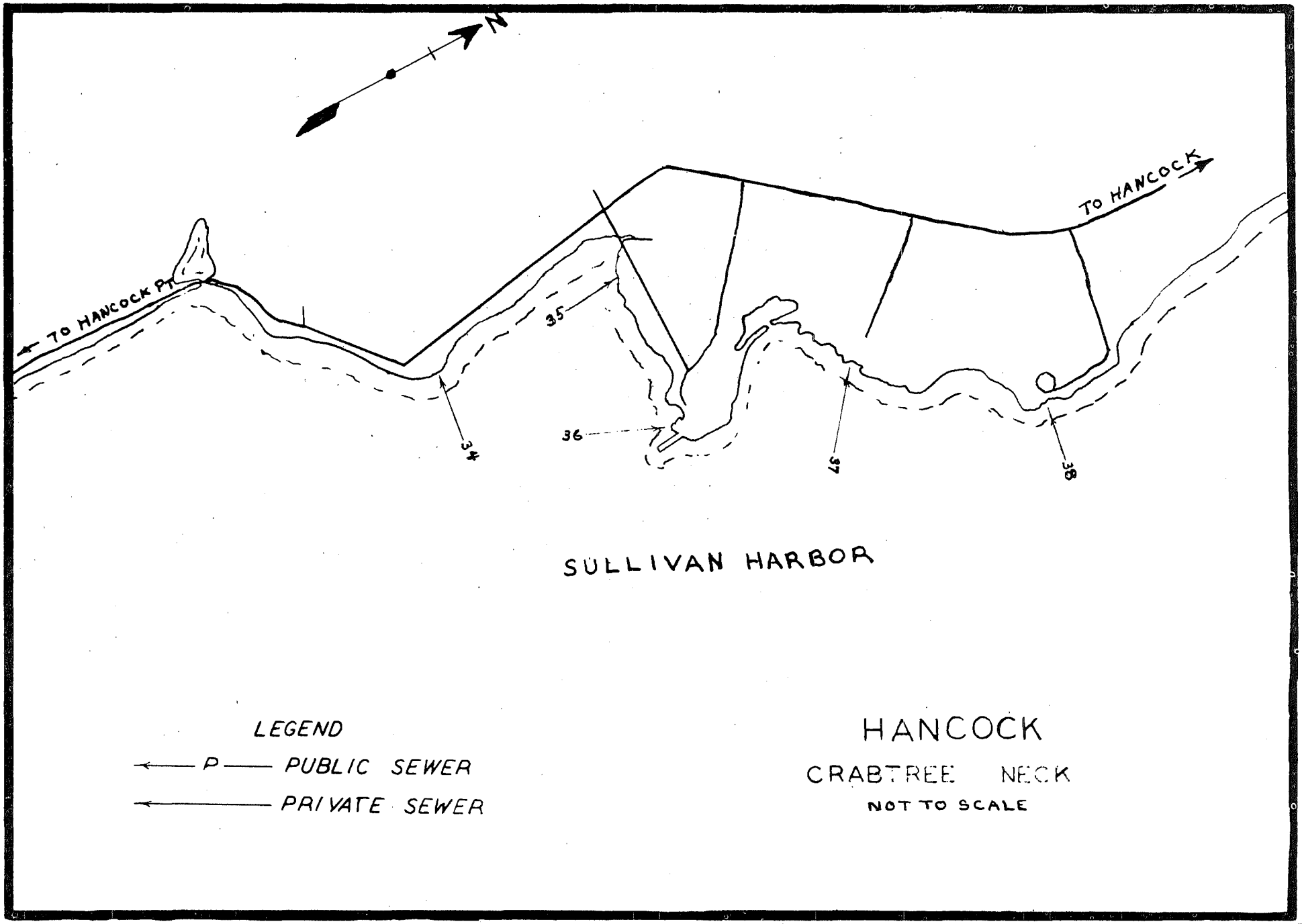
CITY OF ELLSWORTH

The tidewaters of the Union River at Ellsworth are polluted by the sewage of approximately 3,900 people who are served by 12 public and 27 private sewer lines.

Following are brief descriptions of the outfalls which are indicated on the accompanying map of Ellsworth:

Index No.	Description
1-6 incl.	Along the west bank of the Union River from the Bangor Hydro-Electric Company dam south to the bridge at Main Street, there are 6 sewer outfalls, two of which, (#4 and #5), are public lines 12 and 15 inches in diameter, respectively.
7-17 incl.	Sewage from 11 outfalls reaches the west bank of the river south of the Main Street bridge. The last 6 outfalls (#12 to #17), discharge to brooks south of Laurel Street, which reach the river about 1/4 mile further south. Numbers 8, 10, and 16 are public sewers.
18-22 incl.	Two public sewers, (#18 and #19), and 3 private sewers discharge from the east bank to the Union River north of the Main Street bridge. Number 18 is a 24-inch concrete line serving approximately 50 houses.
23-32 incl.	On the east bank from the Main Street bridge south to the junction of Franklin and Water Streets, there are 10 sewer outfalls. Two of these, (#25 and #27), are public lines. The former is a 24-inch concrete sewer serving the business district.
33-39 incl.	Seven sewer lines discharge from the east bank to the river between Franklin Street and Card Brook. Numbers 33, 35, and 39 are public sewers, 15, 24, and 12 inches in diameter, respectively.


N
TO HANCOCK
FRENCHMAN BAY
LEGEND
P PUBLIC SEWER
PRIVATE SEWER
HANCOCK
HANCOCK POINT
NOT TO SCALE

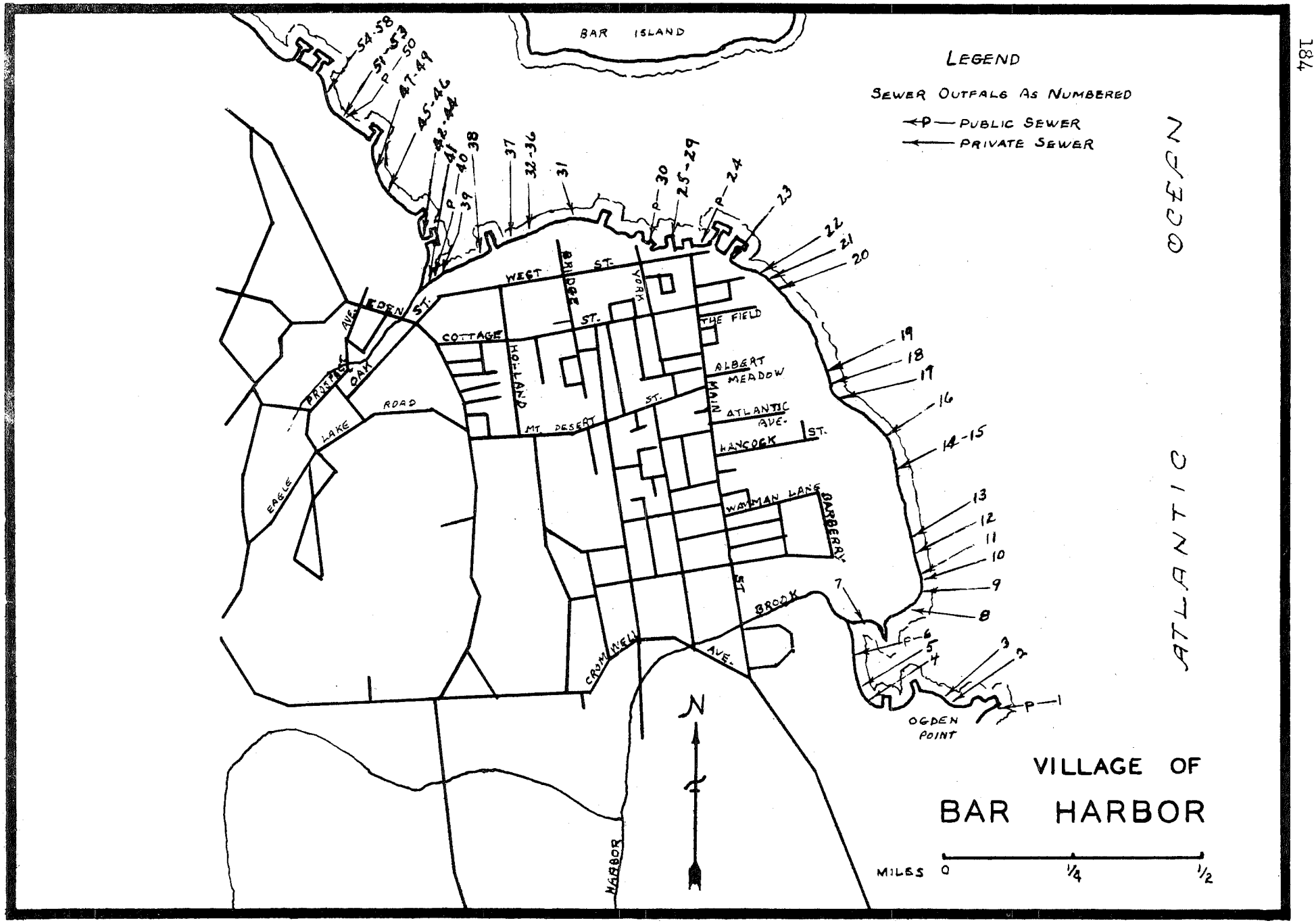

N
TO HANCOCK
TO HANCOCK PT.
35
34
36
37
38
SULLIVAN HARBOR
LEGEND
P PUBLIC SEWER
PRIVATE SEWER
HANCOCK
CRABTREE NECK
NOT TO SCALE

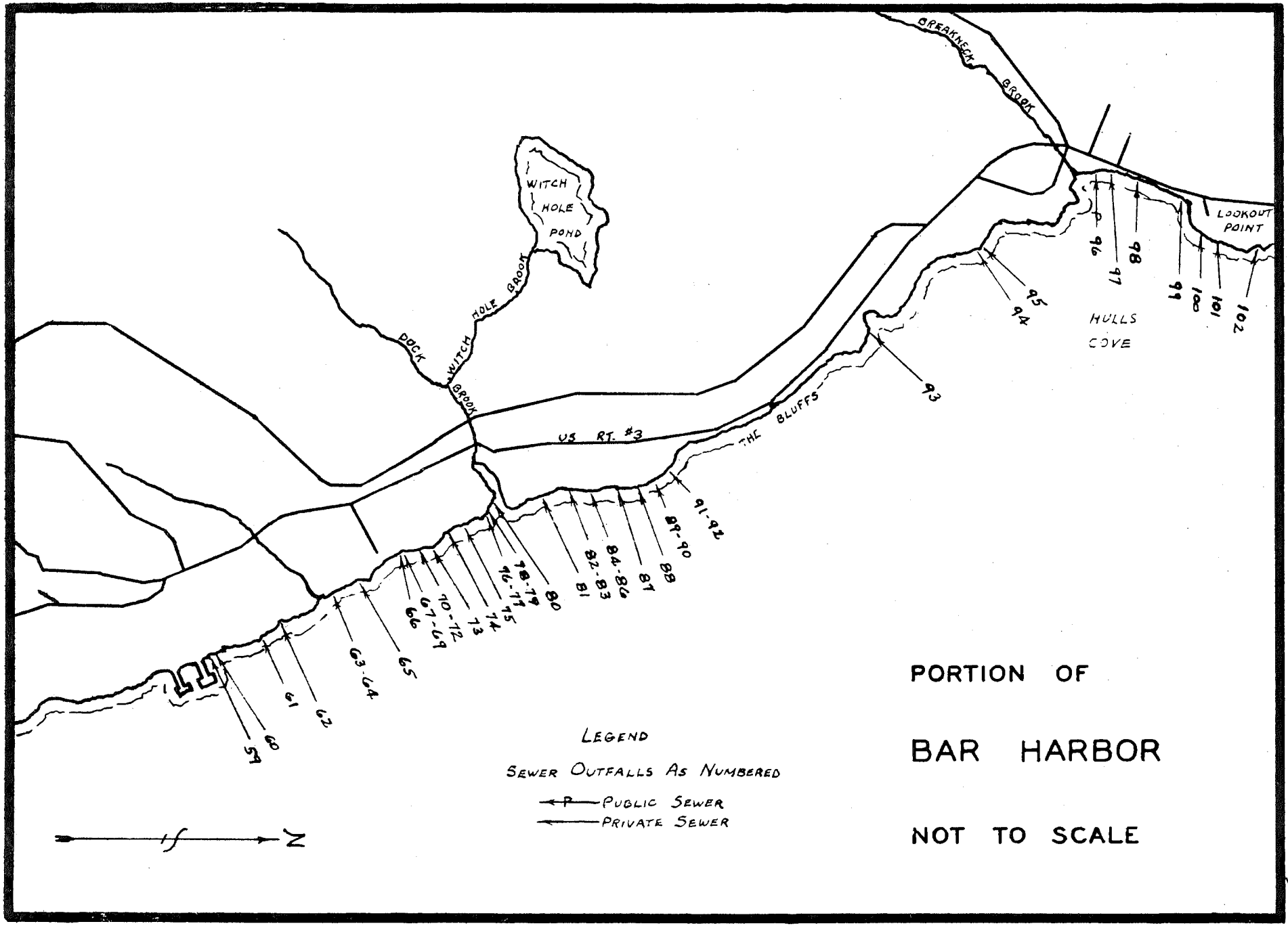
TOWN OF HANCOCK

The town of Hancock, having a population of 761, contributes sanitary wastes only to tidal waters. The major pollution sources are from individual residential sewers. A number of the outfalls shown on the map carry wastes from cottages tenanted during the summer season only.

As indicated on the accompanying map of Hancock, there are 38 separate sewer outfalls discharging to tidal waters in the vicinity. Following is a brief description of the outfalls and locations:

Index No.	Description
1-6 incl.	On the west side of Crabtree Neck, 6 sewers, the majority of which are 4 inches in diameter, discharge to tidewater. All serve individual houses.
7-16 incl.	There are 10 sewer outfalls located on the west side of Hancock Point, all of which are 4 inches in diameter.
17-25 incl.	Nine lines, each 4 inches in diameter, discharge from the south side of Hancock Point.
26-33 incl.	Sewage is discharged from 8 outfalls ranging in size from 4 to 6 inches in diameter, located on the east side of Hancock Point.
34-35 incl.	In the Crabtree Neck area bordering Jellison Cove, 2 outfalls, 4 inches in diameter, carry sewage from small cottages.
36-38 incl.	Sewage is discharged from three 4-inch outfalls beginning at a point just east of the Socony-Vacuum pier and extending along the shore to a point just north of Grant's Cove.


BAR ISLAND
LEGEND
SEWER OUTFALS AS NUMBERED
P — PUBLIC SEWER
PRIVATE SEWER
OCEAN
ATLANTIC
54-58
P—53
51-50
47-49
45-46
42-44
41
40
39
38
37
32-36
31
P—30
25-29
P—24
23
22
21
20
19
18
17
16
14-15
13
12
11
10
9
8
7
P—6
5
4
3
2
P—1
WEST ST.
BLOOMER
YORK
ST.
THE FIELD
COTTAGE
EDEN ST.
AVE.
HIGHLAND
ALBERT MEADOW
MAIN
ATLANTIC AVE.
MT. DESERT
ST.
HANCOCK ST.
PARADISE
OAK
ROAD
LAKE
EAGLE
WAYMAN LANE
BARBERRY
ST.
BROOK
CROMWELL
AVE.
HARBOR
OGDEN POINT
N
VILLAGE OF
BAR HARBOR
MILES
0
1/4
1/2


BREAKNECK BROOK
WITCH HOLE POND
WITCH HOLE BROOK
DOCK BROOK
US RT. #3
THE BLUFFS
LOOKOUT POINT
HULLS COVE
59
60
61
62
63-64
65
66
67-69
70-72
73
74
75
76-77
78-79
80
81
82-83
84-86
87
88
89-90
91-92
93
94
95
96
97
98
99
100
101
102
LEGEND
SEWER OUTFALLS AS NUMBERED
PUBLIC SEWER
PRIVATE SEWER
N
PORTION OF
BAR HARBOR
NOT TO SCALE

TOWN OF BAR HARBOR

The 102 sewer outfalls along the Bar Harbor coast serve most of the 4,378 permanent residents of the town, plus the summer population which is 3 to 4 times as great. Six of the outfalls at the village, and one at Hull's Cove, are part of the public sewer system.

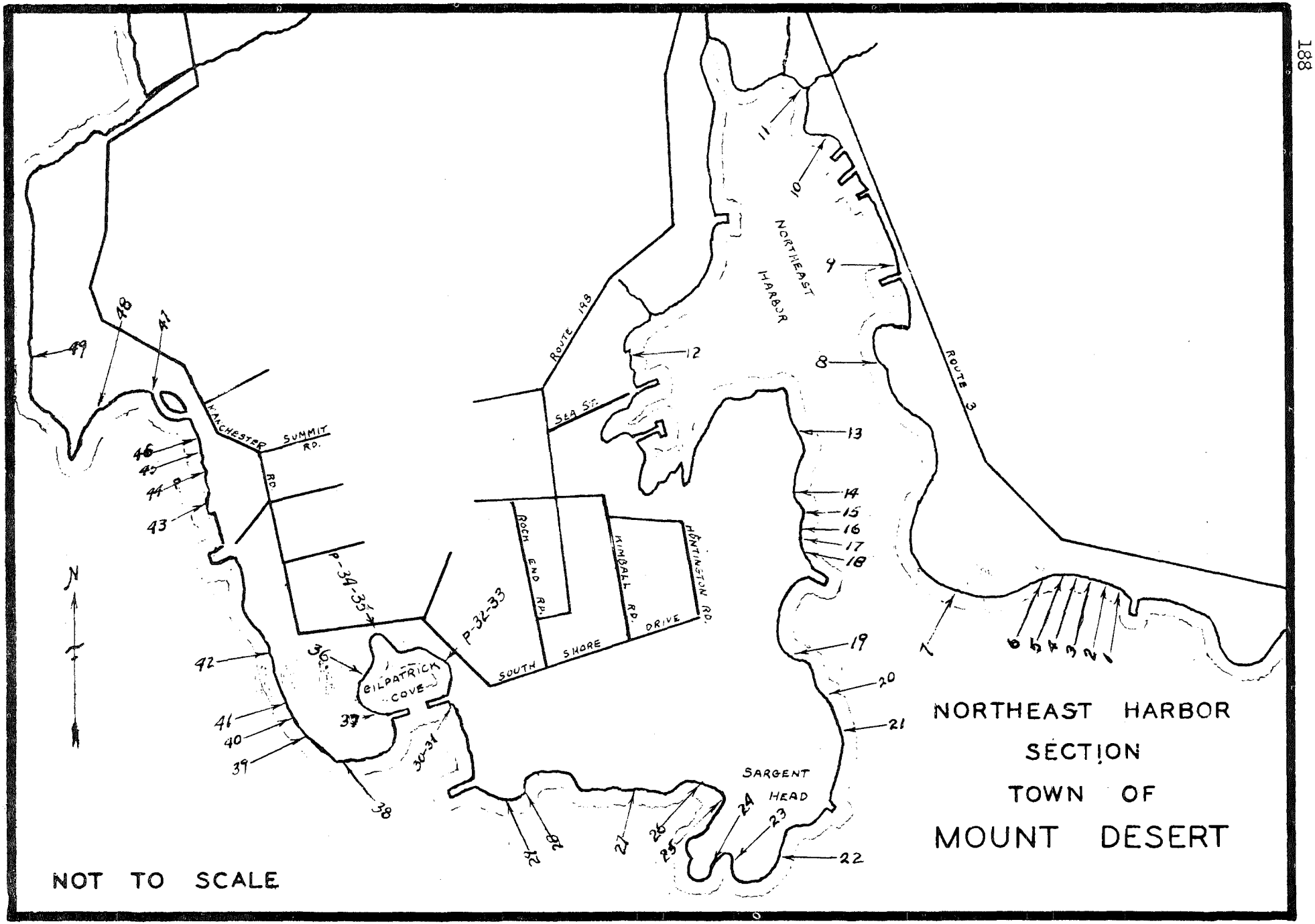
The outfalls are indicated on the accompanying two maps of Bar Harbor, and are briefly described as follows:

Index No.	Description
1-6 incl.	There are 6 outfalls from Ogden Point north to Harbor Brook. The first and last of which, #1 and #6, are public sewers, 20 and 24 inches in diameter, respectively. The others are 4 and 6-inch private lines.
7-13 incl.	From Harbor Brook to the shore off Wayman Lane, there are 7 private outfalls ranging from 4 to 8 inches in diameter.
14-19 incl.	There are 6 outfalls from Wayman Lane to the foot of Albert Meadow, all of which are private sewers, the largest of which, #15, is a 10-inch line.
20-24 incl.	Five outfalls discharge to tidewater between Albert Meadow and the north end of Main Street. Number 24 is a 4-inch town sewer serving the information bureau and a boating company, both located on the town wharf. Numbers 20 and 21 are 10-inch private lines.
25-30 incl.	From Main to York Streets, there are 6 outfalls, one of which, #30, is a 15-inch public sewer discharging to deep water. The others are small private lines.
31-38 incl.	There are 8 private sewers from York Street to the end of Oak Street, all of which are 4 to 6-inch lines.
39-58 incl.	From Oak Street to the large wharf located 1/2 mile further up the coast, there are 20 sewer outfalls. Numbers 40 and 50 are public lines, 20 and 10 inches in diameter, respectively. Both discharge below low tide. The others are private sewers, the majority of which are 4 inches in diameter.
59-80 incl.	Twenty-two private sewers discharge from the shore between the wharf and Duck Brook. The largest of these is #66 which is a 12-inch line.
96-102 incl.	Around Hull's Cove, from Breakneck Brook to Lookout Point, there are 7 outfalls. Number 96 is a public line, 8 inches in diameter.

