BUZZARDS BAY BASIN

1976

WATER QUALITY MANAGEMENT PLAN

Dennis G. Beauregard
Assistant Sanitary Engineer

Water Quality and Research Section
Massachusetts Division of Water Pollution Control

Westborough, Massachusetts
January 1977

PUBLICATION:# 14887-143-15-6-86-C.R.
APPROVED BY: Daniel Carter, State Purchasing Agent

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

BASIN PLANNING

What is a Water Quality Management Plan?

The approach to river basin plan development in Massachusetts is based on a series of reports prepared by the Division of Water Pollution Control. These reports define existing problems and propose solutions. The Federal Clean Waters Act Amendments of 1972 (PL92-500) set detailed requirements for basin plans. A basin plan is a water quality-oriented document based on the most up-to-date data available. The primary functions are:

1. To establish pollution abatement priorities in the particular basin based on existing water quality impact.
2. To establish effluent limitations for individual discharges as necessary to meet water quality standards.
3. To identify and, where possible, establish controls for non-point pollution sources.
4. To identify further studies necessary to meet future water quality goals and establish the relationships among the various plans.
5. To evaluate and, where appropriate, propose changes in existing water quality standards.
6. To establish a program of water quality monitoring and surveillance to chart progress towards meeting the goals of the plan.

Basin plans deal with both existing and potential water quality problems and are therefore both short-term and long-term plans. The plan is updated periodically as other plans and studies are completed which have impacts on basin planning. Basin plans prepared by the Division of Water Pollution Control are formulated to meet the existing water quality standards. Following the completion of recommended actions, all plans will be updated to evaluate the effects of these actions and propose further measures necessary to meet future goals, such as the 1983 goal of the federal law of all waters "swimmable/fishable."

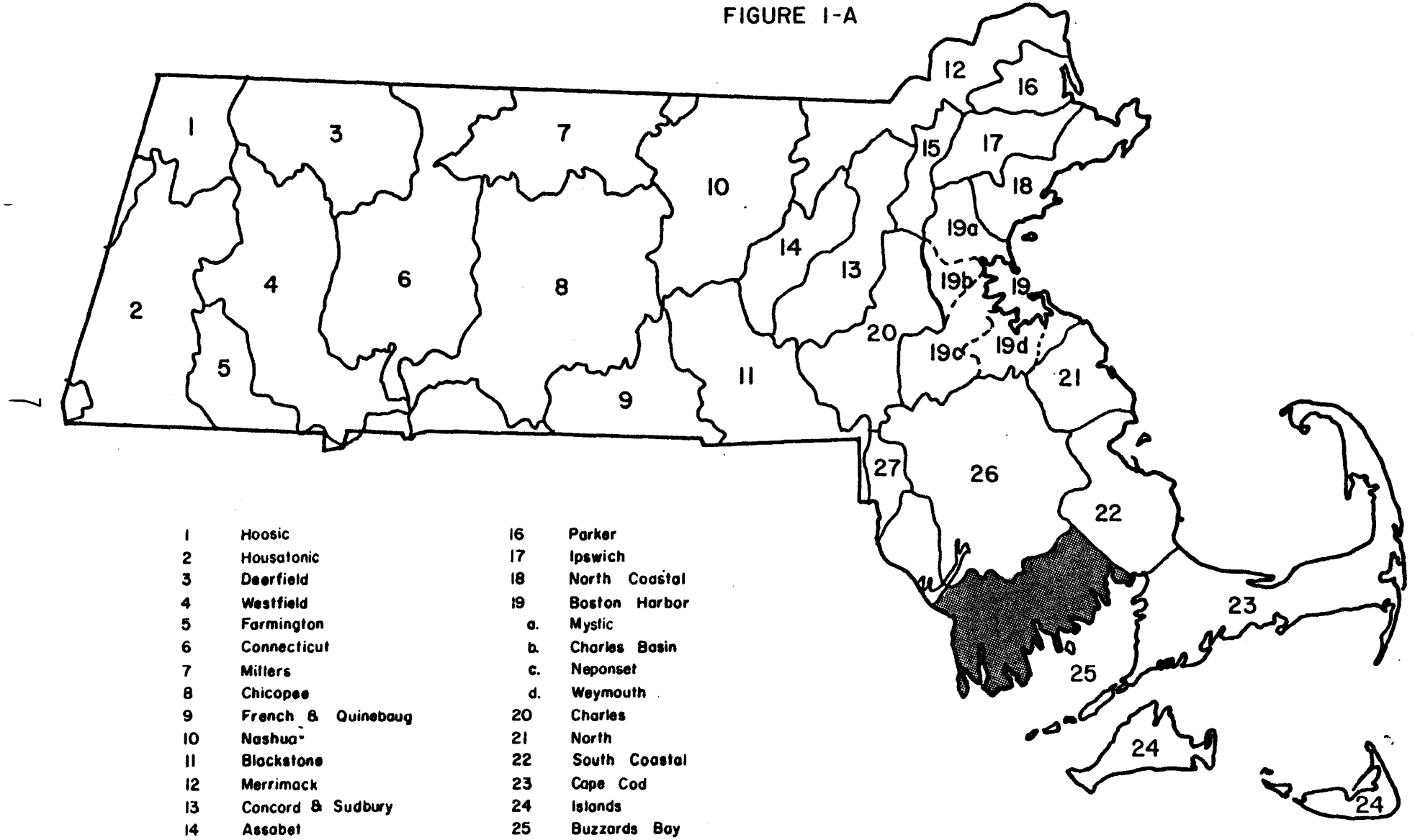
How do basin plans relate to other plans required by the Federal law?

Besides basin plans, PL92-500 calls for two other types of plans: Section 201 of the act calls for Facilities Plans, which are detailed engineering studies necessary to build a particular treatment facility; while Section 208 calls for Areawide Waste Treatment Management Plans. These plans are usually referred to by their section numbers. The basin plan identifies the needs for such plans in the basin. In designating 201 planning areas, the basin plan might identify potential sewer districts serving two or more towns. The alternative of forming the district or treating each town's wastes separately would be studied further in a 201 plan. In areas with highly complex water quality problems resulting from a cluster of point and non-point waste sources, the basin plan might call for a 208 study. A 208 study is a land-oriented study; a basin plan is water-oriented. The basin plan might provide one

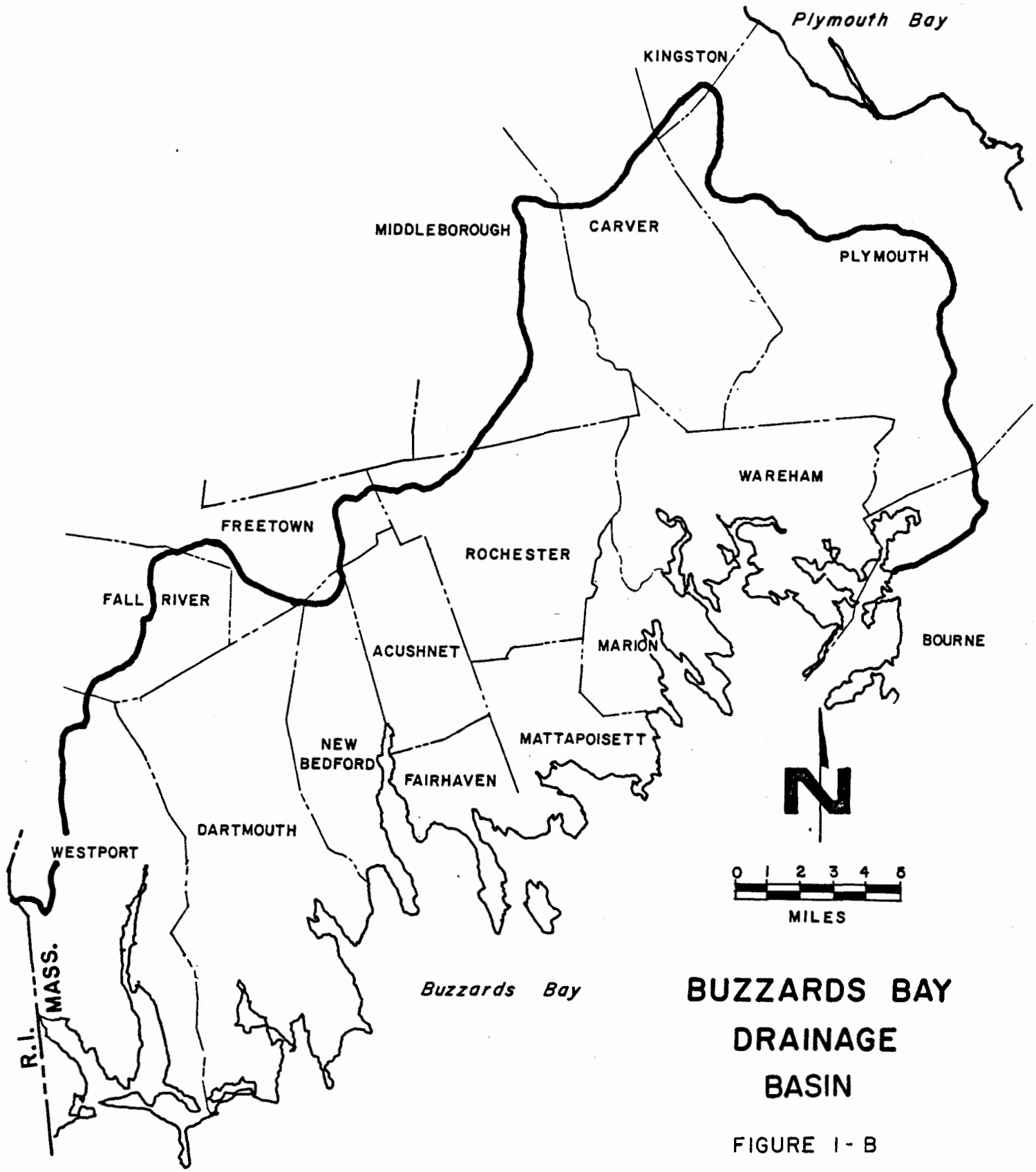
COMMONWEALTH of MASSACHUSETTS

DRAINAGE BASINS

FIGURE 1-A



1	Hoosic	16	Parker
2	Housatonic	17	Ipswich
3	Deerfield	18	North Coastal
4	Westfield	19	Boston Harbor
5	Farmington	a.	Mystic
6	Connecticut	b.	Charles Basin
7	Millers	c.	Neponset
8	Chicopee	d.	Weymouth
9	French & Quinebaug	20	Charles
10	Nashua	21	North
11	Blackstone	22	South Coastal
12	Merrimack	23	Cape Cod
13	Concord & Sudbury	24	Islands
14	Assabet	25	Buzzards Bay
15	Shawsheen	26	Taunton
		27	Ten Mile



BUZZARDS BAY DRAINAGE BASIN

FIGURE I - B

TABLE I-1

BUZZARDS BAY BASIN CITIES AND TOWNS

LAND AREA - POPULATION

MUNICIPALITY	INCORPORATED (year)	LAND AREA (sq. mi.)	AREA IN BASIN (% of total)	POPULATION 1970	1970 DENSITY (persons/sq.mi.)
Acushnet	1860	18.00	100	7,767	431
Bourne	1884	41.02	11	12,636	308
Carver	1790	38.41	84	2,420	63
Dartmouth	1664	60.91	100	18,800	309
Fairhaven	1812	12.15	100	16,332	1,344
Freetown*	1785	34.57	19	4,270	124
Kingston*	1726	18.55	4	5,999	323
Marion	1852	14.28	100	3,466	243
Mattapoisett	1857	17.46	100	4,500	258
Middleborough*	1669	69.98	21	13,607	194
New Bedford	1847	18.99	96	101,777	5,359
Plymouth	1620	97.57	47	18,606	191
Rochester	1686	33.76	93	1,770	52
Wareham	1739	36.68	100	11,492	313
Westport	1787	53.01	85	9,791	185

*These communities are not considered members of the Buzzards Bay Basin planning area due to their relatively small percentage of land area within the basin.

Source: Cities and Town Monographs, Department of Commerce and Development, Commonwealth of Massachusetts

waste load allocation for the cluster of discharges; the 208 study would look at alternative methods of meeting that allocation, including land use controls to reduce the non-point contribution. The 208 study might also evaluate a regional management authority to operate several waste treatment facilities.

Each type of plan includes a mechanism for public participation. In areas where all three types of plans are required, the public participation should be viewed as one overall program. In the basin planning portion, the public has the opportunity to help set goals of the overall process by assessing proposed water quality classifications. Basin planning public meetings are largely educational: the basin planner explains the technical data used to formulate the plan. The public in turn can provide the basin planner with information about the area, assess potential regional alternatives from a local viewpoint, and evaluate proposed abatement priorities.

BUZZARDS BAY BASIN

The Buzzards Bay drainage basin is formed by seven major coastal river basins which discharge their waters to the Massachusetts coastline from Bourne to Westport. The Cape Cod Canal determines the eastern border of the basin, while the Rhode Island state line defines the western border. From east to west, the major river basins are: Agawam, Wankinco, Weweantic, Mattapoisett, Acushnet, Paskamanset/Slocums, and Westport. The Buzzards Bay Basin has an approximate drainage area of 350 square miles. The 1970 population within the basin is estimated at 200,000 people (estimated from SENE Study figures.)

Geologically, the Buzzards Bay Basin is characterized as a low granitic upland with glacial till and outwash deposits forming the soils. The terrain can be described as low and gently rolling with elevations ranging from slightly more than 200 feet in the hilly northernmost portions of the basin to sea level at the coastline. The minimal elevation change in the basin accounts for the meandering nature of most of the rivers.

The straightline distance of the Buzzards Bay coastline is 32 miles, but its actual total length is 210 miles when all the undulations are accounted for. The numerous harbors and coves formed by the jagged coastline are used extensively for recreational and commercial purposes. New Bedford Harbor, which is famous for its whaling history, is the industrial and commercial center of the basin and, in turn, suffers the most severe water quality problems. These can be mainly attributed to discharges of sewage from combined sewer overflows and varied industrial discharges. The problems plaguing other harbors within Buzzards Bay include discharges of sanitary wastes from municipal collection systems and from watercraft. Oil pollution from the on-shore terminals and the off-shore tankers is a problem that is common to the entire coastline of Buzzards Bay.

With the exception of the Acushnet River and New Bedford Harbor area, industrial wastewater discharges are few in number and have little impact on the quality of the receiving waters.

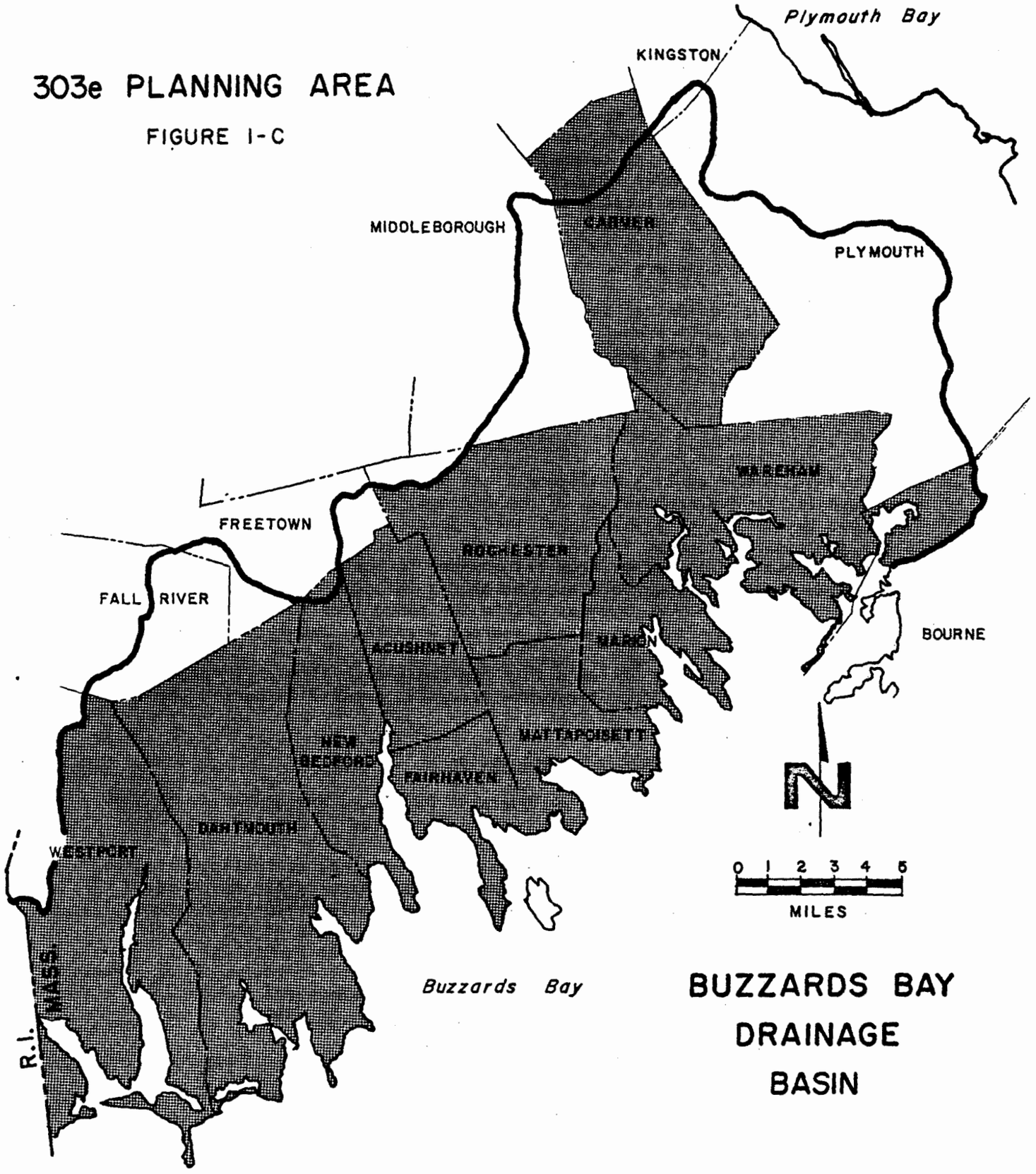
There are five municipal wastewater treatment plants serving the communities of Wareham, Marion, Fairhaven, New Bedford, and Dartmouth. The New Bedford

TABLE I-2

COMMUNITIES AND DESIGNATED PLANNING AREA

BUZZARDS BAY BASIN

MUNICIPALITY	BASIN PLAN
Acushnet	Buzzards Bay
Bourne - northern side	Buzzards Bay
Bourne - southern side	Cape Cod
Carver	Buzzards Bay
Dartmouth	Buzzards Bay
Fairhaven	Buzzards Bay
Fall River	Taunton
Freetown	Taunton
Kingston	South Coastal
Marion	Buzzards Bay
Mattapoisett	Buzzards Bay
Middleborough	Taunton
New Bedford	Buzzards Bay
Plymouth	South Coastal
Rochester	Buzzards Bay
Wareham	Buzzards Bay
Westport	Buzzards Bay


303e PLANNING AREA
FIGURE I-C
Plymouth Bay
KINGSTON
MIDDLEBOROUGH
CARVER
PLYMOUTH
WAREHAM
FREETOWN
ROCHESTER
FALL RIVER
MARION
BOURNE
ACUSHNET
MATTAPOISETT
NEW BEDFORD
FAIRHAVEN
DARTMOUTH
WESTPORT
R.I.
MASS.
0 1 2 3 4 5
MILES
Buzzards Bay
BUZZARDS BAY
DRAINAGE
BASIN

facility provides primary treatment, while the remaining plants offer at least secondary treatment.

Non-point pollution sources to the rivers and harbors of Buzzards Bay include stormwater runoff, agricultural runoff, and possibly leachate and landfill runoff. Included within the category of agricultural runoff is the use of pesticides by the cranberry industry which has in past years been responsible for fish kills in rivers located in the eastern portion of the basin. Wetland areas, in certain instances, are considered natural non-point sources of pollution because of high color, high carbonaceous oxygen demand, and low dissolved oxygen waters contributed by them to streams.

The United States Geological Survey maintains only one permanent flow gaging station within the entire basin, located on Adamsville Brook (the headwaters of the West Branch of the Westport River) in Adamsville, Rhode Island.

PRESENT WATER USE

Water Supply

In 1970, an average of 21.5 million gallons per day (MGD) of potable water were supplied to the communities of New Bedford, Acushnet, Dartmouth, and Fairhaven by the out-of-basin Lakeville Ponds complex. Surface water sources within the basin accounted for only 0.4 MGD. An additional 4.8 MGD were supplied by municipal systems from groundwater sources within the basin. Groundwater resources therefore account almost in total for potable waters supplied to the basin from sources within the basin itself. Table I-3 breaks down by community the present sources and projected future demands.

The cranberry industry is active within the eastern portion of the basin and is dependent upon surface freshwater sources, especially during the harvesting season.

Recreation

The rivers, lakes, and ponds in the Buzzards Bay Basin are generally of high quality and offer swimming, boating, and fishing (see Tables I-4 and I-5).

The ocean is, without a doubt, the primary water-related recreation resource within the entire basin. The jagged coastline of Buzzards Bay has created an abundance of natural harbors which are used extensively for both commercial and recreational purposes. New Bedford Harbor is the home of the largest commercial fishing fleet of the harbors comprising Buzzards Bay but is presently of such poor water quality as to be of almost no recreational value. Fortunately, many of the remaining coastal waters of Buzzards Bay are of excellent quality; and recreation in the form of boating, swimming, and fishing (among others) is offered.

Shellfishing is both a form of recreation and a commercial industry which is totally dependent upon high quality waters. Approximately one-third of the productive shellfishing areas of Buzzards Bay are presently closed due to bacterial contamination (Table I-6).

TABLE I-3

SUMMARY OF 1990 WATER SUPPLY PROPOSAL

BUZZARDS BAY BASIN

MUNICIPALITY	EXISTING SYSTEM 1970 SOURCE	SAFE YIELD* (MGD)	1990 AVERAGE DEMAND (MGD)	1990 DESIGN DEMAND** (MGD)	PROPOSED ADDITIONAL SOURCES OF SUPPLY
Acushnet	New Bedford Water Dept.	0.36	.77	.77	New Bedford Water Dept.
Bourne	Wells	5.9	3.93	3.93	Ground water
Carver	Private wells	---	---	---	Private wells
Dartmouth	Wells	1.50			Ground water and
	New Bedford Water Dept.	0.49			New Bedford Water Dept.
		1.99	2.23	4.46	
Fairhaven	Wells	1.14			Ground water and
	New Bedford Water Dept.	0.17			New Bedford Water Dept.
		1.31	1.60	3.30	
Marion	Wells	1.15	1.15	2.46	Ground water
Mattapoisett	Wells	2.05	.73	1.63	None
New Bedford	Lakeville Ponds	20.00	20.98	20.98	Ground water and Acushnet Reservoir
Plymouth	Great & Little South Ponds	2.00	7.57	7.57	Ground water
	Gravel-packed wells	5.86			
		7.86			
	Gravel-packed wells	0.58 (emergency supply)			
Rochester	Private wells	---	---	---	Private wells
Wareham	Wells	3.52			Ground water
	Jonathan Pond	0.40			
		3.92	3.56	6.73	
Westport	Wells	>0.04	.47	1.10	Ground water and Fall River Water Dept.

*Ground water yield is reported as pumping capacity of system.

**Systems relying primarily on ground water sources must supply maximum day needs.

Source: SENE Study.

TABLE I-4

SURFACE WATER INVENTORY

BUZZARDS BAY BASIN

Total number of lakes, ponds, and reservoirs	162
Number of significant lakes and ponds (greater than 10 acres)	115
Number of officially recognized Great Ponds	16
Total surface area of lakes, ponds, and reservoirs	6,224 acres
Surface area of significant lakes and ponds (greater than 10 acres)	5,948 acres
Surface area of officially recognized Great Ponds	1,937 acres

Source: Massachusetts Division of Water Pollution Control.

TABLE 1-5

STOCKED TROUT WATERS

BUZZARDS BAY BASIN

RIVER/STREAM	COMMUNITY
Acushnet River	Acushnet
Agawam River	Wareham
Bread and Cheese Brook	Westport
Copicut River	Dartmouth
Doggett Brook	Rochester
Mattapoisett River	Mattapoisett, Rochester
Shingle Island River	Dartmouth
Westport River	Westport

Source: Massachusetts Division of Fisheries and Wildlife.

TABLE I-6

STATUS OF SHELLFISH AREAS*

BUZZARDS BAY BASIN

CITY OR TOWN	CLOSED AREA	ACRES CLOSED	ACRES OPEN
Bourne	Wings Cove	10	800
	Bassetts Island	<1	---
Dartmouth-New Bedford-Fairhaven	New Bedford Harbor(6/7**)	1,270	1,400
	Clark Cove	1,640	---
	Apponagansett Bay	37	---
Marion	Sippican Harbor	<11	900
Mattapoisett	Mattapoisett Harbor	19	900
Wareham	---	---	500
Westport	---	---	900

*Based on data from the Department of Environmental Quality Engineering, Division of Water Supply and Water Quality, Shellfish Sanitation Section, April 1976.

**Indicates fraction ot total closed area; taken to determine estimated productive shellfish area.

TABLE I-7

LAND USE COMPARISON: 1951 and 1971

BUZZARDS BAY BASIN

Land Use - Acreage

TOWN	YEAR	FOREST	AGRICULTURAL OR OPEN	WETLAND[1]	MINING/WASTE DISPOSAL[2]	URBAN	OUTDOOR RECREATION[2]
Acushnet	1951	7,800	2,877	437	---	1,101	---
	1971	7,280	2,666	569	253	1,392	55
Bourne	1951	21,326	2,204	2,524	---	1,897	---
	1971	19,736	1,697	2,163	120	3,962	273
Carver	1951	18,132	6,558	2,596	---	218	---
	1971	17,023	5,911	2,982	66	1,478	44
Dartmouth	1951	25,815	9,017	2,200	---	3,005	---
	1971	22,852	7,196	4,110	579	4,640	660
Fairhaven	1951	3,060	1,909	907	---	2,035	---
	1971	2,768	1,767	928	11	2,257	180
Marion	1951	6,731	944	610	---	820	---
	1971	6,085	544	775	76	1,379	246
Mattapoisett	1951	8,160	1,549	705	---	722	---
	1971	7,870	866	663	76	1,508	153
New Bedford	1951	5,221	1,012	375	---	6,169	---
	1971	4,034	591	576	99	7,013	464
Plymouth	1951	51,267	4,561	4,436	---	2,651	---
	1971	44,510	5,015	5,306	299	6,843	942

TABLE I-7 (Continued)

TOWN	YEAR	FOREST	AGRICULTURAL OR OPEN	WETLAND[1]	MINING/WASTE DISPOSAL[2]	URBAN	OUTDOOR RECREATION[2]
Rochester	1951	16,315	4,449	2,174	---	124	---
	1971	15,594	4,248	2,366	97	757	---
Wareham	1951	14,866	4,172	2,478	---	2,229	---
	1971	12,349	3,260	3,538	223	4,014	361
Westport	1951	21,344	7,960	5,820	---	1,912	---
	1971	19,827	7,031	5,906	249	3,650	373

1. Different definition used in 1951 and 1971, so direct comparison not possible.
2. Not separated from other categories in 1951 study.

Source: Remote Sensing 20 Years of Change in Massachusetts, Barnstable, Bristol and Plymouth Counties.

ECONOMY

New Bedford was once the leading whaling port of the nation and the fourth largest seaport on the East Coast. The economy of this area is still very much associated with the ocean, but the whaling trade is gone and the harbor is considered to be an important secondary seaport only.

Today, New Bedford Harbor is the home of the largest fishing fleet within Buzzards Bay and is a modern fish-shipping center. Many Cape Cod fishing boats which formerly unloaded their cargoes at Boston or New York now transship their haul at New Bedford.

Acushnet and New Bedford are the basin's industrial center. The textile industry once formed much of their industrial base, but since the Depression, textiles have been of secondary importance. Since then, the industrial base has been expanded to include electronics, rubber, plastics, metals, and other industries.

Agriculture has always played an important part in the economy of the basin. Westport, Dartmouth, Acushnet, and Bourne are all dairying centers to varying degrees. Carver is famous as the cranberry producing center of the United States. The cranberry industry is also important to the economies of Bourne, Rochester, and Wareham.

Tourism is now a major industry throughout the basin, especially to the coastal communities of Bourne, Dartmouth, Marion, Mattapoisett, and Wareham, which are all resort centers of some fashion. New Bedford and Fairhaven are presently handicapped by a badly polluted harbor but are making attempts to develop the waterfront into a lucrative tourist attraction based on the area's colorful whaling history.

II. WATER QUALITY STANDARDS

EXISTING STANDARDS

The goals of the basin planning process are set by the appropriate Water Quality Standards. The Massachusetts standards were established by the Division in 1967 and revised in 1974. The Water Quality Standards consist of definitions of the use classifications, general regulations, present and future use classifications for the waters of the Commonwealth, and plans of implementation to meet the future use classifications. Use classification definitions, including water quality criteria, and general regulations are established on a state-wide basis. These parts of the Standards, as revised in May 1974, are presented in Appendix 2 of this plan. Application of the use classifications and setting forth the program of implementation in a particular basin is the major function of the basin plan. These portions of the standards are particularly suited for periodic review and revision depending upon abatement progress, waste treatment technology available, and national water quality goals. The application of the new definitions and regulations to each basin amounts to a reclassification, whether or not the actual future use classifications are changed. For example, a stream which was given a "B" future use classification under the 1967 standards must now be reclassified to "B" under the 1974 standards. This process requires a formal public hearing in each basin.

Changes to the classification definitions are summarized as follows:

1. Numerical criteria for nutrients have been replaced by two general provisions. The first prohibits new discharges of nutrients to lakes and ponds or their tributaries. The second requires that discharges containing nutrients in concentrations that encourage eutrophication or the growth of algae or weeds shall be treated to the maximum extent technically feasible. The result of this change is that the need for nutrient removal at waste treatment facilities will be assessed on a case-by-case basis, rather than through the use of state-wide stream standards.

2. Modifications of the B and C classifications have been established for streams where all criteria for these classifications can be met except dissolved oxygen. A Class B1 stream would meet all the criteria for Class B except for dissolved oxygen, for which Class C criteria would be met. A Class C1 stream would meet all Class C criteria except dissolved oxygen, for which a minimum concentration of 2.0 mg/l would be maintained. These modifications allow higher use classifications to be assigned to slow, sluggish streams with natural low dissolved oxygen values than were possible under the old standards.

3. An objective for coliform bacteria of 5,000 per 100 milliliters has been established for Class C and SC waters. In waters not subject to urban runoff, this shall be the criterion for Classes C and SC. Waters subject to urban runoff which do not meet this objective but do meet all other Class C criteria can be used as Class C streams. It is the long-term goal of the Division to solve all urban runoff problems and assign bacterial limits to all waters.

4. Class D has been eliminated. All waters assigned this classification for future use must be upgraded to at least Class C1. This represents a

substantial upgrading, since C1 waters shall be suitable for a variety of uses, including recreational boating and fish and wildlife habitat. Class D waters were suitable only for power, navigation, and limited industrial uses.

ANTI-DEGRADATION CLAUSE

Included in the "General Provisions" of the Massachusetts Clean Waters Act is an anti-degradation statement which is directed toward the preservation of high-quality waters within the Commonwealth. Rivers which receive no municipal discharges and segments of rivers which are upstream of existing discharges from municipal wastewater treatment plants are defined as anti-degradation areas and protected from any future wastewater discharges. Existing discharges to anti-degradation streams will be connected to municipal collection systems. Where this proves impractical or impossible (such as where there is no existing municipal system to connect to), treatment of the highest and best practical means will be provided.

