Wastewater Collection and Return Flow in New England, 1990

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CONTENTS

Glossary V
Abstract 1
Introduction 1
    Purpose and Scope 2
    Description of Study Area 3
    Acknowledgments 3
Wastewater Component of Water Use 6
Methods of Data Compilation and Analysis 9
    Sources and Description of Data 9
    Organization of Data 12
    Estimation of Sewered Populations 12
    Quality Control 13
Wastewater Collection and Return Flow, by State 17
    Connecticut 18
    Maine 23
    Massachusetts 23
    New Hampshire 39
    Rhode Island 46
    Vermont 49
Wastewater Collection and Return Flow in New England 55
Wastewater Collection and Return Flow by Drainage Basin 57
Summary 58
References Cited 59
Appendix 1. Summary of Municipal Wastewater-Treatment Facilities and Mean Daily Return Flows by Subregional Drainage Basins and Subbasins in New England, 1990 63

FIGURES

1. Map showing location of subregional drainage basins and subbasins in the New England States 4
2,3. Diagrams showing:
    2. Generalized water-use-flow system 7
    3. Detailed water-use and design-related factors of wastewater collection, treatment, and return flow 8
4-9. Map showing locations of Minor Civil Division boundaries, drainage-subbasin boundaries, and municipal wastewater-treatment facilities in:
    4. Connecticut 18
    5. Maine 25
    6. Western and Eastern Massachusetts 31
    7. New Hampshire 41
    8. Rhode Island 47
    9. Vermont 51
10. Bar graph showing sewered and unsewered populations in the New England States for 1990 56
11. Diagram showing monthly variations in total return flows from municipal wastewater-treatment facilities in New England, 1990 57

TABLES

1. Subregional drainage basin code and name; and code, name, location, and area of drainage subbasins in New England 5
2. Sources and description of water-use data in New England 10
3. Summary of statistical difference in percent between data sets for sewered populations in New England, 1990 14
4. Contingency-table analysis for association between per capita return flows and two anomaly causing factors (industrial contributions and high infiltration and inflow) for municipal wastewater-treatment facilities in New England 16
5. Summary of data about municipal wastewater-treatment facilities and median per capita return flow in New England, by State 17
6-11. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in:
   6. Connecticut, 1990 19
   7. Maine, 1990 26
   8. Massachusetts, 1990 32
   9. New Hampshire, 1990 43
   10. Rhode Island, 1990 48
   11. Vermont, 1990 52
12. Summary of return-flow data for the sewered and unsewered population in New England, by State, 1990 55

CONVERSION FACTORS AND ABBREVIATIONS

CONVERSION FACTORS

Multiply	By	To Obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
square mile (mi^2)	2.590	square kilometer
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
gallon per day (gal/d)	0.003785	cubic meter per day
million gallons per day (Mgal/d)	3,785	cubic meter per day

ABBREVIATIONS

CDEP	Connecticut Department of Environmental Protection
Maine DEP	Maine Department of Environmental Protection
MDEM	Massachusetts Department of Environmental Management
MDEP	Massachusetts Department of Environmental Protection
MWRA	Massachusetts Water Resources Authority
NHDES	New Hampshire Department of Environmental Services
USBC	U. S. Bureau of the Census
USEPA	U. S. Environmental Protection Agency
USGS	U. S. Geological Survey
VDEC	Vermont Department of Environmental Conservation

GLOSSARY

The following are definitions of selected technical terms as they are used in this report; they are not necessarily the only valid definitions for these terms. Terms defined in the glossary are in bold print where first used in the main body of this report.

Combined sewer. A sewer designed to carry sanitary wastewater and storm- or surface-water runoff.

Consumptive use. That part of water withdrawn that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the immediate water environment.

Conveyance. The systematic and intentional movement or transfer of water from one point to another. Conveyance types include water instream conveyance, water distribution, and wastewater collection.

Effluent. Wastewater or other liquid—raw (untreated), partially, or completely treated—flowing from a reservoir, basin, treatment process, or treatment plant.

Exfiltration. Water that leaks from a conveyance system or storage area into the surrounding and underlying materials. Water will leak out if the ambient ground-water pressure is less than the internal pressure of the conveyance system or storage area at a breach.

Ground-water disposal. Refers to wastewater that is disposed of through the ground either by infiltration or by injection. This disposal includes the following discharge methods: injection well, drain fields, percolation ponds, and spray fields (land application/spreading). Reuse systems (such as the wastewater used to irrigate turf or crops) and land-disposal systems are considered a ground-water-disposal method.

Infiltration. Water that infiltrates into a conveyance system, such as a wastewater-collection system. Water will infiltrate if the ambient ground-water pressure exceeds the internal pressure of the conveyance system at a breach.

Inflow. Water discharged into the sewer system and service connections from sources other than regular connections. This includes flow from yard drains, foundation drains, and around manhole covers. Inflow differs from infiltration in that it is a direct discharge into the sewer rather than a leak in the sewer itself.

Interbasin transfer. Conveyance of water across a drainage or river-basin divide.

Major municipal wastewater-treatment facility. A U.S. Environmental Protection Agency designation for facilities with a design flow of at least 1 million gallons per day.

Minor Civil Division (MCD). Legal subdivisions of counties, called townships in many States, which serve as a basic compiling unit for many U. S. Bureau of the Census data products and reports.

Minor municipal wastewater-treatment facility. A U.S. Environmental Protection Agency designation for facilities with a design flow of less than 1 million gallons per day.

Outfall. Refers to the outlet or structure through which treated effluent or reclaimed water is finally discharged to a receiving water body.

Primary treatment. A wastewater treatment process that takes place in a tank and allows those substances in wastewater that readily settle or float to be separated from the water being treated.

Reclaimed wastewater. Municipal or industrial wastewater-treatment facility effluent that has been diverted or intercepted for reuse before it reaches a natural waterway or aquifer.

Regional wastewater-treatment facility. A wastewater-treatment facility where collection and treatment of wastewater is from users in at least one other Minor Civil Division besides that in which the wastewater-treatment facility is located.

Return flow. Water that is returned to surface or ground water after use or wastewater treatment and becomes available for reuse. Return flow can go directly to surface water, directly to ground water through an injection well or infiltration bed, or indirectly to ground water through septic systems.

Reuse. Use of water that has undergone wastewater treatment and is delivered to a user as reclaimed wastewater.

Saline water. Water that contains more than 1,000 milligrams per liter of dissolved solids.

Sanitary sewer. A pipe or conduit intended to carry wastewater or waterborne wastes from homes, businesses, and industries to a wastewater-treatment facility. A separate system of pipes or conduits (storm sewers) also may be used to collect and transport storm runoff to natural watercourses.

Secondary treatment. A wastewater-treatment process used to convert dissolved or suspended materials into a form more readily separated from the water being treated. The process commonly is a type of biological treatment process followed by secondary clarifiers that allow the solids to settle out from the water being treated.

Septic tank. Refers to a buried tank for the separation in the absence of oxygen of solids, grease, and liquid components of wastewater. The liquid fraction from the septic tank is discharged to a drain field for disposal.

Sewer. A pipe or conduit that carries wastewater or drain water. A set of linked pipes or conduits comprises a wastewater-collection system.

Sludge. The solids that can be separated from liquids during processing of wastewater.

Stabilization. Conversion into a form that resists change. Organic material is stabilized by bacteria, which convert the material to gases and other relatively inert substances. Stabilized organic material generally will not give off obnoxious odors.

Surface-water disposal. Refers to wastewater that is disposed of directly into a surface water body or wetland. This does not include water discharged into ponds for holding or percolation purposes.

Wastewater-collection system. The set of pipes or conduits that carries postuser water and possibly storm runoff to a wastewater-treatment facility before release to surface or ground water as return flow.

Wastewater treatment. The processing of wastewater for the removal or reduction of contained solids or other undesirable materials.

Wastewater Collection and Return Flow in New England, 1990

By Laura Medalie

Abstract

Site-specific data on municipal wastewater-collection systems, municipal wastewater-treatment facilities, and wastewater return flows, organized by State and drainage basin provide information that can be used by State and municipal planners to develop water-resources models. This report includes a consistent set of population-served and return-flow data for the New England States, a description of all assumptions and methods, and quality-control techniques used on the data. Data are included for all municipal wastewater-treatment facilities and associated wastewater-collection systems that had a mean flow greater than 0.01 million gallons per day (Mgal/d) or that served a sewered population of greater than 150 people if a mean daily flow value was not available.

During 1990, about 1,725 million gallons per day (Mgal/d) of treated wastewater were discharged from 490 municipal wastewater-treatment facilities into surface and ground waters in New England. About 52 percent (905 Mgal/d) of this wastewater was generated in Massachusetts from a sewered population of 4.37 million people, or 73 percent of the State's total population. Connecticut's sewered population of 2.29 million people (70 percent of the State's total population) generated 417 Mgal/d of wastewater return flows. In Maine, a sewered population of 0.59 million (48 percent) generated 136 Mgal/d; in Rhode Island, a sewered population of 0.69 million (69 percent) produced 136 Mgal/d; in New Hampshire, a sewered population of 0.54 million (48 percent) generated 82 Mgal/d; and in Vermont, a sewered population of 0.25 million (44 percent) generated 49 Mgal/d.