TOWN OF BAR HARBOR
VILLAGE OF SALISBURY COVE

Following is a brief description of the sewer outfalls which are located in the Salisbury Cove section of Bar Harbor.

Index No.	Description
1-3 incl.	Three private sewer outfalls, 2 of which are 4-inch lines and the other 8 inches in diameter, discharge to the Cove.


NORTHEAST HARBOR
ROUTE 198
ROUTE 3
SEA ST.
WALCHESTER SUMMIT RD.
RD.
ROCK END RD.
KIMBALL RD.
HUNTINGTON RD.
DRIVE
SOUTH SHORE
P-34-35
P-32-33
GILPATRICK COVE
SARGENT HEAD
N
NOT TO SCALE
NORTHEAST HARBOR
SECTION
TOWN OF
MOUNT DESERT

TOWN OF MOUNT DESERT
NORTHEAST HARBOR VILLAGE

Sewage from 400 to 500 permanent residents and a considerable summer population is discharged to the ocean by means of 49 sewer outfalls located in the Northeast Harbor section of Mount Desert. As there is very little industry in this area, pollution by industrial wastes is insignificant.

The accompanying map of Northeast Harbor shows the locations of the outfalls, which are described as follows:

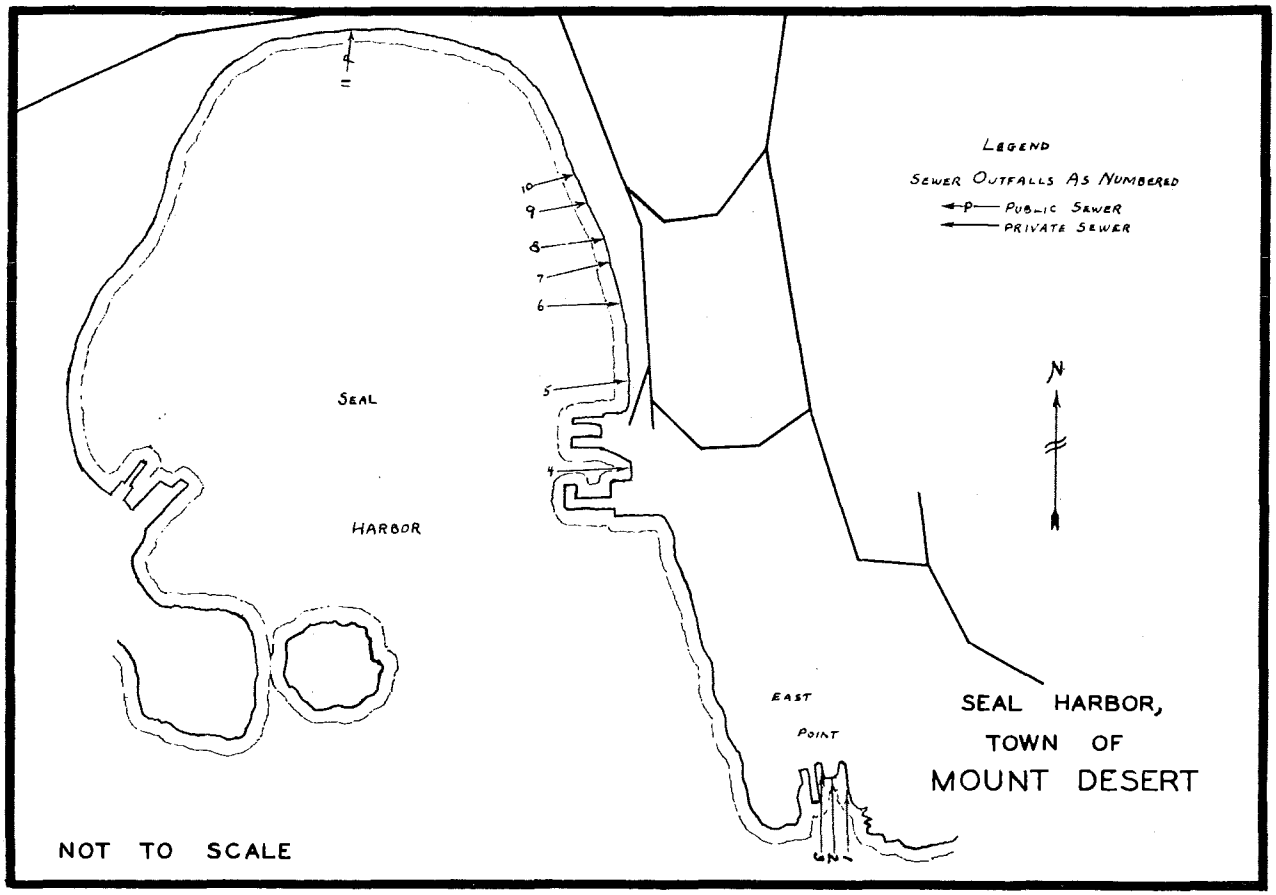
Index No.	Description.
1-11 incl.	On the eastern side of the harbor, there are 11 outfalls, all of which are 4-inch lines, the majority serving summer cottages only.
12-21 incl.	There are 9 sewers discharging to tidewater on the western side of the harbor south to Sargent Head. Number 12 is a 10-inch overflow pipe leading from a sewage pumping station. The majority of the remainder are 4-inch private sewers.
22-32 incl.	From Sargent Head to the wharf near the western end of South Shore Drive, there are 11 outfalls ranging from 4 to 8 inches in diameter, the largest, (#22), being an 8-inch tile line.
33-37 incl.	In Gilpatrick Cove there are 5 outfalls. Numbers 32 and 35 are public sewers, 8 and 10 inches in diameter, respectively. Number 33 is an overflow serving a manhole connected to sewer #32. The others are smaller private lines.
38-49 incl.	There are 11 private and 1 public sewer outfalls west of Gilpatrick Cove. Number 44 is a public sewer 8 inches in diameter. Two 4-inch and one 6-inch private sewers are connected, forming one large line which is numbered 47 and which discharges to deep water. The remainder are private sewers ranging from 4 to 6 inches in diameter.

TOWN OF MOUNT DESERT
VILLAGE OF SEAL HARBOR

Sewage from about 300 permanent residents and 600 to 800 summer residents of Seal Harbor in the town of Mount Desert is discharged to tidewater through 10 private and 1 public sewer outfall. Sanitary sewage is the only major pollution factor in this area, industrial wastes being negligible.

Following is a brief description of the outfalls which are indicated on the accompanying map of Seal Harbor:

Index No.	Description
1-11 incl.	From East Point to the north shore of the harbor there are 11 outfalls. Number 11, a public sewer, is part of the National Park system and is 10 inches in diameter. The others are 4-inch private lines.

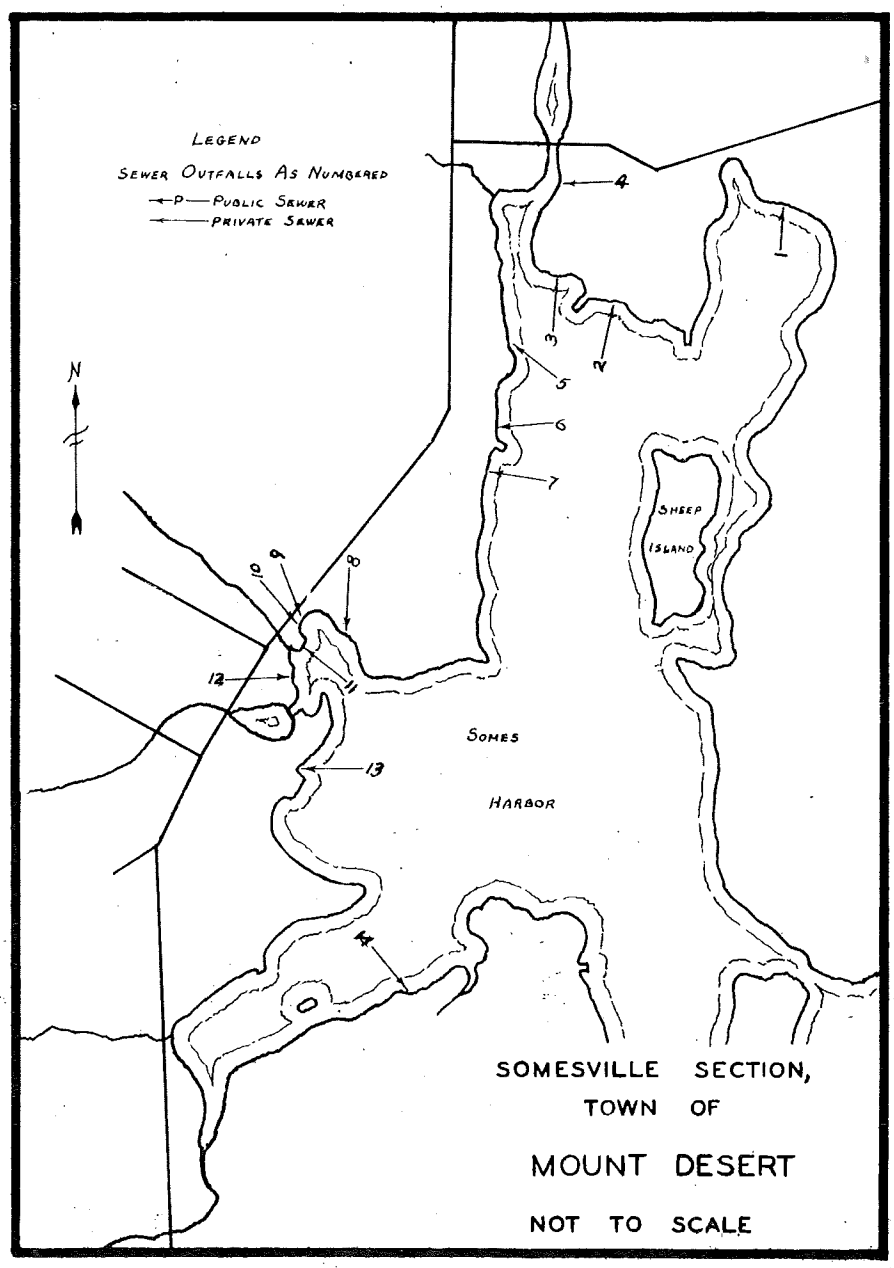


TOWN OF MOUNT DESERT
VILLAGE OF SOMESVILLE

There are 14 private sewer outfalls in the Somesville section of Mount Desert. Somes Harbor is relatively unpolluted because of the small population and lack of industrial waste.

The sewers indicated on the Somesville map are described briefly as follows:

Index No.	Description
1-14 incl.	There are 14 sewer outfalls, ranging in size from 4 to 6 inches, which discharge to Somes Harbor north of Sheep Island.

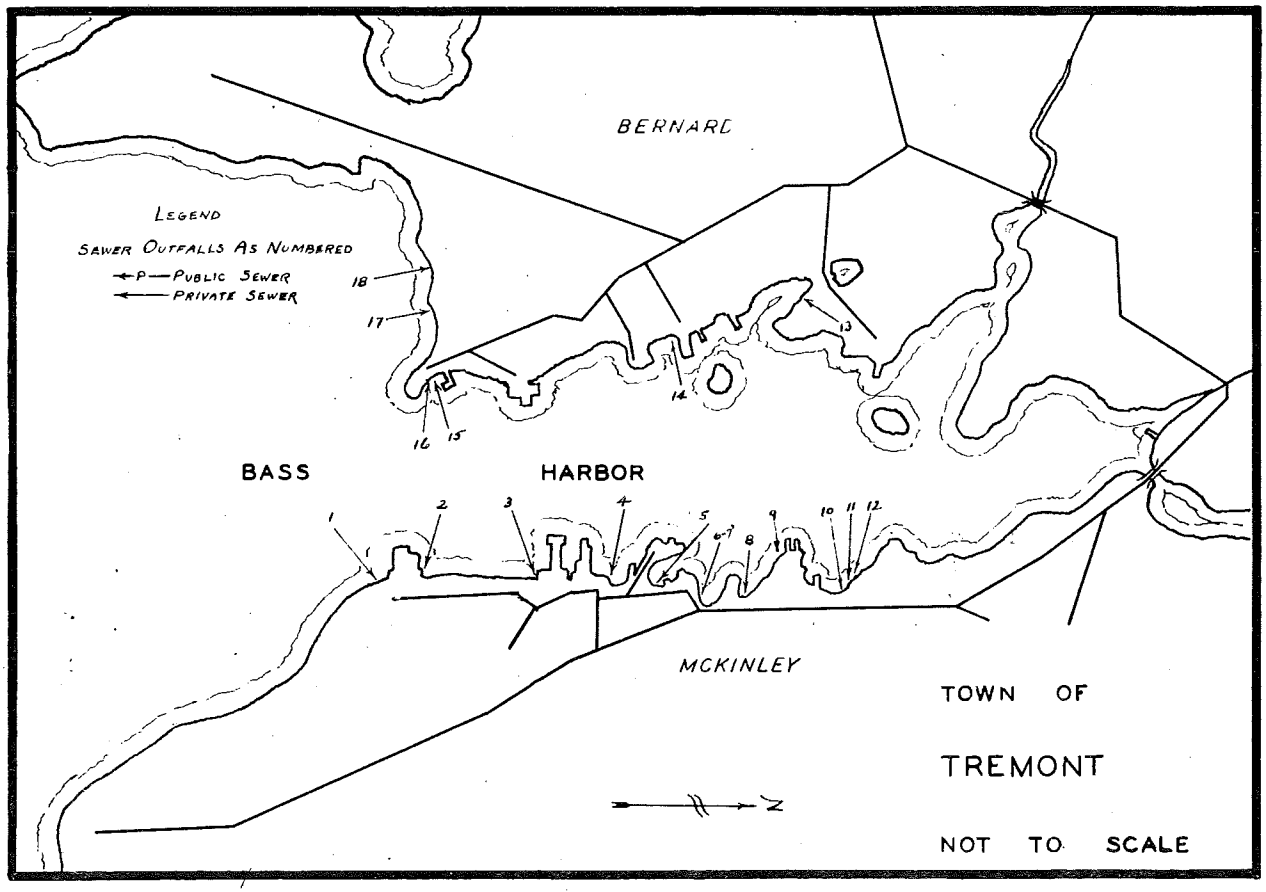


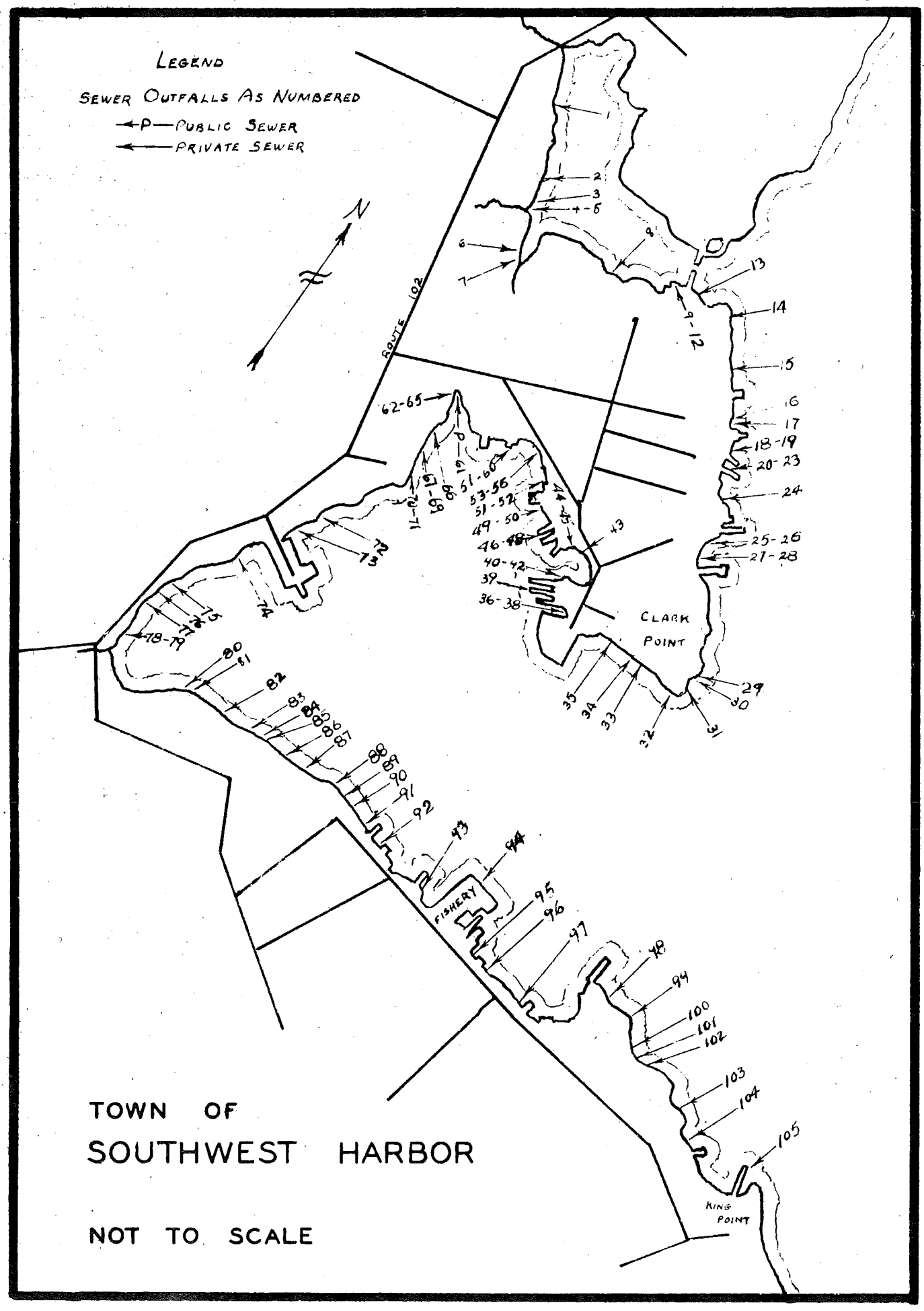
TOWN OF TREMONT

In the Bernard and McKinley sections of Tremont, there are 18 private sewer outfalls which discharge to tidewater in Bass Harbor. As this area is lightly populated, pollution by sanitary sewage is of little consequence, however, some industrial wastes are discharged from 2 fish canning plants and a boat yard.

Following is a brief description of the outfalls indicated on the accompanying map of Tremont:

Index No.	Description
1-12 incl.	There are 12 outfalls on the eastern side of Bass Harbor in the village of McKinley. They are small private sewers, 3 and 4 inches in diameter.
13-18 incl.	On the western side of the harbor in the village of Bernard, there are 6 outfalls, all of which are 4-inch private sewers.




LEGEND
SEWER OUTFALLS AS NUMBERED
P—PUBLIC SEWER
PRIVATE SEWER
N
ROUTE 102
CLARK POINT
FISHERY
KING POINT
TOWN OF
SOUTHWEST HARBOR
NOT TO SCALE

TOWN OF SOUTHWEST HARBOR

In the town of Southwest Harbor, 104 private outfalls and 1 public sewer discharge to tidewater. These outfalls serve a major part of the 900 residents of the town. Some pollution is also contributed by industrial wastes discharged from fish packing plants and boatyards.