New discharges to anti-degradation streams from municipal waste treatment facilities will be permitted only if they are in accordance with a plan developed under the provisions of Section 27(10) of the General Laws (Massachusetts Clean Waters Act) which has been the subject of a public hearing and approved by the Division. Industrial discharges of cooling water will be allowed only if associated with the public or private supply of heat or electrical power.

Another important section of the anti-degradation statement prohibits any new discharges of nutrients to lakes or ponds and any new discharges to tributaries of lakes or ponds which would encourage eutrophication.

FUTURE CLASSIFICATION

Public Law 92-500 set forth the following goals:

1. By 1977, attain the water use classifications proposed in 1967.
2. By 1983, attain Class B quality for all freshwaters and Class SA for all coastal waters (fishable/swimmable).
3. By 1985, eliminate all discharges of pollutants to surface waters.

The objective of the basin plan is to achieve the 1967 water quality classifications by 1977. It is obvious at this late date that attainment of all assigned water quality classifications for waters of the Buzzards Bay Basin will be impossible. However, it is intended that the goals outlined in PL92-500 be attained despite delays in target dates.

The water quality classifications proposed in 1967[1] for the waters of the Buzzards Bay Basin will undergo review once these goals have been met. At that time, segments which have assigned classifications of less than B or SA quality will be reclassified to these levels unless these goals prove unreasonable or unattainable for such reasons as economic considerations or limits on current pollution control technology.

[1] 1967 water quality classifications were revised in 1974.

TABLE II-1

MAJOR ANTI-DEGRADATION STREAMS

BUZZARDS BAY BASIN

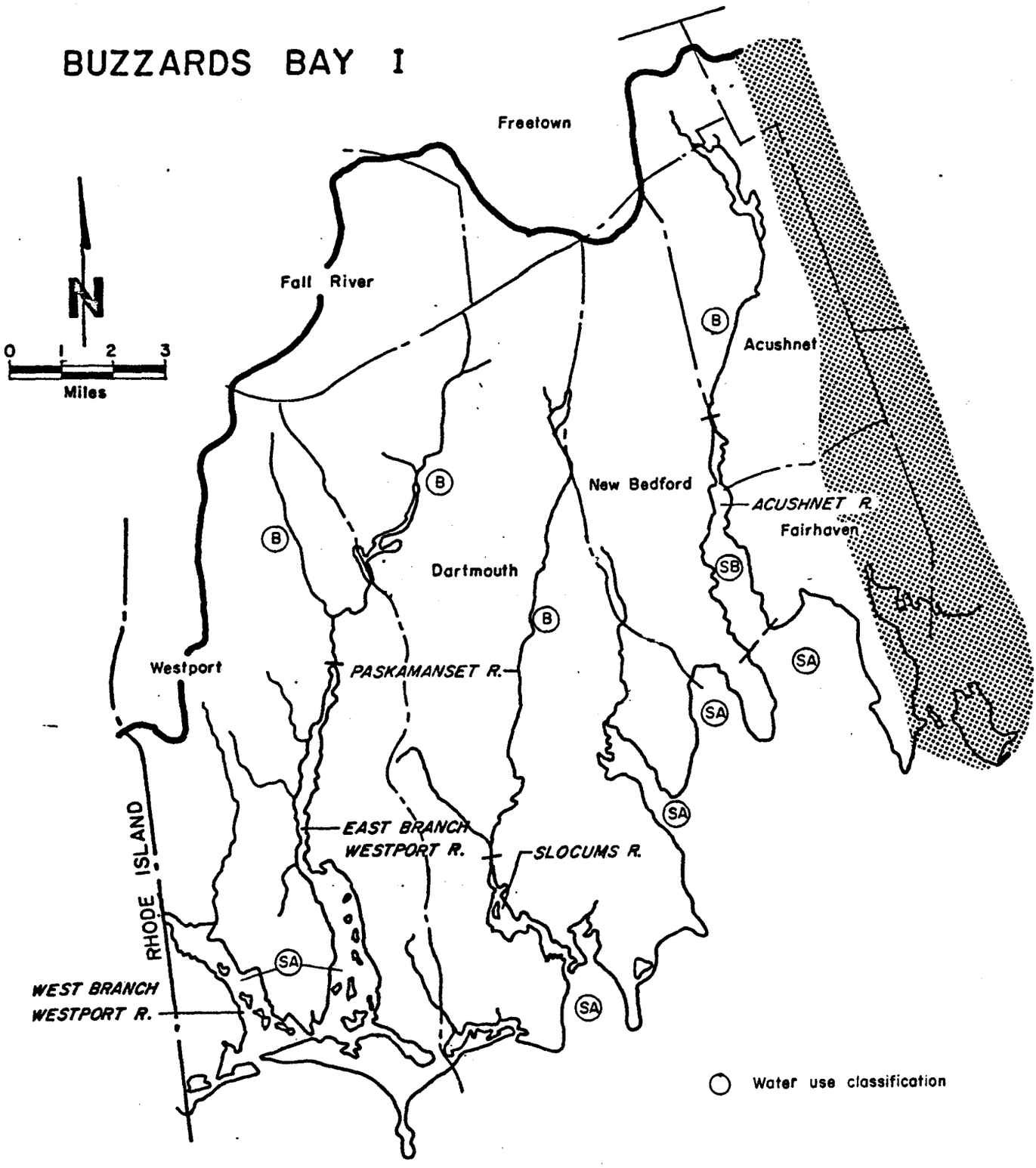
Stream	Municipality
Westport River - West Branch	Westport
Simon Brook	Westport
Angeline Brook	Westport
Dunhams Brook	Westport
Westport River - East Branch	Westport
Bread and Cheese Brook	Westport
Kirby Brook	Westport
Snell Creek	Westport
Allen Creek	Westport
Shingle Island River	Dartmouth
Copicut River	Fall River
Paskamanset River	Dartmouth
Destruction Brook	Dartmouth
Slocums River	Dartmouth
Buttonwood Brook	Dartmouth
Acushnet River to Sawmill Pond outlet	Acushnet
Deep Brook	Acushnet
Nasketucket River	Fairhaven
Swift Brook	Fairhaven
Mattapoisett River	Rochester
Branch Brook	Rochester
Aucoot Creek	Marion
Sippican River	Marion
West Branch, Sippican River	Rochester

TABLE II-1 (Continued)

Stream	Municipality
East Branch, Sippican River	Rochester
Sherman Brook	Rochester
Doggett Brook	Rochester
Hales Brook	Wareham
Cohackett Brook	Wareham
Weweantic River	Carver
South Meadow Brook	Carver
Beaverdam Brook	Carver
Rocky Meadow Brook	Middleborough
Double Brook	Middleborough
East Rocky Gutter Brook	Middleborough
West Rocky Gutter Brook	Middleborough
Indian Brook	Carver
Crane Brook	Carver
Tilson Brook	Carver
Beaverdam Creek	Wareham
Wankinco River	Carver/Plymouth
Frogfoot Brook	Carver
Rose Brook	Wareham
Harlow Brook	Wareham
Broad Marsh River	Wareham
Crooked River	Wareham
Agawam River to Wareham STP	Plymouth/Wareham
Maple Springs Brook, East Branch	Wareham
Gibbs Brook	Wareham

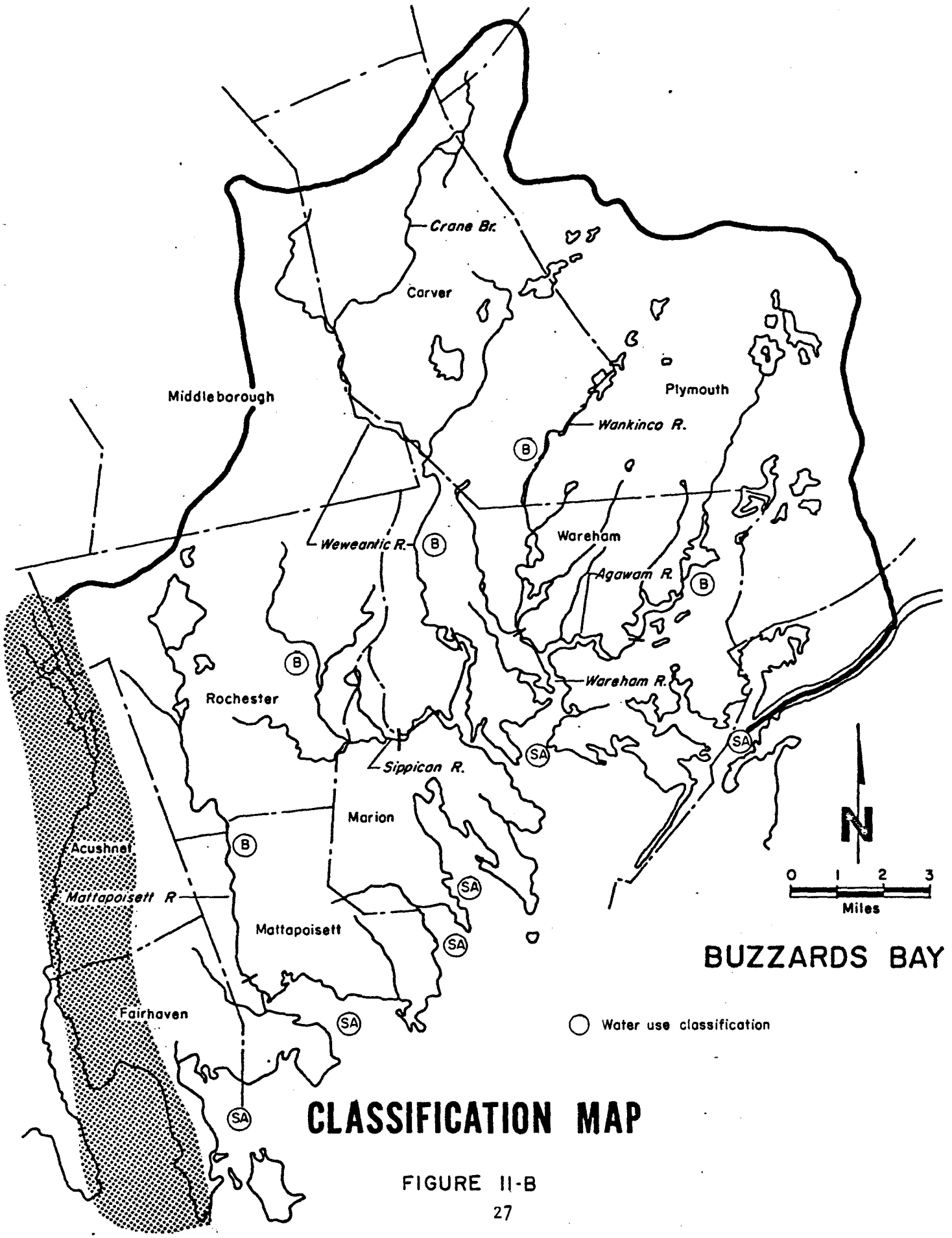
TABLE II-1 (Continued)

Stream	Municipality
East River	Wareham
Red Brook	Wareham/Plymouth
Herring Brook	Bourne



CLASSIFICATION MAP

FIGURE II-A



CLASSIFICATION MAP

FIGURE II-B

III. EXISTING WATER QUALITY

BACKGROUND INFORMATION

During the summer of 1975, the Division of Water Pollution Control surveyed the major rivers and harbors within Buzzards Bay. A total of four weeks were spent on data collection from approximately sixty sampling points within the basin. The results of these surveys have been published by the Division in a report entitled Buzzards Bay 1975 Part A, Water Quality Data.

Major wastewater discharges to the Buzzards Bay Basin were sampled during October of 1975. The sampling results have been published by the Division in a report entitled Buzzards Bay 1975 Part B, Waste Discharge Data. Both reports are available to the public upon request to the Division of Water Pollution Control.

Basin Segmentation

To facilitate a water quality analysis of a particular waterbody, it is often desirable to physically segment the waterbody according to similar characteristics. A change in hydrology, the variation of the water quality due to addition of pollutant sources, or a change in the river's classification are common reasons for segmentation.

The segments for the Buzzards Bay Basin are listed in Table III-1. It is seen from the table that generally the segments comprise an entire harbor or river.

From Table III-1 it is also seen that segments have been classified as effluent limited (EL) or anti-degradation (AD). An effluent limited segment is one that is capable of meeting water quality standards provided that all discharges to the segment are meeting EPA effluent guidelines for secondary treatment. Segments which are recognized as being of a more sensitive nature than effluent limited segments, and thus require a higher degree of treatment applied to discharges, are termed water quality limited (WQ) segments.

Many of the upper freshwater reaches of the rivers within the basin are of a very sensitive nature and are presently of very high water quality. To preserve their existing high quality, the Division has designated these areas as anti-degradation, thus prohibiting the introduction of any future waste discharges to these areas.

Segment Severity Ratings

In order to prioritize water quality problems within a basin, a system of assigning severity points to each segment has been adopted. Seven separate categories are considered in assigning severity points. These are as follows:

1. coliform bacteria
2. dissolved oxygen
3. solids, color
4. nutrients

TABLE III-1

BASIN SEGMENTATION

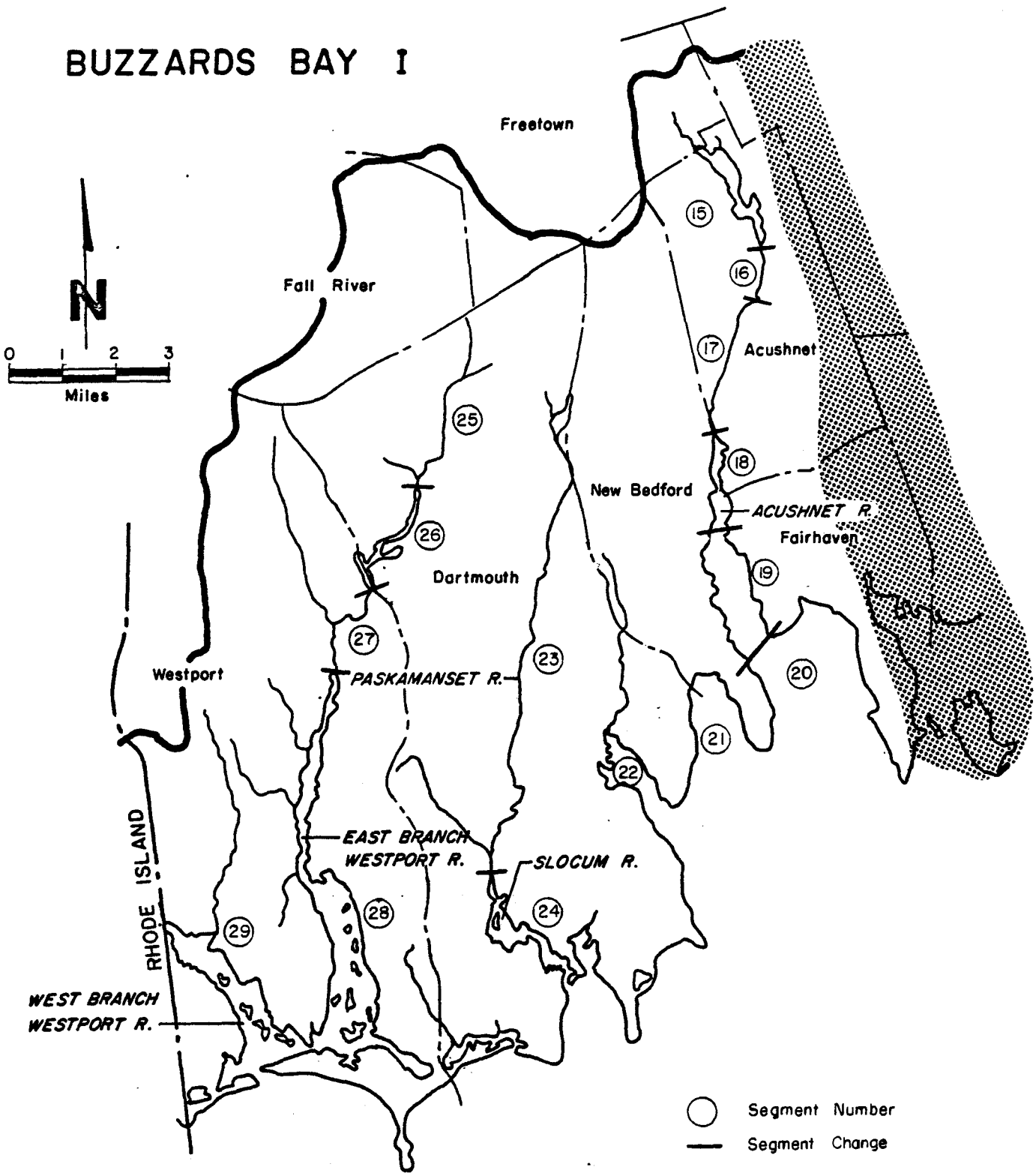
BUZZARDS BAY BASIN

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	SEGMENT CLASS	PRESENT CONDITION	WATER QUALITY CLASSIFICATION
1	Buttermilk Bay	---	--	EF	SA	SA
2	Onset Bay	---	--	EF	SA	SA
3	Agawam River	Above Wareham STP	Above 2.0	AD	B	B
3a	Agawam River	Below Wareham STP	2.0-0.0	EF	B	B
4	Wankinco River	Entire length	--	AD	B	B
5	Wareham River	Entire length	--	AD	SB	SA
6	Weweantic River	Above outlet of Horseshoe Pond, Wareham	Above 4.1	AD	B	B
7	Weweantic River	Outlet, Horseshoe Pond, to the mouth, Wareham-Marion	4.4-0.0	AD	SA	SA
8	Sippican River	Above County Road, Marion-Wareham	Above 2.1	AD	B	B
9	Sippican River	From County Road, Marion-Wareham, to mouth, Marion-Wareham	2.1-0.0	AD	SA	SA
10	Sippican Harbor	---	--	EF	SA	SA
11	Aucoot Cove	---	--	EF	SA	SA
12	Mattapoisett River	Entire length	--	AD	B	B
13	Mattapoisett Harbor	---	--	EF	SA	SA
14	Nasketucket Bay	---	--	EF	SA	SA
15	New Bedford Reservoir	Acushnet	Above 8.2	AD	B	B
16	Acushnet River	From outlet, New Bedford Reservoir, to Hamlin Road, Acushnet-New Bedford	8.2-5.5	AD	B	B
17	Acushnet River	From Hamlin-Road to Main Street, Acushnet-New Bedford	5.5-4.5	AD	C	B
18	Acushnet River	From Main Street to Route 6, Acushnet-New Bedford	4.5-1.2	AD	U	SB

TABLE III-1 (Continued)

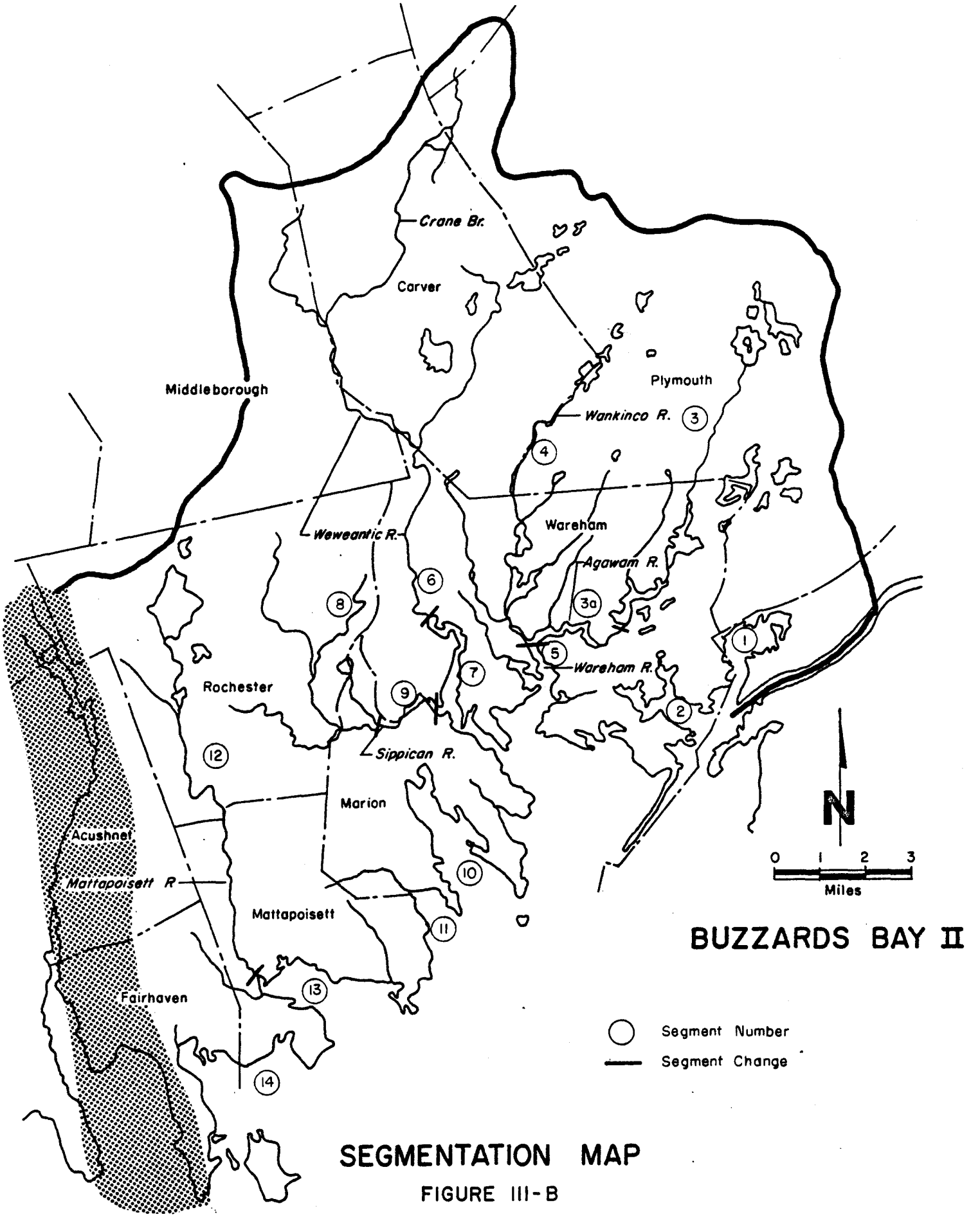
SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	SEGMENT CLASS	PRESENT CONDITION	WATER QUALITY CLASSIFICATION
19	Inner New Bedford Harbor		1.2-0.0	EF	U	SB
20	Outer New Bedford Harbor		--	EF	SC	SA
21	Clark Cove	New Bedford-Dartmouth	--	EF	SB	SA
22	Apponagansett Bay	Dartmouth	--	EF	SB	SA
23	Paskamanset River	Dartmouth-New Bedford	13.6-4.0	AD	B	B
24	Slocums River	Dartmouth	4.0-0.0	AD	SA	SA
25	Shingle Island River	Dartmouth	Above 14.2	AD	B	B
26	Noquochoke Lake	Dartmouth	14.2-12.0	AD	B	B
27	Westport River, East Branch	From the outlet of Noquochoke Lake, Dartmouth, to Old County Road, Westport	12.0-10.0	AD	C	B
28	Westport River, East Branch	From Old County Road, Westport, to the mouth, Westport	10.0-0.0	AD	SA	SA
29	Westport River, West Branch	Entire length	--	AD	SA	SA

AD - Anti-degradation
WQ - Water quality limited
EF - Effluent limited



SEGMENTATION MAP

FIGURE III-A



BUZZARDS BAY II

SEGMENTATION MAP

FIGURE III-B

TABLE III-2

SEGMENT SEVERITY RATING

BUZZARDS BAY BASIN

SEGMENT NUMBER	DESCRIPTION	COLIF.	D.O.	SOLIDS, COLOR	NUTRIENTS	pH, METALS	TEMP.	OTHER	PRESENT QUALITY	CLASSI-FICATION	TOTAL
1	Buttermilk Bay	0	0	0	0	0	0	0	SA	SA	0
2	Onset Bay	0	0	0	0	0	0	0	SA	SA	0
3	Agawam River above Wareham STP	0	0	0	0	0	0	0	B	B	0
3a	Agawam River below Wareham STP	0	1	0	1	0	0	0	B	B	2
4	Wankinco River	0	0	0	0	1	0	0	B	B	1
5	Wareham River	1	0	1	0	0	0	1	SB	SA	4
6	Weweantic River (freshwater)	0	0	0	0	0	0	1	B	B	1
7	Weweantic River (saltwater)	0	0	0	0	0	0	0	SA	SA	0
8	Sippican River (freshwater)	0	0	0	0	0	0	0	B	B	0
9	Sippican River (saltwater)	0	0	0	0	0	0	0	SA	SA	0
10	Sippican Harbor	0	0	0	0	1	0	0	SA	SA	1
11	Aucoot Cove	1	0	0	0	0	0	0	SA	SA	1
12	Mattapoisett River	1	0	0	0	0	0	0	B	B	1
13	Mattapoisett Harbor	1	0	0	0	0	0	0	SA/SB	SA	2
14	Nasketucket Bay	0	0	0	0	0	0	0	SA	SA	0
15	New Bedford Reservoir	0	0	0	0	0	0	0	B	B	0
16	Acushnet River, headwaters to Hamlin Road	0	0	0	0	0	0	0	B	B	0
17	Acushnet River, Hamlin Road to Main Street	2	2	0	1	0	0	0	C	B	6
18	Acushnet River (saltwater)	2	1	2	2	3	0	1	U	SB	13

TABLE III-2 (Continued)

SEGMENT NUMBER	DESCRIPTION	COLIF.	D.O.	SOLIDS, COLOR	NUTRIENTS	pH, METALS	TEMP.	OTHER	PRESENT QUALITY	CLASSI-FICATION	TOTAL
19	Inner New Bedford Harbor	3	1	3	2	3	0	2	U	SB	16
20	Outer New Bedford Harbor	1	0	2	1	2	0	0	SC	SA	18
21	Clark Cove	1	0	1	1	0	0	0	SB	SA	4
22	Apponagansett Bay	1	0	0	0	0	0	0	SB	SA	2
23	Paskamanset River	1	0	0	0	0	0	0	B	B	1
24	Slocums River	0	0	0	0	0	0	0	SA	SA	0
25	Shingle Island River	0	0	0	0	0	0	0	B	B	0
26	Noquocnoke Lake	0	0	0	0	0	0	0	B	B	0
27	Westport River, East Branch (freshwater)	1	0	0	1	0	0	0	C	B	3
28	Westport River, East Branch (saltwater)	0	0	0	0	0	0	0	SA	SA	0
29	Westport River, West Branch (saltwater)	0	0	0	0	0	0	0	SA	SA	0

TABLE III-3

TOTAL SEVERITY POINTS

BUZZARDS BAY BASIN

SEGMENT NUMBER	SEVERITY RATING	MILES IN LENGTH	AREA (mi^2)	TOTAL SEVERITY POINTS	SOURCE
1	0		0.8	0	---
2	0		1.0	0	---
3	0	8.1		0	---
3a	2	2.0		4	Wareham STP
4	1	0.8		1	Tremont Nail Co., non-point
5	4	2.5		10	Non-point sources
6	1	11.6		12	Non-point sources
7	1	4.4		4	Non-point sources
8	0	---		0	---
9	1	2.1		2	Unknown
10	1		2.8	4	Non-point sources
11	0		0.5	0	---
12	0	9.5		0	---
13	2		2.6	8	Mattapoisett sewage overflow, non-point sources
14	0		4.2	0	---
15	0		---	0	---
16	0	2.7		0	---
17	6	1.5		9	White's Dairy
18	13	3.3		43	Acushnet and New Bedford combined sewer overflows, non-point sources
19	16	1.2		19	" "
20	18		1.6	43	New Bedford STP

TABLE III-3(Continued)

SEGMENT NUMBER	SEVERITY RATING	MILES IN LENGTH	AREA (mi^2)	TOTAL SEVERITY POINTS	SOURCE
21	4		1.8	11	New Bedford combined sewer overflows
22	2		1.1	3	Non-point sources
23	1	6.2		6	Non-point sources
24	0	4.0		0	---
25	0			0	---
26	0	2.2		0	---
27	3	2.0		6	Lincoln Park, non-point sources
28	0	10.0		0	---
29	0	4.5		0	---
*64A	6		0.4	4	Septic tanks, Canal View Apartments, Coca-Cola, Inc.
*116A	2		0.7		Same

*from Cape Cod Water Quality Management Plan, 1976.

5. pH, metals
6. temperature
7. other (floating solids, pesticides, oil, etc.)

A scale from 0 to 3 is used to weigh the impact of each individual category upon the water quality of the segment. Zero indicates no problem, one is slight, two is moderate, and three is severe. The points assigned for each of the seven categories are then summed.

The relative size of the segment is compensated for by multiplying the severity points by the river miles to yield the total severity points. Therefore, emphasis is given to the larger of two segments having similar water quality problems.

Harbor segments are weighed according to the area (square miles) of each multiplied by the severity points to yield total severity points. A conversion factor of 1.55 times the total severity points allotted a harbor is used to permit reasonable comparison between river and harbor segments. (Source: North Coastal Water Quality Management Plan, 1975).

An important consideration in evaluating the impact of a given parameter upon a segment's quality is the water use classification assigned by the Division to the segment. A problem which would be considered quite severe in a Class B stream might be allotted three severity points, while the same problem in a Class C stream would likely receive a rating of 0 or 1, due to the less stringent requirements for this classification.

Water Quality Surveys

During the summer of 1971, the Massachusetts Division of Water Pollution Control conducted an intensive water quality survey covering 20 sampling stations on the Acushnet River, New Bedford Harbor, and Clark Cove. This survey was repeated during the 1975 Buzzards Bay surveys with minor modifications.

In most cases, sampling sites from 1971 were used in 1975 to permit comparison of the results. The Acushnet River and Outer New Bedford Harbor were surveyed during the week of July 12-16, 1971, under wet weather conditions. The following week, which was relatively dry, the Inner Harbor was sampled.

Due to the combined sewer overflow and urban runoff problems of Inner New Bedford Harbor, similar survey conditions are required for both years to permit a valid comparison of the results. Both 1975 surveys were relatively dry, thus allowing this comparison; while Acushnet River and Outer New Bedford Harbor, which are much less affected by non-point pollution sources, can also be reasonably compared.

Many of the dry weather flows from New Bedford's combined sewers which were present in 1971 were corrected by 1975. New Bedford's wastewater treatment plant was fully operational during the 1975 surveys; while in 1971, untreated sewage was discharged to Outer New Bedford Harbor. As a result of these actions, an overall improvement in the quality of the Acushnet River and New Bedford Harbor is apparent.

Basin Description/Hydrology

The Buzzards Bay Basin is comprised of seven major drainage basins and a number of relatively smaller ones. The United States Geological Survey (USGS) maintains only one permanent flow gaging station within the entire basin, located on the West Branch of the Westport River at Adamsville, Rhode Island. Hydrologic data concerning the rivers within the basin are therefore scarce in relation to many other rivers within the Commonwealth, many of which have several mainstem and tributary flow gaging stations. The USGS has, however, estimated low flow conditions for many of the rivers and streams within the basin using base flow measurements. Average flow figures are not available for the rivers of the Buzzards Bay Basin, with the exception of the West Branch of the Westport River.