The Massachusetts-Rhode Island Coastal River Basins accounted for 47 percent (808 Mgal/d) of total daily return flows from municipal wastewater-treatment facilities in New England, 17 percent (292 Mgal/d) were in the Connecticut Coastal Basins, 17 percent (291 Mgal/d) were in the Connecticut River Basin, almost 8 percent (130 Mgal/d) were in the Merrimack River Basin, and 4 percent (68 Mgal/d) were in the Saco River Basin. Eight other partial or complete subregional drainage basins in New England comprised the remaining 7 percent (136 Mgal/d) of total daily return flows in 1990.

INTRODUCTION

Accurate data about the location of municipal **wastewater-treatment** facilities, their service areas, and their **return flows** is important in drainage-basin planning. From 1991 to 1993, the U.S. Geological Survey (USGS), New England Water-Use Program, in cooperation with the Connecticut Department of Environmental Protection, the Maine Geological Survey, the Maine Department of Human Services, the Massachusetts Department of Environmental Management, the Massachusetts Department of Environmental Protection, the New Hampshire Department of Environmental Services, the Rhode Island Department of Environmental Management, the Narragansett Bay Commission, the Providence Water Supply Board, and the Vermont Department of Environmental Conservation, compiled and analyzed site-specific data on municipal wastewater collection and return flows for each of the six New England States. A standard procedure for obtaining annual updates has been coordinated with the U.S. Environmental Protection Agency (USEPA) and with the State agencies responsible for collecting and reporting return-flow data from municipal wastewater-treatment facilities.

In proposed amendments to the Clean Water Act, the USEPA encouraged States to implement comprehensive watershed management programs for addressing water-quality issues (Browner, 1994). As a result, most of the New England States have either implemented, or are considering the implementation of, a water-resources planning and allocation approach based on drainage basins rather than politically defined areas, such as towns or counties. For example, the CDEP uses natural drainage basins as planning areas for addressing preventative and corrective strategies for surface- and ground-water-quality issues (Connecticut Department of Environmental Protection, 1982). The MDEM was instructed by the Massachusetts Legislature to develop a water-resources management plan based on 28 drainage basins and 10 subbasins in Massachusetts through the Interbasin Transfer Act (Chapter 658, Acts of 1983). The NHDES has taken steps to set up basin planning studies for water resources in New Hampshire; direction was provided by the public water-rights legislative study committee, which authorized the development of a river-basin planning and assessment program in 1993 (Kenneth Stern, New Hampshire Department of Environmental Services, oral commun., 1994). The Clean Water Strategy of the VDEC identifies 17 drainage basins and numerous small watersheds that are included in comprehensive drainage-basin planning programs (Stephan Syz, Vermont Department of Environmental Conservation, oral commun., 1994). Maine does not currently (1994) use basin planning for water resources; however, the structure for such a plan has been developed and recommendations for implementation have been made to the Maine State Legislature (Maine Water Resources Management Board, 1991). Rhode Island is the only New England State that, except for a few specific projects, does not do any type of water-resources planning by river basins (Elizabeth Scott, Rhode Island Department of Environmental Management, oral commun., 1994).

Purpose and Scope

The purpose of this report is to present information on the location and volume of return flows from municipal wastewater-treatment facilities in New England in 1990. The report provides a consistent set of data related to municipal wastewater-treatment facilities for all States, a description of all assumptions and methods, and quality-control techniques used on the data. Site-specific data, including facility name, USEPA discharge permit number, latitude, longitude, receiving water-body name, drainage basin, 1990 mean daily return flow, towns served, sewered population, and per capita use, are grouped by State and drainage basin to enable water-resources managers to analyze and model water-use processes according to the most appropriate compiling unit (for example, by State, town, or drainage basin). Supplemental analyses are presented for per capita return flows, interbasin transfers, estimates of aggregate return flows from unsewered populations by State, and estimates of return flows into saline and fresh ground and surface water. Data collected for this study are organized and stored by the USGS in a series of linked computer files called the New England Water-Use Data System.

The report includes data on all municipal wastewater-treatment facilities and associated **wastewater-collection systems** that had a mean flow greater than 0.01 million gallons per day (Mgal/d) or that served a sewered population of greater than 150 people if a mean daily flow value was not available. These data include facilities that were registered with a permit to discharge wastewater through the USEPA's National Pollutant Discharge Elimination System permitting program (U.S. Environmental Protection Agency, 1990a), as well as those registered through the States with permits for disposal to ground water. Some facilities, such as high schools and hospitals, which were permitted through the National Pollutant

Discharge Elimination System program and had mean flows greater than 0.01 Mgal/d, were omitted from this report because they did not serve a resident (permanent) population. Other facilities like county nursing homes for the elderly, were included if the resident population was at least 150 people.

The data tables in this report contain mean daily flow and sewered population data as of 1990. For a few facilities (in Massachusetts and Vermont), flow data from 1991 or 1992 were more accessible from State agencies than 1990 data and are presented and noted in the data tables of this report.

The quality and the completeness of return-flow data between States can differ greatly because of the variable requirements between States in reporting data, the dedication of resources to monitoring compliance, and the quality-control procedures applied to the reported data. As a result, summaries of or comparisons between data, such as return flows or sewered populations across State or drainage-basin boundaries, are difficult to make and probably are not accurate without further analysis. Aggregated return-flow data and reported number of facilities could differ from previously published data for 1990 (Solley and others, 1993) because local needs for more detailed and accurate information were identified after the 1990 data compilation effort.