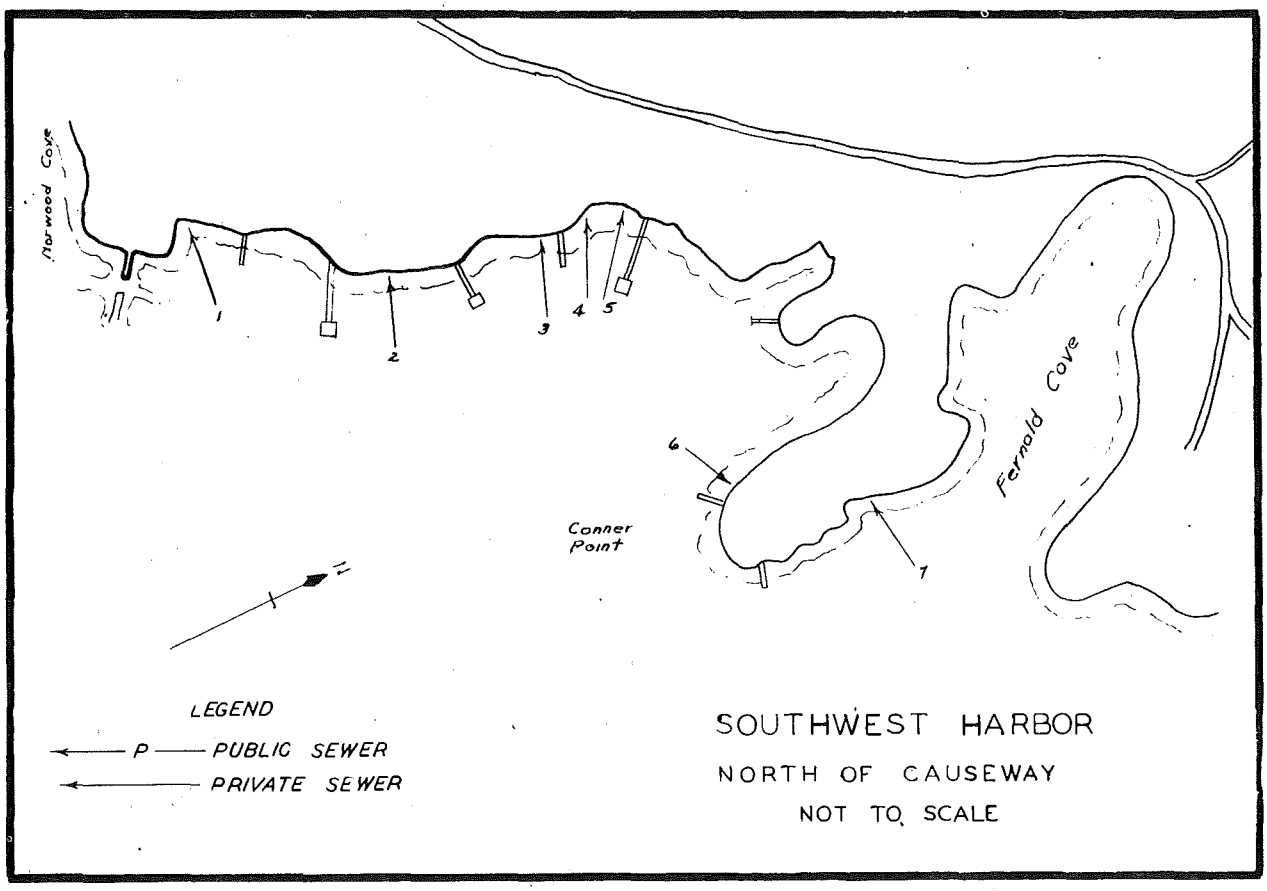
Following is a brief description of the outfalls which are indicated on the accompanying map of Southwest Harbor.

Index No.	Description
1-28 incl.	There are 28 sewer outfalls north of Clark Point. Number 18 is a 6-inch line; all others are 4 inches or less in diameter.
29-62 incl.	Counter-clockwise from Clark Point to the northernmost point of the harbor, there are 34 outfalls. Number 62, the only public sewer in the town, is 15 inches in diameter and serves about 55 buildings, including 2 schools having a total enrollment of over 400 pupils. The other outfalls are private lines. Number 45 is 6 inches in diameter and serves 15 buildings.
63-79 incl.	There are 17 outfalls between the northern and western tips of the harbor. All are 4 inches in diameter, with the exception of numbers 63 and 67, which are 6-inch lines.
80-94 incl.	From the western tip of the harbor eastward along the south shore to Fishery Wharf, there are 15 outfalls. All are 4-inch lines.
95-105 incl.	Between Fishery Wharf and King Point there are 11 outfalls 4 inches in diameter.

TOWN OF SOUTHWEST HARBOR
(area north of Causeway)

A total of 7 sewers are located along the shore of Southwest Harbor, north of Causeway, and are described as follows:

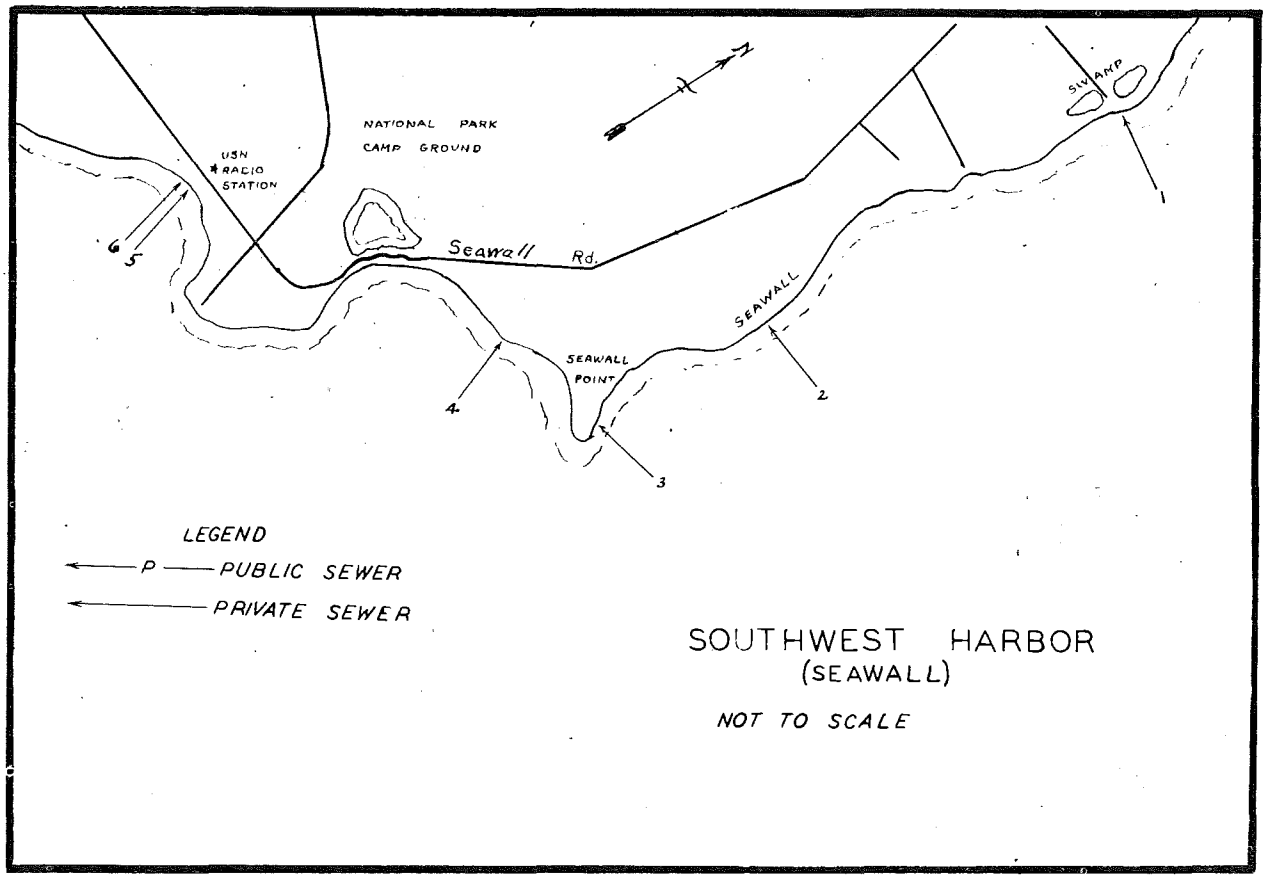
Index No.	Description
1-7 incl.	These 7 sewers are all 4-inch lines which carry domestic sewage.



TOWN OF SOUTHWEST HARBOR
(Seawall Section)

Along the southern shore of Southwest Harbor, from Kings Point to the United States Navy Radio Station, a long seawall is located between the ocean and a coastal swamp. In this section there are 6 sources of pollution which are indicated on the accompanying map.

Index No.	Description
1-6 incl.	Most of the sewers are 4-inch lines discharging at the high water line. Number 6 serves the United States Navy Radio Station which has a complement of 15 to 20 men. Between outfalls #4 and #5, and located behind the seawall, is a small pond which receives sewage from several buildings and the National Park Campground comfort stations which serve an intermittent summer population estimated at 200. During low tide, this pond drains into the ocean.

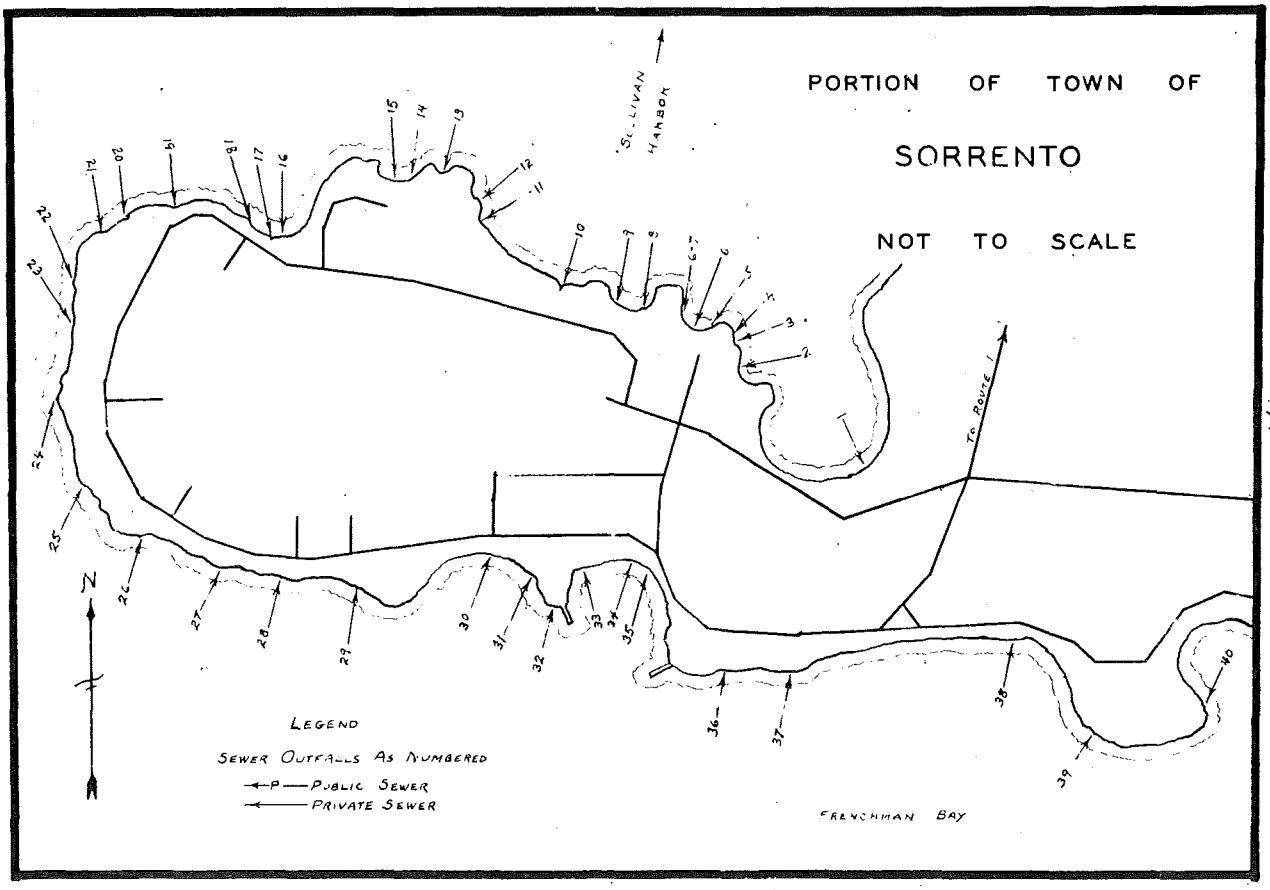


TOWN OF SORRENTO

The town of Sorrento has a permanent population of about 200, most of which is served by the 42 sewer outfalls along the shore of the village.

Following are brief descriptions of the outfalls by groups:

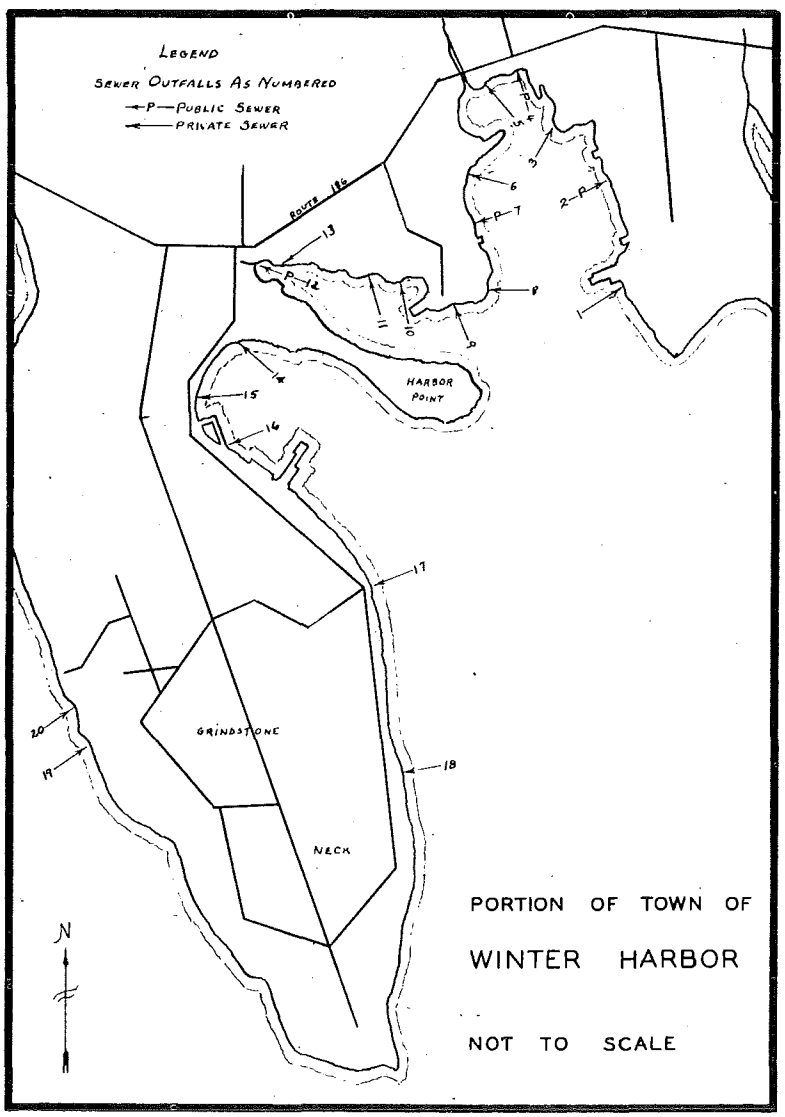
Index No.	Description
1-15 incl.	Counter-clockwise along the upper shore of the Sorrento peninsula to the northernmost point, there are 15 sewer outfalls, all of which are 4-inch lines except #5 which is a 6-inch private group sewer serving 8 to 10 houses.
16-24 incl.	Nine outfalls, from 2 to 4 inches in diameter, discharge to the bay from the northwest quarter of the peninsula.
25-35 incl.	Along the south shore, from the western tip of the peninsula to the second pier, there are 11 outfalls of 4 to 5 inches in diameter.
36-40 incl.	There are 7 outfalls along the south shore east of the second pier, the last two of which are beyond the bounds of the accompanying map. These range in size from a 3-inch pipe, (#36), to a 12-inch drain, (the last outfall), location of which is not shown on the map.

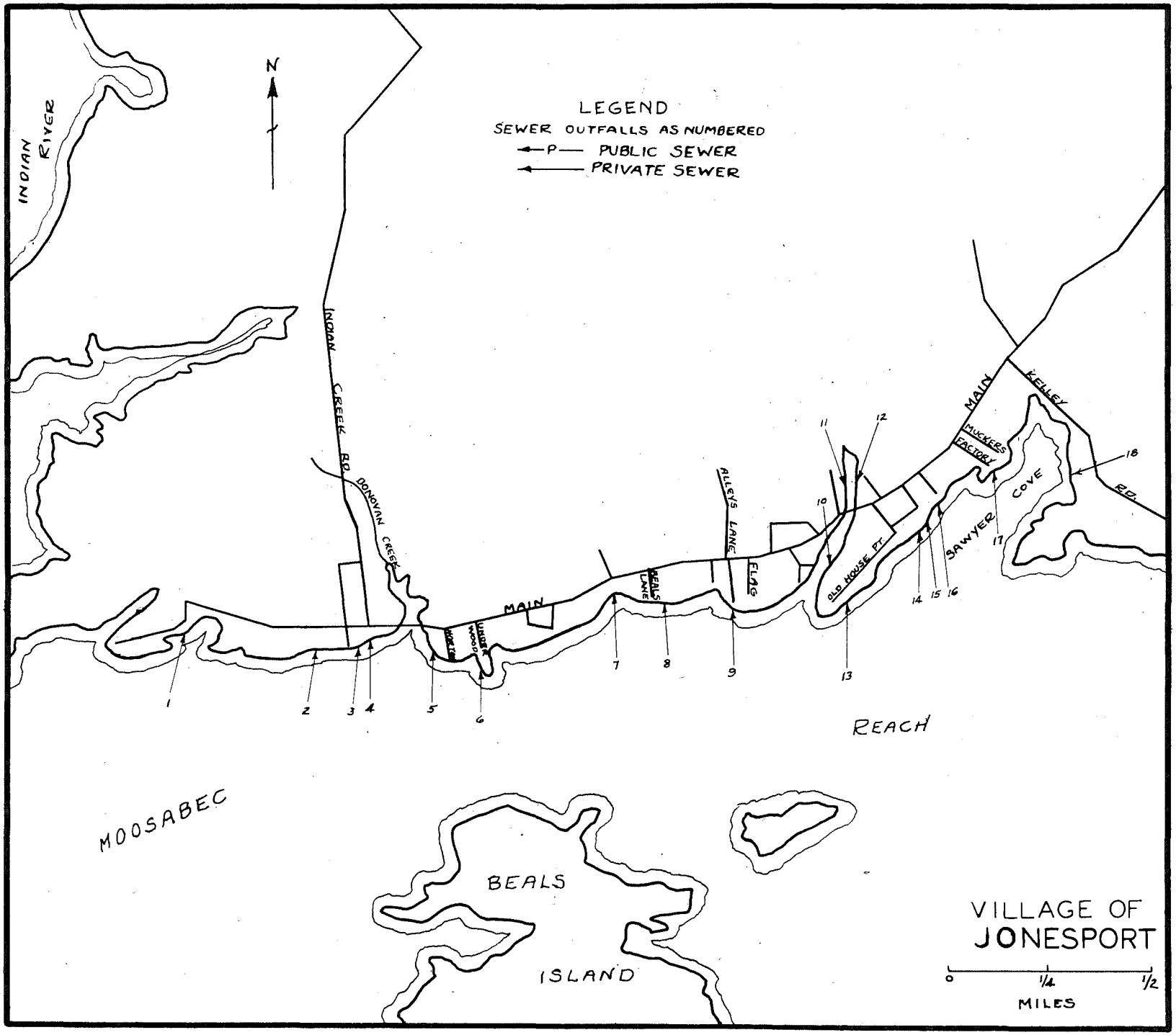


TOWN OF WINTER HARBOR

In the town of Winter Harbor, 4 public sewers, serving about 500 people, and 16 private sewer outfalls discharge to tidewater. The outfalls are indicated on the accompanying map of Winter Harbor, and are briefly described as follows:

Index No.	Description
1-5 incl.	From the eastern side of the harbor, northward to the tidal brook under Route 186, there are 5 outfalls. Numbers 2 and 4 are public sewers serving 20 houses each and the others are private lines, 4 inches in diameter.
6-13 incl.	There are 8 outfalls in the coastal section between the brook under Route 186 and Harbor Point. Numbers 7 and 12 are public lines, the former being 8 inches in diameter and serving approximately 25 houses and a school. The private sewers are 4 to 8 inches in diameter.
14-20 incl.	From Harbor Point around Grindstone Neck, there are 7 private sewer outfalls, ranging in size from 4 to 10 inches.