Average annual precipitation throughout the region ranges from 42 inches per year in the New Bedford area to 46 inches per year in the Marion-Wareham area. Over the entire state, the average annual precipitation is 44 inches per year.

The coastal rivers within the Buzzards Bay drainage basin can be generally characterized as slow moving, meandering streams near their headwaters and for most of their freshwater length. Nearing the coast, the action of the tides rapidly widens the channels as the transition occurs from freshwater stream to tidal estuary.

On the average, in comparison with most other rivers within the state, Buzzards Bay rivers have total lengths which are considerably shorter (usually much less than 20 miles) and smaller drainage areas. Maximum elevations within the basin range slightly in excess of 200 feet; therefore, the average fall of each is often less than the average of 10 feet per mile common to rivers in the eastern portion of the state. The correlation between the drainage areas and base flows of each river system is poor due to the regulation of flow from ponds and cranberry bogs by the owners.

Agawam River Basin

The Agawam River is the easternmost river within the entire Buzzards Bay Basin. It originates at the outlet of Halfway Pond in Plymouth and flows for a distance of approximately 10.1 miles, where it joins the Wankinco River from the west and forms the Wareham River in Wareham. The Wareham River is saltwater over its entire 2.5-mile length and is best described as a tidal estuary.

An elevation change of 55 feet over 10.1 miles is experienced by the Agawam River. This is somewhat below the average of 10 feet per mile for rivers in eastern Massachusetts.

The course of the Agawam River is best described as a connected series of long and narrow ponds which extend from the headwaters to river mile 5.4. The largest of these are Glen Charlie and Mill Ponds. Shortly downstream of this point, the Agawam River becomes tidally influenced but remains primarily freshwater until its confluence with the Wankinco River. Throughout this tidal stretch, the course of the river meanders with little change in elevation.

The USGS has estimated the 7-day 2-year and 10-year low flows at sampling station AG3 in East Wareham, which is the outlet of Mill Pond. The drainage area above this point is 17.00 square miles. The 7-day mean low flow of 2-year recurrence (7-day, 2-year low flow) is 25.0 cfs, while the 7-day mean low flow of 10-year recurrence (7-day, 10-year low flow) is 20.0 cfs.

Wankinco River Basin

The Wankinco River originates at the outlet of East Head Pond on the Carver-Plymouth town line. It flows generally to the south for a distance of 6.5 miles and is freshwater along this stretch. The remaining 0.5 miles of the river are tidal. Over the total length of the Wankinco River, there is an elevation change of 81 feet; thus, it is slightly over the average fall for rivers in the eastern portion of the state.

The freshwater course of the river is somewhat similar to the Agawam River with numerous ponds scattered along the river's mainstem. By far the largest of these are Tihonet Pond and Parker Mills Pond.

The USGS has developed low flow estimates at the Route 28 bridge in Wareham, which is sampling station W03. Upstream of this point, the drainage area is 20.5 square miles. The 7-day, 2-year low flow is 12.0 cfs; and the 7-day, 10-year low flow is 8.00 cfs.

Weweantic River Basin

The headwaters of the Weweantic River are formed by the confluence of Rocky Meadow Brook and South Meadow Brook in Carver. Its freshwater length travels in a southerly direction for a distance of approximately 11.6 miles to the outlet of Horseshoe Pond in Wareham. The remaining 4.4 miles of the river are tidal. Over the total length, there is an elevation change of 74 feet, producing a fall of 4.6 feet per mile. The course of the river is best described as meandering, especially near the headwaters. Two relatively large impoundments are found on the mainstem Weweantic. The most upstream is unnamed, while the remaining impoundment, Horseshoe Pond, is the division between the fresh and saltwater portions of the river. A major tributary to the Weweantic River is the Sippican River, which joins the Weweantic from the west at River Mile 2.2.

Low flow estimates for the Weweantic River have been developed by the USGS at the Squire Island Road Bridge in South Wareham. The drainage area to this point on the river is 56.1 square miles. The 7-day, 2-year low flow is 15.0 cfs, and the 7-day, 10-year low flow is 10.0 cfs.

Mattapoisett River Basin

The Mattapoisett River flows from the outlet of Snipatuit Pond in Rochester a distance of 9.5 miles to the south and discharges to Mattapoisett Harbor in Mattapoisett. The river experiences an elevation change of 53 feet, resulting in an overall fall of 5.6 feet per mile. The division between the freshwater and tidal portions of the river occurs approximately one mile from the mouth.

Generally, the river's course can be characterized as composed of small meanders during its freshwater length. Once tidal, the channel broadens

considerably as the river nears Mattapoisett Harbor. Harley Millpond, which is located near the headwaters, is the only impoundment on the river's mainstem.

The USGS has estimated 7-day, 2-year and 7-day, 10-year low flows at a point on the Mattapoisett River 0.4 miles upstream of the Route 6 bridge in Mattapoisett. Above this gaging station, there are 24.0 square miles of drainage area. The 7-day, 2-year low flow is estimated from base flow measurements to be 0.5 cfs; while the 7-day, 10-year low flow is estimated at 0.2 cfs.

Acushnet River Basin

The Acushnet River begins at the outlet of New Bedford Reservoir in Acushnet. It flows generally to the south for a distance of 3.6 miles, where it enters a small impoundment at the Acushnet Sawmill Company. The next 0.1 mile of the river is tidally influenced. At the Main Street bridge, New Bedford-Acushnet city line, the river begins to broaden as it flows into New Bedford Harbor. The Acushnet River flows an additional 3.3 miles from the Main Street Bridge to the Route 6 bridge, which is recognized as the beginning of New Bedford Harbor.

The Acushnet River experiences an elevation change of 43 feet over its 7.0-mile length, but most of this is realized in the initial 3.6 miles comprising the freshwater portion. Overall, the freshwater course of the river can be described as gently meandering.

At Hamlin Road in Acushnet, which is sampling station AR3, the USGS has estimated the 7-day, 2-year low flow at 0.9 cfs and the 7-day, 10-year low flow at 0.3 cfs. The drainage area above Hamlin Road is 16.4 square miles.

Paskamanset River Basin

The Paskamanset River has its origins at the outlet of Turner Pond on the Dartmouth-New Bedford line. It flows in a meandering manner generally to the south for a distance of 2.7 miles, experiencing an elevation change of 16 feet, then enters a long, narrow impoundment which is 0.7 miles long, upstream of Route 6 in Dartmouth. For the next 6.2 miles, the Paskamanset River falls 49 feet as it again meanders to the south until it enters a small impoundment at Russells Mills Road in Dartmouth. The remaining 4.0 miles of the river are tidal, and this portion is known as the Slocums River.

The USGS has estimated the 7-day, 2-year low flow to be 1.5 cfs and the 7-day, 10-year low flow to be 0.7 cfs at the Russells Mills Road bridge near South Dartmouth. There is a drainage area of 26.1 square miles above this point.

Westport River Basin

Westport River - East Branch

The headwaters of the East Branch of the Westport River are formed by the Shingle Island River and the Copicut River in Dartmouth. The Copicut River is tributary to the Shingle Island River 0.9 miles above Noquochoke Lake.

The outlet of Noquochoke Lake is the beginning of the East Branch of the Westport River. For approximately the initial 2.0 miles, the Westport River is freshwater, then it becomes tidally influenced near Old County

Road in Westport. The remaining 10.0 miles of river to its mouth are tidal. From its inception at the outlet of Noquochoke Lake to the mouth, the East Branch of the Westport River changes 25 feet in elevation, producing an overall fall of 2.1 feet per mile.

The USGS has developed low flow estimates for the Shingle Island River at Hixville Road in North Dartmouth (inlet to Noquochoke Lake). There are 18.1 square miles of drainage area above this gaging station. The 7-day, 2-year low flow is 2.5 cfs, and the 7-day, 10-year low flow is 1.5 cfs.

There are diversions of water from the Copicut Reservoir (which forms the headwaters of the Copicut River) and Noquochoke Lake by the City of Fall River for industrial and municipal use.

Westport River - West Branch

The headwaters of the West Branch of the Westport River are formed by Adamsville Brook in Tiverton, Rhode Island. The USGS maintains a permanent flow gaging station on Adamsville Brook in Adamsville, R.I. Shortly downstream of the gaging station, Adamsville Brook crosses the state line and becomes the Westport River. In the same stretch, a transition occurs from freshwater to salt water.

The West Branch of the Westport River is tidal along its approximately 4.5-mile length and is better termed a tidal estuary than a river. The East and West Branches of the river join immediately prior to discharging to Buzzards Bay.

The USGS has recorded flows at the Adamsville Gage from 1940 to the present. The drainage area above the gage is 7.91 square miles. From 1940 to 1974, the average flow was 14.3 cfs. Based on flow data collected from 1942 to 1971, the 7-day, 2-year low flow is calculated to be 0.2 cfs; while the 7-day, 10-year low flow is 0.0 cfs.

SEGMENT ANALYSIS

Segment 1: Buttermilk Bay

Classification: SA
Present Quality: SA

Buttermilk Bay is located on the northern shore of the southern entrance to the Cape Cod Canal. It would therefore be subject to the effects of wastewater discharges to the canal, dependent upon the tides. There are no known major point discharges of wastewater to Buttermilk Bay. The 1975 Buzzards Bay survey had one station on Miller Cove, MC1, which forms a portion of Buttermilk Bay. The survey results indicate the water to be of excellent quality. The surrounding area is heavily developed, however, and is not sewered; thus there is the possibility of localized water quality problems from failing septic systems.

At the time of sampling, what would be considered excessive amounts of algae

were apparent, indicating that nutrient-rich waters, likely a result of failing septic systems, were present. Unfortunately, the restrictions on laboratory personnel and equipment did not permit a microscopic analysis of this sampling station.

The Cape Cod Canal receives wastewater discharges from Canal Electric Company (primarily cooling water), Massachusetts Maritime Academy, Canalview Apartments, and a Coca-Cola plant. No effect from these discharges is likely in Buttermilk Bay or any other area of Buzzards Bay, due simply to dilution of the wastewater.

There is heavy oil-tanker traffic through the Cape Cod Canal, and the possibility of a serious oil spill is always present. Oil pollution of a minor nature results from the high concentration of pleasure craft in these waters, especially during the summer months. More importantly, discharges of untreated sanitary wastes from the larger watercraft create localized water quality problems, thus endangering the usage of these waters for shellfishing and swimming. Presently, there are no areas of Buttermilk Bay closed to shellfishing.

Segment 2: Onset Bay

Classification: SA
Present Quality: SA

Onset Bay is to the immediate west of Buttermilk Bay and is similar in most respects. It receives no known point discharges of wastewater. The 1975 Buzzards Bay survey had one station (ER1) at the mouth of the East River which forms a small cove in Onset Bay. The sampling results show that, in general, this water is of the highest quality. Again, as is the case of Buttermilk Bay, it is impossible to fully assess the water quality of Onset Bay from the results of one sampling station. The surrounding area is not sewered and is intensively developed. Sampling of a more specific nature would be necessary to determine whether septic tank leachate is a problem in localized areas.[1] Onset Bay supports heavy recreational boating during the summer months and, therefore, discharges of sanitary wastes from watercraft are likely. Oil pollution from pleasure craft and, more importantly, from offshore oil tanker traffic is always possible.

With the exception of Muddy Cove, Onset Bay is open to shellfishing. Muddy Cove has not been closed for reasons of lowered water quality but for the purpose of oyster propagation.

Segment 3: Agawam River, headwaters to Wareham STP discharge

Classification: B
Present Quality: B

The 1975 Buzzards Bay survey had four sampling stations on the Agawam River. Station AG1 was located at the outlet of Halfway Pond in Plymouth, which is the origin of the Agawam River. There are no known sources of pollution to the Agawam River above this point; therefore, AG1 was chosen as a clean water station against which comparisons could be made with data collected from

[1] Results of storm drain sampling by the Division's Southeast Regional Office on coastal portions of the Wareham River indicate that septic tank leachate is a problem common to intensely developed coastal areas.

downstream stations.

The sampling results show the Agawam River to be well within Class B requirements at Station AG1. Nutrient levels were consistently low and, as would be expected, microscopic analyses found algal concentrations also low. A microscopic analysis was possible for the July survey only; therefore, the actual algal population in August is unknown. The nutrient levels remained low for both months and were insufficient to support any algal "blooms." Although the water temperatures recorded during the August surveys were lower than those of the July surveys, overall higher temperatures during the month of August likely resulted in an increased biomass concentration at that time. The BOD_5 in July averaged 1.7 mg/l, which is indicative of clean water; while in August it jumped to an average of 4.4 mg/l. The COD averaged 14 mg/l in July and 16 mg/l in August, indicating only minor additional inputs of organic material. The demand exerted by the algae through respiration and decay is believed to be reflected in the higher BOD_5 levels found in August.

Station AG2 was located 5.2 miles downstream at the outlet of Glen Charlie Pond in Wareham. There are no known point discharges of wastewater to the Agawam River between these stations, and the sampling results from AG2 indicated this. The nutrient levels remained consistently low; but, as noted at Station AG1, the BOD_5 level increased from 1.8 mg/l in July to 4.9 mg/l in August. This is again believed to be attributable to the increased algal population in August.

Station AG3 was located 2.0 miles downstream from Station AG2 at the outlet of Mill Pond on Route 28 in Wareham. Shortly below this point, the Agawam River becomes tidally influenced. The water quality of the Agawam River at Station AG3 was nearly identical to that found at Station AG2 and well within Class B requirements.

Segment 3a: Agawam River, Wareham STP discharge to river mouth

Classification: B
Present Quality: B

Sampling station AG4 was located 1.2 miles downstream of AG3 on Route 6 in Wareham. This point is shortly downstream of the discharge from Wareham's municipal wastewater treatment plant.

As expected, increases in nutrient levels were found which can be attributed to the treatment plant. The Wareham facility is of extended aeration design and uses sand beds to polish the effluent prior to discharge to the river. The survey results indicated that, other than slightly increased nutrient concentrations which are still considered well within Class B criteria, this highly treated discharge has little impact on the quality of the Agawam River. The following charts contrast the quality of the Agawam River before (AG3) and after (AG4) the point of discharge for the July and August surveys. (units are expressed in mg/l unless otherwise noted).

JULY

	BOD_5	NH_3	NO_3	TOTAL P	TOTAL COLIFORM/100ml
AG3	1.6	0.02	0.0	0.02	14
AG4	1.3	0.06	0.1	0.06	55

AUGUST

	BOD_5	NH_3	NO_3	TOTAL P	TOTAL COLIFORM/100ml
AG3	4.2	0.02	0.0	0.01	39
AG4	4.2	0.09	0.1	0.02	950

Again, the higher BOD_5 values in August are believed due to the increased algal population. The presence of algae in August is also indicated by a more pronounced diurnal fluctuation in dissolved oxygen values noted at all sampling stations due to increased photosynthesis during August.

The dissolved oxygen data collected from all four sampling stations show the Agawam River in general was well above the 5.0 mg/l minimum allowable Class B requirement.

At Station AG4, wide fluctuations in the dissolved oxygen values were found, probably caused by the higher nutrient levels and resultant algal population. Minimum dissolved oxygen concentrations at times approached the 5.0 mg/l minimum allowable concentration, but only once during either survey was there a violation (4.7 mg/l). This is not considered a problem at the present time, but it indicates that increased flows from the Wareham treatment plant in the future could result in dissolved oxygen problems downstream.

Segment 4: Wankinco River

Classification: B
Present Quality: B

The Wankinco River Basin is to the west and adjacent to the Agawam River Basin. The two rivers converge near Wareham Center to form the Wareham River. Like the Agawam River, large wetland areas form much of the Wankinco's drainage basin and numerous impoundments are found along the main stem. The Tremont Nail Company discharges cooling water and wastes from a pickling operation to the Wankinco River. This discharge and two sanitary landfills near the river's course largely determined the placement of the sampling stations.

Near the headwaters of the Wankinco River, a regional landfill site serving the communities of Wareham, Carver, and Marion is located. Station W01 was located above this site on the Wankinco River in Carver at mile point 4.5. There are no known sources of pollution above this point; therefore, Station W01 is considered a "clean water" station.

Because the nature of the watersheds is similar, the water quality of the Wankinco River approximates that of the Agawam River. Nutrient levels were very low for both the July and August surveys. As observed on the Agawam River, the BOD_5 levels jumped, from an average of 1.3 mg/l in July to 4.2 mg/l in August. The diurnal fluctuation in dissolved oxygen concentrations increased also and, here again, the higher BOD_5 values in August are due to the effects of algae.

Total coliform bacteria were consistently found in concentrations slightly in violation of Class B standards at Station W01. The source is unknown

and further investigation is required. All other parameters were well within the standards, indicating that the unknown source of pollution is minor in nature.

Station W02 was located slightly downstream of the regional landfill site, on the Wankinco River in Carver. The regional landfill has been in operation a relatively short period of time; consequently, the sampling results showed it had no effect on the water quality of the Wankinco River. These data will be useful in assessing any effects this landfill may have on the river in the future.

Station W03 was located on the Wankinco River in Wareham, immediately downstream of the discharge from the Tremont Nail Company. The original intent of this sampling site was to assess the effects of the waste discharge from the Tremont Nail Company. Also of importance were any possible impacts the former Wareham landfill site, located shortly upstream, had on the Wankinco River. Unfamiliarity with the discharge point from the Tremont Nail Company resulted in the effects of this discharge being missed entirely at W03. It would have been difficult, however, to separate the impacts of the sources, had both been present at Station W03.

The former Wareham landfill is no longer in use and has been covered. It has not been capped, however, and the bare soil will likely in time allow the build-up of a groundwater dome due to the high infiltration rate. This in turn will increase the possibility of leachate from the landfill entering the Wankinco. Phosphorus and COD at W03 indicate that possibly some leachate is presently entering the Wankinco River from the landfill. Another possible source is the regional septage handling lagoons which are located to the west of the Wankinco River. Despite the increases in pollutant levels, the Wankinco River at Station W03 is still of Class B quality.

Dissolved oxygen values were generally well above the 5.0 mg/l minimum allowable for Class B waters at all three stations. There was little diurnal fluctuation in dissolved oxygen concentrations, which can be attributed to the small algal population which, in turn, resulted from the lack of nutrients.

Segment 5: Wareham River

Classification: SA
Present Quality: SB

Approximately four-tenths of a mile downstream from Station W03, the Wareham River is formed by the confluence of the Agawam and Wankinco Rivers. Station WM1 was located one-tenth of a mile downstream from this confluence. The Wareham River is 2.6 miles long and tidally influenced its entire length.

As expected, the results from Station WM1 showed the Wareham River at this point to be of the same quality as the rivers forming it.

Wareham Center is located upstream of Station WM1 on the western bank of the Wankinco River. Any effects of stormwater runoff from Wareham Center on downstream waters are difficult to assess due to the lack of any appreciable precipitation during any of the sampling periods.

As would be expected, fluctuations in the BOD_5 results were similar to those in the Wankinco and Agawam Rivers from July to August with averages of 1.5 mg/l and 4.2 mg/l found in those months, respectively. This is again believed due to the increased algal population in August and the decreased flow which acted to concentrate the pollutants.

The most noticeable change in water quality at WM1 is the increase in ammonia-nitrogen. Concentrations of ammonia-nitrogen were never found in excess of 0.09 mg/l in the Agawam or Wankinco Rivers; while at WM1, ammonia-nitrogen averaged 0.18 mg/l in July and 0.32 mg/l in August. A clean-water ocean sampling station on Aucoot Cove indicates that these levels of ammonia-nitrogen are not due to any single pollution source but are merely background levels found in Buzzards Bay.

Station BM1 was located 0.9 miles downstream of Station WM1 at the mouth of the Broad Marsh River, a tidal estuary of the Wareham River. The results from BM1 indicate the Broad Marsh River is of approximately the same quality as the Wareham River. On the basis of the results from stations WM1 and BM1, these waters are meeting their Class SA requirements. The coliform bacteria levels found were usually under 70/100 ml, which is the median level allowable for SA waters. Previously, there were high coliform bacteria concentrations in the upper reaches of the Broad Marsh River which were due to leachate from failing septic systems. For this reason, the Massachusetts Department of Environmental Quality Engineering, Division of Water Supply, had closed 38 acres of the Broad Marsh River to shellfishing. This area has since been sewered to the Wareham wastewater treatment plant, which has improved the water quality sufficiently to again permit shellfishing.

A minimum dissolved oxygen concentration of 5.8 mg/l was recorded at Station WM1, which is in violation of the 6.5 mg/l minimum allowable for SA waters. The average concentrations for July and August were 7.3 and 7.4 mg/l, respectively, at Station WM1. Minimum D.O. concentrations of 8.2 and 8.5 mg/l at BM1 indicate that, shortly downstream of WM1, low dissolved oxygen concentrations are not a problem. Therefore, the minimum D.O. values recorded at Station WM1 are not sufficient to consider the Wareham River in violation of its classification. It should be noted that the 6.5 mg/l minimum D.O. requirement for Class SA waters is unrealistic, considering that the high water temperatures recorded during the surveys acted to decrease the saturation value to approximately 7.3 mg/l in saltwater (15,000 mg/l chlorides, $75^{\circ}F$).

During the summer months the Wareham River supports heavy recreational boating. It is likely that, at these times, untreated sanitary discharges from the watercraft produce localized areas of lower water quality.

Oil spills on the Wareham River from fuel oil dealers in Wareham Center have been a problem in the past and likely will continue to be so in the future. Like Buttermilk and Onset Bays, the Wareham River is also subject to oil spills from offshore oil tanker traffic.

The Division's Southeast Regional Office (SERO) conducted sampling on September 28, 1976, of storm drains in the areas of Pinehurst Beach, Swift's Beach, and Pine Point, which are coastal areas of the Wareham River. The results indicate that septic tank leachate is a serious problem to the river. Therefore, despite the results from the 1975 survey which indicate that few water quality problems exist, the Wareham River is considered to

be of SB quality based on SERO's sampling results and problems which are known to periodically occur due to the above-cited sources.

Segment 6: Weweantic River, above outlet of Horseshoe Pond

Classification: B
Present Quality: B

The Weweantic River Basin lies to the west of the Wankinco River Basin and is similar in nature. Much of the drainage area consists of wetlands, and numerous cranberry bogs are scattered throughout the basin. The intensive use of this basin by the cranberry industry has made the Weweantic River well known for its pesticide pollution problems. This is a problem shared by all the basins in the eastern portion of Buzzards Bay; but due to a number of large fish kills on the Weweantic River, studies have centered in this area. The Weweantic has been considered as a possible water supply by area communities; thus, its water quality is of great importance.

There are no known direct discharges of wastewater to the Weweantic River. Within the drainage basin are found three landfill sites, two of which are no longer in use. The remaining active site is well situated and there appear to be no important runoff or leachate problems with this or the other landfill sites.

The sampling points on the Weweantic River were chosen rather randomly due to the fact that no pollution sources were known to exist (other than the previously mentioned pesticides).

Station WE1, the most upstream sampling point, was located on Rochester Road on the Middleborough-Carver line, at river mile 12.2. The sampling results indicate that there are no major water quality problems resulting from the two former landfill sites located upstream.

During the July survey, the dissolved oxygen concentration averaged 3.3 mg/l, while in August it averaged 5.9 mg/l. A few days before the July survey, it rained on the order of one to two inches, while the days before the August survey were relatively dry. The flow recorded at Station WE1 in July was approximately triple the the August flow. It appears that the precipitation before the July survey acted to flush out the wetland areas. This water is naturally stagnant and characteristically low in dissolved oxygen content. The higher color values found in July also indicate that wetland waters were the source of the low dissolved oxygen values.

As observed in the neighboring river basins, the BOD_5 values increased from July to August, while the COD values remained relatively constant. The BOD_5 averaged 1.3 mg/l and 4.2 mg/l in July and August, respectively. This increase is due to the effects of a larger algal population in August. The COD values averaged 36 mg/l in July and 34 mg/l in August, indicating that the concentration of organics varied little.

Ammonia- and nitrate-nitrogen were found in very low levels or were non-existent for both months. During the July survey, the total phosphorus averaged 0.10 mg/l, somewhat higher than expected; while in August an average of 0.04 mg/l was recorded. The higher July values are likely due to the flushing of wetland areas from the heavy precipitation.

The total coliform bacteria concentrations averaged 200/100 ml and 350/100 ml for July and August, respectively, which are well within Class B criteria.

The dissolved oxygen concentrations below the minimum allowable 5 mg/l for a Class B stream are due to natural stream conditions. For this reason the Weweantic River is considered as meeting Class B criteria at Station WE1.

Station WE2 was located 4.1 miles downstream at Route 28, Wareham. The water quality at this station is nearly identical in all respects to that observed at WE1. One exception is the dissolved oxygen concentration, which averaged 4.7 mg/l in July. The increase from Station WE1 to WE2 is due to stream reaeration.

Station WE3 was located on Squire Island Road in Wareham, 2.8 miles downstream from Station WE2. Again, water quality here was identical to that observed at WE1 and WE2. The dissolved oxygen concentrations showed continued recovery, with a minimum of 6.1 mg/l and an average of 7.1 mg/l in July.

The Weweantic River has been designated a Class B stream by the Division from its headwaters to the outlet of Horseshoe Pond. The results from sampling stations WE1, WE2, and WE3 indicate the water quality of the Weweantic River to be within Class B criteria.

Segment 7: Weweantic River, outlet of Horseshoe Pond to river mouth

Classification: SA
Present Quality: SA

Downstream of the outlet of Horseshoe Pond, the Weweantic River becomes tidal. From the outlet of Horseshoe Pond to the mouth, the river has been assigned an SA classification by the Division.

The final station on the Weweantic River was located on Route 6 on the Marion-Wareham line. This point is downstream of the confluence with the Sippican River and is 2.1 miles upstream of the mouth of the Weweantic River. The Weweantic is dominated by the tides at WE4; therefore, high and low tide samples were collected to observe the extremes of dilution.

Actually, little difference was noted between the high and low tide sampling results. The ammonia-nitrogen concentration was noticeably higher for the high tide samples, which is due to the background concentration found in Buzzards Bay. Likewise, the total phosphorus concentration increased to background levels.

Dissolved oxygen concentrations for both the July and August surveys were generally above the 6.5 mg/l minimum allowable for SA waters. The total coliform bacteria concentrations were at all times well within Class SA requirements at Station WE4. The Weweantic River is open to shellfishing and, on the basis of the results from Station WE4, is meeting Class SA criteria.

Segment 8: Sippican River, above County Road

Classification: B
Present Quality: B

The Sippican River is tributary to the Weweantic River from the west at river mile 2.2. Its watershed is similar to that of the Weweantic River and, as expected, the sampling results are also similar.

Station SIR1 was located at Pierceville Road in Rochester at river mile 6.8. There are no known sources of pollution to the Sippican River other than the previously mentioned pesticides problem common to all rivers in this portion of Buzzards Bay.

The dissolved oxygen concentrations at Station SIR1 for both the July and August surveys consistently violated the 5.0 mg/l minimum allowable concentration for Class B waters.

As noted on the Weweantic River, the BOD_5 values differed for July and August. In July, the BOD_5 averaged 1.4 mg/l; in August, it averaged 4.3 mg/l. The increase in five-day BOD in August is interesting since the COD actually decreased from an average of 40 mg/l in July to 25 mg/l in August. Thus, the increase in BOD_5 is attributed to the effect of algae on the BOD test.

It is obvious from the COD results that the low dissolved oxygen concentrations are not due to the demand exerted by large amounts of organic material. Rather, these values are believed due to the naturally occurring low dissolved oxygen content found in wetland waters and the sluggish nature of the Sippican River. For this reason, the low dissolved oxygen values are not considered in violation of Class B criteria.

The nutrient levels at SIR1 are typical of those found on the Weweantic River. Ammonia-nitrogen averaged 0.04 mg/l for both months, while no nitrate-nitrogen was found during either survey. The total phosphorus averaged 0.08 mg/l in July and dropped to 0.02 mg/l in August. The higher values in July are due to the heavy precipitation prior to sampling which tended to flush the wetlands.

Segment 9: Sippican River, County Road to river mouth

Classification: SA
Present Quality: SB

Station SIR2 was located 4.7 miles downstream from SIR1, at river mile 2.1. The Sippican River is still freshwater at this point but becomes tidally influenced a short distance downstream. A recovery in the D.O. concentrations was observed at SIR2, with a minimum D.O. of 4.3 mg/l recorded in July and 5.0 mg/l in August.

The nutrient concentrations at SIR2 were comparable to those found at SIR1 except for the appearance of 0.2 to 0.3 mg/l of nitrate-nitrogen during both surveys. The BOD_5 values varied as previously noted at Station SIR1.

The total coliform bacteria concentrations found at SIR2 were slightly in violation of Class SA criteria for both surveys. This portion of the

Sippican River is therefore considered to be of SB quality. The source of the bacteria is unknown, but the Sippican River, despite this, poses minimal pollution problems to the Weweantic River.

Segment 10: Sippican Harbor

Classification: SA
Present Quality: SA

Sippican Harbor has been classified as an SA body of water by the Division. All but a small portion of the harbor is presently of SA quality and is therefore open to shellfishing. A small cove at the head of the harbor has been closed to shellfishing due to high concentrations of mercury. The Massachusetts Department of Environmental Quality Engineering has identified the source as mercury-based anti-foulant paints used on the hulls of racing craft.

Sampling was conducted at three stations within the harbor during the July survey at low tide. The sampling program was expanded during the August survey to include both high and low tide samples. Where depths exceeded approximately three feet, both top and bottom samples were collected for chemical and bacteriological analysis.

The sampling results from all three stations indicate that there was little difference between top and bottom or high and low tide samples. Sippican Harbor is relatively long and narrow, but there are no restrictions at its mouth to prevent complete mixing of the water column at all times.

One of the most important criteria in evaluating the quality of SA waters open to shellfishing is the concentration of coliform bacteria. In general, the total coliform bacteria concentrations found during both surveys were extremely low, with most counts less than 10 coliform/100 ml.

Sippican Harbor is used extensively for recreational boating purposes during the summer months. There is a significant increase in the amount of organic material in the harbor on weekdays which is reflected in the higher BOD_5 results from Tuesday's samples. This increase in organics can be attributed to the large numbers of pleasure craft with onboard sanitation facilities which are moored in the harbor and to the use of these facilities on weekends. Thursday's samples indicated that, during the week, the organic loading is minimal and the harbor flushes itself.

The BOD_5 results showed the same trend during the August survey but were overall considerably higher. This is probably due to the continued discharge of sanitary wastes from pleasure craft and the resultant accumulation of organic material. In August, it is likely that an increased algal population would tend to produce higher BOD_5 results.

During the August survey, the amount of suspended solids increased noticeably at all three sampling stations, further indicating a high degree of organic material present. This increase in organics could also be attributed to water-contact recreational activities which would tend to suspend bottom matter.

In a freshwater environment, discharges of sanitary wastes would be indicated by high counts of coliform bacteria in addition to an increase in the BOD_5

values. This is not the case, however, in a saltwater environment. Coliform bacteria die off rapidly when exposed to high salinity and intense sunlight. During the Buzzards Bay surveys, weather conditions were favorable for long hours of sunlight. This, in addition to the high salinity, produced the low coliform bacteria concentrations found at all stations, despite discharges of sanitary waste.

The nutrient concentrations found at stations SIH1, 2, and 3 were representative of the background concentrations observed at the open-ocean "clean water" stations in Buzzards Bay.