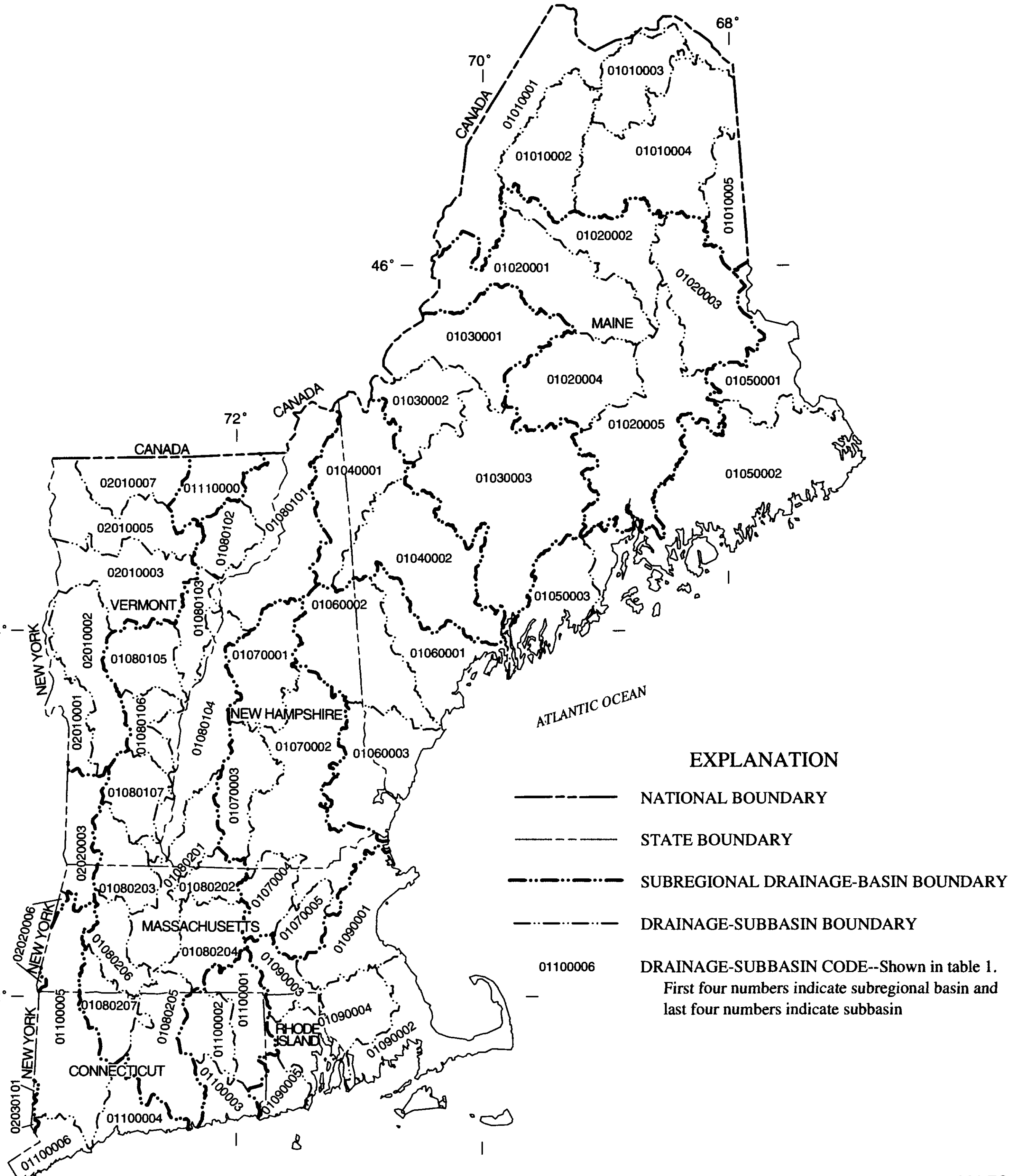
Description of Study Area

The study area covers the New England States of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont (fig. 1). Regional and subregional drainage-basin and subbasin designations used in this report are equivalent to hydrologic cataloging units that were delineated by the USGS in cooperation with the U.S. Water Resources Council (Seabar and others, 1987). All or parts of 13 subregional drainage basins are in the New England regional drainage area. Of these 13 basins, the following 11 have at least 50 percent of their land area in the New England States: the United States part of the St. John River Basin (0101, refers to the first 4 digits of the drainage-subbasin code shown in fig. 1), the Penobscot River Basin (0102), the Kennebec River Basin (0103), the Androscoggin River Basin (0104), Maine Coastal Drainage (0105), the Saco River Basin (0106), the Merrimack River Basin (0107), the Connecticut River Basin (0108), Massachusetts-Rhode Island Coastal (0109), Connecticut Coastal (0110), and the United States part of the St. Francois River Basin (0111). Small sections of the Richelieu and Upper Hudson River Basins are in Vermont and Massachusetts (0201, 0202), and a narrow part of the Lower Hudson-Long Island River Basin (0203) is in Connecticut. These subregional drainage basins can be subdivided further into 60 drainage subbasins, designated in this report by 8-digit numerical codes (such as 01080101), 42 of which are contained entirely in New England (fig. 1 and table 1).

Most of the runoff from these subregional basins flows directly into the Atlantic Ocean. A large part of Vermont and small sections of western Massachusetts and Connecticut discharge into the Atlantic Ocean from the Hudson River in the Mid-Atlantic Region, and a small section of northern Vermont drains first into the St. Lawrence River before reaching the Atlantic Ocean.

Acknowledgments

The author wishes to thank the State and Federal agencies, town officials, and staff from the many municipal wastewater-treatment facilities throughout New England for providing data necessary for the completion of this report. Included are personnel from the following State agencies: Connecticut Department of Environmental Protection, Water Management Bureau; Massachusetts Department of Environmental Protection; Maine Department of Human Services, Maine Geological Survey, and Maine Department of Environmental Protection; New Hampshire Department of Environmental Services, Water Management Bureau, and Wastewater Engineering Bureau, Permits, and Compliance Division; Rhode Island Department of Environmental Management, Division of Water Resources; and the Vermont Department of Environmental Conservation, Permits and Compliance and Protection Division. The USGS contribution to this project was generated through the National Water-Use Information Program.



Base from U. S. Geological Survey digital data, Albers Equal Area Conic projection, 1992, Standard parallels 29°30' and 45°30', central meridian-96°.
1:250,000 scale

0 40 80 MILES

0 40 80 KILOMETERS

Figure 1. Location of subregional drainage basins and subbasins in the New England States. (Modified from Seabar and others, 1987.)

Table 1. Subregional drainage basin code and name; and code, name, location, and area of drainage subbasins in New England

[Data from Seabar and others, 1987]

Subregional drainage basin		Drainage subbasin		State(s)	Area (square miles)
Code	Name	Code	Name		
0101	St. John	01010001	Upper St. John	Maine	2,120
		01010002	Allagash	Maine	1,250
		01010003	Fish	Maine	908
		01010004	Aroostook	Maine	2,420
		01010005	Meduxnekeag	Maine	634
0102	Penobscot	01020001	West Branch Penobscot	Maine	2,150
		01020002	East Branch Penobscot	Maine	1,130
		01020003	Mattawamkeag	Maine	1,510
		01020004	Piscataquis	Maine	1,460
		01020005	Lower Penobscot	Maine	2,360
0103	Kennebec	01030001	Upper Kennebec	Maine	1,570
		01030002	Dead	Maine	878
		01030003	Lower Kennebec	Maine	3,450
0104	Androscoggin	01040001	Upper Androscoggin	Maine, N.H.	1,470
		01040002	Lower Androscoggin	Maine, N.H.	2,060
0105	Maine Coastal	01050001	St. Croix	Maine	999
		01050002	Maine Coastal	Maine	4,880
		01050003	St. George-Sheepscot	Maine	1,250
0106	Saco	01060001	Presumpscot	Maine	1,240
		01060002	Saco	Maine, N.H.	1,690
		01060003	Piscataqua-Salmon Falls	Maine, Mass., N.H.	1,400
0107	Merrimack	01070001	Pemigewasset	N.H.	1,000
		01070002	Merrimack	Mass., N.H.	2,300
		01070003	Contoocook	N.H.	757
		01070004	Nashua	Mass., N.H.	525
		01070005	Concord	Mass.	401
0108	Connecticut	01080101	Upper Connecticut	N.H., Vt.	1,990
		01080102	Passumpsic	Vt.	496
		01080103	Waits	Vt.	441
		01080104	Upper Connecticut-Mascoma	N.H., Vt.	1,460
		01080105	White	Vt.	703
		01080106	Black-Ottauquechee	Vt.	418
		01080107	West	Vt.	612
		01080201	Middle Connecticut	Mass., N.H., Vt.	999
		01080202	Miller	Mass., N.H.	391
		01080203	Deerfield	Mass., Vt.	658
		01080204	Chicopee	Mass.	725
		01080205	Lower Connecticut	Conn., Mass.	1,090
		01080206	Westfield	Conn., Mass.	505
		01080207	Farmington	Conn., Mass.	590
0109	Massachusetts-Rhode Island Coastal	01090001	Charles	Mass.	1,130
		01090002	Cape Cod	Mass., R.I.	2,220
		01090003	Blackstone	Mass., R.I.	451

Table 1. Subregional drainage basin code and name; code, name, location, and area of drainage subbasins in New England—*Continued*

Subregional drainage basin		Drainage subbasin		State(s)	Area (square miles)
Code	Name	Code	Name		
0109		01090004	Narragansett	Mass., R.I.	1,330
		01090005	Pawcatuck-Wood	Conn., R.I.	383
0110	Connecticut Coastal	01100001	Quinebaug	Conn., Mass., R.I.	729
		01100002	Shetucket	Conn., Mass.	517
		01100003	Thames	Conn.	381
		01100004	Quinnipiac	Conn.	516
		01100005	Housatonic	Conn., Mass.	[1]1,756
		01100006	Saugatuck	Conn.	[1]395
0111	St. Francois	01110000	St. Francois	Vt.	590
0201	Richelieu	02010001	Lake George	Vt.	[1]509
		02010002	Otter	Vt.	1,090
		02010003	Winooski	Vt.	1,220
		02010005	Lamoille	Vt.	1,130
		02010007	Missisquoi	Vt.	707
0202	Upper Hudson	02020003	Hudson-Hoosic	Mass., Vt.	[1]622
		02020006	Middle Hudson	Mass.	[1]37
0203	Lower Hudson-Long Island	02030101	Lower Hudson	Conn.	[1]32

[1]These calculated areas represent only the part of the drainage subbasin in New England.

WASTEWATER COMPONENT OF WATER USE

The water-use flow system represented in this report consists of a six-step process that includes withdrawal, water use, return flow, **consumptive use**, treatment, and **conveyance** (Horn and Craft, 1991). The term "water use" is used in the general sense to describe all of the processes as part of the system and in the specific sense to describe an explicit use of water. The relation between processes of wastewater collection, treatment, and return flow and the processes of water supply (withdrawal, treatment, and distribution) is diagramed in figure 2.

Additional factors related to the design of wastewater-collection, treatment, and disposal systems (U.S. Environmental Protection Agency, 1991) that may be important in order to gain a more accurate and complete representation of this water-use system, are shown in figure 3. Ground water usually leaks into the wastewater-collection system (**infiltration**) when the water table is above the **sewer** pipes. Wastewater usually leaks out of pipes (**exfiltration**) when the water table is below the sewer pipes. The magnitude of leakages are a function of age, condition, type, and position of collection-system pipes relative to the water table and the volume of flow. In areas with **combined sewers**, a significant volume of water could be added to collection systems during snowmelt runoff or rainstorms. **Inflow** includes storm runoff from combined sewers and through breaches in uncombined **sanitary sewers**, surface-water runoff from drains, and other non-service-connection sources of water. The volume of water added to collection systems from combined sewers and inflow may be greater than the volume of wastewater generated by domestic, commercial, or industrial water users. Estimates of these volumes are incorporated into the design flow of the wastewater-collection system and treatment facility.