N
LEGEND
SEWER OUTFALLS AS NUMBERED
P PUBLIC SEWER
PRIVATE SEWER
INDIAN RIVER
INDIAN CREEK RD.
DONOVAN CREEK
MAIN
BEALS LANE
ALLEYS LANE
FLAG
OLD HOUSE PT.
MUCKERS FACTORY
SAWYER
COVE
KELLEY
RD.
MAIN
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
REACH
MOOSABEC
BEALS
ISLAND
VILLAGE OF
JONESPORT
0
1/4
1/2
MILES

TOWN OF JONESPORT

Domestic sewage disposal in the village of Jonesport is accomplished largely through the use of cesspools, the suitability of which may be questioned, because the village is without a public water supply, depending instead upon water from private wells and cisterns which may become polluted through the use of such disposal methods.

An estimated 15% of the 1,745 inhabitants are served by private sewers, and the effluent from septic tanks serving public schools having a population of about 350, are discharged to the ocean.

A recent investigation of the shore line at Jonesport showed the presence of 18 sources of tidewater pollution. These are shown on the accompanying sketch of the village and are briefly described as follows:

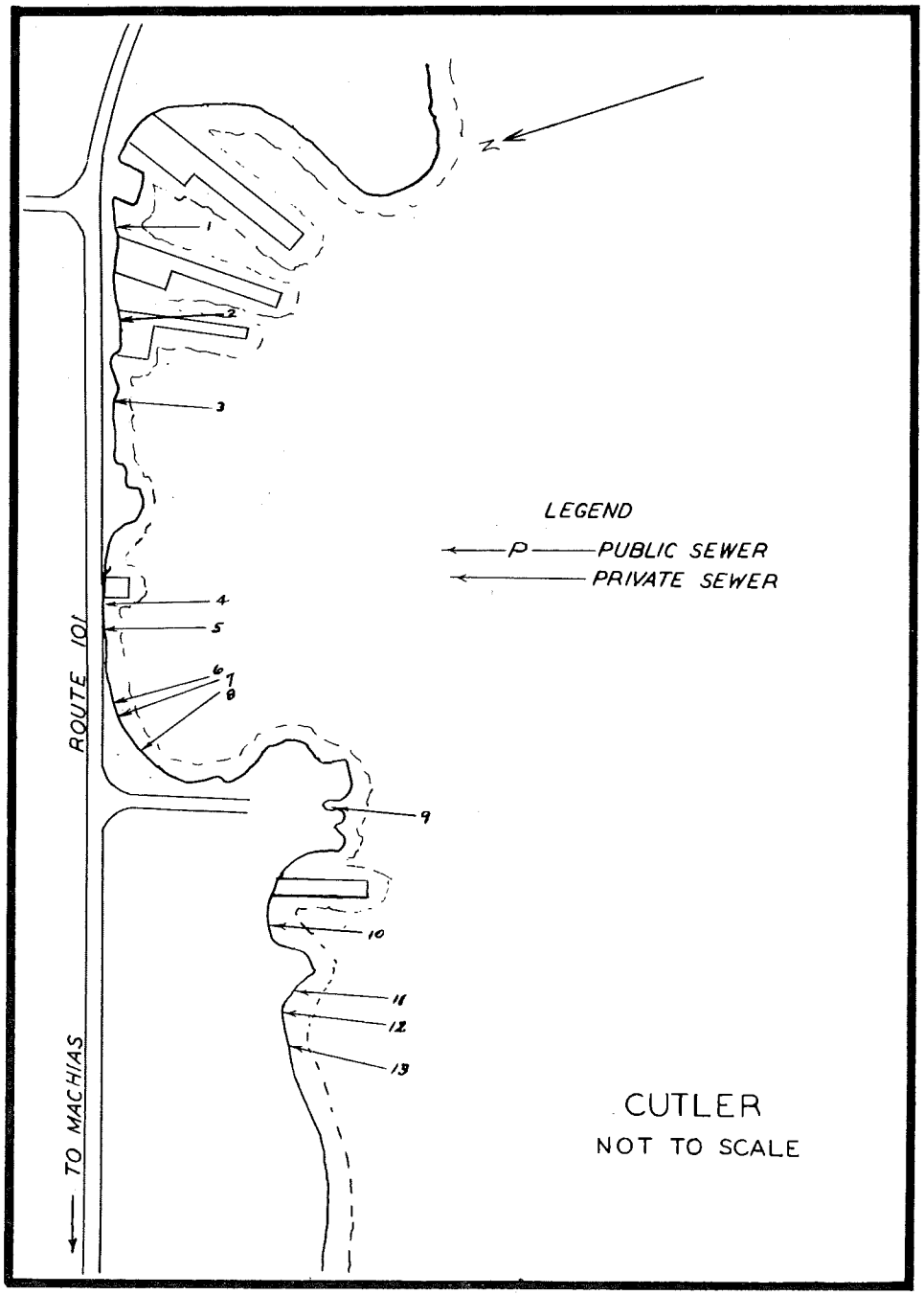
Index No.	Description
1	In the tidal inlet beyond the western end of Main Street, a 4-inch outfall carries waste from a slaughter house.
2-4 incl.	Along the shore within approximately 800 feet of the end of Indian River Road, three outfalls discharge to Moosabec Reach.
5-6 incl.	From Donovan Creek to a point on the shore at the end of Underwood Road, two sewers discharge to tidewater.
7-8 incl.	Two outfalls, each four inches in diameter, discharge sanitary wastes to the shore at points slightly west and directly opposite Beal's Lane.
9-12 incl.	From Alley's Lane around Cross Cove to Old House Point, four outfalls add to the pollution in tidewater. A fish processing plant in this area discharges industrial wastes as well as the sanitary sewage of 60 employees.
13-18 incl.	Eastward from Old House Point around Sawyer Cove, 6 sewer lines discharge to tidewater.

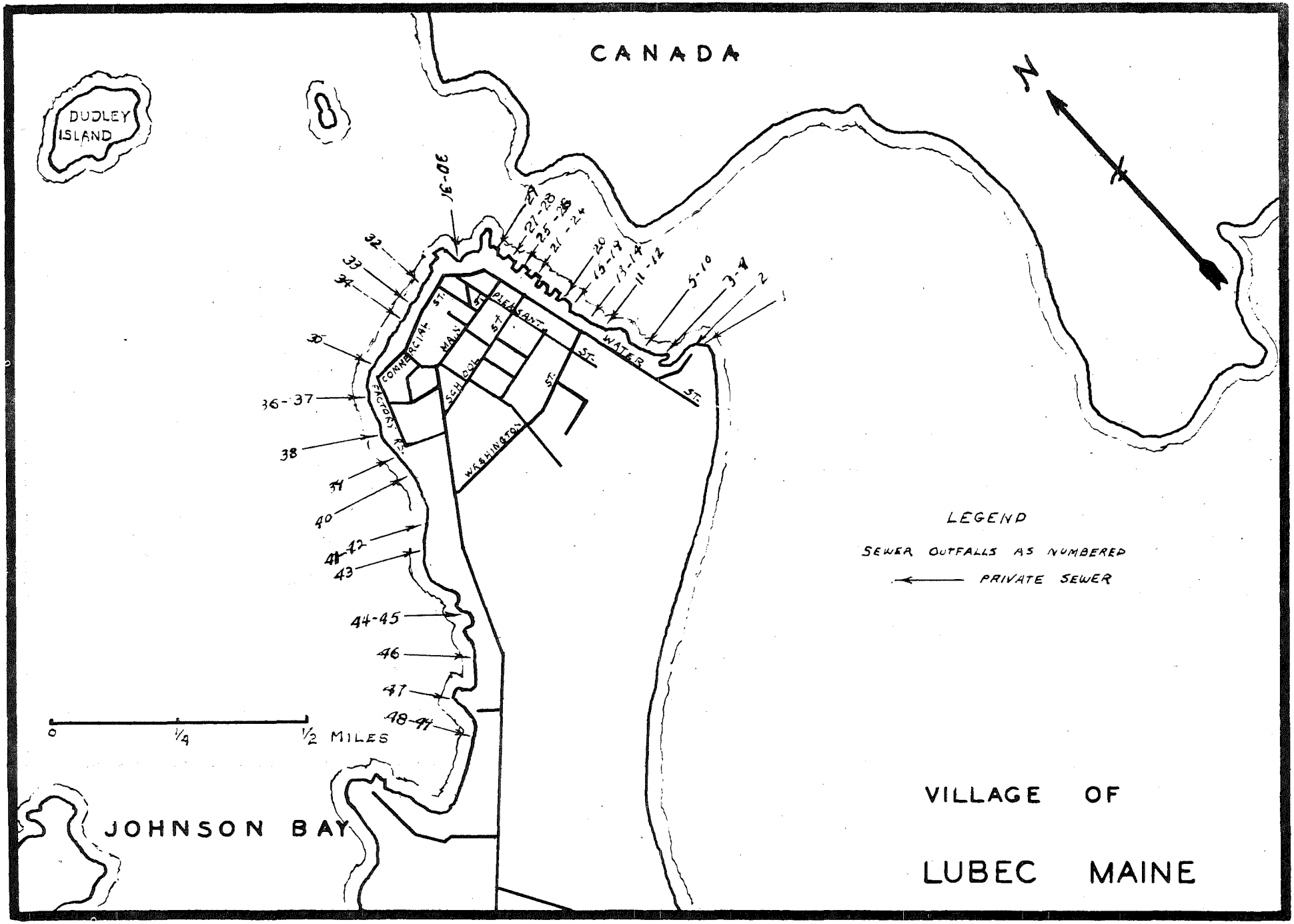
TOWN OF CUTLER

The town of Cutler, lacking a public sewer system and having a small population, contributes very little pollution to the ocean. Although it is a fishing community, there are no fish canning or packing plants in the town.

Following is a brief description of the sources of pollution shown on the accompanying map:

Index No.	Description
1-13 incl.	There are 13 private sewer outfalls, ranging in size from 4 to 6 inches, serving a population of 100, which discharge to tidal water.




CANADA
DUDLEY ISLAND
N
16-OE
A
21-23
25-26
21-24
20
15-17
13-14
11-12
5-10
3-4
2
32
33
34
35
36-37
38
39
40
41-42
43
44-45
46
47
48-49
PLEASANT ST.
WATER ST.
MAIN ST.
COMMERCIAL ST.
SCHOOL ST.
FACTORY RD.
WASHINGTON ST.
0
1/4
1/2 MILES
JOHNSON BAY
LEGEND
SEWER OUTFALLS AS NUMBERED
PRIVATE SEWER
VILLAGE OF
LUBEC MAINE

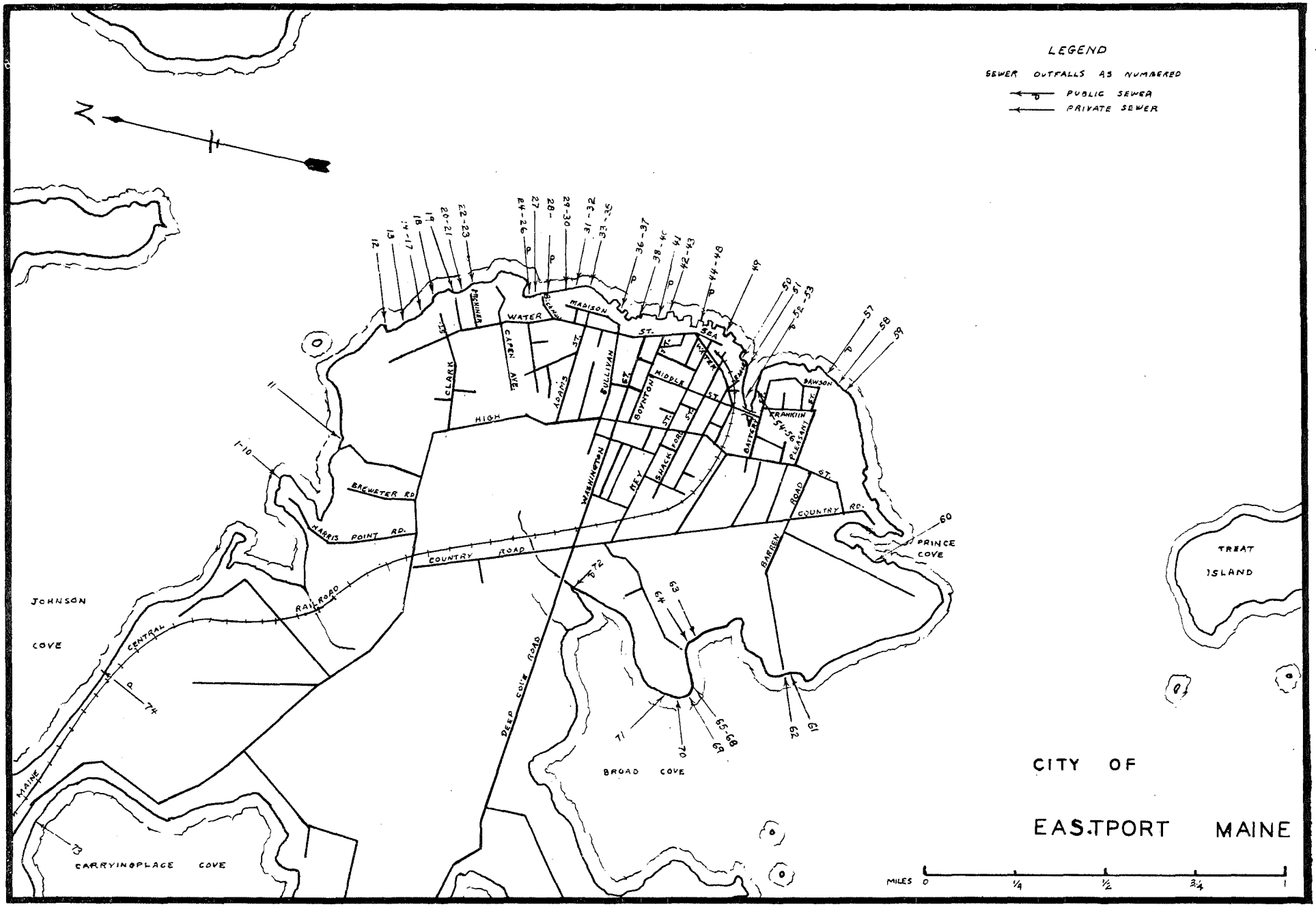
TOWN OF LUBEC

There is no public sewer system in the town of Lubec. Its population, estimated at 3,188, is served by 49 small private lines.

The sewer outfalls indicated on the Lubec map are located as follows:

Index No.	Description
1-13 incl.	Thirteen sewer outfalls serve the area extending from the south end of Water Street to the foot of Washington Street. They range in size from a 4-inch pipe drain to a 12-inch wooden drain.
14-27 incl.	Fourteen outfalls discharge sanitary sewage to tidewater between the ends of Washington and Main Streets. A school having 372 pupils is served by sewer #18. All other outfalls serve from 1 to 12 buildings each.
28-35 incl.	There are 8 outfalls, mostly small drains and sanitary sewers, serving the area from the northeast end of Main Street westerly around Lubec to the southwestern end of Commercial Street, at which point fish wastes are discharged to tidewater.
36-49 incl.	Southwesterly, from the end of Commercial Street and down the shore bordering Main Street, to the end of the populated area, there are 14 sewer outfalls.

In the village of North Lubec there are only two private sewers draining to tidal waters.


LEGEND
SEWER OUTFALLS AS NUMBERED
PUBLIC SEWER
PRIVATE SEWER
N
MADISON
WATER
ST.
CLARK
HIGH
CAREN AVE.
ADAMS
SULLIVAN
BOYNTON
MIDDLE
WASHINGTON
KEY
BRACKETT
FRANKLIN
PLEASANT
DAWSON
BREWSTER RD.
HARRIS POINT RD.
COUNTRY ROAD
RAILROAD
CENTRAL
MAINE
JOHNSON
COVE
DEEP COVE ROAD
BROAD COVE
BARREN
ROAD
COUNTRY RD.
PRINCE
COVE
TREAT
ISLAND
CARRYINGPLACE COVE
CITY OF
EASTPORT MAINE
MILES
0
1/4
1/2
3/4
1

CITY OF EASTPORT

An estimated 3,150 people, or 95% of the population of Eastport, are served by 74 sewer outfalls which discharge to tidewater. There are 11 principal public sewers in the city, one of which, located in the cove near Middle Street, serves about 1/3 of the population.

Industrial pollution in the city consists mainly of fish wastes contributed by 15 fish packing and canning plants.

The 74 sewer outfalls indicated on the Eastport map are located as follows:

Index No.	Description
1-11 incl.	Eleven small, private sewer outfalls, extending easterly about 1/2 mile from Harris Point, discharge to tidewater. The first 10 of these serve a group of 11 summer cottages on Harris Point, and the other serves a fish packing plant.
12-23 incl.	Twelve outfalls are located between the northern end of Water Street and the foot of Capen Avenue. They range in size from 4-inch to a 15-inch public sewer. Two fish packing plants, employing over 200 people, are also located in this area.
24-35 incl.	Twelve sewers discharge from a point near Buckman Street to the foot of Adams Street. They are private lines, except the first two which are public sanitary sewers 8 and 12 inches in diameter. Three fish canning plants, employing approximately 215 people, are also located in this section of the shore.
36-43 incl.	Between the ends of Sullivan and Boynton Streets, there are 8 sewer lines, two of which, #37 and #40, are 6-inch and 15-inch public sewers, respectively.
44-49 incl.	Four private and 2 public sewers discharge between the ends of Boynton and Shackford Streets. Industrial and Sanitary wastes from a fish packing plant and a bottling plant also drain to this area.
50-56 incl.	Between Shackford Street and the shore north of Battery Street there are 7 outfalls, 2 of which, #50 and #52, are public lines. Number 52, the city's largest sewer, is 24" x 30" in size, and serves over 1,100 people. Another major source of pollution in this area consists of industrial and sanitary wastes from 5 fish packing plants.
57-59 incl.	There are 3 sewer outfalls along the shore near the end of Pleasant Street. The first is an 8-inch public line and the other 2 are private sewers.
60	Only one 3-inch private sewer discharges to Prince Cove.
61-72 incl.	Twelve outfalls, one of which, #72, is an 8-inch public sewer, discharge to Broad Cove. There are 3 fish processing plants located in this area.

73-74 incl. The first of these two lines, #73, is a private sewer discharging to Carrying Place Cove. The other, #74, is a public sewer serving 9 houses and discharging to Johnson Cove.

Not shown on the Eastport map is the former U.S. Government project, Quoddy Village. This development is served by 7 sewer lines which originally led to 1 central outfall, emptying to deep water. Recently, these have become disconnected, and all lines discharge to the water near high tide. At the time of the inspection, (early 1950) the village was uninhabited. It was expected, however, that a population of about 900 might soon occupy the village.

TOWN OF DENNYSVILLE

The Dennys River receives small amounts of sanitary sewage at the town of Dennysville. Only 5 private sewer outfalls were located in the village area. These range from 3 to 6 inches in diameter.

TOWN OF PEMBROKE

There is no public sewer system in the town of Pembroke, which has a population of 1,000, and the only important source of pollution in this area is a sardine canning factory employing 140 persons. Two sewer outfalls were located on the shore near the cannery.