Segment 11: Aucoot Cove

Classification: SA
Present Quality: SA

Aucoot Cove is the receiving water for the secondary treated effluent from Marion's wastewater treatment plant. There are no other known wastewater discharges to Aucoot Cove, but problems from septic tank leachate are known to exist, primarily in the Hiller Cove, Harbor Beach area of Mattapoisett.

Two sampling stations were located in Aucoot Cove. Station AC1 was a "clean water" station at the mouth of the cove. Its purpose was to provide a point of reference against which the results from other tidal sampling stations could be compared.

The effluent from Marion's treatment facility is discharged to a small stream which enters the head of Aucoot Cove. Sampling station AC2 was located in the vicinity of the mouth of the stream with the intent of assessing the water quality impact of Marion's discharge. To maintain the quality of the shellfishing flats of Aucoot Cove, this discharge is lagooned during the summer months; thus, it proved impossible to assess its impact at this time.

The results from both stations indicate that Aucoot Cove is a high-quality shellfishing area that is well within its Class SA requirements.

Segment 12: Mattapoisett River

Classification: B
Present Quality: B

The Division has classified the Mattapoisett River as a Class B stream. Its water quality is of special interest due to the municipal well fields near its course which serve the communities of Fairhaven and Mattapoisett. There are no known sources of either point or non-point pollution to the Mattapoisett River.

Sampling station MA1 was located at river mile 9.5 on the Snipatuit Road. This site is a short distance downstream from the outlet of Snipatuit Pond, which forms the headwaters of the Mattapoisett River.

The BOD_5 results averaged 1.2 mg/l in July and 2.2 mg/l in August, which are indicative of high quality water. The nutrient levels were likewise relatively low for both months.

Dissolved oxygen concentrations were often found below the 5.0 mg/l minimum allowable for Class B waters. The flow at Station MA1, which was extremely low for both surveys, was comprised mainly of leakage through an outlet structure of an impoundment located immediately upstream. This produced near-stagnant conditions and thus little reaeration. A pronounced fluctuation in the dissolved oxygen concentration due to photosynthesis produced values during the early morning hours as low as 0.4 mg/l.

At sampling station MA2, river mile 3.8, the Mattapoisett River is meeting Class B requirements, but there are increases in the COD, BOD_5, and nutrient values. This is probably due to an input of organic material from the large wetland areas within the watershed. Minimum D.O. concentrations of 4.2 mg/l in July and August were recorded, with averages of 4.9 and 5.9 mg/l, respectively.

Station MA3, at river mile 1.7, was the final sampling station on the Mattapoisett River. Shortly downstream of this point, the river becomes tidal and then discharges to Mattapoisett Harbor.

Between stations MA2 and MA3, no significant change in water quality occurs other than the dissolved oxygen concentrations which continued to recover, with minimum values of 4.4 mg/l in July and 5.1 mg/l in August.

The coliform bacteria concentrations at stations MA1 and MA2 were generally within Class B requirements. On August 26, 1200 coliform/100 ml were recorded at MA1; while on July 15, 2700 coliform/100 ml were found at MA2. These counts are not sufficient cause to consider the Mattapoisett River in violation of its B classification, but they do indicate the possibility of minor unknown sources of pollution.

The low dissolved oxygen concentrations found at all three sampling stations are due to the characteristically low D.O. content of wetland waters which comprise much of the river's total flow and to the sluggish nature of the river itself. Because the low D.O. values are due to natural causes, the Mattapoisett River is considered to be of Class B quality.

Segment 13: Mattapoisett Harbor

Classification: SA
Present Quality: SA/SB

Mattapoisett Harbor has been classified as an SA body of water by the Division of Water Pollution Control. Nineteen acres of the harbor in the vicinity of the town pier have been closed to shellfishing by the Division of Water Supply, Shellfish Section (formerly in the Department of Public Health). The closure was necessary due to discharges of raw sewage at the Town Pier from a small stormwater and sanitary collection system serving Mattapoisett Center.

Two small unnamed streams which discharge to Mattapoisett Harbor were sampled in addition to three sampling points in the harbor itself. Sampling stations MH1 and PI2 were located near the mouth of each of these streams, and the sampling results show both to have significant pollution problems. The stream which enters Pine Island Pond and which was monitored by Station PI2 receives a secondarily discharge from the Rochester Regional High School. The other stream flows through Mattapoisett Center and appears to be subject to leachate from failing septic systems. The flow of these streams, however, is

negligible during most of the year; therefore, they have little impact on the water quality of Mattapoisett Harbor.

Sampling station MH3 was sited in Mattapoisett Harbor in the vicinity of the discharge at Town Pier, with the intent of assessing this discharge's impact on the water quality of the harbor. Sampling station MH4 was positioned much farther out, near the mouth of the harbor, to provide an overall assessment of the harbor's quality.

A comparison of stations MH3 and MH4 for both the July and August surveys shows no apparent difference in quality between the two sampling sites. A degradation in the overall quality of the harbor was observed at both stations from July to August.

Total coliform bacteria were found in concentrations well below Class SA criteria at stations MH3 and MH4. The low values are due to the rapid die-off rate coliform bacteria experience under high salinity and intense sunlight conditions.

The nutrient concentrations found at stations MH3 and MH4 are comparable to those found at "clean water" station AC1.

Overall, Mattapoisett Harbor is of SA quality but has obvious problems which are the result of raw sewage discharges at Town Pier. Certain areas of the harbor, particularly the 19 acres closed to shellfishing, are considered to be of Class SB quality, suitable for swimming but not for shellfishing, due to the differing coliform bacteria requirements for each activity.

Segment 14: Nasketucket Bay

Classification: SA
Present Quality: SA

Nasketucket Bay is among the highest quality bodies of water within Buzzards Bay. It receives no wastewater discharges and is open to shellfishing. Due to its expected high quality, the Division has had no sampling stations on the bay.

Segments 15 & 16: New Bedford Reservoir; Acushnet River to Hamlin Road

Classification: B
Present Quality: B

The headwaters of the Acushnet River are formed by the New Bedford Reservoir, which is no longer in use but serves as an emergency water supply. The outlet of the New Bedford Reservoir is the start of the Acushnet River. Station AR1, located at the outlet, was the "clean water" station for the 1971 and 1975 surveys.

As expected, the quality of the Acushnet River at this point is excellent and was well within Class B criteria for both surveys. There are no pollution sources to the reservoir; therefore, little change in quality has occurred during the years from 1971 to 1975.

Segment 17: Acushnet River from Hamlin Road to Main Street

Classification: B
Present Quality: C

Station AR3, at river mile 5.5, was a station common to both surveys. Upstream of this point, wastes from White's Dairy Farm enter the Acushnet River as a direct discharge to a feeder stream (Station AR2a) and as runoff.

In 1971, the Acushnet River at Station AR3 was severely degraded due to this source of pollution. The dissolved oxygen concentrations were often found near zero. The dairy wastes were still a problem in 1975, but to a much lesser degree.

The survey results from Station AR2a in 1975 show the feeder stream conveying the dairy wastes to be heavily polluted. Its flow is minimal, however, thus limiting its impact on the Acushnet River. Despite the improvement in water quality at Station AR3 between 1971 and 1975, the river is still below Class B criteria. Minimum dissolved oxygen concentrations of 3.8 mg/l in July and 4.3 mg/l in August were recorded. Since 1971, a small impoundment upstream of Station AR3 has been drained, alleviating in part the low dissolved oxygen problems.

A range of 9.0-3.8 mg/l of dissolved oxygen in July and 11.0-4.3 mg/l in August 1975 indicates a high degree of photosynthetic activity which can be attributed to the abundance of nutrients from the dairy wastes. Elimination of this pollution source would likely increase the minimum dissolved oxygen concentrations and decrease the wide fluctuations in range.

Coliform concentrations well in excess of Class B criteria were found at Station AR2a. In general, at Station AR3, coliform bacteria concentrations were within Class B criteria, in contrast to 1971 when a maximum value of 240,000 coliform/100 ml was found.

Considerably more severe D.O. problems were found at the outlet of Sawmill Pond, Station AR5, at river mile 4.6. In July and August of 1975, the BOD_5 values averaged 1.3 mg/l, which is indicative of high quality water. The dissolved oxygen concentrations averaged 2.3 mg/l in July and 1.5 mg/l in August 1975. A range of only 4.8-1.9 mg/l of dissolved oxygen in July and 2.3-0.9 mg/l in August indicates that there is little photosynthetic activity. Between stations AR3 and AR5, the river is slow-moving due to the small change in elevation. The relatively long time of travel through Sawmill Pond produces low D.O. values due to the assimilation of organic material and the low reaeration rate. The depth of the pond is such that rooted aquatics are not abundant; thus, oxygen is not replenished through photosynthesis. A microscopic analysis of Station AR5 during the July survey showed algae to be almost totally absent.

Between 1971 and 1975 at Station AR5, slight decreases in nitrogen, phosphorus, and BOD_5 concentrations indicate a minor improvement in water quality, but low dissolved oxygen values persist. Therefore, the Acushnet River is in violation of Class B standards at Station AR5.

A small dam at the outlet of Sawmill Pond reaerates the Acushnet River, resulting in a tremendous improvement in the D.O. concentration. This improvement was monitored at Station AR6, located one-tenth of a mile downstream at river mile 4.5. At this point, the Acushnet River is primarily freshwater but is tidally influenced. In 1971, a minimum D.O. concentration of 3.8 mg/l was recorded; while in 1975, minima of 4.9 mg/l for both surveys were found. Average values for 1971 and 1975 are not comparable due to the differing sampling procedures. In 1971, samples were collected primarily during daylight hours, whereas in 1975, samples were collected at four-hour intervals on a 24-hour basis to yield a more accurate average.

Between stations AR5 and AR6 are numerous discharges of raw sewage from private dwellings. Due to the minor nature of these discharges, little water quality degradation is actually seen at Station AR6. The coliform bacteria concentrations did increase to an average of 15,500 col/100 ml in July and 10,000/100 ml in August 1975. These values are an improvement over the maximum of 240,000/100 ml found in 1971.

In 1975, the Acushnet River at Station AR6 is still considered in violation of Class B criteria due to the high coliform bacteria concentrations.

Segments 18 & 19: Acushnet River from Main Street to Route 6; New Bedford Inner Harbor

Classification: SB
Present Quality: U

Stations AR7, AR8, and NB1 were located on the Acushnet River and New Bedford Inner Harbor, which have been classified as SB by the Division and are physically the same body of water. In 1971, top and bottom sampling was conducted at three points across the harbor which were referred to as west, middle, and east. The results from 1971 indicated only minimal differences among the samples from each transect and little change between top and bottom; therefore, only mid-channel, mid-depth sampling for chemical analysis was conducted in 1975. The stratification of saltwater and freshwater in the harbor did greatly affect the coliform bacteria concentrations; therefore, top and bottom sampling for bacteria was continued.

The 1975 surveys show an overall improvement in the quality of Inner New Bedford Harbor. This can be attributed to actions taken by the City of New Bedford to limit dry weather flows from combined sewer overflows and the connection of numerous sanitary and industrial discharges to municipal sewer lines.

In 1971, a newly constructed secondary wastewater treatment plant serving the community of Fairhaven had recently been placed on line with the effluent entering the New Bedford Harbor inside the hurricane barrier. During the 1971 survey, the plant was experiencing operational problems and was discharging an effluent of less than secondary quality. At the time of the 1975 surveys, the effluent was of excellent quality and the plume was barely distinguishable.

In 1971, the total coliform bacteria concentrations were considerably higher than 1975 at all Inner Harbor stations. This is due to the raw sewage flows from the sources previously mentioned. The results from both years show a

large variance in coliform concentrations for samples collected from top and bottom waters. Much higher values were found in samples collected from surface waters, due to the nature of the lighter freshwater to overlay the heavier saline waters. Coliform bacteria experience a rapid die-off rate in highly saline waters.

Dissolved oxygen samples collected from the bottom waters of stations AR7 and AR8 were generally well below the 5.0 mg/l minimum allowable for Class SB waters. The demand exerted by the bottom muds which have accumulated in the harbor over the years is responsible.

The lower BOD_5 results from 1975 confirm the fact that discharges of raw sewage and industrial wastes have been greatly reduced. This has also resulted in the overall reduction of nitrogen and phosphorus levels.

The quality of New Bedford Harbor has improved since 1971 but is still well below Class SB quality. It will likely remain less than SB quality for the near future due to the accumulation of toxic concentrations of heavy metals in the bottom muds. It is encouraging to note, however, that a comparison of the heavy metal concentrations in the bottom muds shows a decrease from 1971 to 1975. The concentrations remain at levels which are toxic to most benthic organisms, and dredging will be required for Inner New Bedford Harbor to meet SB criteria.

Segment 20: Outer New Bedford Harbor

Classification: SA
Present Quality: SC

The overall quality of Outer New Bedford Harbor has also improved from 1971 to 1975. This is due to the construction of a primary wastewater treatment facility serving the City of New Bedford. The effluent is discharged to Buzzards Bay via a 3,300-foot-long outfall. The same outfall discharged untreated wastewater during the 1971 survey.

Station NB3, located in the vicinity of the plume from New Bedford's discharge, experienced a noticeable improvement in quality from 1971 to 1975. Due to the chlorinated effluent in 1975, the coliform bacteria concentrations decreased to levels acceptable for SA waters. The results from stations NB2 and NB5, which were common to both surveys, also indicate a general water quality improvement in the outer harbor.

New Bedford Outer Harbor, despite the low coliform bacteria levels, is considered to be of SC quality due to the magnitude of the pollutional load from New Bedford's wastewater treatment plant.

The problem with toxic concentrations of heavy metals in bottom muds is much less severe in the Outer Harbor. Extremely high concentrations of metals were found in the bottom muds collected at Station NB3 (New Bedford's discharge). At Pope Beach, Station NB5, the sediment consisted of only 0.6% organic material (dry weight basis), and the heavy metals concentrations were greatly reduced. Chromium, which was found in a concentration of 355 mg/kg at NB3, decreased to 43 mg/l at NB5. While this is a definite improvement, the sediment at Station NB5 still represents an unsuitable environment for shellfish. The Outer Harbor has therefore been closed to shellfishing by

the Division of Water Supply's Shellfish Section. Heavy metals continue to be discharged to the Outer Harbor from numerous metal-plating industries connected to the New Bedford Wastewater Treatment Plant, but their concentrations are considerably less due to each industry pretreating its effluent prior to discharge to the municipal system. The primary facility removes a considerable amount of the sludge formerly discharged to the harbor but removes very little of the metals which are in solution.

Segment 21: Clark Cove

Classification: SA
Present Quality: SB

The 1971 New Bedford Harbor survey had one station (NB4) on Clark Cove. Its purpose was to assess the impact of sewage bypasses from the Rodney French Drive West Pumping Station. The frequency of these overflows had been greatly reduced by 1975, therefore the station location was changed to the most sensitive water use area, Jones Park Beach, located on the opposite side of the cove. In 1975, this station was labeled CC1.

Clark Cove has been classified as an SA body of water by the Division. There are twelve combined sewer overflows from New Bedford's collection system which periodically discharge to the cove. The intermittent nature of these wastewater flows results in widely varying water quality. No problems were found in Clark Cove during the 1971 or 1975 surveys. It is likely, however, that at times of heavy precipitation, raw sewage bypasses from the pumping station and the combined sewer overflows result in a temporarily lower quality. Due to these wastewater sources, Clark Cove has been closed to shellfishing by the Division of Water Supply's Shellfish Section. It is open to the taking of quahogs, which are less sensitive to polluted waters than other forms of shellfish.

The overall quality of Clark Cove is considered to be SB due to the temporary water quality problems resulting from discharges of untreated sewage.

Segment 22: Apponagansett Bay

Classification: SA
Present Quality: SB

The 1975 Buzzards Bay surveys had one station on Apponagansett Bay (AP1) and one on Buttonwood Brook (AP2), which is a small tributary to the Bay.

The sampling results from Station AP2 in general indicate that Buttonwood Brook is not meeting Class B criteria. Nitrate-nitrogen averaged 1.2 mg/l in July and 1.5 mg/l in August, which indicates the possibility of failing septic systems upstream. The coliform bacteria concentrations were continually in violation of Class B criteria, with a maximum of 8,500 col/100 ml found on August 19, 1975. These values further indicate a source of sewage to the brook.

While Buttonwood Brook is not grossly polluted, the concentrations of coliform bacteria found are in violation of Class B criteria and it is therefore considered to be of Class C quality. Buttonwood Brook, despite its water

quality problems, is not a major source of pollution to Apponagansett Bay due to its minimal flow.

Apponagansett Bay has been classified as SA waters by the Division of Water Pollution Control.

The community of Dartmouth has a recently completed secondary wastewater treatment plant which discharges via a deep ocean outfall to Buzzards Bay. Much of the area surrounding Apponagansett Bay remains to be sewered to the plant, and failing septic systems are a problem. As a result, 37 acres of the Inner Harbor have been closed to shellfishing by the Division of Water Supply.

Station AP1 was located on Gulf Hill Road at the inlet to a smaller bay within Apponagansett Bay. During the July survey, total coliform bacteria were present in concentrations acceptable to SA waters. In August, the total coliform bacteria concentrations increased to an average of 2,550 col/100 ml, which is in violation of Class SB standards. The source is believed to be failing septic systems in addition to discharges of sanitary waste from the numerous pleasure craft moored within the harbor. The nitrogen and phosphorus concentrations were slightly in excess of those found at "clean water" station AC1, further indicating sources of sanitary waste. These concentrations are still quite low, however, and the amount of biodegradable organic material is minimal, as indicated by the BOD_5 results which ranged from 0.0 mg/l to 2.2 mg/l.

It is difficult to assess the quality of an entire harbor on the basis of results from one sampling station. The high coliform bacteria counts found at Station AP1 indicate possible sources of sanitary waste to the Bay and, therefore, the ay is believed overall to be of SB quality. The 37 acres which have been closed to shellfishing are also likely to be of SB quality and are suitable for swimming but have been closed due to the more stringent coliform bacteria requirements for the taking of shellfish.

Segment 23: Paskamanset River

Classification: B
Present Quality: B

The 1975 Buzzards Bay surveys had four stations on the Paskamanset River which were located with the intent of assessing the impact of two sanitary landfills sited near the river's course. Station PA1, located at the outlet of Turner Pond, was chosen as a "clean water" station as there are no known sources of pollution upstream of this point.

The Paskamanset River at Station PA1 has a high concentration of organic material which is indicated by the average COD values of 112 mg/l in July and 99 mg/l in August. The BOD_5 results of 3.3 mg/l in July and 1.3 mg/l in August show that little of this material actually exerts an oxygen demand on the river.

Dissolved oxygen concentrations were continually found below the 5.0 mg/l minimum allowable for Class B waters. This is believed due to the large

wetland areas forming the headwaters and the characteristically low D.O. concentrations found in these waters. The unusually low pH values, which ranged from 4.5 to 4.9, are also characteristic of wetland waters. The stagnant nature of these waters affords little reaeration.

Due to the natural conditions producing the low dissolved oxygen values, the Paskamanset River at this point is considered to be meeting standards.

Station PA2 was initially intended to directly monitor possible leachates from the New Bedford Sanitary Landfill. This station was dropped from the July survey due to its inaccessibility. It was positioned on the main stem of the Paskamanset River, downstream of the New Bedford sanitary landfill at Route 6 in Dartmouth, for the August survey.

The results from the August survey at Station PA2 indicate that there are no problems with leachate from the landfill site. At Station PA1, the total coliform bacteria were well below Class B criteria. (A maximum of 100 col/100 ml were found in August.) At Station PA2, the total coliform bacteria concentrations for the August survey were in violation of Class B standards, averaging 1,600 col/100 ml. This is only slightly above the average allowable for Class B waters and could be the result of other unknown sources of pollution. The nutrients experienced only slight increases in concentration, while the COD values decreased, indicating no important input of organics from the landfill site.

Due to the reaeration between stations PA1 and PA2, the dissolved oxygen concentrations increased to an average of 5.3 mg/l in August, with a minimum of 4.6 mg/l recorded.

The coliform bacteria at Station PA2 are only slightly above the Class B allowable average and are not sufficient to consider the Paskamanset below Class B standards.

Stations PA3 and PA4 were located on the Paskamanset River above and below the Dartmouth sanitary landfill with the intent of assessing any leachate or runoff problems. There is little change in quality between stations PA2 and PA3, other than the continued recovery in dissolved oxygen concentrations.

Coliform bacteria were also found at Station PA3 in numbers slightly higher than expected, indicating possible failing septic systems. This problem appears to be minor, as there is no increase in the nutrients and COD values.

There are suspected leachate problems with the Dartmouth sanitary landfill. The results from stations PA3 and PA4 do not indicate any water quality problems resulting from the leachate, however. Overall, an improvement in quality is seen between stations PA3 and PA4 with reductions in coliform bacteria and nutrient concentrations. The Paskamanset River at this point is considered to be of Class B quality despite the dissolved oxygen concentrations which periodically fall below the 5.0 mg/l minimum allowable for Class B streams. The Paskamanset River is by nature a slow-moving and meandering river which drains large wetland areas. As a result, reaeration is minimal and low dissolved oxygen concentrations are found along its entire length.

Segment 24: Slocums River

Classification: SA
Present Quality: SA

Sampling Station PA4 marks the end of the Paskamanset River and the beginning of the Slocums River. The Slocums is tidal along its entire length and has no known pollution problems. It easily meets its SA classification and is open to shellfishing.

Segments 25 & 26: Shingle Island River; Noquochoke Lake

Classification: B
Present Quality: B

The headwaters of the East Branch of the Westport River are formed by the Shingle Island and Copicut Rivers above Noquochoke Lake in Dartmouth.

A former Dartmouth sanitary landfill site is located near the course of the Shingle Island River in the vicinity of its headwaters. Sampling Station SI1 was positioned downstream of the landfill site at Pine Island Road to assess any possible leachate or runoff problems. The results from both the July and August surveys indicate that the landfill is not a source of pollution to the Shingle Island River. The quality of the river at Station SI1 is excellent and is well within Class B criteria.

Station WPE1 was located at the outlet of Noquochoke Lake, which is the actual beginning of the Westport River. Dissolved oxygen concentrations were occasionally found below the 5.0 mg/l minimum allowable for Class B waters during the July survey, but this was believed due to natural conditions. In all other respects, the Westport River at Station WPE1 is meeting Class B criteria.

Segment 27: Westport River, East Branch, from outlet of Noquochoke Lake to Old County Road

Classification: B
Present Quality: C

Station WPE2 was located on the Westport River at Old County Road, two miles downstream from Station WPE1. Between the two stations, the Westport River receives a treated wastewater discharge from the Lincoln Park Amusement Company. There is also a moderate amount of development along the river in this area, and failing septic systems are a possibility.

At sampling Station WPE2, the Westport River does not meet Class B standards due to high counts of coliform bacteria which are probably the result of the previously mentioned sources. In July and August, the coliform bacteria averaged 3,300 and 5,000/100 ml, respectively. The ammonia- and nitrate-nitrogen concentrations increased noticeably, which would be expected downstream of a treated sanitary wastewater discharge. The phosphorus level did not increase, which may be due to the phosphorus removal employed at the Lincoln Park wastewater treatment plant.

Station WPE2 marks the division between the upstream waters classified as B waters and the downstream, tidally influenced waters of SA classification.

Segment 28: Westport River, East Branch, from Old County Road to river mouth

Classification: SA
Present Quality: SA

Station WPE3 was located on Hix Bridge Road on the Westport River and is 3.7 miles downstream from Station WPE2. The quality of the Westport River at this station is similar to that at WPE2, with the exception of the coliform bacteria counts, which decreased to nearly acceptable Class SA levels.

Station WPE4 was positioned on a small tributary to the Westport River which is in the vicinity of the Westport sanitary landfill. The results from both surveys indicate the landfill has no water quality impact on the Westport River.

The final station on the Westport River, East Branch, was located on the Route 88 bridge near the river's mouth. The results from this station and Station WPE3, located 4.1 miles upstream, indicate that this SA-classified stretch of the river at times violated coliform bacteria requirements. During the July survey, the total coliform bacteria concentrations at Station WPE5 were well within SA requirements, with an average of 22 col/100 ml (low tide); while in August the concentration rose to 1000/100 ml (low tide), which is well above the median of 70/100 ml allowable for SA waters.

The increased coliform bacteria concentrations in August are possibly due to discharges of untreated sanitary waste from recreational and commercial water craft near the river's mouth. Despite the higher than expected bacteria concentrations, the East Branch of the Westport River is considered to be of SA quality overall. The mere possibility of sanitary discharges, however, places the shellfishing beds in danger of closure.

Segment 29: Westport River, West Branch

Classification: SA
Present Quality: SA

The 1975 Buzzards Bay survey had one sampling station (WPW1) on the West Branch of the Westport River at the United States Geological Survey gaging station in Tiverton, Rhode Island. The gaging station divides the upstream freshwater portion of the river located in Rhode Island from the downstream saltwater portion located primarily in Massachusetts.

There are no known wastewater discharges to the West Branch of the Westport River, but an average of 1700 coliform/100 ml were found in July. In August the average was 200/100 ml, which is well within Class B criteria. During both surveys, all other parameters were found to be within Class B criteria, indicating this pollution source to be minor.

The tidal portion of the river has been classified as SA by the Division and

is believed to be currently meeting this classification. Like the East Branch, this portion of the river is subject to possible discharges of untreated sanitary waste from commercial and pleasure craft. Both the East and West Branches of the Westport River are high-quality shellfishing areas, but the possibility of sanitary discharges in the vicinity of the beds places them in danger of closure.

SIGNIFICANT WASTEWATER DISCHARGES

Significant point discharges of wastewater within the Buzzards Bay Basin number approximately 20 (excluding combined sewer overflows). There are multitudes of other discharges which are considered to be minor and of little significance. Table III-4 lists the discharges, their location, the receiving water, existing treatment, and proposed treatment. Discharge locations are shown on Figure III-C.

Municipal Discharges

Five communities within the basin have constructed waste treatment facilities to basically serve their own needs, while two communities have some form of collection system but no provisions for treatment.

The New Bedford Wastewater Treatment Plant was completed in 1973 and is a primary facility with a design flow of 30.0 million gallons per day (MGD). The discharge is to Buzzards Bay via a 3,300-foot-long deep ocean outfall extending due south from the plant's site at the tip of Fort Rodman. New Bedford's combined stormwater and sanitary collection sewer system suffers from extreme inflow and infiltration problems; thus, flows to the treatment plant of two to three times the design flow are not uncommon during and following heavy precipitation. Discharges from the plant in excess of 30 MGD are treated and discharged to Buzzards Bay via a 900-foot-long auxiliary outfall. The sludge is centrifuged, then incinerated and the ash landfilled on-site.

The discharge from New Bedford's treatment plant has the greatest water quality impact of the treated municipal discharges, due to the large volume of wastewater which receives only primary treatment.

The Fairhaven wastewater treatment facility is a secondary plant of extended aeration design. It has a 2.1 MGD design flow and discharges at the eastern shore of New Bedford Inner Harbor.

Dry weather flows are slightly over 1.0 MGD, while during wet weather, the design flow is at times exceeded due to infiltration problems within the collection system. Flows in excess of the design flow are diverted to a storm settling basin and subsequently rerouted through the treatment plant. Should the capacity of the settling basin be exceeded, chlorination is provided prior to discharge to the Inner Harbor. Sludge from the plant is dewatered through vacuum filtration and then landfilled at Fairhaven's municipal site.

The Fairhaven treatment plant is well designed and is efficiently operated; consequently, the discharge to the Inner Harbor has little or no discernable water quality impact.

TABLE III-4

SIGNIFICANT WASTEWATER DISCHARGES

BUZZARDS BAY BASIN

NUMBER	SOURCE AND LOCATION	RECEIVING WATER	EXISTING TREATMENT	PROPOSED TREATMENT
1	Mass. Maritime Academy, Bourne	Cape Cod Canal	Secondary	Same
2	Wareham STP, Wareham	Agawam River	Secondary with sand filters	Same
3	Tremont Nail Company, Wareham	Wankinco River	None	Process modification to closed system
4	Marion STP, Marion	Aucoot Cove	Secondary with sand filters	Same
5	Old Rochester Regional High School, Mattapoisett	Stream to Pine Island Pond	Secondary	Connection to Mattapoisett sewer when available
6	Mattapoisett sewers, Mattapoisett	Mattapoisett Harbor	None	Connection to Fairhaven municipal
7	White's Dairy, New Bedford	Acushnet River	Spray irrigation/ bypass	Advanced
8	Acushnet Nursing Home, Acushnet	Acushnet River	Secondary/chlorination	Connection to Acushnet sewer when available
9	Acushnet sewers, Acushnet	Acushnet River	None	Connection to New Bedford municipal
10	Acushnet Co., Golf Div., Acushnet	Acushnet River	None	Connect to Acushnet sewer when available
11	Fairhaven STP, Fairhaven	New Bedford Inner Harbor	Secondary	Same
12	Atlas Tack Corp., Fairhaven	New Bedford Outer Harbor	Lagoon	Connection to Fairhaven Municipal

TABLE III-4 (Continued)

NUMBER	SOURCE AND LOCATION	RECEIVING WATER	EXISTING TREATMENT	PROPOSED TREATMENT
13	East Fairhaven Elementary School, Fairhaven	Buzzards Bay	Secondary/ chlorination	Connection to East Fairhaven sewer when available
14	Chamberlain Manufacturing Corp., New Bedford	Nash Road Pond and Copper Brook	BPT	Same
15	Acushnet Co., Rubber Div., New Bedford	Acushnet River	None	Connect to New Bedford sewer
16	Aerovox Corp., New Bedford	Acushnet River	BPT	BAT
17	Revere Copper and Brass, New Bedford	Acushnet River	BPT	Same
18	New Bedford combined sewer overflows, New Bedford	Acushnet River, New Bedford Harbor, Clark Cove	None	Separation
19	Cornell Dubilier Elect. Corp., New Bedford	New Bedford Outer Harbor	BPT	BAT
20	New Bedford STP, New Bedford	Buzzards Bay	Primary	Secondary
21	Dartmouth STP, Dartmouth	Buzzards Bay	Secondary	Same
22	Lincoln Park Amusement Company, Dartmouth	Westport River, East Branch	Advanced	Same

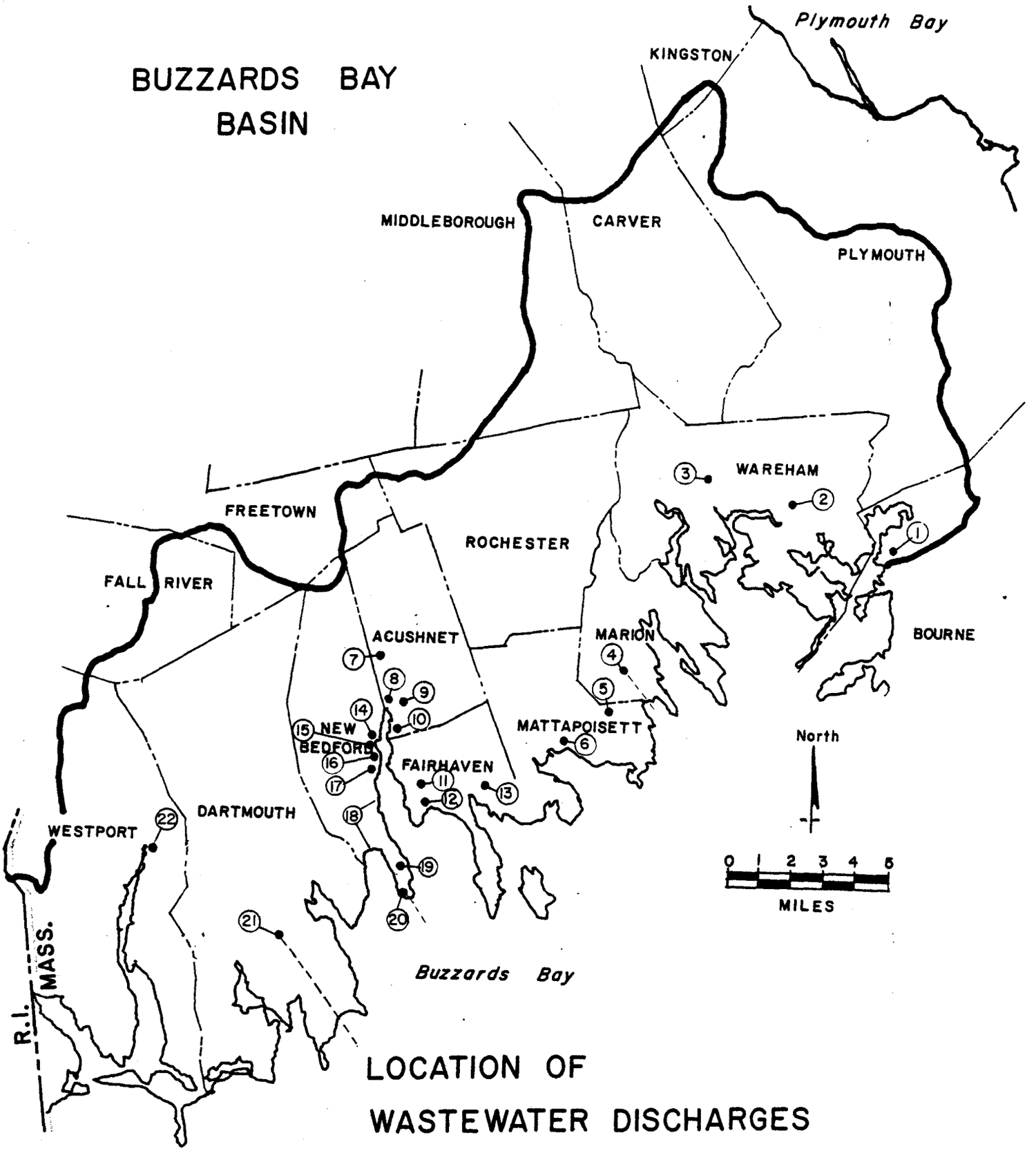

BUZZARDS BAY
BASIN
Plymouth Bay
KINGSTON
MIDDLEBOROUGH
CARVER
PLYMOUTH
WAREHAM
FREETOWN
ROCHESTER
FALL RIVER
ACUSHNET
MARION
BOURNE
MATTAPOISETT
NEW BEDFORD
FAIRHAVEN
DARTMOUTH
WESTPORT
North
0 1 2 3 4 5
MILES
R.I.
MASS.
Buzzards Bay
LOCATION OF
WASTEWATER DISCHARGES

FIGURE III-C

The Dartmouth waste treatment facility was completed in 1970 and is also an extended aeration plant with a 2.1 MGD design flow. Discharge is to Buzzards Bay via a 900-foot-long deep ocean outfall. The plant handles approximately 1.0 MGD and there are no problems with infiltration into the collection system. Sludge from the treatment plant is dewatered through vacuum filtration and is then landfilled at the Dartmouth municipal site.