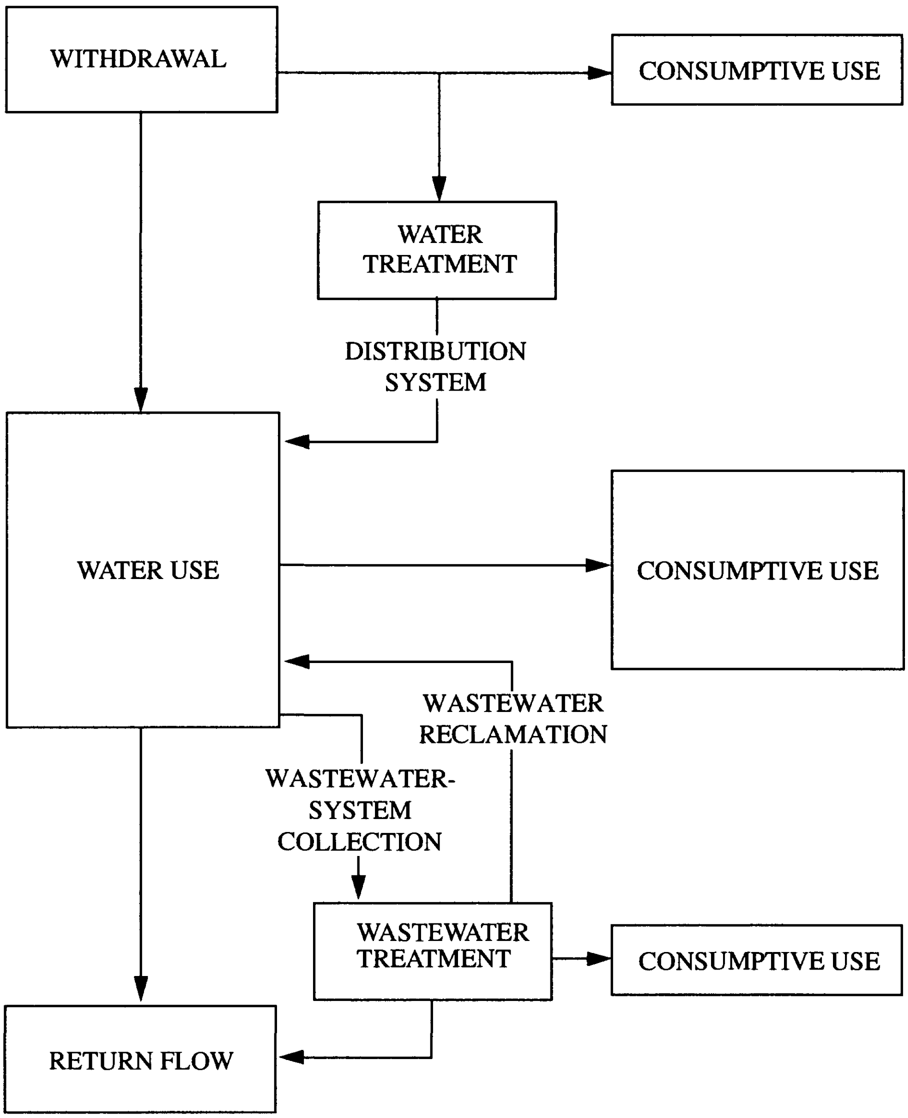


Figure 2. Generalized water-use-flow system. (Modified from Horn and others, 1993, fig. 1.)

Inflated volumes of water in wastewater-collection systems can be the result of inflow from surface runoff and infiltration of ground water from leaks into sewer systems during spring snowmelt or other large-scale hydrologic events. Inflow and infiltration may explain the wide range of differences, 4 to 4,300 percent (appendix 1), between monthly minimum and maximum return-flow volumes for municipal wastewater-treatment facilities listed in this report. Exfiltration also can cause monthly fluctuations of flow volumes.

A brief introduction to wastewater-treatment processes can help to explain how differences in treatment processes relate to differences in wastewater return-flow volumes. Water conveyed by sewers into a wastewater-treatment facility first undergoes **primary treatment**, which settles out large suspended materials. Most municipal wastewater-treatment facilities in New England also provide biological **secondary treatment**, a further separation and settling out of solids from the wastewater. If wastewater is stored in open air for extended periods of time, during or after treatment, its total volume may by reduced by evaporation.

One purpose of treating wastewater is to produce an **effluent** (treated liquid) that can be released safely into the environment, usually through an **outfall** into a surface-water body. Some treatment facilities in New England discharge effluent on land by use of one of the following **ground-water disposal** methods: injection or infiltration-percolation. Another alternative for effluent disposal is **reuse.** Reuse may involve reclamation, whereby the condition of the effluent is improved to attain a product suitable for particular uses, such as agricultural or golf course irrigation or industrial cooling water.

A by-product of effluent production is called **sludge**. Depending on the type or types of treatment, the volume of water contained in sludge can be significant. Primary and secondary treatments produce primary and secondary sludges. Typically, primary sludge contains 95 to 97 percent water by weight, and secondary sludge contains

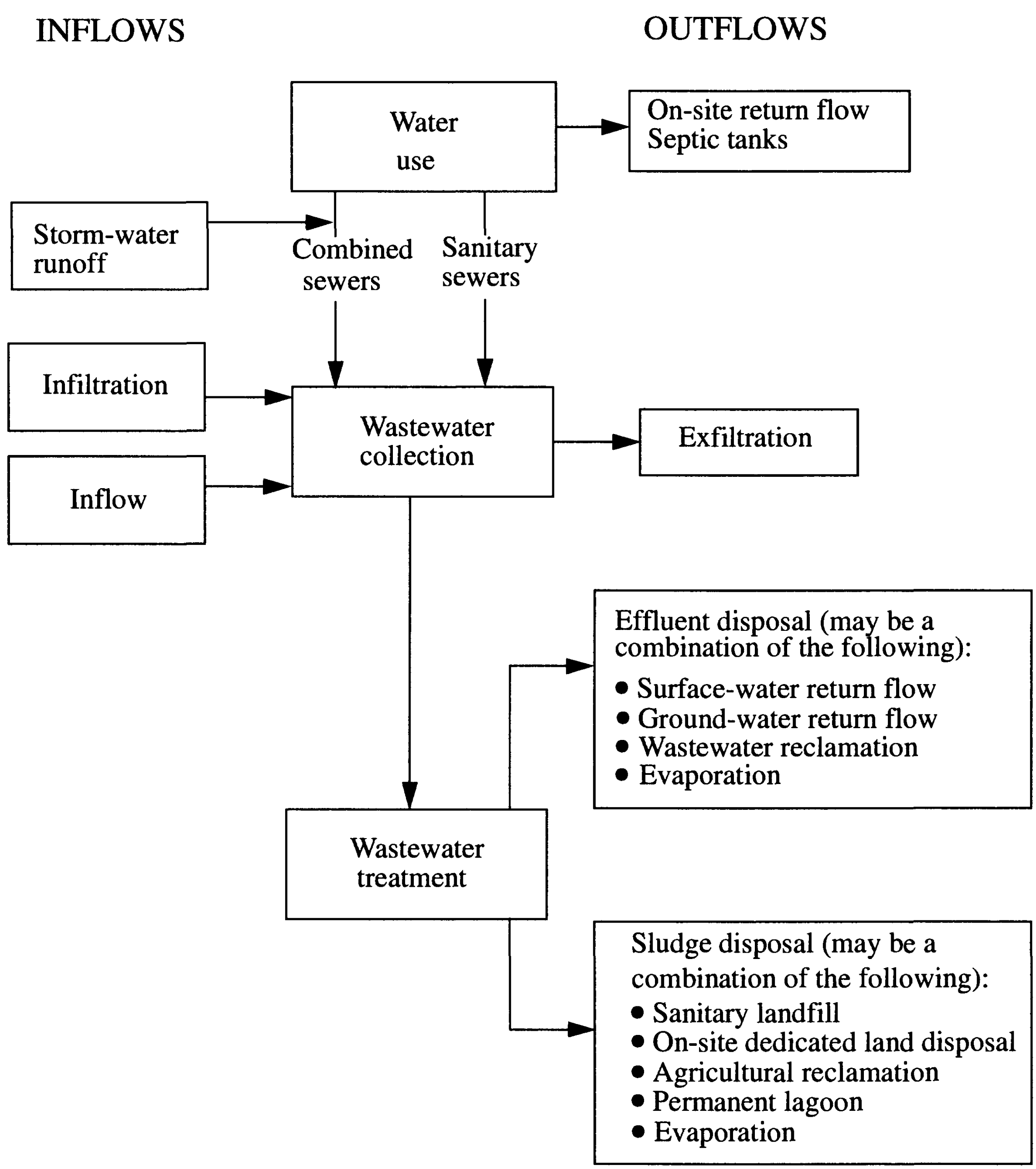


Figure 3. Detailed water-use and design-related factors of wastewater collection, treatment, and return flow.

greater than 97 percent water (U.S. Environmental Protection Agency, 1991). Because of these high percentages of liquid, sludge undergoes further treatment to reduce its volume before disposal. Water removed from sludge during volume-reduction treatment is usually recycled back to the inlet of the treatment facility. All sludge undergoes the process of **stabilization**, which converts the organic material to a relatively inert and nonodorous form with a reduced pathogen content. Stabilized sludge is concentrated during liquid storage to about 6 percent solids, or it could be treated for further volume reduction before disposal. Dewatering produces a sludge that is 20 to 60 percent solids by weight and composting produces a sludge that is 60 to 75 percent solids. Incineration of sludge removes almost all of the water from the dewatered sludge.