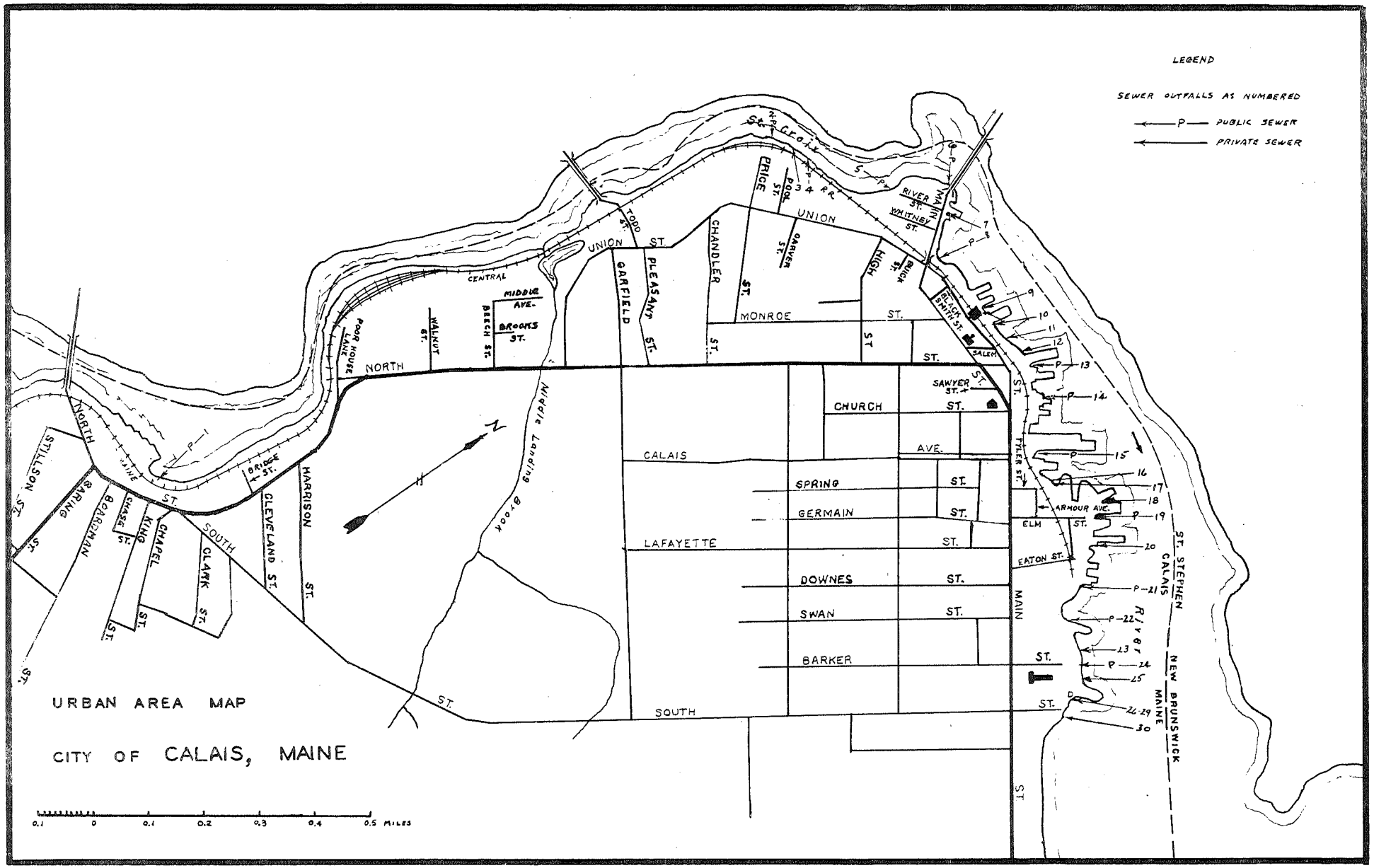
TOWN OF PERRY
(Indian Reservation at Pleasant Point)

Only 2 sewer outfalls, discharging to tidewater, were located in the Pleasant Point section of Perry, both of which are located at the southern tip of the point.

TOWN OF ROBBINSTON

A total of 3 private sewers discharging to tidewater were located in the town of Robbinston. No map of the area has been prepared due to the isolated nature of the few sewers located.

The major individual source of pollution contributed to tidal waters in Robbinston is from a sardine packing plant employing approximately 250 persons.


LEGEND
SEWER OUTFALLS AS NUMBERED
P PUBLIC SEWER
PRIVATE SEWER
St. Croix
N.B. & C. R.R.
3 4
PRICE ST.
POOL ST.
RIVER ST.
WHITNEY ST.
MAIN ST.
UNION ST.
TODD ST.
CENTRAL
MIDDLE AVE.
BROOKS ST.
BEECH ST.
WALNUT ST.
POOR HOUSE LANE
GARFIELD
PLEASANT ST.
CHANDLER ST.
CARVER ST.
HIGH ST.
UNION ST.
MONROE ST.
NORTH
BLACKSMITH ST.
SALEM ST.
SAWYER ST.
CHURCH ST.
AVE.
CALAIS
SPRING ST.
GERMAIN ST.
LAFAYETTE ST.
DOWNES ST.
SWAN ST.
BARKER ST.
SOUTH
TYLER ST.
ARMOUR AVE.
ELM ST.
EATON ST.
MAIN ST.
ST. STEPHEN CALAIS
NEW BRUNSWICK MAINE
St. Croix River
BRIDGE ST.
NORTH MAIN ST.
STILLSON ST.
BOARDMAN ST.
CHASE ST.
KING ST.
CHAPEL ST.
SOUTH ST.
CLARK ST.
CLEVELAND ST.
HARRISON ST.
QUIPUDY BIPAIN BROOK
URBAN AREA MAP
CITY OF CALAIS, MAINE
0.1 0 0.1 0.2 0.3 0.4 0.5 MILES

CITY OF CALAIS

The St. Croix River at Calais receives industrial wastes and untreated sewage from a population of over 4,000. Thirty-seven outfalls are located along the river bank, of which 13 are public lines and 17 are private systems.

The location of the sewers are shown on the accompanying map of Calais and are briefly described as follows:

Index No.	Description
1	A public sewer is located at the end of King Street in Milltown.
2-6 incl.	Five sewers are located in the area between Price Street and the International Bridge, four of which are public sewers.
7-14 incl.	Eight sewers are located downstream between the bridge and the end of Church Street, three of which are large public sewers serving a major portion of the downtown area, the others are smaller private lines.
15-19 incl.	Five sewers serve the area between the end of Calais Avenue and Elm Street. Numbers 15 and 19 have a very large flow and are estimated to serve more than 100 houses.
20-30 incl.	Eleven sewers are located along the river bank from Elm Street to South Street, #21, #22, and #24 being public sewers. The remaining sewers are 4 to 6-inch private lines, except #23, which is a combined storm and sanitary sewer serving a restaurant and a factory building housing a woolen goods knitting plant and a wood novelty plant.

TABLE OF CLOSED CLAM FLAT AREAS

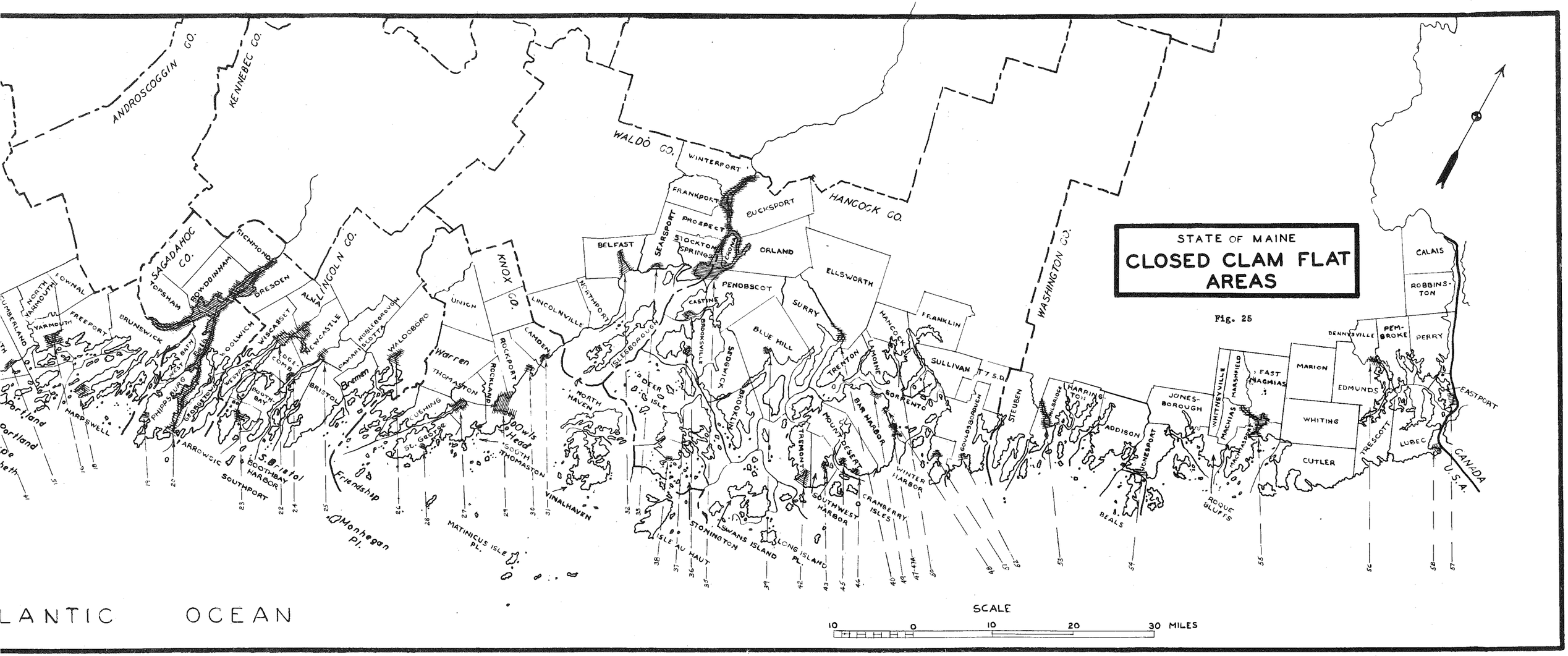
IN STATE OF MAINE

It is unlawful to dig or take in any manner any clams, quahogs, or mussels from the flats and shores of the State of Maine that have been legally designated as closed areas. Fifty-eight of such areas have been closed and are described below, of which five subsequently have been re-opened because of improved conditions.

Closed Area Number	Description
1	All that portion of the Piscataqua River and tributaries thereto in the State of Maine north and northwest of a line drawn in a generally southwesterly direction from the end of the pier on the western side of Gerrish Island to the northernmost point of Wood Island and thence to the southernmost point of Jaffery Point on Newcastle Island in New Hampshire.
2	All of York Harbor inside and west of a line drawn in a southeasterly direction from Fort Point (East Point) to the easterly extremity of Western Point.
3	All the area inside of a line drawn from Barn Point Northerly to Weare Point.
4	Except between the seventh day of November and the fifteenth day of April, both days inclusive, it shall be unlawful to dig or take clams, quahogs, or mussels from any flat or shore of the Ogunquit River north of a line drawn from the most southern point on Ogunquit Beach southerly to the northernmost point on Israels Head.
5	Except between the first day of March, 1950 and the thirtieth day of April, 1950, both days inclusive, it shall be unlawful to dig or take clams, quahogs or mussels from any flat or shore of the Webhannet River and its tributaries south of the Beach Road and Bridge which connects U.S. No. 1, Atlantic Highway with Wells Beach.
6	The Mousam River and its tributaries inside or north of a line drawn from the tip of the most westerly peninsula on Kennebunk Beach to the mid-point of the beach known as Crescent Surf.
7	The Kennebunk River and its tributaries inside of a line drawn from a point opposite the Kennebunk Beach Road where the road turns from an easterly to a northerly direction southeast to the first point of land on the opposite shore northeast of Little Fishing Rock. Exception: Residents of Kennebunk and Kennebunkport may take not more than 1 bushel of clams, quahogs or mussels per person per tide from any flats of the Kennebunk River for bait purposes only, under provisions of c. 169, P & S L. 1949.

The following two pages include a map that was too large to be scanned as a single image. To view the print version of the map, please visit the Maine Law and Legislative Reference Library.

YORK CO.
CUMBERLAND CO.
ANDROSCOGGIN CO.
KENNEBEC CO.
SAGADAHOC CO.
ALNA
LINCOLN CO.
KNOX CO.
WALDO CO.
HANCOCK CO.
WASHINGTON CO.
WINTERPORT
FRANKPORT
BUCKSPORT
PROSPECT
SEARSPORT
STOCKTON SPRINGS
BELFAST
ORLAND
ELLSWORTH
PENOBSCOT
CASTINE
BROOKSVILLE
SURRY
BLUE HILL
SEDGWICK
DEER ISLE
TRENTON
MOUNT DESERT
BAR HARBOR
FRANKLIN
HANCOCK
SULLIVAN
T7 S.D.
GOULDSBORO
STEUBEN
HARRINGTON
ADDISON
BEALS
CRANBERRY ISLES
SOUTHWEST HARBOR
WINTER HARBOR
LAMOINE
GOUTENTO
ISLE AU HAUT
STONINGTON
SWANS ISLAND
LONG ISLAND PL.
MATINICUS ISLE PL.
VINALHAVEN
NORTH HAVEN
SOUTH THOMASTON
OWL'S HEAD
ROCKPORT
CAMDEN
LINCOLNVILLE
NORTHPORT
ISLESBOROUGH
UNION
WARREN
THOMASTON
ST. GEORGE
FRIENDSHIP
MONHEGAN PL.
BREMEN
WALDOBORO
NOBLEBOROUGH
SCOTIA
CAPAWAY
BRISTOL
SOUTH BAY
ROSE-TOWN
WISCASSET
NEWCASTLE
DAMARISCOTTA
DRESDEN
RICHMOND
BOWDOINHAM
TOPSHAM
GEORGETOWN
WESTERN
PHIPPSBURG
WEST BATH
HARPSWELL
BRUNSWICK
FREEPORT
YARMOUTH
NORTH YARMOUTH
TOWNAL
CUMBERLAND
FALMOUTH
WESTBROOK
S. PORTLAND
CAPE ELIZABETH
PORTLAND
SCARBOROUGH
SACO
OLD ORCHARD BEACH
BIDDEFORD
KENNEBUNKPORT
KENNEBUNK
ROCH-ESTER
WELLS
YORK
ELIOT
KITTERY
N.H.
MAINE
ARROWSIC
SOUTHPORT
SOUTH BRISTOL
BOOTHBAY HARBOR
ATLANTIC OCEAN
SCALE
10 0 10 20


STATE OF MAINE
CLOSED CLAM FLAT AREAS
Fig. 25
ANDROSCOGGIN CO.
KENNEBEC CO.
SAGADAHOC CO.
LINCOLN CO.
KNOX CO.
WALDO CO.
HANCOCK CO.
WASHINGTON CO.
PENOBSCOT
WINTERPORT
FRANKPORT
BUCKSPORT
PROSPECT
STOCKTON SPRINGS
SEARSPORT
CASTINE
BELFAST
ORLAND
ELLSWORTH
SURRY
BLUE HILL
BROOKLIN
BROOKSVILLE
SEDGWICK
DEER ISLE
ISLESBOROUGH
NORTH HAVEN
VINALHAVEN
STONINGTON
ISLE AU HAUT
LONG ISLAND
LOWS ISLAND
MATINICUS ISLE PL.
Monhegan Pl.
Owls Head
SOUTH THOMASTON
ROCKLAND
ROCKPORT
CAMDEN
LINCOLNVILLE
NORTHPORT
UNION
WARREN
THOMASTON
ST. GEORGE
FRIENDSHIP
BREMEN
BRISTOL
S. BRISTOL
BOOTHBAY HARBOR
SOUTHPORT
ARROWSIC
WALDOBORO
NEWCASTLE
DAMARISCOTTA
NOBLEBOROUGH
BOOTHBAY
EDGECOMB
WISCASSET
ALNA
DRESDEN
RICHMOND
BOWDOINHAM
TOPSHAM
BRUNSWICK
WOOLWICH
PHIPPSBURG
GEORGETOWN
WESTPORT
SOUTH BATH
BATH
WEST BATH
HARPSWELL
FREEPORT
YARMOUTH
NORTH YARMOUTH
TOWNAL
CUMBERLAND
Portland
TRENTON
LAMOINE
HANCOCK
FRANKLIN
SULLIVAN
T 7 S.D.
GOULDSBOROUGH
STEUBEN
SORRENTO
BAR HARBOR
MOUNT DESERT
TREMONT
SOUTHWEST HARBOR
WINTER HARBOR
CRANBERRY ISLES
HARRINGTON
MILLBRIDGE
ADDISON
JONESPORT
BEALS
JONESBOROUGH
ROQUE BLUFFS
WHITNEYVILLE
MACHIAS
MACHIASPORT
MARSHFIELD
EAST MACHIAS
MARION
WHITING
CUTLER
DENNYSVILLE
PEMBROKE
PERRY
EDMUNDS
TRESCOTT
LUBEC
EASTPORT
CALAIS
ROBBINSTON
CANADA
U.S.A.
ATLANTIC OCEAN
SCALE
10 0 10 20 30 MILES

Closed Area Number	Description
8	Except between the first day of March, 1950 and the thirtieth day of April, 1950, both days inclusive, it shall be unlawful to dig or take clams, quahogs or mussels from the closed area west or inside a line across the mouth of Ellison Creek (also known as Petty Creek and Paddy Creek) and all of the shores and flats of Sampson Cove (also known as Skipper Joe Harbor) west and inside of a line drawn from a red painted wood post on the northernmost point of Cape Porpoise due north to a red painted wood post on the northern shore of said cove or harbor.
9	The Saco River and all tributaries thereto, including Biddeford Pool, inside or west of a line extending from the end of "the breakwater" to the most northerly point of Fletcher Neck.
10	Goosefare Brook (Creek) and tributaries from its source to its mouth.
11	That portion of the Scarboro River known as Dock Creek, so called, from its junction with the Scarboro River to its source.
12	All of the shores and flats of the Nonesuch River north and east of a line drawn from the end of the Clay Pitts Road on the eastern shore to the end of Oak Hill Road on the western shore.
13	The flats and shores of the Spurwink River, above a line drawn from a red painted wood post 100 yards above the mouth of Angells Creek on the west shore to a red painted wood post directly across said river on its eastern shore, shall be closed to all digging of clams, quahogs and mussels from the first day of May to the thirty-first day of October of each year, both days inclusive.
14	The shores and flats in the Town of Falmouth, including Mackworth and The Brothers Islands, and in the Cities of Portland and South Portland, of the Presumpscot River, Back Cove, Fore River and their tributaries inside of a line drawn from Waites Landing in the Town of Falmouth to the most northern points on Great Diamond Island in the City of Portland, thence to the most northerly point on Peak Island in the city of Portland, thence through Peak Island in the city of Portland to the most easterly point of White Head on Cushing Island in the city of Portland and thence to Portland Head Light in the town of Cape Elizabeth.
15	The shores and flats of Falmouth Shore between Perry's Landing and Waites Landing, including Mussel Cove and its tributaries.

Closed Area Number	Description
16	The shores and flats of Royal and Cousins Rivers and their tributaries within or west of a line drawn from Fogg Point to Parker Point.
18	It shall be unlawful during the months of May, June, July, August, September, and October of each year to dig or take in any manner any clams, quahogs or mussels from the shores and flats in Potts Harbor one-quarter of a mile from the low water shore line from the northern end of Ash Point Cove to Potts Point on the western shore and on the eastern shore from Potts Point as far north to that point where a line drawn from the northern point on Bar Island to the northern point on Ram Island would cross the Neck.
19	The shores and flats of Sebasco Harbor and Cove within a line drawn from a point on the mainland and due west 1/8 mile toward Horse Island Point on Harbor Island and thence due north to a point on the mainland opposite the northernmost point of Harbor Island.
20	Commencing on the twenty-sixth day of August 1948, it shall be unlawful to dig or take, in any manner, any clams, quahogs or mussels from any flat or shore of the Kennebec River or any of its tributaries, including all coves and bays thereof, northerly of a line drawn from the most southerly point of Cox Head in the town of Phippsburg through Gilbert Head on Long Island to the most southerly point of Bay Point in the town of Georgetown.
22	The shores and flats of the Sheepscot River between a line drawn from a red painted wood post at Old Fort Edgecomb on Davis Island Shore to the most northern point of Westport Island and thence due west to a red painted wood post on Birch Point in Wiscasset and a line drawn from a red painted wood post from the railroad embankment on Clark's Point, southerly to a red painted wood post on the most northern point on Davis Island.
23	The shores and flats at Boothbay Harbor north of a line drawn from McKown Point easterly to a point on the opposite shore north of Higgins' Lobster Pound.
24	The shores and flats at East Boothbay west of a line drawn from Montgomery Point to Farnham Point, except during the period of December first to May fifteenth, inclusive, clams, quahogs and mussels may be taken from the shores and flats of Farnham Cove from Farnham's Point to Rice's Point.
25	The flats and shores of the Damariscotta River, from its source to a line drawn due east from a red painted post on road leading to shore on Flagg Point, to a red painted post on the opposite shore.

Closed Area Number	Description
26	The shores and flats of the Medomak River north of a line drawn from the mouth of Sprague Brook on the west shore, to Packard's Wharf on the opposite shore.
27	The shores and flats of the St. George River from its source to a line drawn in a westerly direction from a red painted post on the east shore of St. George River in the Town of South Thomaston, to a red painted post on the west shore of said river in the Town of Cushing.
28	The shores and flats of Tenants Harbor within or north of a line drawn across the mouth of the small stream flowing in a southerly direction into the harbor.
29	The flats or shores of Rockland Harbor, Broad Cove and Deep Cove, within or west of the Breakwater and a line drawn from the Breakwater headlight to Owl's Head lighthouse.
30	The shores and flats of Rockport Harbor within or north of a line drawn from Beauchamp Point in a westerly direction toward Beach Hill.
31	The shores and flats of Camden within or west of a line drawn from Northeast Point to the Lighthouse on Negro Island, sometimes called Curtis Island, and thence to Ogier Point.
32	The shores and flats of Belfast Bay within or west of a line drawn from Patterson Point due south to the opposite shore.
33	All territory northwest of a line drawn from Mack Point to Moore Point, including all shores and flats adjacent to the town of Searsport.
35	The shores and flats of the Penobscot River from its source to a line drawn from Fort Point due east to a point on the opposite shore.
36	It shall be unlawful to dig or take in any manner any clams, quahogs or mussels from the shores and flats of Castine Harbor and that part of the Bagaduce River between Dice's Head and a line drawn from a red painted wood post on the southeast point on Hatches Point to a point directly across the Bagaduce River to a red painted wood post on the southern shore of Lord's Cove.
37	The shores and flats of Bucks Harbor, within or north of a line drawn from the easterly extremity of Condon Point to Gray's Point.
38	The shores and flats at Stonington north and northwest of a line drawn from the most southeasterly part of Greens Head northeasterly to a point on the opposite shore.