The Dartmouth facility operates moderately well and has minimal water quality impact on Buzzards Bay. There were no sampling stations in the vicinity of the discharge during any of the surveys; therefore, it is difficult to fully assess its impact.

The Marion wastewater treatment facility is of an unconventional design but produces an effluent of very high quality. From the headworks, the sewage is pumped to a series of three facultative lagoons and then applied to sand beds. The effluent is then chlorinated and discharged to a small stream which enters Aucoot Cove. Slightly in excess of 0.3 MGD is presently handled by the treatment plant.

Aucoot Cove is open to shellfishing; thus, the discharge from the treatment plant is lagooned during the summer shellfishing season. Due to its overall high quality and the restricted periods of discharge, the effluent appears to have little if any effect on the quality of Aucoot Cove.

The treatment facility has been in operation since 1972. Since that time, removal of sludge from the lagoons has not been required.

The Wareham wastewater treatment plant is of extended aeration design and was completed in 1972. Although the design flow is 1.75 MGD, it presently treats only 0.3 MGD. The low sewage flows have resulted in long detention times to the treatment plant and have produced septic conditions at the headworks. The use of hydrogen peroxide is now required to eliminate foul odors and permit proper operation of the plant.

Sand beds are used for effluent polishing prior to discharge to the Agawam River. The high-quality effluent has little impact on the river and none on the shellfishing beds located farther downstream.

The community of Acushnet has a small collection system which discharges to the tidal portion of the Acushnet River without treatment.

Mattapoisett at the present time has a similar situation. There is a small collection system serving a portion of the town center which discharges without treatment to the harbor.

The Massachusetts Maritime Academy is located in Bourne in the Village of Buzzards Bay. It has a small extended aeration treatment plant with a discharge of approximately 15,000 gallons per day (gpd) to the Cape Cod Canal. Due to the rapid and frequent flushing of the canal, discharges to it likely have little or no water quality impact.

TABLE III-5

RANKING OF MUNICIPAL DISCHARGES

BUZZARDS BAY BASIN

RANK	DISCHARGE	TOTAL SEVERITY POINTS
1	New Bedford combined sewer overflows	54
2	New Bedford STP	43
3	Mattapoisett sewers	8
4	Acushnet sewers/septic tanks	6
5	Westport septic tanks	4
6	Fairhaven STP	3
7	Bourne septic tanks	3

New Bedford Overflows

The City of New Bedford has 26 combined sewer overflows which discharge to the Acushnet River, New Bedford Inner and Outer Harbors, and Clark Cove. The combined water quality impact of these intermittent discharges is the most severe within the basin.

All municipal discharges in the Buzzards Bay Basin have been placed on implementation schedules under the National Pollutant Discharge Elimination System (NPDES). Schedules for the construction and upgrading of waste treatment facilities are compatible with the national water quality goals of PL92-500.

Industrial Discharges

Previous pollution abatement efforts have greatly reduced the number of untreated industrial discharges within the basin. Most of those requiring some form of treatment have been connected to municipal waste treatment facilities. Those discharges which would prove toxic to the biological action of a secondary treatment plant receive appropriate pretreatment prior to discharge to the collection system.

In certain cases, it is desirable to provide a high degree of treatment and discharge directly to a receiving water.

All of the industries within the Buzzards Bay Basin have been placed on implementation schedules under the National Pollutant Discharge Elimination System. The abatement schedule set forth for each discharger is compatible with the national water quality goals of PL92-500.

Table III-4 lists the discharges, their locations, the receiving water, existing treatment, and proposed treatment. Discharge locations are shown on Figure III-C.

The discharges in the Buzzards Bay Basin have been ranked according to their impact on water quality. This was accomplished by multiplying the severity ratings shown in Table III-3 by the river miles or harbor area (a conversion factor has been used to allow comparison) affected by the discharge. These rankings for the basin are shown in Table III-5.

It can be seen from this table that generally, untreated municipal discharges have the most important water quality impacts.

IV. PAST ABATEMENT PROGRAMS

In order to provide a logical time sequence for a water pollution abatement program, the Division set up an implementation schedule in 1967. The Division identified municipalities and industries which needed to initiate water pollution control facilities or which needed to expand or upgrade their existing facilities. An implementation schedule issued to the designated municipality or industry contained specific dates for the submission of engineering reports and final plans, for the initiation of construction, and the expected completion and operation of the required construction. Legal orders were given those municipalities and industries not complying with the original implementation schedule. In some instances in the Commonwealth, court action was needed to insure the proper compliance with the implementation schedule.

As part of the Federal Water Pollution Control Act Amendments of 1972 (PL92-500), the implementation program was incorporated into the permit program. This is an effort of the Division and Federal government which will be examined in detail in Section VII of this document.

Following is a synopsis of the present status of the implementation schedules for various municipalities within the Buzzards Bay Basin. The Division issued schedules to those municipalities which exhibited the need for a sewerage program in order to alleviate water quality problems within the communities. Reference should be made to Table IV-1.

Dartmouth: The community of Dartmouth has a 2.1 MGD wastewater treatment plant of extended aeration design which was completed in 1970. Presently a flow of approximately 1.0 MGD is treated and discharged to Buzzards Bay via a deep ocean outfall.

The built-up area of South Dartmouth on the east shore of Apponagansett Bay is sewered to the treatment plant, but some illegal sewage discharges to the harbor remain. Gulf Hill Dairy, located on the western shore of the bay, was previously a major polluter but is now connected to the municipal system which was extended for this purpose.

Based on a 1975 population of 21,644 persons, sewer service is now offered to 27.8% of the population (6,024 persons) occupying 28.5% of the total number of dwellings within the town.

Fairhaven: The community of Fairhaven has an extended aeration wastewater treatment plant of 2.1 MGD design flow which was completed in 1970. It presently treats and discharges to Inner New Bedford Harbor an average of slightly greater than 1.5 MGD. The municipal collection system services primarily Fairhaven Center and is subject to heavy infiltration. Fairhaven has separate sanitary and stormwater collection systems and, therefore, has no combined sewer overflow discharges to New Bedford Harbor.

Marion: The community of Marion has the equivalent of a secondary wastewater treatment plant. It consists of a conventional headworks near the town center which is fed by a small collection system serving the built-up area. The wastewater is pumped through a force main to three facultative lagoons connected in series and then is applied to sand beds (seven total) to provide a further degree of treatment. The effluent is then chlorinated

and discharged to Aucoot Cove via a small stream near the head of the cove.

The design flow of the treatment plant is 0.34 MGD; however, approximately 0.45 MGD is presently handled. Due to the treatment plant's somewhat unconventional design, the Division has conservatively estimated its capacity at 0.34 MGD. The engineering consultants responsible for the plant's design, Camp, Dresser and McKee, feel the design flow is in excess of 0.5 MGD. This appears to be a more realistic estimate, as the treatment system is presently providing adequate secondary treatment for wastewater flows in the range of 0.4 to 0.5 MGD. Also of consideration is the effect of evaporation. Due to the long detention times through each lagoon, sizeable losses of flow are likely; therefore, an influent flow measurement is not representative of the actual volume of treated effluent.

An infiltration study of the municipal collection system was conducted during 1969 and 1970 which prompted the replacement of a sewer line along Front Street in the spring of 1974.

New Bedford: The City of New Bedford has a 30 MGD primary wastewater treatment plant which was completed in 1973. The treatment plant was not fully operational until the summer of 1975 following the construction of a grit chamber. During 1974, an average flow of 33 MGD was handled by the treatment plant. Normal dry-weather flows average approximately 26 MGD, but during precipitation, flows of twice the design flow are common due to infiltration plaguing most of New Bedford's ancient collection system.

The Division's water quality surveys of New Bedford Harbor during the summer of 1971 were responsible for subsequent actions taken by the City of New Bedford to limit dry weather sewage flows from combined sewer overflows. This was accomplished primarily through a program of maintenance and adjustment of existing overflow structures.

Wareham: The community of Wareham has a secondary wastewater treatment plant of 1.8 MGD design flow which was completed in 1972. The plant is of extended aeration design with effluent polishing accomplished through the use of sand beds (eight) with discharge to the Agawam River.

The actual point of discharge is somewhat controversial. There are four effluent lines which discharge to the river but are not hydraulically connected to the sand beds. The purpose of the effluent lines is to lower the groundwater table and thus insure proper drainage of the beds. Over a period of time, the surface and groundwater systems have become closely related, and it is apparent that much of the flow from the effluent lines is treated effluent. For this reason, the Agawam River is recognized by the Division as the receiving water for Wareham's wastewater discharge.

Presently, Wareham Center, Onset Center, and a portion of Point Independence are sewered to the treatment plant, which has an average flow rate of 0.2 to 0.3 MGD. The low sewage flow produces septic conditions at the treatment plant, forcing the installation of facilities to provide pre-treatment with hydrogen peroxide. Despite these operational difficulties, following application to the sand beds, the effluent to the river is of excellent quality.

TABLE IV-1

STATUS OF IMPLEMENTATION SCHEDULE FOR MUNICIPALITIES

BUZZARDS BAY BASIN

MUNICIPALITY	UNDER ORDERS	PRELIMINARY REPORT	FINAL DESIGN	UNDER CONSTRUCTION	IN OPERATION	REMARKS
Acushnet	No					Sewering to New Bedford STP
Bourne	No	X				Report approved by DWPC
Dartmouth	Yes	X	X		X	Secondary treatment
Fairhaven	No	X	X		X	Secondary treatment
Marion	No	X	X		X	Secondary treatment/sand filters
Mattapoisett	Yes	X				Sewering to Fairhaven STP
New Bedford	Yes	X	X		X	Primary treatment
Wareham	No	X	X		X	Secondary treatment/sand filters
Westport	No					Has engaged consultant

Industrial Implementation Program

Industrial discharges in the Buzzards Bay Basin in previous years have had a major water quality impact, primarily in the Acushnet River and New Bedford Harbor area.

Implementation of pollution abatement programs for industries has been completed for many and is well in progress for others. Table IV-2 shows the major industries in the basin and their status.

TABLE IV-2

STATUS OF IMPLEMENTATION SCHEDULE FOR INDUSTRIES, BUSINESSES, INSTITUTIONS

BUZZARDS BAY BASIN

INDUSTRY	TOWN	UNDER ORDERS	PRELIMINARY REPORT	FINAL DESIGN	UNDER CONSTRUCTION	IN OPERATION	REMARKS
Acushnet Co., Golf Div.	Acushnet	X	X				Pretreat & connect to sewer within 30 days of availability
White's Dairy	Acushnet						Untreated dairy wastes
Mass. Maritime Academy	Bourne	X	X	X		X	Secondary
Lincoln Park Amusement Co.	Dartmouth	X	X	X		X	Advanced
Atlas Tack Company	Fairhaven	X	X				Treatment & connection to Fairhaven STP downline
Acushnet Co., Rubber Div.	New Bedford	X	X	X	X	4/77	Connect to New Bedford STP
Aerovox Corporation	New Bedford	X	X				New effluent limits to be met by July 1977
Chamberlain Manuf. Co.	New Bedford	X	X	X	X	1/77	Secondary
Cornell Dubilier Elect. Corp.	New Bedford	X	X				New effluent limits to be met by July 1977
Revere Copper & Brass	New Bedford	X	X	X		X	Physical-chemical
Tremont Nail Co.	Wareham	X	X	X			Pickling operation to be modified to closed system

V. NON-POINT SOURCES

Non-point sources of pollution can be defined as those sources having a diffuse origin and often having no measurable flow. Many of the rivers and harbors within the Buzzards Bay Basin receive no wastewater discharges; thus, non-point sources of pollution must account for areas of degraded water quality.

Non-point sources of pollution are usually the result of man's activities within a basin, although naturally occurring conditions can also be considered within this category. Whether or not a condition which is found to be natural can be considered a pollution source is debatable, since it is by definition the natural state of the river. These conditions do affect the river's quality, however, and in that respect can be labelled "sources of pollution".

A brief description of the more common non-point sources follows. Some of these have produced a measurable water quality degradation in certain rivers and harbors within the Buzzards Bay Basin, while others appear to have little or no water quality impact. Non-point sources of pollution within the basin will be fully investigated under the ongoing "208" study.

LANDFILLS

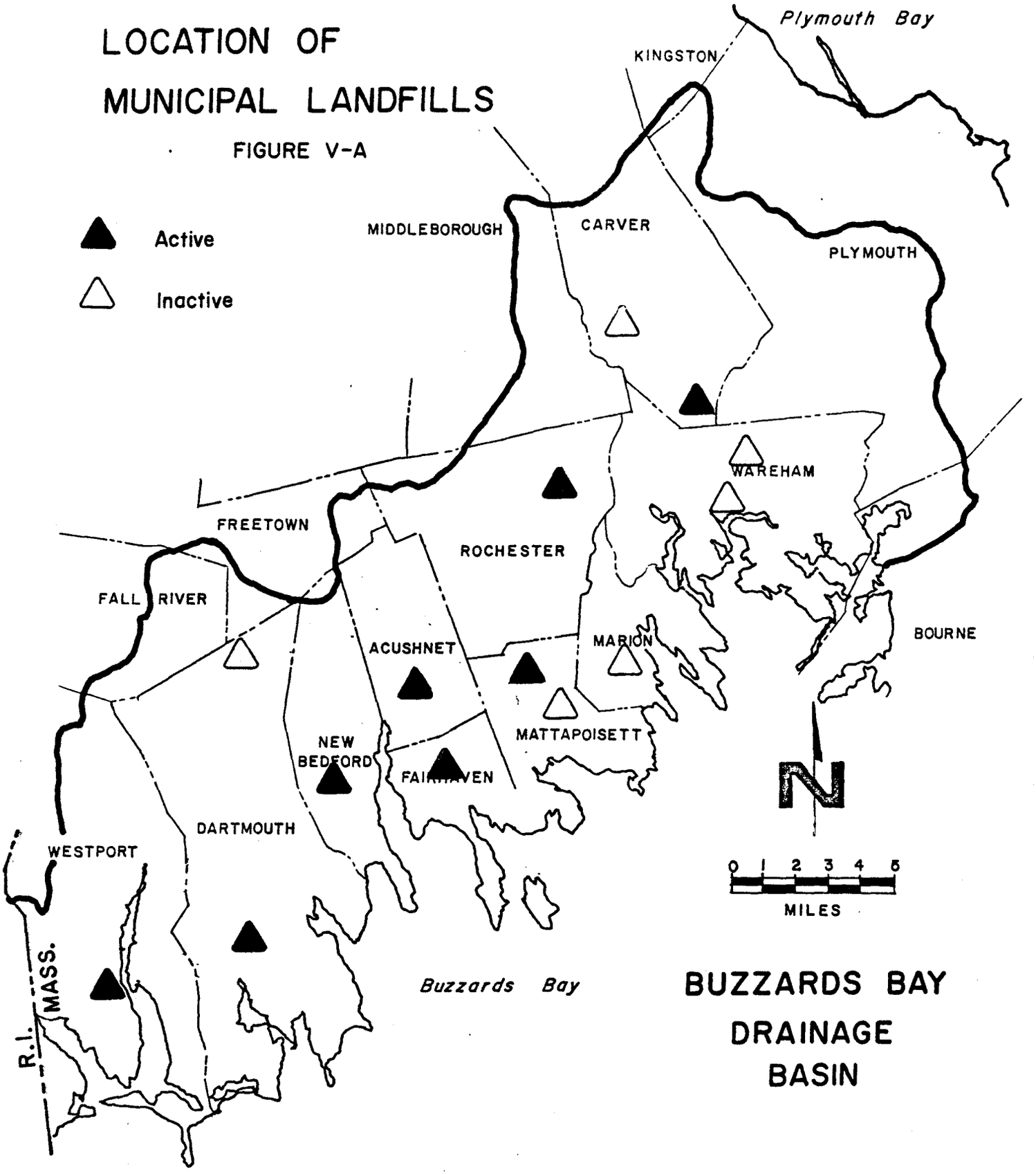
The Massachusetts Division of Environmental Health follows the guidelines listed in Regulations for the Disposal of Solid Waste by Sanitary Landfill (Massachusetts General Laws, Ch. 111). When these guidelines are rigidly adhered to, few problems to surface and groundwaters resulting from landfill leachate or runoff should occur. In the past, unfortunately, it has often proved convenient, due to a variety of reasons, for a municipality to locate its sanitary landfill site near the course of a river. From a water quality standpoint, this is an extremely poor choice. (See Figure V-A for landfill locations within the basin).

Operation of these sites is often far from the guidelines listed in the Sanitary Landfill Code. The worst possible condition is generally termed an "open dump". In this case, little or no attempt has been made to follow the code, and refuse is merely deposited at the landfill site.

When the guidelines have been loosely followed, the site is referred to as a "dump and cover". Here, a program of periodically covering the refuse is followed, although not in strict accordance with the regulations of the code.

A landfill site is termed a "sanitary landfill" only when all the guidelines have been followed. A layer of refuse is graded to a specified depth and is then covered with a layer of fill, also of a specified depth. The process is then repeated. Many other requirements, too numerous to list, must also be followed.

Municipal landfill sites within the Buzzards Bay Basin are of the "open dump" or "dump and cover" variety. The Massachusetts Division of Environmental Health (formerly the Department of Public Health) is working closely with each community to minimize leachate and runoff problems from poorly sited land-


LOCATION OF
MUNICIPAL LANDFILLS
FIGURE V-A
Active
Inactive
Plymouth Bay
KINGSTON
MIDDLEBOROUGH
CARVER
PLYMOUTH
WAREHAM
FREETOWN
ROCHESTER
FALL RIVER
ACUSHNET
MARION
BOURNE
MATTAPOISETT
NEW BEDFORD
FAIRHAVEN
DARTMOUTH
WESTPORT
R.I.
MASS.
Buzzards Bay
0 1 2 3 4 5
MILES
BUZZARDS BAY
DRAINAGE
BASIN

fills and is ensuring through proper selection of new sites that future problems are not created.

Generally, neither runoff nor leachate from landfill sites has been found to have an important impact on the quality of the surface waters of Buzzards Bay.

AGRICULTURE

The excessive use of fertilizers on farm crops can produce surface and groundwater having an abundance of nutrients (primarily nitrogen and phosphorus). Other agricultural non-point forms of pollution include the use of pesticides, insecticides, and algaecides by the cranberry industry. This source is of primary importance within the Buzzards Bay Basin and requires further investigation to determine its full effects. The Cranberry Research Station in Sandwich has conducted most of the research to date in this area.

SUBSURFACE DISPOSAL

Malfunctioning subsurface disposal systems produce leachate which can degrade both the surface and groundwaters of the immediate area. The most common reasons for malfunctioning systems include: unsuitable soil composition, high water table, siting near a surface waterbody, and the assimilative capacity of groundwater system being exceeded as a result of intensive development. Further study is needed within the basin to fully assess the impacts failing subsurface disposal systems have on groundwaters or surface waters.

URBAN AREAS

Urbanization is generally accompanied by a high percentage of impervious land area. Stormwater runoff from these areas is rapid and, as a result, pollutants, largely in the form of suspended solids and oil and grease, are carried to the river. Impervious land areas also severely restrict groundwater recharge and thus adversely affect the hydrology of the river basin.

Within the Buzzards Bay Basin, stormwater runoff appears to be a significant water quality problem only in the City of New Bedford. Other communities within the basin are less developed, and stormwater runoff problems are minimal at best.

WATERCRAFT

United States Coast Guard regulations for newer vessels require on-board sanitation facilities to provide chlorination and maceration prior to any discharge of sanitary waste. Proper operation and maintenance of these systems is largely the responsibility of each vessel owner. Even though in compliance with Coast Guard regulations, discharges from numerous craft in a confined area, such as a harbor, could produce water quality problems. Discharges of untreated sewage create worse situations, and the mere possibility of this in a shellfish area is sufficient cause for its closure.

Both pleasure craft and commercial vessels are sources of oil pollution. Powered pleasure craft are not major polluters, but in sufficient numbers provide an annoying background level of oil pollution observed as a "sheen" on the water's surface. Oil tanker traffic through the Cape Cod Canal is heavy; thus, an offshore oil spill such as the one which occurred off Falmouth in 1967 might have catastrophic effects on the entire coastline of Buzzards Bay.

WETLAND AREAS

Wetland areas within a river basin act to regulate the river's flow. During the wet spring months, runoff is absorbed as the wetland is "recharged." The stored ground and surface waters are slowly released during the late spring and early summer months to augment river flow. In late summer and early fall, increased evapotranspiration results in an overall loss of flow from the river system.

Wetlands are characteristically highly productive areas and are, therefore, abundant in organic material. The assimilation of these organics and the minimal reaeration afforded by their stagnant nature produces waters which are considered deficient in dissolved oxygen concentration (often much less than 5.0 mg/l).

Frequently, the headwaters of a river are formed by large wetland areas and consequently, low dissolved oxygen concentrations are found in the river as the wetland releases water to augment the flow. This problem is common to many of the rivers within the Buzzards Bay Basin.

VI. WASTE LOAD ALLOCATION

Two approaches are used for determining the effluent limits to be placed on a specific discharge. The use of either is dependent upon the assimilative capacity of the receiving water.

Receiving waters are classified as either water quality limited or effluent limited. An effluent limited segment is one that is capable of meeting water quality standards after accepted secondary effluent limits have been placed on all discharges to the segment. A water quality limited segment is a receiving water which is of a more sensitive nature than one designated effluent limited, thus a higher degree of treatment for discharges to such a segment will be required before it is capable of meeting standards.

In determining the limits to be placed on a discharge to a water quality limited segment, the Division employs a highly complex computer model which simulates the water quality conditions found in the river. Extensive amounts of physical, chemical, and biological data are necessary to develop this model and interpret its results properly. These data are not always available or current; in this case, a Streeter-Phelps analysis is performed, which is a much simpler approach. Both methods are concerned with the basic relationship between the stream dissolved oxygen (D.O.) and biochemical oxygen demand (BOD).

Buzzards Bay segments have been classified as either effluent limited or anti-degradation. An anti-degradation segment will receive no new wastewater discharges, unless they are incorporated into a revised basin plan which will be subject to a public hearing. Existing discharges will be required to connect to a municipal collection system or, if none is available, to provide the highest and best practical means of treatment.

Municipal dischargers to effluent limited segments will be required to achieve secondary effluent limits as set forth in the NPDES discharge permits.

Industrial dischargers to effluent limited segments will be required to utilize best practicable treatment technology as outlined by EPA for various classes and categories of industrial effluents, as defined in NPDES permits.

Effluent limitations for both municipal and industrial discharges have been developed and set forth in the implementation schedules with the intent of achieving the water quality goals outlined in Public Law 92-500.

VII. FUTURE ABATEMENT PROGRAMS

This section of the basin plan for the Buzzards Bay Basin will set forth the Division's strategy for the attainment of the 1977 water quality goals of PL92-500. These goals are to attain the water quality classifications proposed in 1967. To evolve this strategy, the present and future sewerage needs of the individual communities are examined. The needs may be for the construction of treatment facilities, the expansion of existing facilities, the sewering of problem areas, or the assurance of proper subsurface disposal. With the establishment of municipal needs, an abatement program will be recommended which will provide an orderly progression toward fulfilling those needs and attaining the water quality goals. Another important aspect of the abatement program is the discharge permit program. This program establishes effluent limitations for existing discharges and sets forth implementation schedules for those dischargers which contribute to water quality violations.

The following is a general discussion of municipal needs and the discharge permit program. Next, the municipal needs, the discharge permits, and the abatement program for the individual communities of the Buzzards Bay Basin will be presented.

MUNICIPAL SEWAGE DISPOSAL NEEDS

In assessing municipal needs, the first input is an evaluation of the present situation of the municipality. The present mode of disposal of waste should be examined. If there is a municipal sewage treatment plant, it must be determined if the present treatment is adequate. On-lot subsurface systems must be examined for possible failures. The municipal zoning laws will show how development has proceeded and will show the anticipated future development.

In looking at future municipal needs, the projected population is of the utmost importance. Although sometimes erroneous, future projections are the best method of measuring the quantity of future needs. The future population projections for the communities in the Buzzards Bay Basin are given in Table VII-1. If the municipality already has a treatment facility, the future population must be equated with the capacity of the facility. If individual subsurface systems will not adequately handle the increased population, the need for a municipal sewage treatment facility must be examined. The type of facility should be pursuant to water quality standards.

If the construction of additional on-lot subsurface systems is proposed, the capacity of the soil to adequately handle the increased leachate must be examined. Inadequate subsurface disposal systems can cause water quality problems in groundwater and receiving waterbodies.

Municipal sewerage needs are also dependent upon the zoning laws of each community. The size of house lots is important in assessing the capability of the soil to adequately assimilate septic leachate. Industrial growth can produce sewage treatment needs for the municipality and the industry.

TABLE VII-1

POPULATION GROWTH AND POPULATION PROJECTIONS

BUZZARDS BAY BASIN

MUNICIPALITY	POPULATION 1950	1960	1970	PROJECTION - 2000 LOW	MOST PROBABLE	HIGH
Acushnet	4,401	5,755	7,767	11,150	11,600	13,000
Bourne	4,720	14,011	12,636	-	14,300*	-
Carver	1,530	1,949	2,420	7,050*	7,350*	8,250*
Dartmouth	11,115	14,607	18,800	25,950	27,050	29,200
Fairhaven	12,764	14,339	16,332	18,550	18,950	19,900
Marion	2,250	2,881	3,466	4,950	5,150	5,550
Mattapoisett	2,265	3,117	4,500	7,600	7,900	8,550
New Bedford	109,189	102,477	101,777	91,350	93,200	97,850
Plymouth	13,608	14,445	18,606	37,450*	39,000*	42,100*
Rochester	1,328	1,559	1,770	3,150	3,300	3,700
Wareham	7,569	9,461	11,492	21,800	22,700	24,500
Westport	4,989	6,641	9,791	17,200	17,900	18,800

Sources: Southeast Regional Planning and Economic Development District, Cape Cod Planning and Economic Development Commission, Office of State Planning, January 1976.

Note: Bourne population projections are preliminary figures.

*Year 1995.

The evaluation and ranking of municipal needs gives the Division the priorities in its planning. Present critical needs will be given a higher priority than possible needs based upon predicted growth. The municipal needs will be continually revised through the Continuing Planning Process and through facilities planning and areawide management planning (see page 92).

The individual communities within the Buzzards Bay Basin were asked to present to the Division their financial need for the construction of publicly owned sewerage systems. Based on the projected 1990 population, the cost estimates were made in eight major categories. The estimates were reported in January 1976 dollars (ENR = 2205). Explanation of the categories is given below, and the cost estimates are shown in Table VII-2.

1974 Needs Survey

Category I: This includes costs for facilities which would provide a legally required level of "secondary treatment," or "best practicable wastewater treatment technology" (BPWTT). For the purposes of the Survey, BPWTT and secondary treatment were considered synonymous.

Category II: Costs reported in this category are for treatment facilities that must achieve more stringent levels of treatment. This requirement exists where water quality standards require removal of such pollutants as phosphorus, ammonia, nitrates, or organic substances.

Category IIIA: This includes costs for correction of sewer system infiltration/inflow problems. Costs could also be reported for a preliminary sewer system analysis and for the more detailed Sewer System Evaluation Survey.

Category IIIB: Requirements for replacement or major rehabilitation of existing sewage collection systems are reported in this category. Costs were to be reported if the corrective actions were necessary to the total integrity of the system. Major rehabilitation is considered extensive repair of existing sewers beyond the scope of normal maintenance programs.

Category IVA: This category consists of costs for construction of collector sewer systems designed to correct violations caused by raw discharges, seepage to waters from septic tanks and the like, and/or to comply with Federal, State, or local actions.

Category IVB: This category consists of costs for new interceptor sewers and transmission pumping stations necessary for the bulk transport of wastewaters.

Category V: Costs reported for this category are to prevent periodic bypassing of untreated wastes from combined sewers to an extent violating water quality standards or effluent limitations. It does not include treatment and/or control of stormwaters.