METHODS OF DATA COMPILATION AND ANALYSIS

Data for this report were compiled from several sources. Whenever possible, multiple sources for the same data element were used to fill in missing pieces or to provide a means of corroboration. This section of the report includes a description of data sources, how the data are organized, the procedure used to estimate sewered populations, and a discussion of the quality-control techniques that were employed. A thorough description of the analytical techniques is presented so that the limitations of the data can be evaluated. A description of the specific data elements collected is in table 2.

Sources and Description of Data

The USEPA Permit Compliance System, Needs Survey, and Industrial Facilities Discharge databases and the 1990 Census of Population and Housing database from the U.S. Bureau of the Census (USBC) provided much of the data for this report. Under the Federal Water Pollution Control Act of 1972, the USEPA established the National Pollutant Discharge Elimination System permitting system for point sources of discharges into United States waterways. The Permit Compliance System database tracks permit information, permit compliance, and enforcement status data for the National Pollutant Discharge Elimination System program. The Permit Compliance System database contains descriptive information on municipal and industrial wastewater-treatment facilities, their location, treatment processes, return flows, and the chemical quality of their influent and effluent. In general, the Permit Compliance System database contained complete or nearly complete data for **major municipal wastewater-treatment facilities** in each State. Mean daily flow data are collected by and entered into the Permit Compliance System database by State agencies when States have petitioned the USEPA and been delegated the lead role (or "have primacy") in evaluating and approving National Pollutant Discharge Elimination System permits. Mean daily flow is reported on a monthly basis by all major and some **minor municipal wastewater-treatment facilities** directly to the USEPA in non-delegated States, or to the State, in States where the USEPA has primacy. Connecticut, Rhode Island, and Vermont are delegated States; Maine, Massachusetts, and New Hampshire are non-delegated States.

The USEPA Needs Survey database consists of an inventory of existing and proposed publicly owned treatment works that need to be constructed to meet requirements of the Clean Water Act. Because the Needs Survey database is designed to project future needs, it contains data on wastewater conveyance and treatment facilities, including populations served. The Industrial Facilities Discharge database contains a listing of industries that are permitted through the National Pollutant Discharge Elimination System program to directly or indirectly **discharge** wastewater to **surface waters** in the United States. For this report, the Industrial Facilities Discharge database provided names of industries that discharge wastewater to municipal wastewater-treatment facilities; this information was used qualitatively to evaluate per capita return-flow values and is discussed in the section titled "Quality Control."

The USBC collects data on population and housing. Several data elements from the 1990 Census of Population and Housing were used to calculate an estimate of sewered populations as described in the section titled "Estimation of Sewered Population."

State agencies also supplied data on municipal wastewater-treatment facilities. Most of the data from State agencies were provided in the form of paper files, with the exception of return-flow data from the NHDES, which was provided on a computer diskette. Data from the MDEP were only available by visiting the four regional offices and copying data from paper files. Data for the minor municipal wastewater-treatment facilities usually came from State agencies rather than the Permit Compliance System database because they are not required to report to the USEPA.

Wastewater-collection and return-flow data collected for this study, as well as data on water withdrawals, distribution, and water use, are stored by the USGS in the New England Water-Use Data System database. These computer files were designed so that all of the components of a water-use system are linked together to allow the tracking of water from withdrawals to returns, in either a forward or a backward direction.

Table 2. Sources and description of water-use data in New England

[Auxiliary data: Available in the U.S. Geological Survey, New England Water-Use Data System database. Abbreviations: USEPA PCS, U.S. Environmental Protection Agency Permit Compliance System; NPDES, National Pollutant Discharge Elimination System; USBC, U.S. Bureau of the Census; USGS, U.S. Geological Survey]

Data element	Sources of data	Description of water-use data
	DATA PRESENTED IN THIS REPORT	
Wastewater-treatment facility name	USEPA PCS database, State agencies	Wastewater-treatment facility name
NPDES number	USEPA PCS database	Nine-digit NPDES permit number
Latitude/longitude	USEPA PCS database, USGS topographic maps, telephone interviews	Latitude and longitude of wastewater-treatment facility
Receiving water body	USEPA PCS database, USGS topographic maps, telephone interviews, State agencies	Common name of surface-water body (or the words "ground-water discharge") that receives effluent from the wastewater-treatment facility
Subbasin code	USGS (From Seabar and others, 1987).	Eight-digit hydrologic cataloging-unit code
1990 return flow	USEPA PCS database, State agency, or estimated	Sum of reported monthly average daily flows divided by number of months of reported data
Town (Minor Civil Division) served	State agencies, USEPA Needs Survey database	Name of Minor Civil Division with wastewater-collection system served by the regional wastewater-treatment facility
Sewered population	USBC, USEPA Needs Survey database, State agencies, telephone interviews	Resident number of people served by the wastewater collection system
Per capita return flow	Calculated (equation 5)	Average volume of water used per person per day
Per capita return-flow code	Assigned by author	Code based on evaluation of possible anomaly-causing factors
	AUXILIARY DATA	
County	USBC	Three-digit county code
Pipe latitude and longitude	USEPA PCS database	Latitude and longitude of discharge pipe at outfall
Facility address	USEPA PCS database	Facility street and mailing address
Contact person	USEPA (1990c)	Name of wastewater-treatment facility contact person
Telephone number	USEPA (1990c)	Telephone number of wastewater-treatment facility
Treatment type	USEPA (1990c)	Codes for type of wastewater-treatment process
Sludge disposal method	USEPA (1990c)	Codes for method of sludge disposal
Pretreatment indicator	USEPA (1990c)	Yes or no for whether industrial pretreatment program is in effect
Design flow	USEPA (1990c)	Maximum discharge for which wastewater-treatment facility was designed
Authority/Facility number	USEPA Needs Survey database	Database site-identification number

Sources and descriptions of specific water-use data elements that are in data tables in the "Wastewater Collection and Return Flow, by State" section of this report are shown in table 2. The National Pollutant Discharge Elimination System data element is included in this report to maintain a useful link between the USEPA-Permit Compliance System and Needs-Survey databases and the New England Water-Use Data System, where wastewater data are stored. The National Pollutant Discharge Elimination System number is a unique nine-digit USEPA-designated code that begins with the two-letter State abbreviation, followed by the digits "010" (an indicator for permitted municipal wastewater-treatment facilities), then by a 4-digit number.

Latitude and longitude are included in the data tables in the "Wastewater Collection and Return Flow, by State" section of this report to provide an accurate geographic-referenced product that can be used in a computerized Geographic Information System (GIS). In order to create a GIS file, or "coverage" (a set of digital data that is related to a given map projection) of wastewater-treatment facilities, an existing coverage of wastewater-treatment facilities, a set of latitudes and longitudes, or a set of maps with points to identify the location of wastewater-treatment facilities is needed. Although the Permit Compliance System database contains fields for latitude and longitude data, these data frequently were missing and the geographic data in the Permit Compliance System database were incomplete. These locational data were verified or derived if missing.

About one-half of the missing latitudes and longitudes for wastewater-disposal sites were derived by digitizing the sites from USGS 7.5 minute topographic maps. These locations are accurate to the nearest second of latitude or longitude, or about 75 ft. Locational data on the remaining sites were obtained from telephone interviews with town officials or wastewater-treatment-facility operators who described the location to within an estimated 10 seconds of latitude or longitude, or about 750 ft. Information such as resident population served by the collection system, the number of large non-residential customer connections, and the name of the receiving water body was requested during the telephone interview along with the locational data.

Return-flow data are the quantitative water-use numbers valuable to water-resources planners. These values must be accurate and used with consistent units in order to be meaningful. Return flow is reported in millions of gallons per day by wastewater-treatment-facility operators. Flows are usually measured by a continuous recorder at the headworks or inlet of the treatment facility, although a weir or a meter also is commonly used (U.S. Environmental Protection Agency, 1990b). The return-flow values presented in this report are mean daily values, calculated by totalling the monthly-reported mean daily flows and dividing by the number of months of reported data. The monthly return-flow values presented in appendix 1 are the mean daily return flows for each month of reported data.

Return flows for some or all minor facilities in Massachusetts, Maine, New Hampshire, and Vermont were obtained from State agencies because the data were not present in the Permit Compliance System database. With the exception of New Hampshire, these data were not computerized. Data from paper files for more recent years (1992 for Vermont and 1991 for Massachusetts, table 2) were more readily available and are, therefore, presented in this report. When return-flow data were not available, they were estimated by multiplying the per capita water-use coefficient of 65 gal/d by population served; this coefficient is based upon the average self-supplied per capita domestic use of 76 gal/d in New England, less 14 percent consumptive use (Solley and others, 1993).

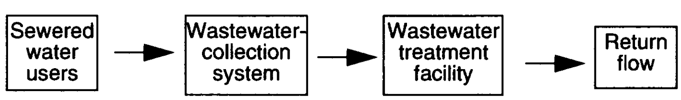
Sewered populations were estimated by use of three different methods. Depending on the methodology, data collected and published by the USBC on Population and Housing Characteristics, included in the USEPA Needs Survey database, and from certain State agencies (CDEP, Maine DEP) supplied estimates of populations served. In addition, telephone calls to facilities or town offices provided some information on the number of service connections or sewered populations. A description of the three estimating methods used is included in the section "Estimation of Sewered Populations."