Closed Area Number	Description
39	The flats and shores of Blue Hill Harbor north of a line drawn from Peters Point due west to a red painted post on the west shore.
40	The flats and shores of the Union River and its tributaries north of a line extending from Weymouth Point in Surry, easterly to a red post on the east shore of Union River in Ellsworth.
42	It shall be unlawful between the first day of April and the thirtieth day of November, both days inclusive, of each year, to dig or take in any manner any clams, quahogs or mussels from any flat or shore of Bass Harbor north of a line drawn from the easterly tip of Lopaus Point easterly to the lighthouse at Bass Harbor Head.
43	The shores and flats of Southwest Harbor inside or west of a line drawn from Kings Point northwesterly to the easternmost point on Clark Point.
45	It shall be unlawful during the months of May, June, July, August, September and October of each year to dig or take in any manner, any clams, quahogs or mussels from the shores and flats at Northeast Harbor within or north of a line drawn in a general easterly direction from a red painted wood post at Sargent Head to a red painted wood post on the opposite shore, north of Bear Island.
46	The shores and flats of Seal Harbor north of a line extending from Crowinshield Point (Dodge Point) to East Point.
47	The shores and flats at Bar Harbor from a point beginning at the bar between Bar Harbor and Bar Island in the town of Gouldsboro to a point on the southern portion of Sol's Cliff.
47A	The shores and flats at Bar Harbor from a point beginning at the mouth of Duck Brook to the bar between Bar Harbor and Bar Island in the town of Gouldsboro between May first and November thirty-first, both days inclusive.
48	It shall be unlawful during the months of May, June, July, August, September and October of each year to dig or take in any manner any clams, quahogs or mussels from the shores and flats of Hull's Cove west of a line drawn from Lookout point to Canoe point.
49	It shall be unlawful during the months of May, June, July, August, September and October to dig or take in any manner any clams, quahogs or mussels from the shores and flats of Salisbury Cove south and southwest of a line drawn from the most northerly point on the east side of Salisbury Cove to the most northerly point on the west side of Salisbury Cove.

Closed Area Number	Description
50	It shall be unlawful from May first to October thirty-first, both days inclusive, of each year, to dig or take in any manner any clams, quahogs or mussels from the shores and flats of Sorrento between Bean's Point and Eastern Point.
51	The shores and flats of Winter Harbor within and north of a line drawn from Harbor Point northeasterly to the nearest point of land on Biggers Point.
52	It shall be unlawful from March 1 to December 31, both days inclusive, of each year, to dig or take in any manner any clams, quahogs or mussels from the shores and flats of Prospect Harbor, north and northwest of a line drawn from the lighthouse on Prospect Harbor Point to a red painted marker on Clark Point.
53	The shores and flats of the Narraguagus River between the source of said river and a line drawn from Fish Point southwesterly to a red painted post on the west shore of said river in the town of Milbridge except for that portion of the east shore between Fish Point and the northeast end of the Route 1A highway bridge across the Narraguagus River at Milbridge.
54	The shores and flats of Cross Cove north of a line drawn from a red painted wood post at the end of the Fred Smith factory point to a red painted wood post at the end of Old House point.
55	All of the shores and flats of the Machias River that are situated within the following boundaries: Beginning at a point on the east side of roadway at the foot of Mill Hill, extending in a southeast direction across Machias River to a point called Croker's Point, thence following said river southerly to a point on the north side of Frank Libby's Cove, thence in a westerly direction across said river to a point called Graveyard Hill, thence following the said river northerly to the place of beginning.
56	The shores and flats of the Denny's River above a line established by two red painted wooden posts, one placed on Clark Point at the Narrows of the mouth of the Denny's River and the other on the opposite bank.
57	The closed area shall include all flats and shores from Dog Island Light to Buckman Head.
58	The closed area shall include all flats and shores from Leadueny Point to Diamond Point.

DEBRIS INCLUDING SAWMILL WASTES DEPOSITED ON TIDAL CLAM FLATS.

SURVEY OF CLOSED CLAM FLAT AREAS

October, 1946 - May, 1947

The procuring and marketing of shellfish (clams) is a major industry in many sections along the coast of Maine. The 1946-47 report of the Department of Sea and Shore Fisheries states that over 5,000 persons were engaged in the business, with a value of about $5,000,000 a year.

These facts alone are enough to indicate the importance of such an industry to the State of Maine, but further progress of the industry is seriously handicapped due to many productive areas being closed because of the contamination of the waters above such areas. Previous surveys made of these areas in 1925 and 1938 revealed that considerable contamination existed. The extent of the survey at the different areas had been questioned, especially when the inadequate results had been used as a criteria for closing such areas.

It was decided in the Fall of 1946 to make a more detailed and complete survey of each area, to bring the information up to date and to establish definitely what areas were contaminated by sewage, or were subject to potential pollution hazards because of the proximity of sanitary sewer outfalls. The survey was carried out jointly by the Sanitary Water Board, the State Bureau of Health in the Department of Health and Welfare, the State Department of Agriculture, and the State Department of Sea and Shore Fisheries.

The field work of the survey lasted from September 1946, to May 1947. The entire 58 closed areas were surveyed from a physical standpoint relative to sources of pollution or contamination, and from a bacteriological standpoint through the collection of sea water samples and examination of the same for the presence or absence of B. Coli. For a portion of the survey, some special tests were made to determine presence of fecal or non-fecal coli. These were called "Imvic" tests; the name being derived from the first letters of the various bacteriological tests utilized:

I - Indol
M - Methyl Red
V - Voges-Proskauer
C - Citrate

A total of 520 water sampling stations were established from which 2,537 samples were taken for bacteriological examination, particularly for coliform organisms and from which 1,923 additional tests were carried through by the "Imvic" method for further identification. At each closed area the sampling stations were established at such points as to cover the entire area. A series of samples were collected from each station at different tide levels, such as high, half ebb, half flood and low; and on different days and under as many varying conditions of wind and weather as possible. Many recheck samples were collected to verify conditions in doubtful areas.

Bacteriological work was carried out in the mobile trailer laboratory in accordance with standard methods. A sanitary survey was made of each area and information secured relative to sewer outfalls, toilets, dumps and similar sources of pollution.

The control of the closed areas is under the joint jurisdiction of the State Department of Agriculture (Division of Inspection) and the State Department of Sea and Shore Fisheries, both cooperating with the Shellfish Section of the United States Public Health Service.

On the basis of the information furnished by the above departments, the United States Public Health Service certified the various areas allowing the collection of clams therefrom, and entrance into interstate commerce. The opening and closing action is contained in "The Manual of Recommended Practice for Sanitary Control of the Shellfish Industry, 1946".

The direct results of the survey were the complete opening of 4 areas and the opening of sections of 11 other areas. It was estimated that over $50,000 worth of clams were taken from one of the opened sections during a period of six months.

The survey directly indicates that removal of the pollution may readily result in opening of many closed areas. The considerable data obtained discloses that although these areas are polluted to the extent of making them unsatisfactory for shellfishing, yet many such areas could be reclaimed if proper sewage treatment plants were provided to remove fecal contamination.

Following is detailed information regarding each closed area. All remarks and recommendations are based only upon the use of such waters for shellfishing.

Closed Area No. 1 - Piscataqua River

Very few clams are found in this area. The survey indicates considerable pollution from sanitary sewage and industrial wastes discharged to the Piscataqua River from Portsmouth and Kittery.

Twenty-six stations were established and 89 samples collected. Thirty-six samples showed an m.p.n., (most probable number), of bacteria of the Colon-Aerogenes group of over 70, the limit for safe shellfish waters.

Closed Area No. 2 - York Harbor

This area, consisting of the York River, has few clams. It receives considerable sanitary sewage throughout the year, with a noticeable increase during the summer months.

Thirteen stations were established and 26 samples collected. Seven samples exceeded 70 m.p.n. with several over 1,100 m.p.n.

Closed Area No. 4 - Ogunquit River

There are clams in this area that are dug during the winter when the area is open.

Nine stations were established and 16 samples collected, of which 14 were over 70 m.p.n. These results indicate a heavily polluted area during the summer months.

Closed Area No. 5 - Webhannet River (Wells)

This closed area has long been a source of controversy. There are only a few clams left after the two-month open period during 1950. The only sources of pollution observed were some pit privies, cesspools and septic tanks near or directly on the marshy area that drains to the river. The establishment of a system of sewers with proper treatment would help to eliminate these sources of pollution.

Five stations were set up and 31 samples collected, with 17 over an m.p.n. of 70.

Closed Area No. 6 - The Mousam River

It was reported that there are few clams in this area. The sanitary survey indicated that the Mousam River is highly polluted by sewage at Sanford, Kennebunk Village and Kennebunk Beach, and by industrial waste at Sanford and Kennebunk. Sewage from summer homes also drains to the river.

Eleven stations were established and 52 samples collected. Of this number, 39 were above 70 m.p.n.

Closed Area No. 7 - Kennebunk River

This area, located on the Kennebunk River, has some clams. There is considerable pollution from public and private sewers on both sides of the river at Kennebunkport. The area appears to have little commercial value for shellfishing.

Six stations were established and 12 samples collected, with 7 having an m.p.n. over 70.

Closed Area No. 8 - Cape Porpoise

There are very few clams in this area. Some private sewers and the waste from a fish plant pollute the waters. Removal of this pollution should allow the area to be opened.

There were 8 samples collected from 4 stations, and all exceeded the limit of 70 m.p.n.

Closed Area No. 9 - Saco River

There are some clams in this area, especially in the Biddeford Pool Section. The Saco River is receiving sanitary sewage from Biddeford, Biddeford Pool and Saco, from a combined population of approximately 28,000, including many homes along both sides of the river, and is also receiving pollution from small towns and industries above Biddeford and Saco.

Twelve stations were set up and 20 samples collected. All exceed the limit of 70 m.p.n. and 17 samples had an m.p.n. of 1,100 or greater. These results indicate the extent of pollution of this area.

Closed Area No. 10 - Goosefare Brook

There are few clams in this area, which receives the direct, untreated sewage from a considerable area of the city of Saco and some sewage from the Ocean Park section of Old Orchard Beach.

Two stations were established and 4 samples collected, all of which showed an m.p.n. of over 70.

Closed Area No. 11 - Scarboro River

Three thousand bushels of clams were dug by the end of 1950, following the April, 1950, opening of the area.

Two stations were established and 5 samples collected. All tested above 70 m.p.n., with an average of 654 or greater.

Closed Area No. 12 - Nonesuch River

It was reported by the Sea and Shore Fisheries Department that there are several thousand bushels of clams in this area. There are some open sewers at Prouts Neck and Grand Beach section of Scarboro, also sewers from a few cottages around Winnocks Neck. Pollution apparently comes in with the tide or is forced upstream by southerly winds.

Thirteen stations were established and 30 samples collected, of which 18 were over an m.p.n. of 70.

Closed Area No. 13 - Spurwink River

Clams, with an aggregate value of $80,000, have been taken from this area during the winter openings since 1947, with the result that not many clams are left in this area at present.

A short distance from the mouth of the Spurwink River there is a large sanitary sewer which discharges sewage from a population of over 2,000 into the river in the summer and from about 75 to 80 in the winter. Previous surveys of the clam flats and of the beach area have recognized this sewer as an important source of pollution. During the winter the sewage is discharged through a 7,500 gallon septic tank, but during the summer the tank is by-passed because it is not large enough to treat the additional sewage. In 1938, attention was focused on this sewer and a recommendation was sent to the Board of Selectmen suggesting the installation of a suitable treatment unit.

In 1946, there was much agitation among the clam diggers to have the area opened. The survey revealed that the area, starting at a point 100 yards above the mouth of the river and north of this point, could be opened during the periods of low population at Higgins Beach, provided that the 7,500 gallon septic be used for partially treating the sewage during this period. It was agreed to reconnect the sewer to the septic tank, and after this was done, the above mentioned area was opened from November to May.

Two stations were established and 5 samples collected. All were above 70 m.p.n., with an average of 654 or greater.

Closed Ares No. 14 - Portland Harbor

No samples were taken in this area as previous sanitary surveys revealed the entire area to be highly polluted. There are some clams in this area, but they should not be made available commercially until pollution has been substantially removed from the harbor and from the Presumpscot River.

Closed Area No. 15 - Falmouth Shore

In the area extending along the Falmouth shore there are some clams. Before this area was closed, it was reported that 15,000 barrels were dug by 175 diggers in 1942. The survey revealed at least 9 outfalls discharging raw sewage into these waters. There is also the possibility that tidal currents and wind action may bring pollution from Portland Harbor and the mouth of the Presumpscot River into this area.

Seven stations were established and 14 samples were collected. Thirteen tested over 70 m.p.n., and 10 had an m.p.n. of 1,100 or over.

Closed Area No. 16 - Royal River, Yarmouth

There are some clams in this area, especially along the Cousins River. In 1942, 35 diggers took out 10,000 barrels of clams. A special effort was made to see if the Cousins River section could not be opened. An engineer from the United States Public Health Service reviewed the situation with our personnel and many re-check samples were taken, but the results of anlyses of these samples, together with the results of the sanitary survey made of the area, precluded the opening of this section.

Fourteen stations were set up and 74 samples collected. Sixty were over 70 m.p.n., and a great many of these were 1,100 m.p.n. and over.

Closed Area No. 17 - Harraseeket River, Freeport

At the time of the survey of 1947, a few clams were reported in this area where about 70 diggers were employed. At that time 19 stations were established and 108 samples collected.

In 1949, Freeport completed construction of a new sewerage system and a new sewage treatment plant. This resulted in removal of the greater portion of raw sewage from the area, consequently a considerable portion of the area is within the limits permitting harvesting of clams. The greater portion of this area was opened in 1949.

Closed Area No. 18 - Harpswell

There are some clams available for digging during the winter months that the area is opened. The survey revealed that there were several sanitary sewers, including summer units, discharging untreated wastes into this area.

Fourteen stations were established in the closed area and 64 samples collected. Nine samples had an m.p.n. of over 70.

Closed Area No. 19 - Sebasco Area, Phippsburg

There are only a few clams in this area which is located near a private resort called Sebasco Estates. Four stations were established and 12 samples collected, 2 of which exceeded the limit of 70 m.p.n.

A septic tank with sand filter bed has been installed for treatment of the sewage from this area.

Closed Area No. 20 - Kennebec Area

This area is very important and has long been in dispute. It is located on both sides of the tidal estuary of the Kennebec River, and is reported to have many clams. At one time, before the area was closed, over 40 diggers were working these flats.

Twenty-nine stations were established and 110 samples collected, 81 of which were over the limit of 70 m.p.n. These samples were collected in the fall of 1946 and as a result of the tests, a portion of the area was opened.

During April, 1947, 48 additional samples were collected from 12 established stations, of which samples 39 were over the limit of 70 m.p.n., and many exceeded 1,700 m.p.n.

Closed Area No. 21 - Sasanoa River, Back River, Hockomock Bay, Knubble Bay

There are some clams in this area. Fourteen stations were established and 64 samples collected, and because of satisfactory test results, this entire area was opened for unrestricted digging on January 10, 1947.

Closed Area No. 22 - Sheepscot River

There are few clams in this area. The survey indicated that many sewers discharge into the river at Wiscasset.

Fourteen stations were established and 82 samples collected, 33 of which were over the limit of 70 m.p.n.

Closed Area No. 23 - Boothbay Harbor

There are few clams in this area. The sanitary survey indicated that there are sewers discharging into the harbor at many points, and that the sewage load is increased during the summer months.

Fourteen stations were established and 28 samples collected; of this number 22 were over the limit of 70 m.p.n., with 11 having an m.p.n. of 1,100 or over.

Closed Area No. 24 - East Boothbay

There are some clams in this area which receives sewage from many houses along the shore.

Three stations were established and 6 samples collected. Five had an m.p.n. of over 70.

Closed Area No. 25 - Damariscotta River

There are some clams in this area. The sanitary survey revealed that there are many private sewers entering the river at Newcastle and Damariscotta.

Closed Area No. 26 - Medomak River

There are some clams in this area. Eleven stations were established on December 16, 1946, and one set of samples collected. Five of these samples exceeded 70 m.p.n., and 3 exceeded 1,100 m.p.n. In July, 1947, supplemental samples were collected from additional stations and the tests indicated that the closed area was still heavily polluted.

Closed Area No. 27 - St. George River

This is an important clam digging area and there are several thousand bushels of clams within its limits.

Eight stations were established and 85 samples collected. Only 27 tested over 70 m.p.n., with a very few exceeding 240 m.p.n. As a result of this testing and the sanitary survey, a major portion of the area was opened.

Closed Area No. 28 - Tenants Harbor

There are only a few clams in this area and the presence of sanitary sewers discharging into the harbor indicates a considerable degree of pollution.

Six stations were established and 60 samples collected. Only one station was located within the closed area. The results at this station were unsatisfactory, therefore, the area remained closed.

Closed Area No. 29 - Rockland

There are few clams in this area. The harbor is heavily polluted with sanitary sewage and industrial wastes.

Fifteen stations were established and 85 samples collected, of which 49 were over 70 m.p.n., and 26 were 1,100 m.p.n., or over.

Closed Area No. 30 - Rockport

There are few clams within the limits of this closed area.

Five stations were established and 25 samples collected, of which 9 were over the limit of 70 m.p.n.

Closed Area No. 31 - Camden

There are only a few clams in this area, most of which are in Sherman's Cove.

Eight stations were established and 40 samples collected. Twenty-three were over 70 m.p.n., with 15 having an m.p.n. of 1,400 or over.

Closed Area No. 32 - Belfast

In this area there are only a few clams, mostly taken for home consumption. Eleven stations were set up and 60 samples collected, 43 of which were over the limit of 70 m.p.n., and a great many 1,100 m.p.n., or over.

Closed Area No. 33 - Searsport

This is a small area, having only a few clams which are used mainly for home consumption. From 6 stations, 60 samples were collected; only 14 were above the limit of 70 m.p.n., and about all of these were taken from stations located at the inner part of the harbor.

Closed Area No. 34 - Stockton Springs

There are few clams in this area, which are used mainly for home consumption. Six stations were established and 60 samples collected, only 3 of which were above the limit m.p.n. of 70. As a result of this survey, the entire area was opened on April 30, 1947.

Closed Area No. 35 - Penobscot River

There are some clams in this area which is polluted by sewage and industrial wastes from the Penobscot River. Thirty-one of a total of 33 samples showed an m.p.n. of over 70.

Closed Area No. 36 - Castine

There are few clams in this area. Nine stations were established and 90 samples collected, of which 32 were over 70 m.p.n.

Closed Area No. 37 - South Brooksville

There are only a few clams in this small, closed area in Bucks Harbor. The area is contaminated by 2 summer, and 1 year-round sewers. Four stations were established, from which 32 samples were collected. Four were above the limit of 70 m.p.n.

Closed Area No. 38 - Stonington

There are practically no clams in this area which receives considerable sewage pollution. Six stations were set up, 18 samples taken; 15 were over 70 m.p.n., with 11 having an m.p.n. of 1,100 or over.

Closed Area No. 39 - Blue Hill

There are some clams in this area. Six stations were established and 30 samples collected. Two of the samples were over the limit of 70 m.p.n., so a new line was established leaving only the inner harbor now closed.

Closed Area No. 40 - Union River, Ellsworth

This is a large closed area extending up Union River Bay to include Patten Bay at Surry and the Union River up to Ellsworth. Ten stations were established and 50 samples collected. The only unsatisfactory samples were from stations along the Union River below Ellsworth, which was expected

because of the large amount of untreated sewage discharged to the river by that city. As a result of this survey, a considerable portion of the closed area was opened and a new line established.

Closed Area No. 41 - Goose Cove

This area was opened to unrestricted digging on April 30, 1947. Only 3 stations were established, and only 3 samples of the 15 examined were over the limit of 70 m.p.n.

Closed Area No. 42 - Bass Harbor, McKinley

There are some clams in this area but the sanitary survey revealed several summer and factory sewers on the McKinley shore. Seven stations were set up and 35 samples collected. Eight samples exceeded the limit of 70 m.p.n.

Closed Area No. 43 - Southwest Harbor

There are some clams in this area. During the summer months the increased summer population adds a considerable amount of sewage to the harbor waters without treatment. Eight stations were established in this closed area, and 40 samples were collected, more than half of which, 22, were over 70 m.p.n. and 13 had an m.p.n. of 1,100 or over.