States were also asked to make a rough cost estimate in another category, "Treatment and/or Control of Stormwater." This includes the cost of abating pollution from stormwater runoff channelled through sewers and other

TABLE VII-2

1976 NEEDS FOR MUNICIPAL WASTEWATER TREATMENT FACILITIES

BUZZARDS BAY BASIN

MUNICIPALITY	SECONDARY TREATMENT	ADVANCED TREATMENT	INFIL-TRATION	COLLECTOR REHABILITATION	COLLECTOR CONSTRUCTION	NEW INTERCEPTORS	COMBINED SEWERS
Acushnet	0	0	0	0	2,860,000	511,000	0
Bourne	0	2,004,000	0	0	1,190,000	1,024,000	0
Carver	0	0	0	0	0	0	0
Dartmouth	3,384,000	0	0	0	8,776,000	4,110,000	0
Fairhaven	5,850,000	0	0	0	6,412,000	2,434,000	0
Marion	0	0	0	0	3,737,000	309,000	0
Mattapoisett	0	0	0	0	4,554,000	4,497,000	0
New Bedford	26,049,000	0	0	0	0	7,884,000	22,600,000[1]
Rochester	0	0	0	0	0	0	0
Wareham	3,523,000	0	0	0	10,639,000	2,922,000	0
Westport	1,781,000	0	0	0	2,310,000	252,000	0

ENR Index = 2305 (January 1, 1976)

1. ENR Index = 1900 (June 1973)

Cost figures developed by consultants for individual communities and do not represent information generated by the Division.

conveyances used only for such runoff. The costs of abating pollution from stormwater channelled through combined sewers which also carry sewage are included in Category V. Category VI was added so the survey would provide an estimate of all eligible facility costs, as explicitly required by PL93-243.

DISCHARGE PERMIT PROGRAM

All of the enforcement functions formerly carried out under the implementation schedule have been transferred to the joint Federal-State Discharge Permit Program. This program, formally known as the National Pollutant Discharge Elimination System (NPDES), establishes levels of effluent quality to be maintained at existing treatment facilities and sets forth implementation schedules for discharges which contribute to violations of water quality standards. Discharge permits comprise the vehicle for implementation of water quality management plans. Whereas the basin plan is essentially a strategy document, each permit sets forth a formal implementation schedule for abatement action. Coordination of basin planning and permit issuance is therefore vital in order to assure effective abatement of pollution in each basin as well as state-wide.

In order to facilitate the issuance of permits, preliminary basin plans have been prepared for several Massachusetts rivers. These documents contain ranking of significant discharges, preliminary load allocations, and abatement priorities based on water quality impact. Discharge permits have been drafted based on the information contained in the preliminary basin plans. These permits could be revised to reflect additional recommendations of the final basin plans.

Each permit contains two portions: effluent limitations, and schedules for corrective actions. The effluent limitations formally establish performance criteria for treatment facilities. Through these limits, the goals of the operation and maintenance program are set. Implementation schedules are included where existing levels of treatment are not adequate to meet water quality goals or where no treatment is being provided. In instances where point source discharges, consisting of facility bypasses, overflows from combined sewer systems, and/or sewer systems with excessive infiltration/inflow, will not be eliminated by the construction of a new waste treatment system, an additional report must be submitted by the permittee. This report, which is usually due within 18 months of the permit issuance date, must contain both short- and long-term abatement plans. Short-term measures require development of a program of system operation to optimize the full potential of the permittee's treatment facilities and sewerage system. The long-term program must be developed for the eventual elimination of these discharges. When the permittee's report has been submitted, the "second round" of permits will establish schedules for implementing the recommendations as approved by the Division and EPA.

In cases where existing treatment facilities provide insufficient degrees of treatment to meet water quality goals, the effluent limitations portion of the permit requires that present performance levels be maintained while corrective action is undertaken. This assures that conditions do not worsen in the period leading up to and including construction of a new treatment facility.

Each permit is issued for a period of five years or less. At the expiration of the "first round" permits, new permits reflecting any revised water quality goals or treatment requirements will be issued. The period of time covered by permits in a basin will be determined in part by scheduled revisions to the particular basin plan.

BUZZARDS BAY BASIN DISCHARGE PERMIT PROGRAM

Discharge permits have been issued to all municipal dischargers in the Buzzards Bay Basin. Table VII-3 designates the facilities and gives the dates for the completion of various steps in the abatement program. For the municipal facilities, each permit designates effluent limitations and, in most cases, the date for the completion of a facilities plan. The "second round" of permits will give dates for the completion of upgraded facilities, where necessary.

Of the dischargers in Table III-4, all have waste discharge permits with the exception of White's Dairy. The dairy has not submitted an application to the Division for a discharge permit on the grounds that it has no discharge. The Division feels otherwise, based on the results of its water quality surveys on the Acushnet River. This matter will be pursued by the Division through legal means.

Revere Copper and Brass and the Chamberlain Manufacturing Company have completed waste treatment facilities with discharges to the Acushnet River and New Bedford Inner Harbor. The Rubber Division of Acushnet Company is conducting in-house separation and processing changes which will permit a connection to the New Bedford collection system by April 1977. The Golf Division is studying the requirement for pretreating its wastes once the New Bedford collection system is extended to Acushnet.

The Atlas Tack Company is presently negotiating with the Division, the EPA, and the Town of Fairhaven to connect its discharge to the effluent line from the Fairhaven STP. The negotiations concern the degree of treatment required.

The Tremont Nail Company has a contact cooling water discharge to the Wankinco River which is well within permit requirements. There is also a discharge from a pickling operation which receives no treatment. This process is to be modified to a closed system in the near future.

Aerovox and Cornell Dubillier are manufacturers of transformers and capacitors and are considered to be significant dischargers due to the accumulating evidence concerning the harmful effects of PCB's. Permit modifications have recently been made which will require much tighter processing controls to meet the strict effluent limits which will be in effect by July 1, 1977.

MUNICIPAL NEEDS AND ABATEMENT PROGRAM OF THE INDIVIDUAL COMMUNITIES

Acushnet: The community of Acushnet has a stormwater collection system serving the town center to which numerous sanitary discharges are connected. The combined stormwater/wastewater is discharged to the Acushnet River at the Main Street Bridge, Acushnet.

Serious problems resulting from failing septic systems are found in the built-up town center. The town has submitted a letter of intent to the Division indicating their desire to have wastewater collection facilities constructed to service the town center with a connection to New Bedford's collection system. Presently, an estimated 40 dwellings within Acushnet are connected to the New Bedford system. It will be necessary to renovate New Bedford's Belleville Road and Howard Road pumping stations to accept the additional flow from Acushnet.

It is not possible to assign implementation dates to these projects for a number of reasons. Although Acushnet is under orders from the Division of Water Pollution Control, implementation dates are speculative due to the town's dependency upon the progress of New Bedford's pollution abatement efforts.

Bourne: The community of Bourne recently called a special Town Meeting to discuss the engineering study completed in 1975 which addressed wastewater disposal alternatives for the future.

The study recommended two secondary treatment plants be constructed on either side of the canal with canal discharges. Land application of the effluent from both plants was investigated, but this concept was found impractical due to either the unsuitability or unavailability of application sites.

The alternative of sewering Buzzards Bay and North Sagamore to Wareham was largely discounted due to the Division's feeling that the Wareham treatment facility and the Agawam River would be unable to adequately handle the additional flow. It was felt by the citizens of Bourne that this alternative would be the most cost-effective, and they desired a much more in-depth evaluation. The recommended alternative of a canal discharge was not approved, and the sewering of any portion of Bourne is presently a dead issue.

The community of Bourne is not under implementation orders from the Division and therefore is not required to pursue the matter any further. Should no action be taken by the community of Bourne, Wareham will complete its sewer extension program along Routes 6 and 28 within the next five years without providing sufficient capacity for the additional flow from Bourne. Thus, this alternative will be eliminated from consideration.

Dartmouth: The Buttonwood Brook area of Dartmouth is the remaining built-up section of town which requires sewering. Construction on this portion of the sewer extension program is expected to start by October 1977. Following completion of the Buttonwood Brook project, sewer service will be provided to an additional 19.6% of the town's population (based on 1975 figures), bringing the total population served to 47.4%.

Fairhaven: The present collection system will be extended to Fort Phoenix, much of Sconticut Neck, and the remaining unserviced areas near Fairhaven Center.

The Fairhaven wastewater treatment plant has sufficient capacity to handle the additional flow from Fairhaven's own sewer extension projects but will require expansion to accept an estimated 0.4 MGD from Mattapoisett. The

community of Fairhaven will initiate construction by January 1977 of an interceptor which will service East Fairhaven and will continue along Route 6 to the Fairhaven-Mattapoisett town line, where a future connection will be made to Mattapoisett. Allowing for an 18-month construction period, the interceptor should be completed by July 1978 and will connect to Mattapoisett's force main which should be completed at approximately the same time.

Marion: The municipal wastewater treatment facility has sufficient capacity for the near future. A small sewer extension project is planned for Ryder's Lane, upper Spring Street, and Maple Avenue, involving 3,000 feet of sewer lines and 15 to 20 additional services. Renovation of the Silvershell Pumping Station is necessary, and the town is presently seeking federal funding for a major portion of this project.

Due to the high degree of treatment afforded through the use of sand beds, the town's practice of zero discharge during the summer shellfishing season, and the relatively small volume of treated wastewater, the construction of a deep ocean outfall will not be required.

Mattapoisett: The community of Mattapoisett has an approved 201 Facilities Plan which recommends expansion of its present collection system to service the entire downtown area. A connection to Fairhaven's interceptor (which is being extended to the town line for this purpose) will require construction of a force main and pump station. Construction will be initiated by January 1977 and will be completed by July 1978, allowing for an 18-month construction period.

New Bedford: The City of New Bedford has submitted a facilities plan to the Division which addressed upgrading of the primary treatment plant to a level of secondary treatment and presented a number of alternatives for correction of the combined sewer overflow problem. Additional study on infiltration and inflow has been requested by the Division. An Environmental Assessment has also been requested due to the filling at the Fort Rodman site which will be necessary to provide room for upgrading the primary facility. Submission of the completed facilities plan is scheduled for June 1978. Approximately two years will be required following that date to develop the final engineering plan. It is estimated that construction on the project will begin sometime during 1981 and will be completed some two to three years thereafter. Due to the magnitude and complexity of this project, all implementation dates are highly speculative at this time.

Wareham: The Wareham Wastewater Treatment Facility is designed for a 1.8 MGD maximum flow, but provisions have been made at the present site for expansion to 5.0 MGD if required. The Town of Wareham is at present voluntarily conducting a sewer extension program which will, when completed, service the following areas: Routes 6 and 28 to the Wareham-Bourne town line, Swift's Beach, Pinehurst Beach, Hamilton Beach, Shangri-La, and West Wareham. Population projections vary for these areas and so, accordingly, do the waste flows generated.

A 1965 engineering study conducted for the town was based on population

TABLE VII-3

FUTURE ABATEMENT PLAN

BUZZARDS BAY BASIN

MUNICIPALITY	FACILITY NEEDS	SEVERITY POINTS	SUBMIT FACILITIES PLAN	SUBMIT FINAL PLANS	COMMENCE CONSTRUCTION	COMPLETE CONSTRUCTION
Acushnet	Sewering to New Bedford	6	1/78			
Bourne	Secondary treatment plant or connection to Wareham STP	3	1/76			
Dartmouth	Sewer extension program	--	Update of existing engineering study			
Fairhaven	Sewer extension program, expansion of treatment plant	--	Update of existing engineering study	5/76	6/77	6/78
Marion	Sewer extension program	--	Update of existing engineering study			1/77
	Renovation of pump station	--			2/77	4/77
Mattapoisett	Sewering to Fairhaven STP	8	2/76	4/77	9/77	9/78
New Bedford	Secondary treatment, correction of combined sewers	97	6/78	6/80	6/81	1/84
Wareham	Sewer extension program	--	Update of existing engineering study	5/77	11/77	
Westport	Sewering to Fall River STP	4	1/78			

projections which are now considered far too high. Accordingly, the predicted waste flows may be unrealistic. It is estimated that these areas will generate approximately 1.0 MGD. A higher than normally accepted infiltration rate was also used in the 1965 study which may be considered unreasonable. Waste flow estimates for Buzzards Bay and North Sagamore were developed in order to investigate the possibility of sewering these areas to Wareham. A figure of 0.6 MGD for Buzzards Bay by 2020 is considered reasonable, while 1.0 MGD from North Sagamore appears to be too high.

It is apparent now that the waste flow from Wareham will not be as great as previously predicted and that the treatment plant will have sufficient capacity (once expanded) to accept the additional flow from the northern portion of Bourne, should this concept prove desirable.

Westport: The Town of Westport has three built-up areas, two of which are located on Route 6 near the headwaters of the East Branch of the Westport River. The remaining built-up section is Westport Point, which is near the confluence of the East and West Branches of the Westport River.

A consulting firm has been contracted by the Town of Westport to prepare a Section 201, Step 1, Facilities Plan which will investigate the town's future wastewater disposal alternatives.

The two areas located in the north and northwest portions of Westport will require sewering, assuming that development in that area continues. The Division recommends that the 201 plan investigate the sewering of these areas to the Fall River Wastewater Treatment Plant.

The Westport Point area has little land remaining for development. Therefore, it is highly unlikely that in the near future this area will require sewering. The Division recommends that the Town of Westport avert the need for sewering Westport Point and other sections of Westport through the adoption and enforcement of suitable zoning laws.

The Division has designated both the branches of the Westport River as anti-degradation. Any municipal discharges to the Westport Rivers, if permitted, would be extremely cost-prohibitive due to the level of treatment required.

PRESENT SEPTAGE HANDLING

The New Bedford wastewater treatment plant accepts septage from the city itself and neighboring Dartmouth. The Fairhaven and Marion wastewater treatment plants accept septage from each respective town.

The Massachusetts Department of Environmental Health has approved a septage disposal site in Wareham. It is the only approved site within the basin, although a number of other unapproved sites, including municipal landfills, are used for the disposal of septage by various communities (see Table VII-4).

TABLE VII-4

SEPTAGE HANDLING METHODS

BUZZARDS BAY BASIN

MUNICIPALITY	METHOD
Acushnet	Fairhaven and New Bedford STP's
Bourne	Municipal landfill, not approved
Carver	Has site which is not approved, new site in planning stage
Dartmouth	New Bedford STP
Fairhaven	Fairhaven STP
Marion	Marion STP
Mattapoisett	No approved site
New Bedford	New Bedford STP
Plymouth	Septage handling beds at municipal landfill
Rochester	Has site, not approved
Wareham	Has approved site
Westport	Brockton STP

Source: Mass. Dept. of Environmental Health, Lakeville Office.

Present disposal methods consist of dumping into open pits or lagoons. Commonly, two lagoons are connected with the first receiving the septage. Settling then occurs and the overflow is carried to the second lagoon. This practice is continued until a specified depth of septage accumulates in the first lagoon, at which point the site is covered. Careful siting of the lagoons can minimize water quality problems, while poor siting can produce severe impacts. From a water quality standpoint, this is an unsatisfactory method for septage disposal.

In the case of Mattapoisett, septage handlers operating in the area have little alternative to dumping septage in the woods. Indiscriminate dumping of septage could have severe impacts upon the quality of both the surface and groundwaters of the area.

FUTURE SEPTAGE HANDLING

The Town of Wareham has engaged a consulting firm to study septage handling alternatives to the lagoons which are presently used. The study recommends that the existing facility be upgraded to permit septage treatment using either the activated sludge or lime stabilization processes with mechanical sludge dewatering. This treatment scheme would minimize the possibility of operational problems at the existing treatment facility which is the major objection plant operators have against accepting septage.

There are obvious needs for septage handling plants in other areas of the basin. Treatment plants which now accept septage at some point during the treatment process are constantly plagued by operational problems which result in reduced wastewater treatment efficiency. The Dartmouth Wastewater Treatment Plant until recently accepted septage from Dartmouth, but operational problems became so severe that it was necessary to halt this practice and treat the septage at the New Bedford plant.

In communities where septage is disposed of at unapproved sites, public health hazards are possible. At the very least, a degradation of surface and groundwaters at the disposal site will likely be found.

It is obvious that present septage disposal practices in most areas of the basin are inadequate. Treatment alternatives such as those presently under study by the community of Wareham should be investigated by other communities within the basin.

VIII. FUTURE WATER QUALITY GOALS

In June of 1967, the Commonwealth of Massachusetts adopted water quality standards for both its interstate and intrastate waters. These standards were revised and subsequently approved by the Federal government on August 7, 1967. Water supplies within the Buzzards Bay Basin were designated Class A bodies of water. All freshwater streams and rivers were classified as B quality, while tidal estuaries and harbors were assigned SA classifications.

The single exception to this is the New Bedford Inner Harbor and the tidal portion of the Acushnet River, which have received SB classifications. The Division feels that a goal of SA quality for these segments may not be desirable from an economic standpoint or even technically feasible. However, if pollution abatement efforts in New Bedford Inner Harbor prove fruitful in the future, thus allowing attainment of SB quality, and if feasible technically and economically, Inner New Bedford Harbor will be upgraded to an SA classification in accordance with the Federal goal of fishable/swimmable waters by 1983.

The objectives of this plan are to achieve the 1977 goals of the Federal law, PL92-500, which are to attain the water use classifications adopted in 1967. This plan sets forth a program intended to meet this goal, which is the first step towards the 1983 goal of swimmable/fishable waters, and the 1985 goal of zero discharge of pollutants.

Implementation of the strategy set forth in this document will result in a marked improvement in both the surface and ground waters of those areas within Buzzards Bay Basin most severely affected. However, some problem areas will remain even after all point sources have been controlled.

The Southeastern Regional Planning and Economic Development District (SRPEDD) is preparing a Section 208 Areawide Waste Treatment Management Plan for most of the communities within the Buzzards Bay Basin. The 208 plan will detail strategies for abatement of pollution sources which are considered non-point in nature and, in some cases, not amenable to control through structural means. Water quality problems to be studied include those resulting from stormwater runoff, agricultural runoff, sanitary landfill leachate, and subsurface disposal systems, among others.

It is expected that, following implementation of the recommendations set forth by the 208 study, most segments will meet the 1983 fishable/swimmable goal. A possible exception will be the tidal portion of the Acushnet River and New Bedford Inner Harbor. Toxic concentrations of heavy metals will remain in the bottom sediments which will prohibit this segment from attaining Class SB quality. Whether this goal will be realized in the near future will largely depend on the economics involved versus the benefits derived.

IX. RELATIONSHIP WITH OTHER PLANS

The Buzzards Bay Section 303(e) Basin Plan was formulated in large part through a coordination of the previous planning efforts of the individual communities within the basin. A report entitled A Regional Study for Water Supply, Sewage Disposal and Drainage was completed in 1970 by Tippetts, Abbett, McCarthy, Stratton Consulting Engineers for the Southeastern Regional Planning and Economic Development District. The report utilized previous water and sewer studies to develop a basin-wide strategy for pollution abatement efforts and served to lay much of the groundwork for the Basin Plan.

The Division of Water Pollution Control in 1975 conducted a baseline water quality survey on the major rivers and harbors of Buzzards Bay. In 1975 and again in 1976, the major industrial and municipal wastewater discharges to the basin were also sampled. The results from these surveys have provided a solid data base from which many of the recommendations in the Basin Plan have been derived.

SECTION 201 FACILITIES PLANS

Section 201 Facilities Plans for a particular community (or communities) are developed in three separate and distinct phases:

Step 1: Planning
Step 2: Design
Step 3: Construction

Federal funding is available for 75% of the total cost of Step 1. A community must appropriate the remaining 25%, which is reimbursible by the State upon completion of Step 1 and application for Step 2 funding. Federal funding of 75% and 15% State funding is available for a Step 2 study.

The purpose of a Step 1 Facilities Plan is to investigate in detail various wastewater disposal alternatives for the community or communities in question. Considerations which weigh heavily in the decision to recommend a particular alternative include its water quality impact and the overall cost. The alternative presenting a reasonable balance of these considerations and satisfying both is in most cases selected. The final Step 1 Facilities Plan is submitted to the Division of Water Pollution Control for approval. If approved, the community (or communities) is eligible to receive a Step 2 planning grant which will be used to develop the engineering design of the pollution abatement facility. The final Step 2 Facilities Plan is submitted to the Division for approval. Again, if approved, Federal and State funding is available for 90% of the total construction cost.

In the Buzzards Bay Basin, a majority of the 201 facilities planning has been completed and implemented. Communities in this category are Dartmouth, Fairhaven, New Bedford, Marion, and Wareham.

The community of New Bedford has submitted a 201 Step 1 Facilities Plan to the Division which recommends upgrading the existing primary wastewater treatment plant to a level of secondary treatment and presents alternatives for correction of New Bedford's combined sewer overflow problem. The Division has requested an additional study from the city's consultants on infiltration and inflow into the existing collection system.

The Town of Mattapoisett has an approved Step 2 Facilities Plan which will be implemented shortly.

A Step 1 Facilities Plan for the Town of Bourne has received Division approval, but the town has voted against proceeding any further.

SECTION 208 AREAWIDE WASTEWATER TREATMENT MANAGEMENT PLANS

The Southeastern Regional Planning and Economic Development District is the agency designated by the Governor to carry out Section 208 planning in the Buzzards Bay Basin. All communities within the basin, with the exception of Bourne, are members of SERPEDD and are included in the 208 study area. Bourne is a member of the Cape Cod Planning and Economic Development Commission and is included in their 208 study area.

Section 208 plans address complex water quality problems which cannot be solved through the control of point sources of pollution alone. In the Buzzards Bay Basin, such problems to be investigated include stormwater runoff from urbanized areas, agricultural runoff, landfill leachate, and vessel discharges.

SECTION 209 LEVEL B STUDIES

The Southeastern New England Water and Related Land Resource Study (SENE) is much broader in scope than a basin plan. The study area includes 4,400 square miles of coastal plain in Massachusetts and Rhode Island. Study elements include floodplain and streamflow management, water quality, groundwater management, water supply, land use patterns, fish and wildlife, outdoor recreation, inland wetlands, management, navigation, coastal resources, power, minerals, irrigation and drainage, sediment and erosion, and health aspects.

The recommendations made by the SENE study concerning the Buzzards Bay Basin are, for the most part, in agreement with the Basin Plan. However, the Basin Plan does differ with the SENE study in some recommendations.

Proposal 3 of the SENE study recommends expansion of Fairhaven's existing secondary facility to provide service to Mattapoisett and a relocation of the outfall outside the hurricane barrier. The Division agrees with this proposal but feels that, at the present time, the water quality impact of Fairhaven's discharge to the Inner Harbor is impossible to fully assess due to the gross pollution from other sources. The Division feels the combined sewer overflow problem in the Inner Harbor should be addressed before it is possible to make any decision on a possible relocation of Fairhaven's outfall.

Proposal 4 of the SENE study recommends that the Town of Marion upgrade and expand its existing secondary facility with an outfall extension to Aucoot Cove. The Division has closely monitored the performance of the Marion facility and feels that neither expansion nor upgrading will be required. The town has plans for a small sewer extension project which will account for a minimal increase in flow and will be easily handled by the present facility. The design of the wastewater treatment plant is such that it is possible to restrict plant flows during the summer months when Aucoot Cove is used for the taking of shellfish. Therefore, it is felt that an outfall extension to the cove would be both costly to the town and unnecessary from a water quality standpoint.

Proposal 6 recommends that the Buzzards Bay and North Sagamore portions of Bourne be sewered to the Wareham treatment plant. While the Division is not opposed to this alternative, it feels that this has not been fully investigated in past studies and would definitely require closer study before such a recommendation could be made. It is suggested that this concept be evaluated with careful consideration given to the water quality impact on the Agawam River.

Proposal 7 states that by 1990, construction of two advanced wastewater treatment plants for the community of Westport may be required. Both discharges will be to the East Branch of the Westport River. The study recommends that measures be implemented immediately which would avert the necessity for any discharges to the river. The Division agrees with this recommendation due to the shellfishery supported by the river and the location of Horseneck Beach near the river's mouth.

X. MONITORING PROGRAM

In order to assess the progress made towards achieving the goals of this water quality management plan, the Division has developed a comprehensive monitoring program in accordance with the 1972 Amendments to the Federal Water Pollution Control Act (PL92-500). The program for the waters of the Commonwealth includes the following eight elements:

1. intensive water quality surveys
2. biological monitoring
3. lake monitoring
4. compliance monitoring
5. National Water Quality Surveillance Sampling Network (NWQSS)
6. water quality monitoring network
7. groundwater monitoring
8. special studies

The main aspects of these elements and the specific program for the Buzzards Bay Basin are discussed below.

Intensive water quality surveys: Beginning in 1963, under the direction of the Massachusetts Department of Public Health, intensive water quality surveys have been conducted on all the major river basins of the Commonwealth. With the formal establishment of the Division in 1967, the program has been progressively expanded in scope. Depending upon the pollution abatement program of each basin, the surveys have been conducted at intervals ranging from three to ten years.

It is the Division's goal to survey each river basin and major estuary and harbor at least every five years. At least one location in each segment of the basin is sampled for two 24-hour periods during each of two weeks. All samples are analyzed for dissolved oxygen, temperature, pH, biochemical oxygen demand, total alkalinity, suspended solids, ammonia-nitrogen, nitrite-nitrogen, nitrate-nitrogen, total phosphorus, chlorophyll a, chlorides, total coliform bacteria, and microanalysis. Additional tests for particular constituents (e.g., oil and grease, heavy metals, pesticides, etc.) are performed where appropriate.

Water quality surveys were conducted in the Buzzards Bay Basin in 1971 and 1975. The 1971 survey concentrated on the Acushnet River, New Bedford Harbor, and Clark Cove. Many of the same stations were repeated during the 1975 survey, which was greatly expanded to include the following rivers: the Agawam, Wankinco, Wareham, Weweantic, Sippican, Mattapoisett, Paskamanset, and both branches of the Westport. Coastal areas surveyed included Miller Cove, Sippican Harbor, Aucoot Cove, Mattapoisett Harbor, and Apponaganset Bay. The location of sampling stations during those surveys are given in Tables X-1 and X-2 and shown in Figures X-A and X-B. In 1980, a survey is scheduled to be conducted by the Division on the major rivers and harbors in the Buzzards Bay Basin. The locations listed in Tables X-1 and X-2 will be resampled, with additional locations which will enhance the knowledge of the progress of the pollution abatement program.

Biological monitoring: This program was developed by the Division in 1973 with the goal of conducting biological studies on all major basins on a five-year basis. Bottom dredge samples are collected at selected stations, and benthic macroinvertebrates are identified and classified according to varying

TABLE X-1

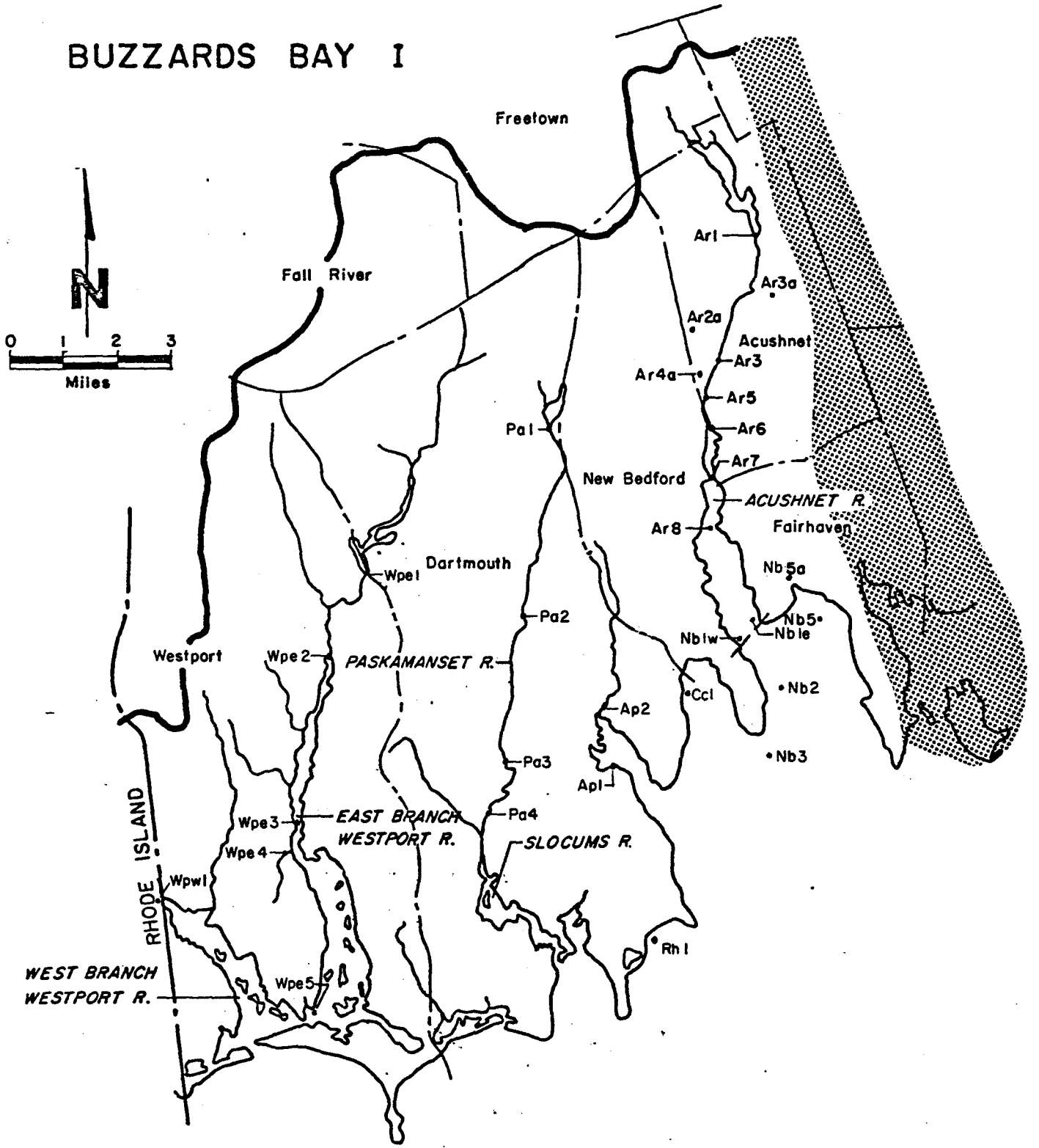
BUZZARDS BAY I 1975 SURVEY

LOCATION OF SAMPLING STATIONS

STATION NUMBER	LOCATION	RIVER MILE
AR1	Acushnet River, outlet of New Bedford Reservoir, Acushnet	8.2
AR2a	Tributary to Acushnet River through White's Dairy, Middle Road, Acushnet	5.5, 0.5
AR3	Acushnet River at Hamlin Road, Acushnet	5.5
AR3a	Tributary to Acushnet River from Acushnet dump, Acushnet	6.0, 0.7
AR4a	Tributary to Acushnet River from Coury Heights, Acushnet	5.0, 0.2
AR5	Acushnet River at dam above Acushnet Sawmill, Acushnet	4.6
AR6	Acushnet River at Main Street, Acushnet-New Bedford city line	4.5
AR7	Acushnet River opposite Coffin Avenue, Fairhaven-Acushnet-New Bedford city line	3.1
AR8	Acushnet River opposite radio station WBSM tower, Fairhaven-New Bedford city line	2.1
AP1	Apponagansett Bay, Gulf Hill Road, Dartmouth	
AP2	Buttonwood Brook, Elm Street, Dartmouth	
CC1	Clark Cove at Jones Park Beach, Fairhaven	
NB1 West NB1 East	New Bedford Harbor inside hurricane barrier, Fairhaven-New Bedford city line	0.2
NB2	New Bedford Harbor at Butler Flats Lightship, New Bedford	
NB3	New Bedford Harbor at New Bedford's sewer outfall, New Bedford	
NB5	New Bedford Harbor off Pope Beach, Fairhaven	
NB5a	Drainage ditch to New Bedford Harbor from Atlas Tach Co. lagoons, Fairhaven	