Data that have been compiled on municipal wastewater-treatment facilities, but are not discussed in this report, are listed as auxiliary data in table 2. These data are stored in the USGS New England Water-Use Data System. Examples of auxiliary data, obtained from USEPA, Region I (U.S. Environmental Protection Agency, 1990c), include county, telephone number, treatment type, sludge-disposal methods, and design flow.

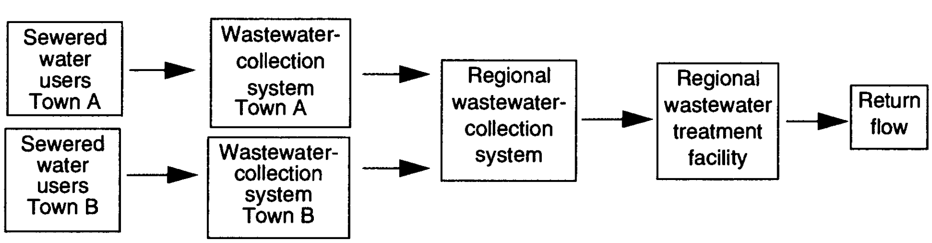
Organization of Data

Data in this report are organized by geographic area and include return-flow volumes from municipal wastewater-treatment facilities in New England for 1990. One anticipated application of the data is to use the return-flow values compiled by drainage basins and subbasins in basin-wide water-use analyses. Water-use data assessments are also commonly done on a county basis. Therefore, a small compiling unit will facilitate calculation of return-flow volumes either on the basis of drainage basins or counties. The USBC **Minor Civil Division** (MCD) was chosen to represent the geographic area for data compilation. MCDs are a logical choice for the compiling unit because Federal, State, and local agencies accept and use MCDs, and the USBC has formally delineated the MCD and uses it as the basis for compiling population data, which are essential in developing water-use estimates. In this report, a return-flow value is presented for each facility, rather than for each MCD, because flows are reported by facility to the State or to the USEPA.

For most municipal wastewater systems in New England (77 percent of the systems), wastewater is collected from sewered users and conveyed to wastewater-treatment facilities, treated, and discharged as effluent all within the same MCD, as diagramed below:



For **regional wastewater-treatment facilities**, wastewater is collected from users in at least one other MCD besides that in which the wastewater-treatment facility is located. A schematic representation of a regional wastewater-treatment facility is shown below:



Identifiers unique to the original data from State and Federal agencies were maintained for easier cross-referencing with the data sources. The National Pollutant Discharge Elimination System identification number preserves a link to the Permit Compliance System and the Needs Survey databases. The Authority/Facility (A/F) number, which is the Needs Survey database unique collection-system identifier, has been maintained with the data stored in the New England Water-Use Data System database. If a particular State has its own system of identification, then these numbers are also incorporated into the New England Water-Use Data System database. In addition, the location of return-flow outfall pipes to surface or ground water is registered in the USGS National Water Information System database, a master database for the coordinating of collection, storage, processing, and disseminating of water-resources data.

Estimation of Sewered Populations

Estimates of sewered population of MCDs served by municipal wastewater-treatment facilities are a valuable evaluation tool when divided into return flow to yield an average per capita return-flow value. Estimates of per capita return flow that are higher than average indicate one or more of the following: (1) wastewater from one or many industrial or commercial enterprises is treated at the facility in addition to domestic customers, (2) data are incorrect, (3) an assumption used in the estimation is not valid for that particular case, or (4) infiltration or inflow into the system is significant. Estimates of per capita return flow that are lower than average indicate one or more of the following: (1) the data are incorrect, (2) an assumption used in the estimation is not valid for that particular case, or (3) exfiltration from the system is significant. In many cases, the cause of excessively high or low per capita return-flow values can be investigated and explained. Total sewered population for each MCD also can be used to determine unsewered population when subtracted from the USBC population. For water-use analyses, the volume of wastewater returned to ground water through **septic tanks** may be important as an aggregate return flow to ground water if there is a large unsewered population.

Sewered populations listed in the data tables of this report are rounded to the nearest 10 people. The following equations were used to calculate the estimates of sewered population based on USBC data:

Population in households =
(total population) – (population in group quarters) (1)

Population sewered in households = (percentage of households sewered) × (population in households) (2)

Population sewered in group quarters = (percentage of households sewered) × (population in group quarters)[1] (3)

Total sewered population = (population sewered in households) + (population sewered in group quarters) (4)

where population in households includes all people who occupy a housing unit (house, apartment, or mobile home) and population in group quarters includes all people not living in households, such as people living in institutions (prisons, boarding schools, colleges, or military bases) (U.S. Bureau of the Census, 1991a).

Total population and population in group quarters are available by MCD from the 1990 Summary Population and Housing Characteristics (U.S. Bureau of the Census, 1991a-f). Percentage of households sewered is available by MCD from the 1990 Summary Social, Economic, and Housing Characteristics (U.S. Bureau of the Census, 1991g-l), but total sewered population for this report incorporates an estimate for the sewered population in group quarters (not in households).

[1]This formula is not strictly used in every case. When a single, known institution constitutes most or all of the USBC value for population in group quarters, and it is known to be sewered, then the total sewered population of the remainder of the MCD is just the population sewered in households from equation 4.

When separate areas of a single MCD are served by different municipal wastewater-treatment facilities, the 1990 estimate of sewered population for that MCD (U.S. Bureau of the Census, 1991g-l) has to be split between populations served by the separate facilities because the estimate of households sewered provides one sewered population number for every MCD. In these cases, the sewered population for each facility is assigned a proportion based on the average discharge or population data from the Needs Survey database or on information from a telephone call to the facility, the town office, or the State.

Households not connected to a collection system have septic tanks or other on-site disposal systems to process wastewater. An aggregate unsewered population for each State is calculated as the difference between that State's USBC population and the total sewered population. Just as the estimated return flow for some minor facilities that discharge to ground-water systems was based on an average per capita coefficient of 65 gal/d per person, the same coefficient was multiplied by the unsewered population to estimate the aggregate amount of wastewater discharged from on-site household septic systems.

Quality Control

Quality control is a series of steps performed on a set of data to provide assurance that the data are accurate or reliable to a specified degree of confidence. Several different methods of quality control were used on the data contained in this report.

Wastewater-Treatment-Facility Locations

Incorrect latitudes and longitudes were identified by overlaying a GIS-produced map of wastewater-treatment-facility point locations onto a map of MCD boundaries for each State. If the facility plotted outside of the town where it was supposed to be located, the latitude and longitude were assumed to be wrong; the location was then corrected by use of data from topographic maps or telephone interviews with facility operators. A similar check on drainage-subbasin delineations was made by overlaying plots of facility locations with subbasin boundaries to verify that the table values for facilities and subbasin codes are correct.

Return-Flow Data

Data were corroborated in several different ways for this study. In New Hampshire and Vermont, return-flow data for all major municipal wastewater-treatment facilities were obtained from State agencies and compared with those that were available in Permit Compliance System. Only small discrepancies as a result of rounding or unit-conversion differences were noted in the data from the two sources.

An evaluation of the temporal consistency of return-flow data is another method for quality control of data. Most of the return-flow data were obtained from the Permit Compliance System database. These monthly data are entered into the USEPA database as reports are received from wastewater-treatment-facility operators. Quality control on the accuracy of the data, such as comparisons with previous data, was not done. As part of the analysis for this report, monthly return-flow data for each facility were examined and decimal points were shifted on values that differed from the other months by an order of magnitude. For this evaluation, 7 out of the 354 facilities in New England with 1990 monthly flow data in the Permit Compliance System database had values that were adjusted for 1 or 2 months.

Sewered-Population Estimates

Some of the estimates of sewered population were checked by comparing the estimates derived from the data provided by the USBC against data provided by the Massachusetts Water Resources Authority (MWRA) for the 43 MCDs served in Massachusetts (J.A. Riccio, Massachusetts Water Resources Authority, written commun., 1993). A comparison of data from these two sources indicates that the values differ by less than 10 percent in 95 percent of the cases.

Estimates of sewered populations also were compared by use of a statistical summary. The absolute value of the differences in percentage of sewered population for each wastewater-collection system, as determined by the USBC estimate and the USEPA Needs Survey, were compared and are presented as "comparison number 1" in table 3. The data sets corroborate one another when the median percent difference between the data sets is small. For example, in Connecticut, there were 87 facilities with similar data from the USBC and the USEPA Needs Survey. The calculated percentage difference between the two estimates of sewered population for each facility ranged from 1 to 75 percent, with a median difference of 18 percent. State agencies from Connecticut and Maine provided a third set of population data from their own records, which are similarly compared against the USEPA Needs Survey and the USBC estimates as "Comparison number 2 or 3", respectively (table 3). In Connecticut, the median difference between the estimate of sewered population based on the USEPA Needs Survey and the CDEP, a State Agency, was 4 percent, and between the USBC and the CDEP was 16 percent. In Maine, the median difference between the estimate of sewered population based on the USEPA Needs Survey and the Maine DEP, a State Agency, was 16 percent, and between the USBC and the Maine DEP was 25 percent.