Closed Area No. 44 - Somesville

This area has some clams, and as a result of the survey it was found to be satisfactory and practically free of pollution. Four stations were established and 20 samples collected, of which only 2 exceeded the limit of 70 m.p.n. The area was opened to unrestrictive digging on April 30, 1947.

Closed Area No. 45 - Northeast Harbor

There are some clams in the area which receives a considerable amount of sewage pollution. Three stations were set up within the closed area and 15 samples collected; 4 were over the limit of 70 m.p.n.

Closed Area No. 46 - Seal Harbor

There are only a few clams in this closed area which is contaminated by several large sewers entering the upper end of the harbor.

Closed Area No. 47 - Bar Harbor

This area extends along the front of Bar Harbor Village, and it is reported that there are some clams. One large town sewer and a number of sewers from summer cottages discharge into the waters of this area. Nine stations were established and 45 samples collected, 10 of which were over 70 m.p.n.

Closed Area No. 48 - Hulls Cove

There are some clams within the limits of this closed area which is contaminated by 2 municipal sewers. Two stations were established and 10 samples collected, of which 4 were unsatisfactory.

Closed Area No. 49 - Salisbury Cove

There are some clams in this closed area which has one large sewer entering the cove. One station was established and 5 samples were collected, of which 4, or 80%, were over 70 m.p.n., 3 having an m.p.n. of 1,100 or over.

Closed Area No. 50 - Sorrento

There are some clams within the limits of this closed area which receives drainage from a number of sewers. Four stations were established and 20 samples taken, only 4 of which were over 70 m.p.n.

Closed Area No. 51 - Winter Harbor

There are only a few clams in this closed area. Four stations were established and 20 samples collected, 14 of which were above the limit of 70 m.p.n. Eight of the 14 were 1,100 m.p.n. or over, indicating a very polluted water.

Closed Area No. 52 - Prospect Harbor

There are some clams in this area which receives draining from a few sewers in addition to the sewage and wastes from a canning factory. Six stations were established and 30 samples collected. Consistently unsatisfactory samples were found at station #2.

Closed Area No. 53 - Milbridge

There are few clams between Fish and Fickett Points. Six stations were established and 30 samples collected, 12 of which were over 70 m.p.n., but all were under an m.p.n. of 461. Due to the satisfactory test results within a given section containing a large number of clams, it was opened to unrestrictive digging.

Closed Area No. 54 - Jonesport and West Jonesport

There are a great many clams all along this area which receives pollution from sewers and factories near stations #5 and #6. Eight stations were set up between Hopkins and Old House Points, and 40 samples collected. Of these, only 8 were above the limit of 70 m.p.n. A portion of the area was opened to unrestrictive digging.

Closed Area No. 55 - Machias River

There are many clams in this area which is contaminated by sewage in an area near Station #4, and the wastes and sewage from two factories. Six stations were established between Fort O'Brien Point and Pot Head, 30 samples were collected, 15 of which were found to be moderately or grossly polluted.

Closed Area No. 56 - Dennys River

Following the opening of this area between June 3rd and August 1st, 1950, 2,232 bushels of clams were taken from this area. Four stations were established and 20 samples collected, 8 of which were moderately polluted.

Closed Area No. 57 - Eastport

There are few clams in this area which is contaminated by numerous sewer outfalls.

Closed Area No. 58 - Lubec

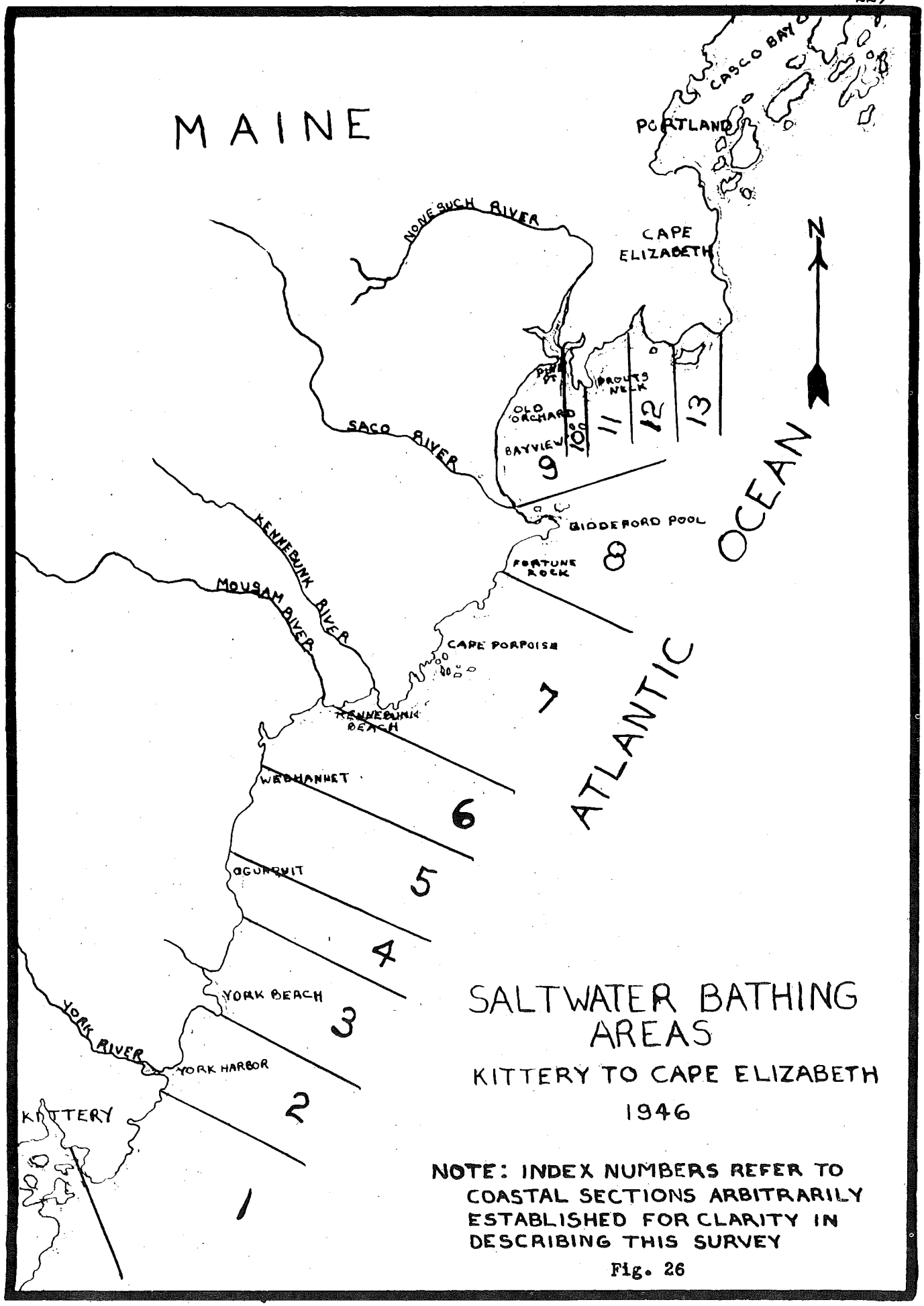
The closed area extends along the water front where there is considerable pollution from the many sewers and factories. Seven stations were established and 35 samples collected, of which about half, or 18, were over the limit of 70 m.p.n.

Summary of Clam Flat Survey of 1946 and 1947

After studying the results of the analyses of the sea water samples and the narrative report of each area, it may be concluded that it would be unwise to open any areas, or sections of areas, unless existing pollution has been removed; furthermore, that there are several very productive areas now closed which could be opened if existing pollution were eliminated. A solution of this problem would be for the state, the cities and towns, private individuals, or combinations thereof, to engage in an extensive program for removing or properly treating sewage and industrial wastes which now cause pollution of the closed areas. Practical methods for treatment of domestic sewage, municipal sewage, and industrial wastes are available and can be utilized whenever they may be financed.

Special work was done on many of the sea water samples to differentiate between fecal and non-fecal types of bacteria. An analysis of the results indicates a frequent occurrence of Escherichia coli, a fecal type of bacteria. On the basis of the findings, all the closed areas are polluted, at least to some extent, by sanitary sewage.

Opening closed areas, or portions thereof, may follow the removing of sources of pollution and subsequent investigations, sampling, and tests to determine that such areas are then sufficiently free from pollution to warrant the harvesting of clams from such areas.



SALTWATER BATHING AREAS

KITTERY TO CAPE ELIZABETH

1946

NOTE: INDEX NUMBERS REFER TO COASTAL SECTIONS ARBITRARILY ESTABLISHED FOR CLARITY IN DESCRIBING THIS SURVEY

Fig. 26

SURVEY OF THE SALT WATER BATHING AREAS FROM KITTERY TO CAPE ELIZABETH, MAINE 1946

A sanitary survey of salt water bathing areas from Kittery to Cape Elizabeth was made between June and September, 1946. The survey was initiated for the purpose of collecting data on the bacteriological quality of the water along the bathing beaches and obtaining information relating to some of the sewer outlets which empty into the tidal waters of York County and the western part of Cumberland County. Areas between the beaches were likewise studied, particularly harbors and tidal areas of rivers emptying in the vicinity of the beaches where tidal currents would be likely to transfer such waters to the beach areas.

Sampling stations were selected to best indicate the prevailing conditions and to properly evaluate sources of pollution. The samples were collected at regular intervals to include at least four tidal levels, the basic examinations being made at the trailer laboratory of the Sanitary Water Board which was located in Biddeford. Each sample was examined for the presence of the coli-aerogenes group of bacteria consisting of the presumptive tests by lactose broth fermentation of two-10 ml.portions, two 1 ml. portions and five-0.1 ml. portions of the sample. Results were read after 24-hour, and again after 48-hour periods of incubation at 37°C. Confirmation was carried out with brilliant green bile broth (2%). The first 84 samples were also carried through using Endos agar for confirmation. Confirmation was about 95% with either method, and the brilliant green bile was chosen for the remainder of the samples.

It was at first proposed to take samples at such times as to give results for all stations at the four stages of the tide, namely, high, half ebb, low and half flood. It soon became evident that consistently increasing south winds in the afternoon produced so much surf that early morning was the practical time to start on boat trips. It was decided to take samples on regular schedules insofar as the weather permitted. It was hoped to get samples at all stages of the tide in the course of a number of trips. This seemed to work out satisfactorily and at most stations two samples were obtained at approximately each stage of the tide.

Although records were kept of wind direction and relative strength at the time of sampling, no attempt was made to collect samples under different conditions of the wind. The tide seems to be the principal factor to be taken into consideration in the movement of pollution along the shore although the tidal currents are many times affected by strong prevailing winds. At times, the wind direction seemed to have a definite effect upon the floating solid portions of sewage.

No attempt was made to determine the strength or direction of ocean currents along the shore. In many places, especially near the tidal rivers, these currents were very evident. However, it was assumed that these currents are similar each time the tide changes, and that recording the stage of the tide also determines the current conditions at any given time.

Temperatures were taken of the ocean water at the time of the collection of most of the samples. These varied to a surprisingly limited degree. The first temperatures taken in the middle of June were about 50°F, while those

taken in July and August varied between 58° and 68°F. Within these limits the temperatures were erratic indicating that many factors may work together to raise the temperature of the inshore waters above that of the deeper ocean water. Enough surface temperatures were taken two miles or more out to sea to indicate that the July and August surface temperature of the ocean water off York County varies only slightly above and below 60°F.

Pollution along the beaches is caused by dumping raw sewage directly into the ocean at or near these areas; from the discharge of polluted rivers and streams into the ocean; by fish plants and similar industries along the coast; by large concentrations of sea gulls and probably in areas of concentrated bathing by the bathers themselves. The pollution is often extended over a wide area by shifting tides, river currents and by the wind in many cases.

On August 2, 1946, Maine experienced one of the worst storms in years. The sea was extraordinarily high, and the ocean bottom was obviously stirred up for long distances from shore in some places. Some of the open areas were discolored for nearly a week, while protected bays remained discolored even longer. Samples collected from August 5 to 12 gave unusually high results at many stations. This unusual event indicates that polluting materials apparently accumulate on the ocean floor and can be brought to the surface during such storms. This phenomena may also serve to indicate that even with the extremely high dilution offered by the salt water, decomposition or dispersion of the pollution solids is slow.

While samples of sea water were being collected, a sanitary survey of the coast was also made. This included the location of sewer outlets, dumps and other sources of pollution, with the data as to the contributing population and other principal factors relating to pollution. The beaches were also patrolled with the idea of observing the deposits of solid fecal material, if any, to determine the extent of visible pollution from certain large sewer outlets and to record any information that might be useful in the survey.

In both the sanitary survey and the bacteriological survey there are several factors which tend to limit the extent of the work and the accuracy of the results. In the sanitary survey the engineer must, to some degree, exercise his judgment concerning the degree of pollution and the extent to which certain areas are affected. In the bacteriological survey the time allowed for the work, while extending over an entire summer season, made it necessary to collect samples from a limited number of stations extending over 95 miles of coast line. An attempt was made to get an over-all picture of conditions in the areas studied. However, in some cases it was not possible to get sufficient samples to be able to definitely locate changes in pollution. This was true at Old Orchard Beach where sampling points were spread over a wide area (twelve stations were spread out over a six and one-half mile beach) and a fairly good picture of conditions is obtained, but the point where one condition changes to another is a matter of judgment aided by observations of the effect of tide, wind, and currents. Eight to ten samples were taken at most stations, and these should be considered to be a fairly good representation of conditions as they exist. At some points in early summer no noticeable pollution is evident, but pollution increases steadily as the season advances until objectionable conditions are found.

The classification of the safety of bathing waters on the basis of analytical results is complicated by the fact that no accepted standard exists as a

basis for such a classification. In public health work such standards have gradually been adopted after experience has shown that these can be attained and are sufficiently rigid to avoid possibility of infection as shown by epidemiological evidence. Some data are available as to the analysis of waters of outdoor bathing beaches. Several standards of purity have been proposed, but none has come to be generally acknowledged as being satisfactory and no accepted standard exists by which to classify such waters as good, fair, poor, and bad. For purposes of study a classification based upon the requirements of the rules and regulations relating to bathing areas was used. Section 14 of the April, 1946 revision of the rules and regulations is of particular significance and reads as follows:

"1. Bacterial quality: B. Coli - No single standard sample collected from the pool shall show a positive confirmed test in lactose broth in more than one (1) of the five (5) standard ten (10) ml. portions tested.

"No single standard sample collected from a public bathing beach shall show a maximum of over 10 B. Coli per ml. when confirmed in lactose broth.

"When a single sample shows over 10 but less than 30 B. Coli per ml. a repeat sample shall be immediately taken.

"If any single sample shows 30 or more B. Coli per ml. the beach shall be closed until subsequent samples show that the water is of satisfactory quality."

The average result of all tests at each station under all tide conditions encountered was used in this classification. This final average result was obtained by averaging the B. Coli index, which seemed to be as satisfactory a method as any. The following classification was used:

TABLE I

Class	A	B	C	D
Average B. Coli per cc.	0 - 10	11 - 20	21 - 30	over 30

Of the approximately ninety-five miles of coastline investigated, twenty-eight miles are considered bathing beach areas and are described as follows:

TABLE II

Class	A	B	C	D	Total
Mileage	20½	4½	½	2½	28
Percentage	73	16	2	9	100

These beaches are likewise classified as a result of the sanitary survey as follows:

TABLE III

Class	A	B	C	D	Total
Mileage	13¼	6	3 3/4	5	28
Percentage	47	22	13	18	100

For the purpose of this survey, the coast was divided into areas or sections according to the location of the various resort areas. In general, these corresponded with the towns in which they were located, but in some cases a town may contain two sections or a section may contain parts of two towns. The following outline of the sections describes the general conditions as found by the surveys:

Section 1 -- Kittery and Eliot Area

The sanitary survey showed little need to sample the inner areas of Kittery harbor or the Eliot shores. The high degree of pollution apparently caused by sewage from Kittery and Portsmouth, together with that from other Maine and New Hampshire cities and towns whose pollution is brought to this area by the rivers flowing into Great Bay and its environs make the area generally undesirable for bathing purposes. Industrial wastes also add to the pollution in this area.

Station A -- The sampling point at this station was at the dam at Spruce Creek near the bridge from Kittery Point to Crockett's Neck. Here the creek mouth is partly dammed, and the samples were taken just above the dam in the current. The pond thus formed by the dam is used as a swimming area and contains a large float and diving board. High bacterial pollution occurred only at high tide indicating that the pollution is in all probability brought into the creek from the harbor.

Station B -- The sampling point was at a dock in Pepperell Cove east of Fort McClary. Results indicate that the tremendous tidal flow into the harbor dilutes the pollution to a great extent.

Station C -- Sea Point Beach This beach of about 400 yards of fine white sand showed no pollution. It seems to be subjected to heavier deposits of sea weeds than any other beach surveyed. This area is safe for bathing. Seven sets of samples were taken and all were satisfactory.

Section 2 -- York Harbor and York Long Sands Area

This area includes York Harbor, a small beach called the Marshall House Beach and York Long Sands. Pollution to the York River includes both direct and indirect sewage from the villages of York Harbor and York Village as well as surface wash from rural areas along the river. The Marshall House Beach is about 300 yards of sand near but well outside of the harbor. Pollution here is from private sewers. York Long Sands consists of about one and three-quarters miles of beach of varying quality sand. There is some question of pollution coming from a swamp behind the main highway that flows through culverts to the beach.

Station A -- Samples were taken in York Harbor close to the inlet of the Marshall House swimming pool. This sampling point was selected mainly because of the pool which fills from and empties into the harbor. As expected, high B. Coli counts were found.

Stations B and C -- These points are near the ends of the Marshall House Beach. Low bacterial results early in the season followed by increasing pollution would seem to indicate that the pollution is from private seasonal sewers rather than from the backwash from York River.

Station D -- This station is near the south end of York Long Sands near the tent and trailer camp ground. Moderate pollution during the latter part of the summer appears to be due to sewage from the camp ground.

Stations E, F and G -- These points are spaced along York Long Sands. With the exception of the period following the severe storm in August, generally satisfactory conditions were observed. After this storm considerable kelp was observed on the beach.

Station H -- Pollution, inconsistent with the sanitary survey, on the north end of York Long Sands in the proximity of Nubble Point seems to be due to private sewers.

Section 3 -- York Short Sands and Cape Neddick Area

This section contains York Short Beach and Cape Neddick Harbor. York Short Beach, a fine beach about 500 yards long, is polluted by the effluent from a septic tank. The outlet pipe crosses the beach and empties into the ocean some distance from shore. Private and public sewers also empty into this area. Cape Neddick Harbor contains a beach of about 200 yards. Pollution here is apparently from the Cape Neddick River and possibly some sewage contamination from nearby houses on Barn Pt.

Stations A and B -- Consistently unsatisfactory results at both ends of York Short Sands show the effect of the sewage from the York Beach area, as well as from many private sewers.

Station C -- Unexpectedly high results at Cape Neddick Harbor are possibly due to upriver sources of pollution or from sewers discharding from Barn Pt. area.

Section 4 -- Ogunquit Area

Perkins Cove and Ogunquit Beach are included in this section. There is no beach at Perkins Cove and no bathing was observed here. Pollution comes from direct sewage and from the Josias River. Ogunquit Beach is a long neck of sand about two and three-quarters miles long between the Ocean and the Ogunquit River. Sewage from Ogunquit and from private sources reaches the Ogunquit River either directly or indirectly.

Station A -- Results of samples from Perkins Cove were consistently high.

Station B -- As was to be expected, samples from the bridge over the Ogunquit River showed consistently high results.

Station C -- Samples from the area of most concentrated bathing in front of the parking area near the tip of Ogunquit Beach showed an objectionable condition caused apparently by sewage from the nearby Ogunquit River. Conditions became much worse as the season progressed. showing the result of increased population in the area and to improper treatment of sewage.

Station D -- Near the unpopulated area of Ogunquit Beach contamination increased steadily to the peak of the season. This contamination may have been caused by tidal currents or by prevailing southwesterly winds to bring such contamination from the mouth of the Ogunquit River. Conditions here could not be considered very objectionable, however.

Stations E and F -- Other samples along Ogunquit Beach toward Moody indicate that a major portion of the beach area is satisfactory.

Section 5 -- Wells Beach and Drakes Island Area

This section includes Wells Beach and Drakes Island. Like Ogunquit Beach, Wells Beach is a neck of sand about two miles long behind which flows the tidewaters of the Webhannet River. Relatively little pollution reaches this river. At Drakes Island the beach is about one and one-quarter miles long. Both are fine beaches and neither is subject to any known sources of pollution.

Stations A, B, C, D, E and F -- Generally satisfactory conditions are indicated by results of samples taken along these beaches with erratic indications of pollution near the mouth of the Webhannet River. High results were obtained after the severe summer storm of August 2nd.