TABLE X-1 (Continued)

STATION NUMBER	LOCATION	RIVER MILE
PA1	Paskamanset River, outlet of Turner Pond, Plainville Road, Dartmouth-New Bedford city line	13.6
PA2	Paskamanset River, Route 6, Dartmouth	10.2
PA3	Paskamanset River, Russells Mills Road, above Dartmouth dump, Dartmouth	5.7
PA4	Paskamanset River, Russells Mills Road, below Dartmouth dump, Dartmouth	4.0
RH1	Round Hill Beach, Dartmouth	
SI1	Shingle Island River, Pine Island Road, Dartmouth	18.5
WPE1	Westport River, East Branch, outlet of Noquochoke Lake, Route 6, Dartmouth	12.0
WPE2	Westport River, East Branch, Old County Road, Westport	10.0
WPE3	Westport River, East Branch, Hix Bridge Road, Westport	6.3
WPE4	Tributary to Westport River, East Branch, from Westport dump, Westport	5.7, 0.1
WPE5	Westport River, East Branch, Route 88 bridge, Westport	2.2
WPW1	Westport River, West Branch, at U.S.G.S. gage, Adamsville, R.I.	4.5



LOCATION OF SAMPLING STATIONS

FIGURE X-A

TABLE X-2

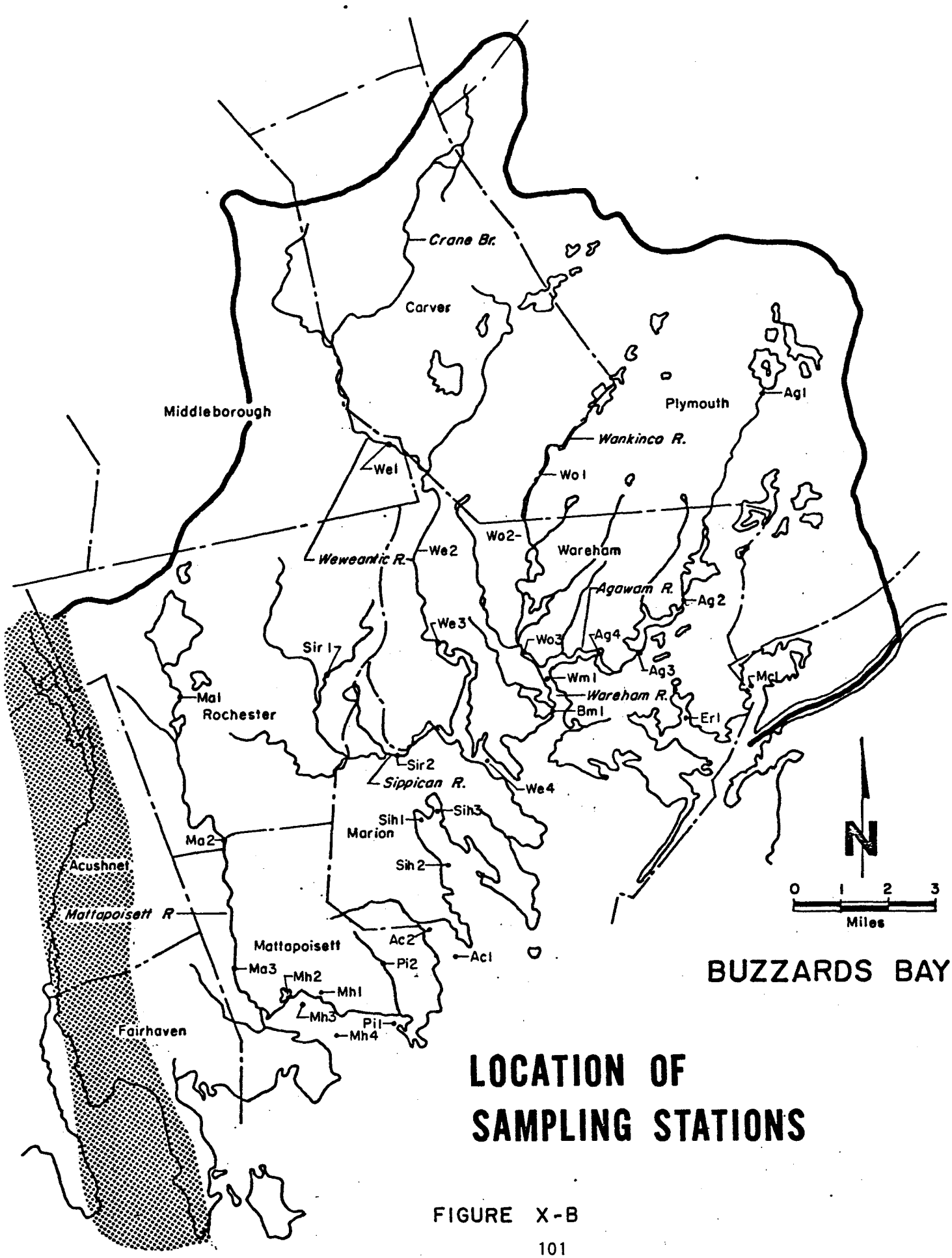
BUZZARDS BAY II 1975 SURVEY

LOCATION OF SAMPLING STATIONS

STATION NUMBER	LOCATION	RIVER MILE
AG1	Agawam River, outlet of Halfway Pond, Plymouth	12.6
AG2	Agawam River, at Maple Park, Wareham	7.4
AG3	Agawam River, outlet of Mill Pond, Route 28, Wareham	5.4
AG4	Agawam River, Route 6, Wareham	4.2
AC1	Aucoot Cove, between Joes Point and Converse Point, Mattapoisett-Marion	
AC2	Aucoot Cove, of Haskell Island, Mattapoisett-Marion	
BM1	Broad Marsh River at mouth, Wareham	1.6, 0.0
ER1	East River at mouth, Onset Avenue, Wareham	0.0
MH1	Unnamed brook to Mattapoisett Harbor, Main Street, Mattapoisett	0.05
MH2	Mattapoisett Harbor, outlet of Eel Pond, Mattapoisett	
MH3	Mattapoisett Harbor at Nun 8, Mattapoisett	
MH4	Mattapoisett Harbor at Nun 6, Mattapoisett	
MA1	Mattapoisett River, Snipatuit Road, Rochester	9.5
MA2	Mattapoisett River, Wolf Island Road, Mattapoisett	4.8
MA3	Mattapoisett River, Acushnet Road, Mattapoisett	1.7
MC1	Miller Cove, Wareham	
PI1	Pine Island Pond, outlet, Mattapoisett	
PI2	Unnamed brook to Pine Island Pond, Route 6, Marion	1.1
SIH1	Sippican Harbor, off Black Point, Marion	
SIH2	Sippican Harbor, off Ram Island, Marion	
SIH3	Sippican Harbor, Hammett Cove, Marion	

TABLE X-2 (Continued)

STATION NUMBER	LOCATION	RIVER MILE
SIR1	Sippican River, Pierceville Road, Rochester	2.2, 6.8
SIR2	Sippican River, County Road, Wareham	2.2, 2.1
WO1	Wankinco River, above regional landfill, Carver	2.6, 4.5
WO2	Wankinco River, below regional landfill, Carver	2.6, 3.4
WO3	Wankinco River, below Tremont Nail Co., Main Street, Wareham	2.6, 0.4
WM1	Wareham River, Route 6, Wareham	2.5
WE1	Weweantic River, Rochester Road, Middleborough-Carver line	12.2
WE2	Weweantic River, Route 28, Wareham	8.1
WE3	Weweantic River, Squire Island Road, Wareham	5.3
WE4	Weweantic River, Route 6, Marion-Wareham line	2.1



BUZZARDS BAY II

LOCATION OF SAMPLING STATIONS

FIGURE X-B

levels of pollution tolerance. Organisms are classified as intolerant, facultative, or tolerant. The study time for a major river basin is about four months. The data and interpretation are published as part of the water quality analysis report prepared by the Division.

Biological monitoring has not yet been conducted on the rivers of the Buzzards Bay Basin. Biological sampling of selected freshwater stations is scheduled to coincide with the water quality survey of 1980. The results of the biological sampling will be included in the Buzzards Bay Basin Water Quality Analysis 1980.

Lake monitoring: This program, started in 1971, went into full gear in 1974 with the development of an intensive year-round program. Five lakes, selected for intensity of use and/or water quality problems, are sampled monthly for a one-year period. The studies include lake geometry, location of tributaries, and special studies. Also, baseline lake surveys are conducted in conjunction with the water quality surveys. Data from these surveys are published by the Division.

In August of 1976, the Division conducted a baseline survey on White Island Pond, which is located in Wareham and Plymouth. This action was taken by the Division in response to a request from members of the White Island Pond Association.

Compliance monitoring: Monitoring of waste discharges is required to assure compliance with the terms of the discharge permits. The monitoring is coordinated with the sampling of treatment facilities for operation and maintenance purposes and the discharge analysis required for mathematical modeling. All major and ten to twenty percent of the minor municipal and industrial discharges are sampled each year. The type of discharge samples collected ranges from twenty-four hour composites on major municipal facilities to grab samples on some minor industrial discharges. The parameters for analysis of each sample depend on the nature of the discharge and the terms of the discharge permit.

Compliance monitoring of discharges within the Buzzards Bay Basin is conducted by the Division in accordance with EPA guidelines. The major and minor facilities located in the Buzzards Bay Basin are listed in Table III-4 and their locations shown in Figure III-C. The major facilities are sampled yearly. Several minor discharges are located in the basin, most of which are uncontaminated cooling water. Minor discharges, if not sampled, are inspected on a yearly basis.

National Water Quality Surveillance Sampling Network: This program was established in Massachusetts in the summer of 1974 to assess the impact of pollution abatement programs on selected streams. A total of nine stations, located on the Connecticut, Nashua, and Merrimack Rivers and Boston Harbor, are sampled monthly and analyzed for dissolved oxygen, temperature, chemical oxygen demand, pH, chlorophyll a, suspended solids, total solids, oil and grease, nitrogen series (total Kjeldahl, ammonia, nitrate, nitrite), total phosphorus, total and fecal coliform bacteria, radiochemical, specific conductance, and turbidity. Quarterly samples are collected and analyzed for sediment samples, total cations, total anions, total metals, phenols, and PCB. There are no NWQSS stations on any stream in the Buzzards Bay Basin at the present time.

Water quality monitoring network: This network consists of telemetric monitors which provide continuous records of dissolved oxygen, temperature, pH, and specific conductance. Nine telemeter stations are operated jointly by the Division and the United States Geological Survey. Data from these monitors are published annually by USGS in Water Resources Data for Massachusetts, New Hampshire, Rhode Island, and Vermont. There are no telemeter monitors located in the Buzzards Bay Basin.

Groundwater monitoring: This program will be established in conjunction with other appropriate agencies in accordance with EPA rules and regulations. The testing of groundwater sources is currently conducted by the Division of Environmental Health and the respective agency of the individual communities.

Special studies: Selected studies will be conducted to evaluate specific problems of the waters of the Commonwealth. Studies will be undertaken to evaluate the impact of non-point sources, combined sewer overflows, and urban runoff. Field studies for mathematical modeling needs, such as low flow and time-of-travel studies, will continue to be performed.

The 1975 water quality surveys of the waters of the Buzzards Bay Basin were intended to provide an assessment of the overall water quality of each segment. Due to the magnitude of the area surveyed and the limited number of sampling stations, it was possible in certain cases to identify water quality problems while the pollutant sources remain undefined. Sampling of a much more intensive nature would be required to fully assess these pollutant sources. It is the Division's intent to expand and refine the 1980 Buzzards Bay water quality surveys such that these problem areas may be more fully evaluated.

XI. PUBLIC PARTICIPATION

Classification of the Commonwealth's coastal waters was accomplished at a public hearing on April 14, 1967, at Gardner Auditorium, State House, Boston. Comments from federal, state, and local government officials and the general public were invited. Similar public hearings were conducted in all Massachusetts drainage basins. Information presented at these hearings included present and proposed classifications, data on existing water quality, and pollution abatement implementation schedules.

Public participation for individual abatement projects has primarily consisted of meetings with local boards and public hearings on proposed sites for treatment facilities. All expenditures for municipal treatment facilities are subject to Town Meeting (or City Council) action. In some areas, the Division has worked with regional planning agencies and watershed groups towards regional pollution abatement solutions.

The Federal Law, PL92-500, requires increased public participation. Plans prepared under Sections 201, 208, and 303(e) of PL92-500 must be adopted through public hearings. Public participation during the formulation of such plans is encouraged. The public participation programs for all planning efforts should be coordinated to avoid duplication while providing ample and meaningful opportunities for public input.

On April 24, 1975, the Division of Water Pollution Control conducted a workshop at the Sippican School in Marion. Discussed were the existing water quality conditions, the existing goals, and the abatement programs to be presented in the Buzzards Bay Basin Plan. Response from the public was sought in accordance with the public participation requirements of PL92-500.

A formal hearing will be conducted for the adoption of this Basin Plan. The hearing will also cover the reclassification of the waters of the Buzzards Bay Basin. Formal statements on the basin plan will be solicited at the hearing and will be included as an addendum to the final edition of this document.

XII. PLAN SUMMARY

BASIN PLAN FUNCTIONS

Basin water quality management plans are required by the Federal Water Pollution Control Act Amendments of 1972 (PL92-500). The purpose of a basin plan is to establish a framework of pollution abatement actions which will result in the attainment of water quality goals. Such actions include construction of sewers and treatment facilities and additional planning efforts to meet long-term goals. The latter include two types of plans specified by the Federal Act: Section 201 Municipal Facilities Plans, and Section 208 Areawide Waste Treatment Management Plans. The Buzzards Bay Basin Water Quality Management Plan has been prepared under the authority and methodology described in the "Massachusetts Continuing Planning Process." This basin plan represents the abatement strategy of the Massachusetts Division of Water Pollution Control for the Buzzards Bay Basin. Implementation of the recommendations of this basin plan will be accomplished through the discharge permit program (National Pollutant Discharge Elimination System).

EXISTING WATER QUALITY PROBLEMS

With the exception of the Acushnet River and New Bedford Harbor, there are few serious water quality problems affecting the inland or coastal waters of Buzzards Bay. In fact, some of the highest quality rivers and harbors within the entire Commonwealth are found in the basin.

In contrast, however, the Acushnet River and New Bedford Harbor are among the most badly polluted. Untreated industrial discharges of heavy metals over the years have resulted in deep bottom muds containing toxic concentrations of these metals. Although most industrial discharges now receive some form of treatment, the bottom muds remain and continue to degrade the Inner Harbor's quality.

Combined sewer overflows from the community of New Bedford are the remaining significant pollutant discharges to the Inner Harbor.

The Outer Harbor receives an average of 33 million gallons per day of primary treated sewage combined with many forms of pretreated industrial waste.

Water quality problems which periodically plague the other waters of Buzzards Bay are mostly of a non-point nature. Included are septic tank leachate, vessel discharges, and urban and agricultural runoff.

WATER QUALITY STANDARDS AND GOALS

The legal authority of this Basin Plan and its implementation through the permit program is based on the Massachusetts Water Quality Standards as revised in May 1974[1]. Stream classifications for the Buzzards Bay Basin under these standards are shown in Figures II-A and II-B. Following the completion of the abatement program outlined in this basin plan, most of the waters of the Buzzards Bay Basin should attain their designated water use classifications. Some water quality problems will remain, including urban runoff, non-point sources, combined sewers, and eutrophication of stream impoundments. These

[1] 1967 standards were revised in 1974.

problems will be addressed by the Division as part of the continuing planning process.

ABATEMENT PROGRAMS

The pollution abatement program for the communities in the Buzzards Bay Basin planning area varies according to the municipal sewerage needs. Table IV-1 shows the recommended action for the individual communities, including a tentative timetable for the various steps in the pollution abatement program. Communities not shown in Table IV-1 do not need abatement action during the design life of this plan.

An abatement program is more critical for some communities than for others. An abatement priority list for those communities known to need construction of pollution control facilities is given in Table XII-1. It can be seen that correction of New Bedford's combined sewer overflow problem is the top priority.

The proper solution of municipal needs may be a regional solution which involves two or more communities. This may be a 201 facilities planning area, a regional sewage treatment facility, a septage treatment plant, or an expanded sewerage system. This Basin Plan recommends regional actions be investigated for certain communities of the Buzzards Bay Basin. Table XII-1 lists the abatement projects and prioritizes them according to water quality impacts.

MONITORING PROGRAM

Implementation of the Basin Plan recommendations will be monitored by the Division through review of construction and operating reports on treatment facilities, periodic inspection of such facilities, and a program of water quality sampling.

The Division's monitoring program contains the following elements: lake surveys, compliance monitoring, groundwater monitoring, water quality monitoring network, and the National Water Quality Surveillance Sampling Network. The monitoring program for Buzzards Bay includes:

1) An intensive water quality survey, scheduled for 1980, conducted on the major inland and coastal waters of the basin. The survey will also include biological sampling and baseline lake surveys.

2) Annual sampling of all major wastewater treatment facilities.

3) A continued effort by the Division's Southeast Regional Office to investigate water pollution problems throughout the basin as they arise.

TABLE XII-1

POLLUTION ABATEMENT PROJECT PRIORITY LIST

BUZZARDS BAY BASIN

Priority	Project Description
1	Correction of New Bedford's combined sewer overflows
2	Upgrading of New Bedford's primary sewage treatment plant to a secondary level
3	Sewering of Mattapoisett to the Fairhaven sewage treatment plant
4	Sewering of Acushnet to New Bedford sewage treatment plant
5	Sewering of Westport to Fall River STP or land application
6	Expansion of Fairhaven STP and relocation of outfall outside hurricane barrier
7	Sewering of Bourne/Connection to Wareham STP or construction of secondary plant with canal discharge

BIBLIOGRAPHY

1. Anderson-Nichols and Company, Inc. Supplemental Sewerage Report for Buzzards Bay and South Sagamore, Town of Bourne. Boston: Anderson-Nichols & Co., 1972.

2. --------. Town of Bourne Wastewater Management Study. Boston: Anderson-Nichols & Co., 1975.

3. Bearse, Ray, ed. Massachusetts, A Guide to the Pilgrim State. Boston: Houghton-Mifflin Company, second edition, 1971.

4. Camp, Dresser and McKee Consulting Engineers. Report on Wastewater Collection and Treatment Facilities for New Bedford. Boston: CDM, 1975.

5. Commonwealth of Massachusetts. Regulations for the Disposal of Solid Waste by Sanitary Landfill. Adopted under the provisions of Section 150A, Chapter 111 of the General Laws of the Commonwealth, April 21, 1971.

6. Commonwealth of Massachusetts, Department of Commerce and Development. Cities and Town Monographs for the following towns:

   a. Acushnet (July 1973)
   b. Bourne (July 1973)
   c. Carver (February 1971)
   d. Dartmouth (June 1973)
   e. Fairhaven (May 1972)
   f. Freetown (October 1973)
   g. Marion (June 1972)
   h. Mattapoisett (October 1972)
   i. Middleborough (June 1972)
   j. New Bedford (April 1973)
   k. Plymouth (August 1973)
   l. Rochester (October 1972)
   m. Wareham (October 1972)
   n. Westport (April 1971)

7. Commonwealth of Massachusetts, Division of Water Pollution Control. Buzzards Bay Part A 1975. Westborough, Mass.: DWPC, 1975.

8. --------. Buzzards Bay Part B 1975. Westborough, Mass.: DWPC, 1976.

9. --------. Classification and Segmentation of Massachusetts River Basins and Coastal Zones. Boston: DWPC, 1976.

10. --------. Continuing Planning Process for Water Quality Management in Massachusetts. Boston: DWPC, 1976.

11. --------. Massachusetts Clean Waters Act and Related Water Pollution Control Laws. Boston: DWPC.

12. --------. North Coastal Water Quality Management Plan. Westborough, Mass.: DWPC, 1976.

13. --------. Rules and Regulations for the Establishment of Minimum Water Quality Standards and the Protection of the Quality and Value of Water Resources. Boston: DWPC, 1974.

14. --------. The Blackstone River Water Quality Management Plan. Westborough, Mass.: DWPC, 1975.

15. --------. The SUASCO River Basin Water Quality Management Plan. Westborough, Mass.: DWPC, 1975.

16. --------. Water Quality Standards Summary. Boston: DWPC, 1971.

17. New England River Basins Commission. Southeastern New England Study. Part III, Volumes 3,4,5. Boston: NERBC, 1975.

18. Tighe & Bond Consulting Engineers. Feasibility Study of a Mattapoisett Wastewater Treatment Facility. Holyoke, Mass.: Tighe & Bond, 1975.

19. Tippetts, Abbett, McCarthy, Stratton Engineers and Architects. Regional Study for Water Supply, Sewage Disposal and Drainage for Southeastern Massachusetts. Taunton, Mass.: Southeastern Regional Planning and Economic Development District, 1970.

20. United States Environmental Protection Agency. Guidelines for Preparation of Water Quality Management Plans. Washington, D.C.: USEPA, 1974.

21. Whitman & Howard, Inc. A Study of Waste Septic Tank Sludge Disposal in Massachusetts. Wellesley, Mass.: Whitman & Howard, Inc., 1976.

22. Williams, John R., and Tasker, Gary D. Water Resources of the Coastal Drainage Basins of Southeastern Massachusetts. Washington, D.C.: U.S. Geological Survey, 1974.

APPENDIX 1

GLOSSARY OF TERMS

ADMINISTRATIVE

Water Quality Standards - Originally established by the Division in 1967 and revised in 1974, the standards consist of three major parts:

Definition of Classification - The water use classifications (A,B,C, SA,SB,SC) in terms of appropriate uses and chemical constituents.

Application of Classification - Each waterbody in the Commonwealth is assigned a future use classification based on existing and desired uses. An estimate of existing water quality is also made under "Present Condition".

Implementation Schedule - A schedule of abatement actions has been established for each waste discharge in the Commonwealth in order to attain the desired use classification for each waterbody.

Segment - A section of a waterbody with common water quality characteristics and use classification. Waterbodies are divided into segments in order to rank the impact of individual waste discharges.

Segment Classification - This classification required by federal guidelines is based on the pollution control measures required to meet water quality standards. The required classifications are:

Effluent Limited - Segments where the application of Best Practicable Treatment (BPT) to each discharge will result in the attainment of water quality goals.

Water Quality Limited - Segments where higher degrees of treatment than BPT are required to meet existing standards.

These classifications are usually abbreviated "EL" and "WQ" with a number 1 or 2 following. A "1" indicates that standards are now being met; a "2" indicates they are not. An additional segment classification is required by the Massachusetts Water Quality Standards.

Anti-degradation - A segment which receives no waste discharges and is upstream of any existing discharges. New discharges to such segments are prohibited under the Massachusetts Standards.

Best Practicable Treatment - The minimum degree of treatment as prescribed by EPA. For municipal discharges, this is secondary treatment. For industrial discharges, guidelines are being developed by EPA for each type of industry.

Reach - A section of a waterbody with common water quality and hydraulic characteristics. This division of a waterbody is made for mathematical modelling purposes. In practically all cases, a segment consists of several reaches.

Permit Program - The National Pollutant Discharge Elimination System whereby each discharge to a waterbody must apply for and receive a permit. Each permit consists of two major parts.

Effluent Limitations: The maximum amount which may be discharged in terms of quantity and quality for the period of the permit (a maximum of five years).

Compliance Schedule: A schedule of abatement actions for the discharge which will lead to attainment of water quality goals.

At the completion of the compliance schedule, a new permit will be issued with new effluent limitations. For example, an existing treatment facility which causes violations of water quality standards would be required to maintain at least the existing level of treatment under the effluent limitations section of the permits. The compliance schedule would require the construction of additional treatment to meet the standards. At the completion of that construction, a new permit would be issued with effluent limitations necessary to maintain standards.

Monitoring Program - The entire sampling program required by federal regulations and carried out by the states. The program consists of seven elements: intensive water quality surveys, biological monitoring, automatic water quality monitors, National Water Quality Surveillance Sampling Network, lake monitoring, compliance (waste discharge) monitoring, and groundwater monitoring.

AGENCIES

The Division - The Massachusetts Division of Water Pollution Control (MDWPC)

EPA - The United States Environmental Protection Agency.

Corps - The United States Army Corps of Engineers.

USGS - The United States Geological Survey.

PHS - The United States Public Health Service.

Public Health - The Massachusetts Department of Public Health, Division of Environmental Health.

OSPM - Office of State Planning and Management.

RMPC - Resource Management Policy Council.

EOEA - Executive Office of Environmental Affairs.

DNR - Massachusetts Department of Natural Resources.

RPA - Regional Planning Agency, of which there are 12 in Massachusetts:

- BCRPC - Berkshire County Regional Planning Commission
- CCPEDD - Cape Cod Planning and Economic Development District
- CMRPC - Central Massachusetts Regional Planning Commission
- DCPEDD - Dukes County Planning and Economic Development District
- FCDP - Franklin County Department of Planning
- LPVRPC - Lower Pioneer Valley Regional Planning Commission
- MAPC - Metropolitan Area Planning Council
- MRPC - Montachusett Regional Planning Commission
- MVPC - Merrimack Valley Planning Commission
- NMAC - Northern Middlesex Area Commission
- OCPC - Old Colony Planning Council
- SRPEDD - Southeast Regional Planning and Economic Development District

Dissolved Oxygen (DO) - The uncombined oxygen in water which is available to aquatic life; DO is therefore the critical paramater for fish propagation. Numerous factors influence DO, including organic wastes, bottom deposits, stream hydraulic characteristics, nutrients, and aquatic organisms. Most mathematical models simulate the impact of these factors on stream DO concentrations. Saturation DO, or the equilibrium concentration, is primarily a function of temperature. DO values in excess of saturation are usually the result of algal blooms and therefore indicate an upset in the ecological balance. Optimum DO values range from 6.0 mg/l (minimum allowable for cold water fisheries) to saturation values. The latter range from 14.6 mg/l at 0° C (32° F) to 6.6 mg/l at 40° C (104° F).

Biochemical Oxygen Demand (BOD) - The amount of oxygen required by bacteria to stabilize organic matter. Biochemical refers to the fact that a chemical change is carried out by biological organisms (bacteria). BOD consists of two parts, carbonaceous and nitrogenous. The carbonaceous portion occurs first; compounds of carbon are broken down with the carbon released combining with oxygen to form carbon dioxide. In the nitrogenous portion, organic compounds of nitrogen are broken down to ammonia which in turn is converted to hydrogen gas and, successively, nitrite and nitrate. Although the total BOD of a waste may take 30 days or more to exert itself, the portion exerted after 5 days has become the standard test through recurrent usage. The 5 day BOD of untreated sewage normally ranges from 150 to 300 mg/l. Streams not subject to pollution will normally have 5 day BOD's of 2.0 mg/l or less.

Coliform Bacteria - Found in abundance in the intestinal tract of warm-blooded animals. Although not harmful themselves, the presence of coliforms often indicates that pathogenic bacteria are also present. Since they can be detected by relatively simple test procedures, coliforms are used to indicate the extent of bacterial pollution. Tests are often conducted to measure the total and fecal coliform. Fecal coliform make up about 90 per cent of the coliforms in fecal matter. Non-fecal coliform may originate in soil, grain, or decaying vegetation. Untreated sewage contains upwards of 20,000,000 coliforms per 100 milliliters. The legal maximum for swimming areas is 1000 coliform per 100 ml, while for public water supplies it is 100 per 100 ml.

pH - A measure of the hydrogen ion concentration of a solution on an inverse logarithmic scale ranging from 0 to 14. Values from 0 to 6.9 indicate acidic solutions, while values from 7.1 to 14 indicate alkaline solutions. A pH of 7.0 indicates a neutral solution. Natural streams usually show pH values between 6.5 and 7.5, although higher and lower values may be caused by natural conditions. Low pH values may result from the presence of heavy metals from acid mine drainage or metal finishing waste. High pH values may result from detergents or limestone quarrying.

Nutrients - Essentially, nutrients are food for aquatic organisms. They are organic compounds made up of carbon, hydrogen, oxygen, nitrogen, phosphorus, and sulfur. Small amounts are vital to the ecological balance of a waterbody. Larger amounts can lead to an upset of the balance by allowing one type of organism, such as algae, to proliferate. The most significant nutrients in waterbodies are those of carbon, nitrogen, and phosphorus. Nutrients of carbon are measured indirectly in the BOD test; separate tests are run to measure nutrients of nitrogen and phosphorus.

Milligrams per Liter (mg/l) - The metric system is used to express concentrations in water chemistry because it allows simpler calculations than the English System. The basis of the metric system is the unit weight and volume of water at standard conditions (20° C). At these conditions, one milliliter of water equals one cubic centimeter and weighs one gram. One milligram per liter is therefore essentially equal to one part per million by weight or volume.

Point Source - A continuous discharge of pollutants through a pipe or similar conduit. Primarily included are sewage and industrial wastes, whether treated or untreated.

Non-point Source - Any source of pollution not defined above. Sources such as urban stormwater runoff, which may reach a waterbody either through a pipe or directly, are included in this category since point source control technology (construction of sewers and treatment plants) is usually not feasible for such sources.

Combined Sewers - In many older cities, one system of sewers carries both storm water and sewage, hence the name "combined". Such systems have numerous overflows to the nearest waterbody. These overflows are considered point sources of pollution.

APPENDIX 2

COMMONWEALTH OF MASSACHUSETTS
WATER RESOURCES COMMISSION
DIVISION OF WATER POLLUTION CONTROL

RULES AND REGULATIONS FOR THE ESTABLISHMENT OF MINIMUM WATER QUALITY STANDARDS AND FOR THE PROTECTION OF THE QUALITY AND VALUE OF WATER RESOURCES

The Division of Water Pollution Control, acting under the authority of Sections 27 (5) and (12) of Chapter 21 of the General Laws and other Acts relating thereto enabling, hereby adopts and established the following Rules and Regulations to restore, maintain, and enhance the quality of the waters of the Commonwealth; to designate the uses for which the various waters of the state shall be maintained and protected; to prescribe the water quality standards required to sustain the designated uses; and prescribe regulations necessary for implementing, achieving and maintaining the prescribed water quality.

Filed with Secretary of State May 2, 1974

RULES AND REGULATIONS
FOR THE ESTABLISHMENT OF
MINIMUM WATER QUALITY STANDARDS
AND FOR THE PROTECTION OF THE
QUALITY AND VALUE OF WATER RESOURCES

REGULATION I Definitions

The terms used in the following regulations are defined as follows:

1. Appropriate Treatment - means that degree of treatment required for the waters of the Commonwealth to meet their assigned classifications or any terms, conditions, or effluent limitations established as part of any permit to discharge issued under the provisions of the Massachusetts Clean Waters Act, or any effluent standard or prohibition established by the Division under authority of Section 27 (6) of the Massachusetts Clean Waters Act.

2. Division - means the Commonwealth of Massachusetts, Division of Water Pollution Control.

3. Person - means any agency or political subdivision of the Commonwealth, public or private corporation or authority, individual, partnership or association, or other entity, including any officer of a public or private agency or organization, upon whom a duty may be imposed by or pursuant to any provision of Sections 26-53 inclusive, of Chapter 21 of the General Laws.