Table 3. Summary of statistical difference in percent between data sets for sewered populations in New England, 1990

[**Comparison No.:** Represents a comparison of population values derived from: 1, USBC and the USEPA Needs Survey database; 2, USEPA Needs Survey database and a State agency; and 3, USBC and a State Agency. **Data sets:** Based on sewered population data from either the U.S. Bureau of the Census (USBC), the U.S. Environmental Protection Agency (USEPA) Needs Survey database, or a State agency]

State	Comparison No.	Number of data sets compared	Statistical difference in percent between data sets		
			Median	Minimum	Maximum
Connecticut	1	87	18	1	75
	2	76	4	0	67
	3	94	16	1	85
Maine	1	109	18	1	73
	2	93	16	0	78
	3	86	25	0	75
Massachusetts	1	175	19	0	96
New Hampshire	1	90	17	0	89
Rhode Island	1	23	24	0	94
Vermont	1	69	24	0	99

The statistical comparisons presented in table 3 are useful to readers who are interested in having some measure of the relative accuracy of the population data presented in this report. No claim is made that any particular data set is more accurate than the others because only rarely were the data verified through telephone calls to the municipal wastewater-treatment facility operators. Except where noted as footnotes to the tables in the "Wastewater Collection and Return Flow, by State" section of this report, sewered populations based on USBC data are used because these data are easily available and uniformly collected for every State in the country. Table 3 provides information on the extent of agreement between different sources of sewered population data.

Per Capita Return-Flow Analysis

The most rigorous check on the accuracy of return-flow and sewered-population data is the per capita return-flow analysis. Because of the large variation in per capita return-flow values among municipal wastewater-treatment facilities, a median value in the return-flow analysis represents a typical value that was used in the State sections of this report. The equation for per capita return flow is:

$$\frac{\text{Return flow from municipal wastewater-treatment facility, in gallons per day}}{\text{Total estimated sewered population from all MCDs with sewer connections to wastewater-treatment facility}} \quad (5)$$

Quality-control checks of the per capita estimates of return flow were based on a qualitative evaluation of the separate components that went into the estimate. Potential anomaly causing factors of the per capita analysis for each facility include the following: (1) a large seasonal population, (2) a large population in group quarters, (3) the presence of industrial connections to the collection system, (4) a system with combined-sewer overflows, and (5) a system with large infiltration and inflow. If one or more of these factors were associated with a collection system, that factor was given a special code in the per capita return-flow column of the data tables in the "Wastewater Collection and Return Flow, by State" section of this report.

The estimate of the USBC sewered populations, which is the denominator of per capita return-flow equation 5, can result in an abnormally large or small per capita estimate if seasonal population or population in group quarters is excessively large. Communities with large seasonal sewered populations can have an artificially large per capita estimate because the estimated sewered population is based on year-round residence and is, therefore, too small. A large population in group quarters also can affect the per capita estimate. Equation 3 shows that the population in group quarters is multiplied by the percentage of households sewered to calculate population sewered in group quarters. If most of the population in group quarters is actually sewered, and the general population is not, or if the reverse is true, the estimate of total sewered population (equation 4) could be either artificially low or artificially high. To address these potential cases of artificially large or small per capita estimates, facilities where the number of seasonal households is greater than 10 percent of total households, or the population in group quarters is at least 10 percent of total population, were identified in the data tables.

Several other factors also can inflate the estimation of per capita use. Most municipal wastewater-treatment facilities, even in small rural towns, have service connections to nondomestic customers. These service connections could increase per capita return-flow values because they contribute to the return-flow volume but not to the user population; this is especially true if large industries or commercial establishments (for example, hotels, laundry facilities, or shopping centers) generate a large percentage of the total wastewater in a collection system. The Industrial Facilities Discharge file includes a listing of municipal wastewater-treatment facilities that accept industrial contributions as part of their collection system (U. S. Environmental Protection Agency, written commun., 1992). If any industrial contributions were present, a code was placed in the per capita return-flow column in the data tables of the section: "Wastewater Collection and Return Flow, by State."

If a combined sewer system was present in a collection system, it was coded in the database. A list of combined sewer-overflow systems in New England was provided by the USEPA (U.S. Environmental Protection Agency, written commun., 1992). A determination of the extent of infiltration and inflow in a collection system was made by comparing return-flow values in March, April, and May with the remaining months of the year. These 3 months are important because in many parts of New England, streamflow and the water table are commonly higher than at other times due to snowmelt (U.S. Geological Survey, 1995). Large runoff volumes from snowmelt and a high water table can lead to increased inflow and infiltration. If return flows from two of the months from March to May exceeded return flows for the other months, infiltration and inflow was considered a factor in the per capita estimates.

A contingency-table analysis (table 4) was used to determine whether there was a statistical association between the presence of some of the potential anomaly causing factors and the value of the per capita return-flow estimate. An association indicates only that the variables share occurrence and that a more detailed investigation is suggested. The contingency-table analysis consisted of evaluating whether links exist between high per capita estimates and the presence of one or two anomaly causing factors. Large seasonal and group-quarters populations are not included as factors in the contingency-table analysis because they may cause either large or small per capita return-flow estimates. Both factors, combined sewer overflows and high infiltration and inflow, are not included because they are similar to one another and are not independent. Thus, one of the variables for the contingency-table analysis is the presence of one or both of the following factors: (1) industrial contributions to collection systems and (2) high infiltration and inflow. The second variable is the range within which the per capita return-flow value falls: 0-99, 100-199, and greater than or equal to 200 gallons per day per person. These ranges were chosen as a somewhat arbitrary attempt to separate low (less than 100) from high (greater than 200) per capita return-flow estimates. The number of municipal wastewater-treatment facilities for each State that falls into this two-factor contingency table is evaluated by use of the chi-square test statistic. An alpha (α) value of 0.05 was used for this analysis.

Table 4 shows that for Connecticut, Massachusetts, and Vermont, there is a statistical association between the absence or presence of anomaly causing factors (industrial contributions and

Table 4. Contingency-table analysis for association between per capita return flows and two anomaly causing factors (industrial contributions and high infiltration and inflow) for municipal wastewater-treatment facilities in New England

[Data represent number of facilities whose wastewater return flows are affected by (0) neither industrial contributions nor high infiltration and inflow, (1) either industrial contributions or high infiltration and inflow, or (2) a combination of industrial contributions and high infiltration and inflow. Null hypothesis (Ho) is that per capita values and explanatory factors are independent (not associated). Chi-square statistic was compared to a tabulated value of 9.488, which corresponds to four degrees of freedom at α = 0.05; ≥, greater than or equal to; n, number of cases analyzed]

Number of factors	Number of wastewater-treatment facilities for given per capita range of return flow, in gallons per day				Chi-square statistic	Acceptance or rejection of Ho	Association present	Probability value
	0-99	100-199	≥200					
Connecticut								
0	12	32	6	$n = 86$	14.7993	Rejected	Yes	0.005
1	0	20	10					
2	0	3	3					
Maine								
0	6	35	21	$n = 111$	6.488	Accepted	No	0.166
1	3	17	23					
2	1	1	4					
Massachusetts								
0	13	44	8	$n = 111$	32.105	Rejected	Yes	0.000
1	1	19	17					
2	0	1	8					
New Hampshire								
0	6	11	10	$n = 56$	4.087	Accepted	No	0.394
1	4	12	5					
2	0	6	2					
Vermont								
0	14	19	6	$n = 83$	11.332	Rejected	Yes	0.023
1	8	18	11					
2	0	2	5					

high infiltration and inflow) and the magnitude of per capita return flows. Therefore, lower per capita return flows for those three States are associated with the absence of contributions from industries and with low infiltration and inflow. The reverse, that higher per capita return flows are associated with the presence of contributions from industries and (or) high infiltration and inflow, also is true. The contingency-table analysis is not intended to produce causal relations between factors. This qualitative analysis was done to propose possible explanations for high or low per capita return flows and to back up the hypothesis with a statistical procedure. Verification of these results is beyond the scope of this report. The results from table 4 complement the non-statistical discussions in the "Wastewater Collection and Return Flow, by State" section of this report that gives reasons for the variations in the magnitude of per capita return flows for the New England States.

WASTEWATER COLLECTION AND RETURN FLOW, BY STATE

The municipal-wastewater-treatment facility data are organized by State in this section of the report and include data tables that contain facility name, National Pollutant Discharge Elimination System number, latitude, longitude, receiving water body, subbasin code, 1990 return flow, MCD served, sewered population, and per capita use and codes. A summary of the data on municipal wastewater-treatment facilities in New England is presented in table 5. The summary includes the year of the data used in this report, the number of major and minor municipal wastewater-treatment facilities in each State, the number of those facilities with 1990 return-flow data in the Permit Compliance System database, the number of facilities that discharge effluent to surface and to ground water, the number of regional municipal wastewater-treatment facilities, and the median per capita return flow for each State.