Station G -- Samples taken at the bridge over the Webhannet River on the road to Wells Beach indicate some pollution in the river which becomes increasingly diluted with ocean water below this point.

Section 6 -- Kennebunk and Kennebunkport Area

This section contains Crescent Surf, a fine beach about one and one-half miles long, and Kennebunk Beach. The latter, composed of several sections of beach, includes about one and one-half miles of varying quality sands. The eastern half of Crescent Surf is affected by the heavily polluted Mousam River which enters the ocean at the eastern end of this beach. Kennebunk Beach is polluted by untreated sewage from private sewers and by the Kennebunk River, which enters the ocean at the eastern and by the Mousam River at the western ends of the beach.

Station A -- Samples from the mouth of the Mousam River show, as expected, an unsatisfactory condition due to a heavily polluted river.

Station B -- Generally low results show satisfactory conditions in this area.

Station C -- High results at high tide are apparently caused by the sewer from a hotel which empties into the ocean outside and west of the ledges which protect this beach. At high tide this polluted water apparently washes back over the ledges. Some pollution at other stages of the tide probably comes from the same source.

Stations D and E -- Generally satisfactory conditions were found at these points. On August 16th a strong southeast wind apparently forced the highly colored water from the Kennebunk River at Kennebunkport back to the beach with a resulting high pollution along the shore.

Stations F and G -- Samples from these stations, the first at the bridge over the Kennebunk River and the second well inside the breakwater at the mouth of the river, show the high bacterial contamination to be expected in the waters of this river. Untreated sewage from Kennebunkport enters the river between these two stations.

Stations H and I -- On the eastern half of Crescent Surf there is found the effect of the polluted waters of the Mousam River. Highly colored river water was at times visible as far as the rocks at the middle of Crescent Surf, and the bacterial results bore out these observations.

Section 7 -- Cape Porpoise and Goose Rock Beach Area

Cape Porpoise Harbor and Goose Rock Beach are included in this area. The harbor itself has little or no bathing and contains no real beach. Pollution, both direct and indirect, enters from private sewers. Large colonies of sea birds on the islands nearby probably have some effect on these waters. Goose Rock Beach is a fine beach about one and one-quarter miles long and somewhat divided by ledges lying in Goose Fare Bay.

Station A -- This station was selected at the wharf in the harbor. Moderate pollution (highest in early August) has more bearing on clam digging than on bathing. This spot would not be likely to attract the most hardy bather due to fish wastes, raw sewage and surrounding flats.

Station B -- The sampling point at Goose Rock Beach was selected near the east end of the beach as this spot offered the best opportunity to approach the shore by boat and the greater part of the cottages were at this location. Pollution found in August was explained when it was learned that about twenty cottages discharge raw sewage or septic tank effluents into a small brook that empties into Little River near its mouth. This beach, being protected by Timber Island, is not flushed out by the tide as are the more exposed beaches. After the storm in early August this bay was still roily and discolored for several days after similar conditions had disappeared at other points.

Section 8 -- Biddeford Area

This section includes Fortunes Rocks, Fletchers Neck, Hills Beach and the Saco River Areas. Fortunes Rocks contains three small beaches broken by ledges totaling less than one-half mile of sand. At Fletchers Neck the beach is nearly two miles long. Hills Beach is about one and one-half miles of sand lying partly inside and partly outside the western breakwater at the mouth of the Saco River. Other small beaches dot the shores on both sides of the Saco River making a total of about one-half mile of beach. Beaches outside and west of Biddeford Pool are subject to no real pollution. All parts of this section north and east of Biddeford Pool are affected by waters from the Saco River which is heavily polluted by sewage from Biddeford and Saco, including industrial wastes.

Station A -- At Fortunes Rocks the western beach was selected for sampling due to the better passage through the ledges. It seemed likely conditions would be similar all along this beach although more houses are grouped at the eastern end of the beach. Conditions here were found to be satisfactory.

Stations B and C -- As was anticipated, low results were found at these stations on Fletchers Neck.

Station D -- A small, rather poor and seldom used, beach facing north at Biddeford Pool near the entrance to the Pool showed high pollution due to contamination by the waters from the Saco River and by sewage from private sewers.

Stations E, F, G, H, I and J -- This whole area near the mouth of the Saco River is highly polluted by that river.

Section 9 -- Saco, Old Orchard Beach and Pine Point Areas

This section includes the wide beach from the Saco to the Scarboro Rivers, a distance of about six and one-half miles. This beach is referred to as one of the finest beaches in the world. Pollution enters this area at Goose Fare Brook near Ocean Park and from six sewers, one at Ocean Park and five at Old Orchard Beach. The outlets of these sewers are supposed to be 2,000 feet beyond low tide mark. During this survey one of these sewers was being repaired due to breaks caused by shifting sands and tide. During the time when the outer end of the Pier is used, some raw sewage falls directly into the ocean. Goose Fare Brook is polluted by sewage from large sections of Saco.

Station A -- At Camp Ellis a large colony of small closely crowded cottages dispose of sewage by means of dry wells and septic tanks.

Station B -- At Bay View conditions were generally satisfactory throughout the season. One set of samples showed unsatisfactory results that might possibly be explained by a strong southeast wind which may have caused water from the Saco River to flow back in this direction.

Station C -- Samples from Goose Fare Brook at the bridge show a high degree of pollution. Apparently this pollution is carried north from the mouth of Goose Fare Brook for a short distance before it becomes sufficiently diluted.

Stations D, E, F, and G -- At these points along Old Orchard Beach, results were generally satisfactory with occasional high bacterial tests. Higher results here from July 24th to August 22nd were probably due to higher temperature of both air and water, a peak load of summer population with its attendant increases in sewage, the storm of early August and nearly continuous south or southeasterly winds.

Station H -- Unusually high results early in the summer may possibly be explained by the break in the sewer which was later repaired. This break was close to the sampling point. Results showed erratic pollution throughout the season.

Stations I and J -- High results in the area just north of the pier bore out the suspected trend of tidal currents and wind to carry sewage, emptied in deep water, in a northerly direction. This was also borne out by the sanitary inspections of the beach.

Stations K, L and M -- Bacterial results did not show the high results to be expected from observations made during the sanitary survey of the areas near Pine Point. Fecal material sometimes littered this end of the beach up to the end of Pine Point, possibly carried by tidal currents and prevailing winds.

The sanitary inspections of Old Orchard Beach show fecal material deposited on the beach more or less consistently from Stations G to J, and it was found that portions of the beach from Ocean Park to Pine Point are at times subject to these deposits.

On August 10th, one set of samples was taken at Old Orchard Beach by wading into about 18 inches of water. These samples gave higher results, especially in the Pine Point area. Higher temperatures observed, and possibly the higher bacterial results, probably were due, at least in part, to several days and nights of continuous warm weather. More erratic results at these stations than in any other section can be satisfactorily explained only by sewage pollution being present and by the uncertain tidal effects and by action of the wind.

Section 10 -- Black Point Area

In the area around Prout's Neck, pollution is from private sewers. These have little effect upon the beaches except for a small, little-used beach about 100 yards long on the neck. A larger beach about one-half mile long between the Scarboro River and Prout's Neck is not extensively used for bathing.

Stations A and B -- On the larger beach between the river and the neck results showed conditions to be generally satisfactory. Apparently moderate pollution coming into the Scarboro River or up from Pine Point is adequately diluted before it reaches these stations.

Station C -- The small beach on the neck is polluted by sewage from a private sewer. This pollution was evident at the peak of the summer season.

Section 11 - Scarboro Beach Area

Scarboro Beach offers about one and one-quarter miles of good beach. Due to its isolated position, no pollution reaches these waters.

Stations A and B -- As was expected, these stations showed very little evidence of pollution.

Section 12 -- Scarboro (Higgins Beach Area)

Higgins Beach and the Spurwink River are included in this section. Pollution at Higgins Beach is from an open sewer to Spurwink River behind the tip of the beach. The Spurwink River above this point receives very little sewage and the effluent from a distant complete sewage treatment plant at Cape Elizabeth Park.

Stations A and B -- Generally satisfactory results were obtained from samples taken at Higgins Beach.

Station C -- This point inside the tip of Higgins Beach was difficult to reach except at high tide. Low results were found just before high tide and high results just after high tide. This point was near the mouth of the sewer for this community.

Station D -- Samples taken from the Spurwink River at the bridge showed moderate pollution at all times with surprisingly high results after the first of August.

Section 13 -- Cape Elizabeth Area

This section includes Crescent Beach and other beaches near Richmond Island. The area is not subject to any heavy pollution. Several small brooks flowing across Crescent Beach were highly polluted, but the volume of flow seems to have little effect upon the beach as a whole, yet they will no doubt produce a polluted area at the point where they enter the salt water. Crescent Beach is about three-quarters of a mile long, while another one-half mile of beautiful beach lies near the end of Richmond Island breakwater, which is close by.

Station A -- Very low results near the breakwater at Richmond Island further the impression that this is an ideal beach.

Stations B and C -- Slight pollution along Crescent Beach seems to come from the small brooks crossing the beach. Conditions are generally satisfactory in this area.

SUMMARY OF BATHING BEACH SURVEY

It is believed that this study of the shore waters of southwestern Maine has produced enough data to provide a basis for the classification of the sanitary conditions of these waters. Some degree of correlation is shown between the relative classification of analytical results used in this study and the classification allocated on the basis of the sanitary survey.

Some of the beaches were found to be in satisfactory sanitary condition, while other beaches were sufficiently polluted to be unsatisfactory. Many of these are polluted by raw sewage from local sewers, or from polluted rivers and streams, but due to their close proximity to population centers some areas are extensively used for bathing purposes. In other places large summer populations increase the pollution of fine bathing areas. This situation requires a steady program of pollution reduction in order to increase the recreational value of these areas and to make them safe for bathing.

Increasing sewage pollution, especially in the crowded vacation areas, may result in conditions more threatening to the safety of the bathers in these areas than is shown by this survey. The need of sewage disposal systems and sewage treatment plants is clearly indicated in certain sections and this need for treatment will increase in proportion to the increased use of these areas for recreational purposes.

SPECIAL INVESTIGATIONS

During the past several years, many special investigations concerning pollution have been conducted by personnel of the Division of Sanitary Engineering and the Sanitary Water Board. The majority of these have been instituted because of complaints and petitions received from residents of areas where objectionable conditions have developed, and have required a considerable period of time and have ranged in scope from complete water-testing surveys such as was made on part of the Sebasticook River in 1944 and 1945, to single inspections of individual sawmills or other industrial plants.

Only a representative few of these special studies have been included because a complete description of all such investigations would require more space than is available in this report and because many do not concern areas of permanent pollution.

The results of many of the special investigations have been inconclusive because sufficient time was not available to obtain all the necessary information concerning the exact causes of pollution and to perform the research necessary to find means of abatement. The studies of wastes from potato starch factories are examples where economically feasible means of removing the causes of pollution from the waste water have not been found. While solutions to similar problems concerning pulp and paper mill wastes, appear to be close at hand, and partial reduction of pollution is achieved by lagooning, positive control is still lacking.

In other instances the investigations have produced more tangible results. Much pollution has been found to be readily eliminated by means of economical measures. Pollution from surplus potato dumps can be avoided simply by expediency in choosing the locations of such dumps; locations that will not permit liquid drainage to reach nearby watercourses. In many cases pollution can be reduced or eliminated by available treatment methods. Much of the pollution from fish processing plants is caused by solid particles included in their liquid wastes. These solids can generally be removed by fine screening the waste water before it is discharged. Further reduction of pollution, however, would require treatment of the soluble wastes.

POTATO DUMPS

A stream pollution problem of maximum proportions has occurred frequently during the last few years, occasioned by the dumping of surplus potatoes on the banks of, or into streams and brooks in Aroostook County during years of excess potato production. The decomposition of the potatoes caused offensive odors, and dark colored liquids leached from large dumps caused extensive pollution of the nearby brooks and streams. Besides causing pollution of nearby waters, these dumps could also spread some potato diseases, and provided extensive breeding areas for insects.

Possibly the most serious pollution was caused in the spring of 1947 when over 73 dumps were found to be located on the banks of rivers and streams. That year, the legislature passed a law prohibiting the dumping of potatoes into any stream, pond, lake or other body of water or watercourse, or on the ice thereof, or on the banks of the same, where such potatoes or any part thereof may pollute such waters. An estimated amount of 10,000,000 bushels of potatoes had already been dumped, many of them in watercourses, and although little further dumping was practiced, that spring many streams were heavily polluted and much damage to fish life resulted.

Another large surplus of potatoes was grown in 1949. As a result of the government purchases during the fall and winter, many of these were released for dumping and were dumped in such a manner as to be contrary to the potato dumping law. Six court cases were held because of the violations, four of which resulted in convictions.

HILL OF SURPLUS POTATOES DUMPED BESIDE STREAM.

POTATO STARCH FACTORIES

Wastes from the manufacture of potato starch are the major causes of industrial pollution in many of the rivers and streams of northern Maine. The manufacturing of starch requires great volumes of process water and results in the discharge of considerable quantities of both soluble and insoluble waste products to the receiving stream. For every 100 pounds of potatoes processed, over 10 pounds of wastes, on a dry basis, are produced, which is approximately equal to the amount of starch recovered. Such wastes on entering the streams cause from ten to twenty times the pollution load of sanitary sewage from the population groups also using the same stream for waste disposal.

No method of treatment has yet been devised which is completely satisfactory both from the standpoint of pollution abatement and economy. In 1945 a survey was undertaken by personnel of the Division of Sanitary Engineering, U.S. Army personnel, and the Sanitary Water Board to find ways of improving the water supply at Presque Isle which served the Army Air Base located there. Very low stream flow rates existed at the time with the result that Presque Isle Stream, the water supply source, was highly discolored even after treatment and contained a disagreeable taste, part of which may be due to starch factories located upstream. The investigation consisted mainly of finding the chemical composition of starch wastes and studying methods of chemical coagulation of protein water and vacuum filtration of the pumice. The studies indicated that practically all the potato wastes must be removed if pollution is to be abated. The most acceptable methods of treatment consist of fine screening, filtering or pressing the potato pumice, and possibly the lagooning of protein water.

Another study of starch wastes in general was carried out in 1946 by A. D. Little of Cambridge, Massachusetts, for the Maine Institute of Potato Starch Manufacturers, as a result of which it was suggested that heat coagulation would be an effective means of removing solids from protein water.

High concentrations of potato starch wastes in streams cause extremely high B.O.D. readings and rapid depletion of dissolved oxygen. Dilution of the wastes reduces their effect, but during periods of low flow or low water levels, sludge beds accumulate near the factories producing objectionable odors and depleting the oxygen in the water downstream to such a degree as to exclude fish life for a considerable area.

PUMICE SLUDGE BANKS ON STREAM BED FROM POTATO STARCH FACTORY

FISH PROCESSING PLANTS

Several special investigations have been made of individual fish processing plants located on the waterfront of coastal cities and towns. Inspections were made in many cases because of complaints stating that very disagreeable odors were being produced in the vicinity of the plants. These odors were the result of pollution in the water and debris along the shore caused by wastes discharged at the factories.

The investigations showed that some fish processing plants discharge quantities of process liquids having high protein content including many suspended solids. These process liquids include spillage from the unloading of boats, wash water, and protein water from cooking processes.

Industrial pollution of tidal waters along the shores of Maine is caused principally by the fishing industry and allied fields. It is a multi-million dollar industry, and along the coast appears to rate second only to the summer tourist trade in order of importance. The high protein content of wastes discharged at some fish processing plants cause considerable pollution even with the high dilution resulting from tidal activity.

CONCLUSION

Investigations and surveys of river pollution in the State of Maine, although rather extensively, carefully, and efficiently conducted, have largely been limited to specific problems or investigations of special areas or watersheds but have shown that, while the major part of the inland watercourses and coastal waters of the state are relatively free from pollution, there are many locations where pollution is excessive. Almost without exception the headwaters of rivers and streams have been found to be uncontaminated; the heaviest inland pollution, as a rule, occurring along the main stems of the larger rivers, especially in lower portions near their mouths, or in smaller rivers or streams in the vicinity of population centers and large industrial establishments. Coastal pollution is principally located in areas near cities, fishing communities, or the mouths of polluted rivers.

Many sources of pollution have been established; however, further study is needed to determine the relative importance of each on its local watercourse or coastal area. The inland surveys have shown the approximate number of people discharging sanitary wastes to each stream. This information, coupled with sewage quantity factors and the degree of treatment involved, forms a basis for close estimates on the amount of polluting material being discharged. In the case of industrial wastes, however, no accurate estimate can be made, therefore, each waste must be sampled and tested in such a manner that representative figures can be obtained regarding its composition, strength, and volume. While many of the larger industrial plants have been thoroughly studied, little information has been collected on the majority of industries in the state.

In the coastal areas, much information has been obtained on water conditions in the closed clam flats and in the southern bathing beach areas. In other sections the sewer outfall survey has given indications of places where sanitary sewage may cause pollution. In these locations few tests on water or industrial wastes reaching the water have been made, therefore, many actual conditions remain uncertain -- further study being necessary before the degree of pollution can be definitely established.

Sanitary sewage has been found to be the most widespread source of pollution in the state and the most dangerous from the public health standpoint. Many industrial establishments, however, are located in the larger population centers so that few instances of heavy pollution are caused by sanitary sewage alone, the majority consisting of a combination of both sewage and industrial wastes.

The most apparent damage in this state resulting from water pollution has been to our natural resources. Considerable inland fish life has been destroyed because of oxygen depletion in the water. This is caused by high concentrations of organic wastes and is the result of chemical and bacteriological action. The atmosphere in the vicinity of highly polluted water is often made objectionable by the evolution of foul gases frequently resulting from the lack of oxygen.

Damage to coastal resources,such as shellfish, has also occurred. Over 50 clam flat areas in the State have become polluted by bacteria of the fecal

coli-form type. Several of these flats are highly productive, and would produce many thousands of dollars worth of shellfish yearly if clam digging there could be allowed. The areas must remain closed, however, until the quality of the water can be improved. In some cases this can be accomplished economically, in others, however, the cost may be prohibitive.

The recreational value of several of the bathing beaches along the southern Maine coast has also been found to be impaired as a result of high bacteria counts in the water. This pollution is derived almost entirely from sanitary sewage, and is most prevalent near the population centers. While the quantity of bacteria in bathing waters required to constitute a public health nuisance is an uncertain factor, high counts when brought to public attention, do lessen their recreational value.

Many of the industries cause extensive water pollution -- the wastes from some types being more offensive than others. Pulp and paper mills, starch factories, fish processing plants, tanneries, and woolen mills produce wastes containing considerable amounts of putrescible material. On entering local streams, these create extremely high B.O.D.'s and low oxygen contents. In most instances, treatment is effective and economically possible. Starch factory wastes, however, present a special problem which was still under investigation in 1950, as are the wastes from wool scouring plants.

The most common types of industrial wastes in the state, but those which cause little actual damage to water quality, are sawmill wastes. They originate from many small mills generally located on streams or brooks, where the greatest nuisance is caused by covering the beds of streams and ponds (thereby destroying flora and fauna), littering their banks, or clogging downstream water intakes.

In general, the work to date (1950) has revealed two present basic requirements regarding a stream pollution abatement program in Maine. First -- the available information has shown a need for more treatment facilities than now exist in the state. Possibly new legislation will be required to provide the necessary impetus for such construction or to enforce other means necessary for abatement. Second -- the lack of complete information regarding water conditions and sources of pollution in many other areas indicates the need for a complete water sampling survey of each watershed, also sanitary surveys, and studies of many industrial wastes. These, however, require more funds than have yet been made available for such work as it has not been possible to initiate a statewide or continuous program of water pollution investigations, supervision or control, although the more recent program of the past year has laid the foundation for future action.

The passage of P.L. 845 by the 80th Congress has demonstrated that there is a nation-wide interest in the general problem of water pollution and has further emphasized that there are interstate differences where streams flow from one state to another which must be adjusted on a higher level than the individual states. Participation under this law by the Federal Government by supplying funds will stimulate development of both interstate and intrastate investigations. Coordination of these efforts by the various states is very essential and have largely been vested in health agencies for reasons of health protection and the provision of essential sanitary facilities for safeguarding the public health. Such activities within the state should be administered and coordinated through the health department.

The work of the last few years consolidated in this report gives inadequate information for definite classification of the various waters, but does demonstrate the need, not only of additional surveys and investigations, but also the need of their being put on a continuous basis and extended to all watersheds in the state.

It is hoped that eventually each river, stream, and coastal area in Maine can be classified according to its highest common use, and the water thereafter maintained at a quality commensurate with such usage, so that this great natural resource shall be best utilized for the greatest benefit possible for all the people of the state.

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