4. Sewage - means the water-carried waste products or discharges from human beings, sink wastes, wash water, laundry waste and similar so-called domestic waste.

5. The "Waters of the Commonwealth" and "Waters" - means all waters within the jurisdiction of the Commonwealth, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, coastal waters, and ground waters.

6. Fresh Waters - means waters not subject to the rise and fall of the tide.

7. Salt Waters - means all waters subject to the rise and fall of the tide.

8. Cold Water Stream - means a stream capable of sustaining a population of cold water fish, primarily Salmonids.

9. Seasonal Cold Water Stream - means a stream which is only capable of sustaining cold water fish during the period of September 15 through June 30.

10. Waste Treatment Facility - processes, plants, or works, installed for the purpose of treating, neutralizing, stabilizing or disposing of wastewater.

11. Pollutant - means any element or property of sewage, agricultural, industrial, or commercial waste, run-off, leachate, heated effluent, or other matter in whatever form and whether originating at a point or non-point source, which is or may be discharged, drained or otherwise introduced into the waters of the Commonwealth.

12. Discharge - means the flow or release of any pollutant into the waters of the

Commonwealth.

13. Wastewater - means sewage, liquid or water-carried waste from industrial, commercial, municipal, private or other sources.

14. Zone of Passage - means a continuous water route of the volume, area and quality necessary to allow passage of free-swimming and drifting organisms with no significant effect produced on the population.

Regulation II - Water Quality Standards

1 - The Water Quality Standards adopted by the Massachusetts Division of Water Pollution Control on March 3, 1967 and filed with the Secretary of State on March 6, 1967 are hereby repealed, except that existing "River Basin Classifications" based on the 1967 Standards will remain in full force and effect until reclassified in accordance with the following standards.

2 - To achieve the objectives of the Massachusetts Clean Waters Act and the Federal Water Pollution Control Act Amendments of 1972 and to assure the best use of the waters of the Commonwealth the following standards are adopted and shall be applicable to all waters of the Commonwealth or to different segments of the same waters:

3 - Fresh Water Standards

Class A - These waters are designated for use as sources of public water supply in accordance with the provisions of Chapter 111 of the General Laws.

Water Quality Criteria

Item	Criteria
1. Dissolved oxygen	Not less than 75% of saturation during at least 16 hours of any 24 hour period and not less than 5 mg/l at any time. For cold water streams the dissolved oxygen concentration shall not be less than 6 mg/l. For seasonal cold water streams the dissolved oxygen concentration shall not be less than 6 mg/l during the season.
2. Sludge deposits-solid refuse-floating solids-oil-grease-scum	None allowable
3. Color and turbidity	None other than natural origin.
4. Total Coliform bacteria per 100 ml.	Not to exceed an average value of 50 during any monthly sampling period.
5. Taste and odor	None other than of natural origin.
6. pH	As naturally occurs.
7. Allowable temperature increase	None other than of natural origin.
8. Chemical constituents	None in concentrations or combinations which would be harmful or offensive to humans, or harmful to animal or aquatic life.

9. Radioactivity	None other than that occurring from natural phenomena.

Class B - These waters are suitable for bathing and recreational purposes, water contact activities, acceptable for public water supply with treatment and disinfection, are an excellent fish and wildlife habitat, have excellent aesthetic values and are suitable for certain agricultural and industrial uses.

Item	Criteria
1. Dissolved oxygen	Not less than 75% of saturation during at least 16 hours of any 24 hour period and not less than 5 mg/l at any time. For cold water streams the dissolved oxygen concentration shall not be less than 6 mg/l. For seasonal cold water streams the dissolved oxygen concentration shall not be less than 6 mg/l during the season.
2. Sludge deposits-solid refuse-floating solids-oil-grease-scum	None other than of natural origin or those amounts which may result from the discharge from waste treatment facilities providing appropriate treatment. For oil and grease of petroleum origin the maximum allowable concentration is 15 mg/l.
3. Color and turbidity	None in such concentrations that would impair any uses specifically assigned to this class.
4. Coliform bacteria per 100 ml	Not to exceed an average value of 1000 nor more than 1000 in 20% of the samples.
5. Taste and odor	None in such concentrations that would impair any uses specifically assigned to this class and none that would cause taste and odor in edible fish.
6. pH	6.5 - 8.0
7. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case

	exceed 83° F in warm water fisheries, and 68°F in cold water fisheries, or in any case raise the normal temperature of the receiving water more than 4°F.
8. Chemical constituents	None in concentrations or combinations which would be harmful or offensive to human, or harmful to animal or aquatic life or any water use specifically assigned to this class.
9. Radioactivity	None in concentrations or combinations in excess of the limits specified by the United States Public Health Service Drinking Water Standards.

Class B1 - The use and criteria for Class B1 shall be the same as for Class B with the exception of the dissolved oxygen requirement which shall be as follows for this class:

Item	Criteria
1. Dissolved oxygen	Not less than 5 mg/l during at least 16 hours of any 24 hour period, nor less than 3 mg/l at any time. For seasonal cold water fisheries at least 6 mg/l must be maintained during the season.

Class C - These waters are suitable for recreational boating and secondary water contact recreation, as a suitable habitat for wildlife and fish indigenous to the region, for certain agricultural and industrial uses, have good aesthetic values, and under certain conditions are acceptable for public water supply with treatment and disinfection.

Item	Criteria
1. Dissolved oxygen	Not less than 5 mg/l during at least 16 hours of any 24 hour period, nor less than 3 mg/l at any time. For seasonal cold water fisheries at least 6 mg/l must be maintained during the season.
2. Sludge deposits-solid refuse-floating solids-oil-grease-scum	None other than of natural origin or those amounts which may result

		from the discharge from waste treatment facilities providing appropriate treatment. For oil and grease of petroleum origin the maximum allowable concentration is 15 mg/l.
3.	Color and turbidity	None allowable in such concentrations that would impair any uses specifically assigned to this class.
4.	Coliform bacteria	None in such concentrations that would impair any usages specifically assigned to this class, see Note 1.
5.	Taste and odor	None in such concentrations that would impair any uses specifically assigned to this class, and none that would cause taste and odor in edible fish.
6.	pH	6.0 - 8.5
7.	Allowable temperature increase	None except where the increase will not exceed the recommended limits on the most sensitive receiving water use and in no case exceed 83°F in warm water fisheries, and 68°F in cold water fisheries, or in any case raise the normal temperature of the receiving water more than 4°F.
8.	Chemical constituents	None in concentrations or combinations which would be harmful or offensive to human life, or harmful to animal or aquatic life or any other water use specifically assigned to this class.
9.	Radioactivity	None in such concentrations or combinations in excess of the limits specified by the United States Public Health Service Drinking Water Standards.

Note I - no bacteria limit has been placed on Class "C" waters because of the urban runoff and combined sewer problems which have not yet been solved. In waters of this class not subject to urban runoff or combined sewer discharges the bacterial quality of the water should be less than an average of 5,000 coliform bacteria/100 ml during any monthly sampling period. It is the objective of the Division to eliminate all point and non-point sources of pollution and to impose bacterial limits on all waters.

Class C1 - The use and criteria for Class C1 shall be the same as for Class C with the exception of the dissolved oxygen (and temperature) requirements which shall be as follows for this Class:

Item	Criteria
1. Dissolved oxygen	Not less than 2 mg/l at any time.

Salt Water Standards

Class SA - These are waters of the highest quality and are suitable for any high water quality use including bathing and other water contact activities. These waters are suitable for approved shellfish areas and the taking of shellfish without depuration, have the highest aesthetic value and are an excellent fish and wildlife habitat.

Water Quality Criteria

Item	Criteria
1. Dissolved oxygen	Not less than 6.5 mg/l at any time.
2. Sludge deposits-solid refuse-floating solids-oil-grease-scum	None other than of natural origin or those amounts which may result from the discharge from waste treatment facilities providing appropriate treatment. For oil and grease of petroleum origin the maximum allowable concentration is 15 mg/l.
3. Color and turbidity	None in such concentrations that will impair any uses specifically assigned to this class.
4. Total Coliform bacteria per 100 ml	Not to exceed a median value of 70 and not more than 10% of the samples shall ordinarily exceed 230 during any monthly sampling period.
5. Taste and odor	None allowable
6. pH	6.8 - 8.5

7.	Allowable temperature increase	None except where the increase will not exceed the recommended limits on the most sensitive water use.
8.	Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, impair the palatability of same, or impair the waters for any other uses.
9.	Radioactivity	None in concentrations or combinations in excess of the limits specified by the United States Public Health Service Drinking Water Standards.

Class SB - These waters are suitable for bathing and recreational purposes including water contact sports and industrial cooling, have good aesthetic values, are an excellent fish habitat and are suitable for certain shell fisheries with depuration (Restricted Shellfish Areas).

Item		Criteria
1.	Dissolved oxygen	Not less than 5.0 mg/l at any time.
2.	Sludge deposits-solid refuse-floating solids-oils-grease-scum	None other than of natural origin or those amounts which may result from the discharge from waste treatment facilities providing adequate treatment. For oil and grease of petroleum origin, the maximum allowable concentration is 15 mg/l.
3.	Color and turbidity	None in such concentrations that would impair any uses specifically assigned to this class.
4.	Total Coliform bacteria per 100 ml	Not to exceed an average value of 700 and not more than 1000 in more than 20% of the samples.
5.	Taste and odor	None in such concentrations that would impair any uses specifically assigned to this class and none that would cause taste and odor in edible fish or shellfish.
6.	pH	6.8 - 8.5

7.	Allowable temperature increase	None except where the increase will not exceed the recommended limits on the most sensitive water use.
8.	Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, impair the palatability of same, or impair the water for any other use.
9.	Radioactivity	None in such concentrations or combinations in excess of the limits specified by the United States Public Health Service Drinking Water Standards.

Class SC - These waters are suitable for aesthetic enjoyment, for recreational boating, as a habitat for wildlife and common food and game fishes indigenous to the region, and are suitable for certain industrial uses.

Item		Criteria
1.	Dissolved oxygen	Not less than 5 mg/l during at least 16 hours of any 24 hour period nor less than 3 mg/l at any time.
2.	Sludge deposits-solid refuse-floating solids-oil-grease-scum	None other than of natural origin or those amounts which may result from the discharge from waste treatment facilities providing appropriate treatment. For oil and grease of petroleum origin the maximum allowable concentration is 15 mg/l.
3.	Color and turbidity	None in such concentrations that would impair any uses specifically assigned to this class.
4.	Total Coliform bacteria	None in such concentrations that would impair any uses specifically assigned to this class. See Note 2
5.	Taste and odor	None in such concentrations that would impair any uses specifically assigned to this class and none that would cause taste and odor in edible fish or shellfish.
6.	pH	6.5 - 8.5
7.	Allowable temperature increase	None except where the increase will not exceed the recommended limits on the most sensitive water use.

8. Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe for fish or shellfish or their propagation, impair the palatability of same, or impair the water for any other use.
9. Radioactivity	None in such concentrations or combinations in excess of the limits specified by the United States Public Health Service Drinking Water Standards.

Note 2: no bacteria limit has been placed on Class "SC" waters because of the urban runoff and combined sewer problems which have not yet been solved. In waters of this class not subject to urban runoff or combined sewer discharges, the bacterial quality of the water should be less than an average of 5,000 coliform bacteria/100 ml during any monthly sampling period. It is the objective of the Division to eliminate all point and non-point sources of pollution and to impose bacterial limits on all waters.

Regulation III - General Provisions

1. It is recognized that certain waters of the Commonwealth possess an existing quality which is better than the standards assigned thereto.

   A. Except as otherwise provided herein, no new discharge of wastewater will be permitted into any stream, river or tributary upstream of the most upstream discharge of wastewater from a municipal waste treatment facility or municipal sewer discharging wastes requiring appropriate treatment as determined by the Division. Any person having an existing wastewater discharge shall be required to cease such discharge and connect to a municipal sewer unless it is shown by said person that such connection is not available or feasible. Existing discharges not connected to a municipal sewer will be provided with the highest and best practical means of waste treatment to maintain high water quality. New discharges from a municipal waste treatment facility into such waters will be permitted provided that such discharge is in accordance with a plan developed under the provisions of Section 27(10) of Chapter 21 of the General Laws (Massachusetts Clean Waters Act) which has been the subject of a Public Hearing and approved by the Division. The discharge of industrial liquid coolant wastes in conjunction with the public and private supply of heat or electrical power may be allowed provided that a permit has been issued by the Division and that such discharge is in conformance with the terms and conditions of the permit and in conformance with the water quality standards of the receiving waters.

   B. Except as otherwise provided herein, no new discharge of wastewater will be permitted in Class SA or SB waters. Any person having an existing discharge of wastewater into Class SA or SB waters will be required to cease said discharge and to connect to a municipal sewer unless it is shown by said person that such connection is not available or feasible. Existing discharges not connected to a municipal sewer will be provided with the highest and best practical means of waste treatment to maintain high water quality. New discharges from a waste treatment facility into such waters will be permitted provided such discharge is in accordance with a plan developed under the provisions of Section 27(10) of Chapter 21 of the General Laws (Massachusetts Clean Waters Act) which has been the subject of a Public Hearing and approved by the Division. The discharge of industrial coolant wastes in conjunction with the public and private supply of heat or electrical power may be allowed provided that a permit has been issued by the Division and that such discharge is in conformance with the terms and conditions of the permit and in conformance with the Water Quality Standards of the receiving waters.

2. The latest edition of the Federal publication "Water Quality Criteria" will be considered in the interpretation and application of bioassay results.

3. The latest edition of Standard Methods for Examination of Water and Wastewater, American Public Health Association, will be followed in the collection, preservation, and analysis of samples. Where a method is not given in the standards methods, the latest procedures of the American Society for Testing Materials (ASTM) will be followed.

4. The average minimum consecutive 7-day flow to be expected once in 10 years shall be used in the interpretation of the standards.

5. In the discharge of waste treatment plant effluents into receiving waters, consideration shall be given both in time and distance to allow for mixing of effluent and stream. Such distances required for complete mixing shall not effect the water use classifications adopted by the Division. However, a zone of passage must be provided wherever mixing zones are allowed.

6. There shall be no new discharges of nutrients into lakes or ponds. In addition, there shall be no new discharge of nutrients to tributaries of lakes or ponds that would encourage eutrophication or growth of weeds or algae in these lakes or ponds.

7. Any existing discharge containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae shall be treated to remove such nutrients to the maximum extent technically feasible.

8. These Water Quality Standards do not apply to conditions brought about by natural causes.

9. All waters shall be substantially free of products that will (1) unduly affect the composition of bottom fauna, (2) unduly affect the physical or chemical measure of the bottom, (3) interfere with the spawning of fish or their eggs.

10. No person shall discharge any pollutants into any waters of the Commonwealth which shall cause a violation of the standards.

11. A person shall submit to the Division for approval all plans for the construction of or addition to any waste treatment facility and no such facility may be constructed, modified or enlarged without such approval.

12. Cold water and seasonal cold water streams shall be those listed by the Massachusetts Division of Fisheries and Game.

13. Whoever violates any provision of these regulations shall (a) be fined not less than two thousand five hundred dollars nor more than twenty-five thousand dollars for each day of such violation or its continuance, or by imprisonment for not more than one year, or by both; or (b) shall be subject to a civil penalty not to exceed ten thousand dollars per day of such violation, which may be assessed in an action brought on behalf of the Commonwealth in any court of competent jurisdiction, pursuant to Section 42 of Chapter 21 of the Massachusetts General Laws.

14. The Division and its duly authorized employees shall have the right to enter at all reasonable times into or on, any property, public or private, for the purpose of inspecting and investigating conditions relating to pollution or possible pollution of any waters of the Commonwealth, pursuant to Section 40 of Chapter 21 of the Massachusetts General Laws.

15. If any regulation, paragraph, sentence, clause, phrase or word of these regulations shall be declared invalid for any reason whatsoever, that decision shall not affect any other portion of these regulations, which shall remain in full force and effect and to this end the provisions of these regulations are hereby declared severable.

APPENDIX 3

RECORD OF PUBLIC HEARING

The final step in the Division's Basin Planning Process is the formal public hearing which takes place prior to the submission of the Basin Plan to EPA. The Basin Plan, the reclassification of the waters in the Basin, and the environmental assessment for the Basin Plan can not be finalized until the public has been given an opportunity to comment on these items. The public hearing for the Buzzards Bay 303(e) Basin Plan was held on April 21, 1977 in the Sippican School Cafeteria in Marion, Massachusetts. This Appendix contains a record of the public hearing, the written comments received relative to the Basin Plan, and the Division's response to the written comments.

Public Notification

Legal notification for the public hearing was published in the New Bedford Standard Times, thirty days prior to the hearing date.

Basin Plan Distribution

On Thursday, April 7, 1977, the Division mailed approximately 75 summaries of the Basin Plan to concerned citizens, state senators, state representatives and industrial development commissions. On the same date, approximately 125 copies of the completed draft Basin Plan were mailed to private conservation groups, conservation commissions, boards of health, planning boards, sewer commissioners, selectmen, mayors, and other concerned groups and citizens. Copies of the completed draft Basin Plan were made available for public review one month prior to the hearing date at the following locations: Southeastern Regional Planning and Economic Development District, Marion; New Bedford Free Public Library, New Bedford; Southworth Library, South Dartmouth; Russell Memorial Library, Acushnet; Millicent Library, Fairhaven; Wareham Free Public Library, Wareham; and the Massachusetts Division of Water Pollution Control at the Boston, Pembroke and Westborough Offices.

Public Hearing

A tape recording of the public hearing is available for public review at the Division's Westborough office. The following is a summary of the proceedings.

Hearing Officer Russell A. Isaac opened the hearing at 7:50 p.m. EDT. Mr. Isaac explained the purpose of the hearing, outlined the agenda for the evening, and, on behalf of Director Thomas C. McMahon, thanked everyone for attending the hearing.

Dennis G. Beauregard, Assistant Sanitary Engineer, presented a summary of the Basin Plan. Mr. Isaac then solicited public comment relative to the Basin Plan. No comments were received at that time. The meeting was formally closed at 9:10 p.m. EDT., after which an informal question and answer period followed. The meeting was adjourned at 10:00 p.m. EDT.

OFFICE OF THE DIRECTOR
DIVISION OF WATER
POLLUTION CONTROL

The Commonwealth of Massachusetts
Water Resources Commission
Leverett Saltonstall Building, Government Center
100 Cambridge Street, Boston 02202

COMMONWEALTH OF MASSACHUSETTS

DIVISION OF

WATER POLLUTION CONTROL

NOTICE OF

PUBLIC HEARING

WATER QUALITY MANAGEMENT PLAN FOR

THE BUZZARDS BAY BASIN

Pursuant to Section 101(e) of the Federal Water Pollution Control Act Amendments of 1972; the State Administrative Procedure Law, Chapter 30A; the Massachusetts Clean Waters Act, Chapter 21; and the Massachusetts Environmental Policy Act, Chapter 30 of the General Laws of the Commonwealth; Notice if hereby given that a Public Hearing will be held before the Division of Water Pollution Control on Thursday, April 21, 1977, at the Sippican School Cafeteria in Marion, Massachusetts, at 7:30 p.m. The purpose of the hearing is to receive comments on a proposed Water Quality Management Plan and the reclassification of the waters of the basin in accordance with the Water Quality Standards promulgated by the Division on May 2, 1974.

The Plan, including the proposed reclassification, will be available for inspection during business hours at the following locations:

Southeastern Regional Planning and Economic Development District, 7 Barnabas Road, Marion, Massachusetts

New Bedford Free Public Library, Pleasant Street, New Bedford, Massachusetts

Southworth Library, 732 Dartmouth Street, South Dartmouth, Massachusetts

Russell Memorial Library, 88 Main Street, Acushnet, Massachusetts

Millicent Library, 45 Center Street, Fairhaven, Massachusetts

Wareham Free Public Library, High Street, Wareham, Massachusetts

Massachusetts Division of Water Pollution Control, 110 Tremont Street, Boston, Massachusetts

Massachusetts Division of Water Pollution Control, Corner of Congress and Washington Streets, North Pembroke, Massachusetts

Massachusetts Division of Water Pollution Control, Westview Building, former Lyman School Grounds, Route 9, Westborough, Massachusetts

A summary of the plan may be obtained by request from:

Division of Water Pollution Control
P. O. Box 545
Westborough, Massachusetts 01581

By order of:

Thomas C. McMahon
Director

TCM/DGB/rg

OFFICE OF THE DIRECTOR
DIVISION OF WATER
POLLUTION CONTROL

The Commonwealth of Massachusetts
Water Resources Commission
Leverett Saltonstall Building, Government Center
100 Cambridge Street, Boston 02202

April 7, 1977

Dear Citizen:

The Division of Water Pollution Control will hold a Public Hearing to receive comments on the Buzzards Bay Water Quality Management Plan on Thursday, April 21, 1977 at 7:30 p.m. in the Sippican School Cafeteria, 16 Spring Street, Marion, Massachusetts.

This hearing is the final step prior to adoption of the document as the water quality management plan for the Buzzards Bay Basin under the provisions of Section 303e of the Federal Water Pollution Control Act and the Massachusetts Clean Waters Act. The Water Quality Standards for the basin have been reviewed and updated to reflect the May, 1974 revisions. Treatment requirements for each discharge required to meet these standards have been established.

A summary of the proposed plan is enclosed. Complete copies of the final draft are available at the following locations for public review:

Southeastern Regional Planning and Economic Development District, 7 Barnabas Road, Marion, Massachusetts

New Bedford Free Public Library, Pleasant Street, New Bedford, Massachusetts

Southworth Library, 732 Dartmouth Street, South Dartmouth, Massachusetts

Russell Memorial Library, 88 Main Street, Acushnet, Massachusetts

Millicent Library, 45 Center Street, Fairhaven, Massachusetts

Wareham Free Public Library, High Street, Wareham, Massachusetts

Massachusetts Division of Water Pollution Control,
110 Tremont Street, Boston, Massachusetts

Massachusetts Division of Water Pollution Control,
Corner of Congress and Washington Streets, North
Pembroke, Massachusetts

Massachusetts Division of Water Pollution Control,
Westview Building, former Lyman School Grounds,
Route 9, Westborough, Massachusetts

A loan copy of the complete final draft can be obtained by written request to the Massachusetts Division of Water Pollution Control, P. O. Box 545, Westborough, Massachusetts 01581.

I solicit your comments, either in writing to the above address or orally at the Public Hearing.

Very truly yours,

Thomas C. McMahon
Director

TCM/DGB/rm
Enclosure

OFFICE OF THE DIRECTOR
DIVISION OF WATER
POLLUTION CONTROL

The Commonwealth of Massachusetts
Water Resources Commission
Leverett Saltonstall Building, Government Center
100 Cambridge Street, Boston 02202

April 7, 1977

Dear Citizen:

The Division of Water Pollution Control will hold a Public Hearing to receive comments on the Buzzards Bay Water Quality Management Plan on Thursday, April 21, 1977 at 7:30 p.m. in the Sippican School Cafeteria, 16 Spring Street, Marion, Massachusetts.

This hearing is the final step prior to adoption of the document as the water quality management plan for the Buzzards Bay Basin under the provisions of Section 303e of the Federal Water Pollution Control Act and the Massachusetts Clean Waters Act. The Water Quality Standards for the basin have been reviewed and updated to reflect the May, 1974 revisions. Treatment requirements for each discharge required to meet these standards have been established.

A copy of the proposed plan is enclosed.

I solicit your comments, either in writing to the above address or orally at the Public Hearing.

Very truly yours,

Thomas C. McMahon
Director

TCM/DGB/rm
Enclosure

BUZZARDS BAY BASIN PLAN - PUBLIC HEARING

APRIL 21, 1977

SIPPICAN SCHOOL CAFETERIA, MARION, MASSACHUSETTS

ATTENDANCE

NAME	ADDRESS	AFFILIATION
Katherine K. Stern	875 Smith Neck Road South Dartmouth	L.W.V., New Bedford
T. Noel Stern	875 Smith Neck Road South Dartmouth	Southeastern Mass. University
Peter M. Smith	10 High Street Boston	Weston & Sampson Engineers, Inc.
Jack Turner	DPW, Wastewater Division Fort Rodman, New Bedford	City of New Bedford
Daniel J. Calnan	DPW, Wastewater Division Fort Rodman, New Bedford	City of New Bedford
Kent Taylor	7 Barnabas Road Marion	Southeastern Regional Planning and Economic Development District
Steven Reckhow	7 Barnabas Road Marion	Southeastern Regional Planning and Economic Development District

HARVARD MEDICAL SCHOOL
DEPARTMENT OF BIOLOGICAL CHEMISTRY
BOSTON, MASSACHUSETTS 02115

April 18, 1977

Thomas C. McMahon, Director,
Division of Water Pollution Control
Commonwealth of Massachusetts
Water Resources Commission
Saltonstall Building, Government Center
100 Cambridge Street
Boston, Mass. 02202

Dear Mr. McMahon,

Thank you for your April 17, 1977 (form) letter with the enclosed Part D Water Quality Management Plan 1976 for Buzzard's Bay. I personally am impressed with the completeness and quality of this document and am very pleased to receive it.

We will make every effort to be represented in Marion on April 21, or at least have some further comments for you in writing shortly thereafter. In order to facilitate our efforts, would it be possible to send 5 additional copies to me at the address below. If there is any expense involved, we will be only too happy to reimburse the Division.

You might remember, Mr. McMahon, that it was our group that successfully fought and eventually reversed the intention of the Westport Board of Health to install a septage lagoon on a hillside draining into the East Branch of the Westport River. Rather than cease our efforts in the Defense of the River and surrounding wetlands, we are now stronger than before. Our Fund is incorporated, tax exempt, and is supported by donations from Westporters. Our mailings reach about 1500 citizens who are known to be interested in the River and in the future of Westport. We have frequent reporting in our newspapers, a literature assembly (reading table) at the local library, and have instituted a regular monitoring program of many stations on the River. Through our efforts Professor James McCarthy, a Harvard ecologist, has been running his research course with 6 students continuously since March on the East Branch.

We would be most happy to receive any further communications from you and respond positively to any questions you may have fo us.

Yours sincerely,

Charles A. Thomas

Charles A. Thomas, Jr.
President
Westport River Defense Fund
P.O. Box 298
Westport, Mass. 02790

cc: Francis W. Davidson
Marcus J. Healey
Herbert H. Stevens
Albert A. Palmer

OFFICE OF THE DIRECTOR
DIVISION OF WATER
POLLUTION CONTROL

The Commonwealth of Massachusetts
Water Resources Commission
Leverett Saltonstall Building, Government Center
100 Cambridge Street, Boston 02202

May 25, 1977

Mr. Charles A. Thomas, Jr.
President
Westport River Defense Fund
P. O. Box 298
Westport, Massachusetts 02790

Dear Mr. Thomas:

I have enclosed five additional copies of the Buzzards Bay Water Quality Management Plan as you requested.

As outlined in the Basin Plan, both branches of the Westport River have been designated anti-degradation. The intent of this is to maintain the existing high quality of the Westport Rivers by prohibiting any new wastewater discharges to these areas. Existing discharges will be required to connect to municipal collection systems if available. Should none be available, a high degree of treatment will be provided prior to discharge.

The Division of Water Pollution Control recognizes the importance of "Watershed Groups" and is appreciative of their efforts to preserve and protect the quality of the waters of the Commonwealth. I hope that the Westport River Defense Fund will continue its efforts in the Westport River area and that we may work more closely with your group in the future. Any questions you may have relative to the Basin Plan or to other related matters should be addressed to Mr. Dennis Beauregard of the Water Quality and Research Section, P. O. Box 545, Westborough, (Tel. 366-9181). Thank you for your interest in Water Pollution Control.

Respectfully,

Thomas C. McMahon
Director

TCM/DGB/rm
Enclosures

SOUTHEASTERN REGIONAL PLANNING AND ECONOMIC DEVELOPMENT DISTRICT
7 BARNABAS ROAD, MARION, MASSACHUSETTS 02738, Tel. (617) 748-2100

May 2, 1977

Mr. Thomas C. McMahon, Director
Division of Water Pollution Control
110 Tremont Street
Boston, MA

Dear Mr. McMahon:

We have reviewed the draft Buzzards Bay Water Quality Management Plan and find that it accurately describes the major water quality problems in the basin. Before the Plan becomes final, however, the following comments should be addressed:

1. The "Pollution Abatement Project Priority List" on Page 107 is slightly at variance with the five-year construction grant priority list developed by ACQUA as part of SRPEDD's 208 program. Specifically, ACQUA recommended that the sewering of Mattapoisett and Acushnet be ranked above the upgrading of the New Bedford treatment plant. Because ACQUA's priority list (a copy of which is included) was developed with considerable local input, I believe that it more closely reflects the wishes of the residents of the Buzzards Bay basin than does the list in the draft plan.

2. The Town of Westport is presently preparing a 201 step one study. Since this study has not yet been completed, item 5 on Page 107 should be amended to read "Sewering of Westport to Fall River STP or Construction of Local Facilities with Land Disposal."

3. Future analysis of water samples from the basin should be expanded to include heavy metals, pesticides and other toxic substances associated with industrial, agricultural and non-point sources.

4. Because of the interrelationship between ground and surface water in the Buzzards Bay basin, groundwater quality must be monitored. It is recommended that future sampling include groundwater samples below known and suspected pollution sources including landfills and sludge disposal sites.

If you have any questions concerning these comments please contact me.

Sincerely,

Stephen C. Smith

Stephen C. Smith
Water Quality Project Director

3-L

cc: Roger Duwart, EPA
SCS/SWR/nlp

OFFICE OF THE DIRECTOR
DIVISION OF WATER
POLLUTION CONTROL

The Commonwealth of Massachusetts
Water Resources Commission
Leverett Saltonstall Building, Government Center
100 Cambridge Street, Boston 02202

May 26, 1977

Mr. Steven Smith
Southeastern Regional Planning and
Economic Development District
7 Barnabas Road
Marion, Massachusetts 02738

Dear Mr. Smith:

In response to your letter of May 2, 1977, addressing the Buzzards Bay Water Quality Management Plan, I offer the following replies to your comments as listed:

1. The "pollution abatement project priority list" as listed in the basin plan is slightly at variance with SERPEDD's ACQUA list due to the differing criteria upon which each has been developed. While the ACQUA list may more closely reflect the wishes of the residents of the Buzzards Bay Basin, this was not a consideration in the development of the basin plan's project priority list. The basin plan is a water quality management document which bases its decisions solely upon water quality considerations and not upon the biases of any particular interest group within the basin.

2. Wastewater disposal alternatives which should be under consideration for the Town of Westport would include land disposal and the basin plan has been amended to read as such.

3. It is the intent of the Division to continually refine its water quality monitoring program. The 1975 Buzzards Bay water quality surveys provided baseline data upon which future surveys can be structured. An expanded range of analysis will be one of many refinements which will be incorporated into the 1980 water quality surveys planned for the basin.

4. The Division recognizes the interrelationship between ground and surface water in many of the river basins throughout the Commonwealth. Groundwater monitoring at the present time is primarily limited to municipal water supplies. Hopefully, in the future, this program can be expanded to include monitoring of sanitary landfills, sludge disposal sites and other potential groundwater pollutant sources as you suggested.

I appreciate your comments regarding the basin plan and hope that in the future we may mutually work toward the goal of improving the quality of the waters of the Buzzards Bay Basin.

Respectfully,

Thomas C. McMahon
Director

TCM/DB/rg