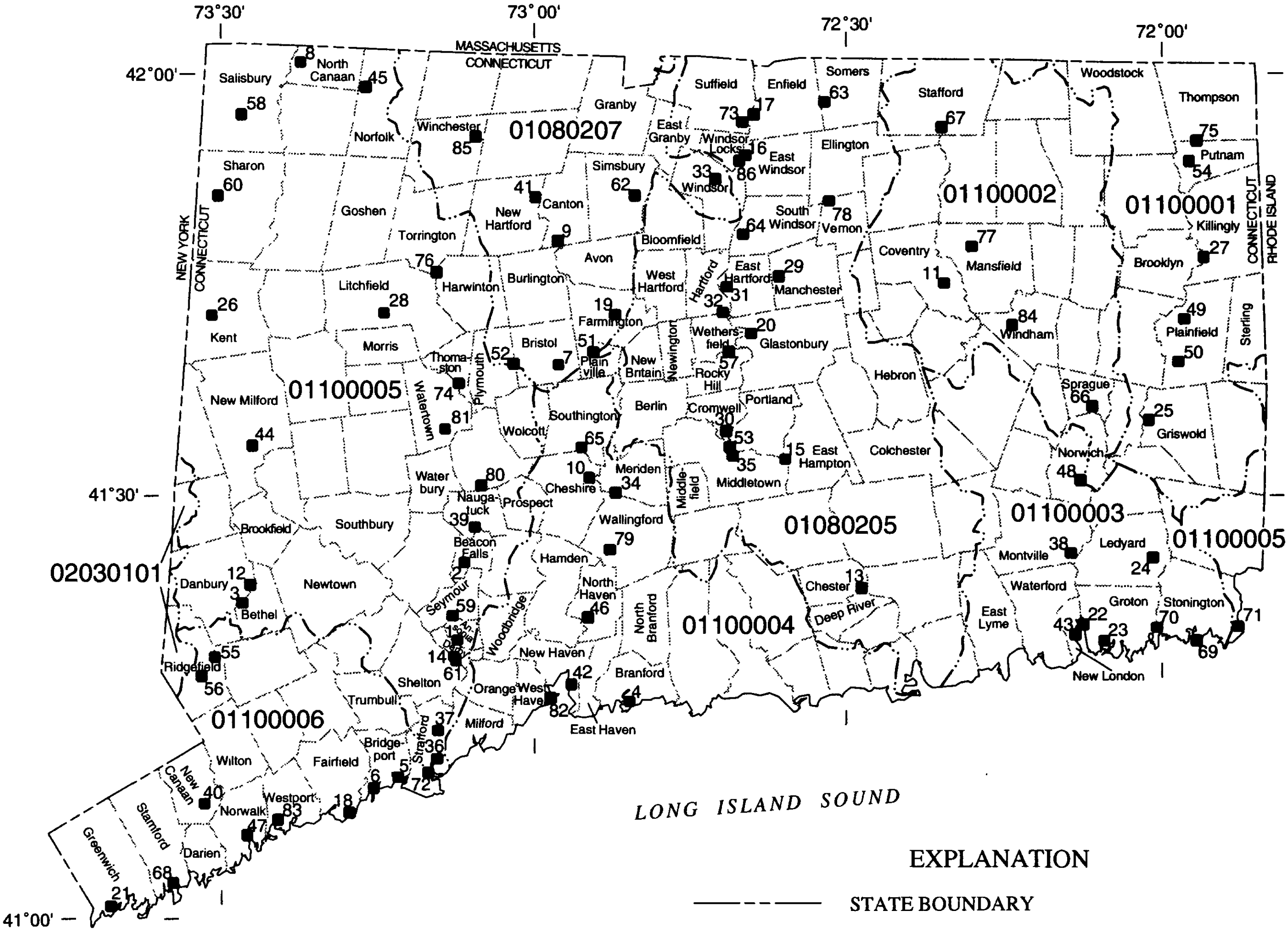
Table 5. Summary of data about municipal wastewater-treatment facilities and median per capita return flow in New England, by State

[**USEPA classification:** Municipal wastewater-treatment facilities with USEPA classifications of Major have design flows of at least 1 million gallons per day. Those classified as Minor have design flows that are less than 1 million gallons per day. **Abbreviations:** USEPA, U.S. Environmental Protection Agency; PCS, Permit Compliance System; gal/d, gallon per day; --, not applicable]

State	USEPA classification	Year of data used in this report	Number of municipal wastewater-treatment facilities with			Number of regional facilities	Median per capita return flow (gal/d)	Total number of municipal wastewater-treatment facilities
			1990 return-flow data in PCS database	Return flows to surface water	Return flows to ground water			
Connecticut	Major	1990	64	64	0	25		64
	Minor	1990	20	19	3	2	157	22
Maine	Major	1990	62	63	0	14		63
	Minor	1990	35	47	3	0	186	50
Massachusetts	Major	1990	89	88	1	29		89
	Minor	1991	1	22	3	1	164	25
New Hampshire	Major	1990	36	38	0	13		38
	Minor	1990	0	29	6	3	151	35
Rhode Island	Major	1990	19	19	0	7		19
	Minor	1990	1	1	0	0	184	1
Vermont	Major	1990	27	28	0	8		28
	Minor	1992	0	53	3	4	135	56
New England	Major	--	297	300	1	96		301
	Minor	--	57	171	21	10	167	189
	All facilities	--	354	471	19	106		490

Connecticut

In 1990, 86 municipal wastewater-treatment facilities in Connecticut operated to serve 2.291 million people, or about 70 percent of the State's population of 3.284 million (U.S. Bureau of the Census, 1991a). These facilities were in 79 MCDs and served all or parts of 111 out of 171 MCDs in the State (fig. 4). Location, return-flow, and sewered-population data about each municipal wastewater-treatment facility in Connecticut for 1990 are contained in table 6.



0 10 20 MILES
0 10 20 KILOMETERS

Base from U.S. Geological Survey Digital Line Graphs
from 7.5 minute topographic quadrangle maps
Connecticut State Plane, Zone 3526
scale 1:24,000

EXPLANATION

- STATE BOUNDARY
- MINOR CIVIL DIVISION BOUNDARY
- DRAINAGE-SUBBASIN BOUNDARY
- 01100006 DRAINAGE-SUBBASIN CODE--Shown in table 1. First four numbers indicate subregional basin and last four numbers indicate subbasin
- ■40 WASTEWATER-TREATMENT FACILITY AND NUMBER--Shown in table 6

Figure 4. Locations of Minor Civil Division boundaries, drainage-subbasin boundaries, and municipal wastewater-treatment facilities in Connecticut.

Table 6. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Connecticut, 1990

[Wastewater-treatment facilities in **bold** print are Regional facilities. **1990 return flow:** Average discharge determined from USEPA Permit Compliance System database, 1990 data (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992). NPDES, National Pollutant Discharge Elimination System. **Sewered population:** Estimated from USBC (U.S. Bureau of the Census, 1991a; U.S. Bureau of the Census, 1991g). Sewered population numbers are rounded to the nearest 10 people. Possible causes for high per capita use values are indicated by the following codes: F, infiltration and inflow; G, large population in group quarters; I, contributions from industries; L, large seasonal population; and O, combined sewers. Mgal/d, million gallon per day; gal/d, gallon per day. --, not applicable]

Wastewater-treatment facility name	Reference No. (fig. 4)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 4)	Sewered population
Ansonia[1]	1	CT0100013	412012	730452	Naugatuck River	01100005	2.67	147	F	Ansonia	18,180
Beacon Falls	2	CT0101061	412548	730412	Naugatuck River	01100005	.19	66	--	Beacon Falls	2,860
Bethel[1]	3	CT0100021	412248	732525	Shepaug Brook	01100005	1.08	112	--	Bethel	9,610
Branford[1]	4	CT0100048	411549	724824	Branford River	01100004	2.62	115	F	Branford	22,700
Bridgeport East[1]	5	CT0101010	411020	731029	Pequonnock River	01100006	10.87	239	I,O	Bridgeport	[2]42,990
										Stratford	[3]2,500
Bridgeport West[1]	6	CT0100056	410933	731248	Cedar Creek	01100006	23.57	200	I,O	Bridgeport	[2]102,200
										Trumbull	15,850
Bristol[1]	7	CT0100374	414004	725514	Pequabuck River	01080207	10.76	190	--	Bristol	56,520
Canaan Fire District	8	CT0100064	420145	732010	Blackberry River	01100005	.23	190	F,L	North Canaan	[2]1,210
Canton	9	CT0100072	414900	725520	Farmington River	01080207	.50	126	--	Canton	3,590
										Burlington	370
Cheshire[1]	10	CT0100081	413153	725213	Quinnipiac River	01100004	2.07	154	--	Cheshire	13,460
Coventry	11	--	414557	721806	Ground-water discharge	01100002	[4].06	65	--	Coventry	970
Danbury[1]	12	CT0100145	412407	732440	East Swamp Brook	01100005	7.93	182	--	Danbury	41,990
										Brookfield	1,640
Deep River	13	CT0101745	412357	722609	Ground-water discharge	01080205	.07	93	--	Deep River	750
Derby[1]	14	CT0100161	411900	730511	Housatonic River	01100005	1.74	149	F,O	Derby	11,710
East Hampton[1]	15	CT0024694	413314	723326	Connecticut River	01080205	.96	96	--	East Hampton	5,650
										Colchester	4,180
										Hebron	180
East Windsor[1]	16	CT0100196	415507	723713	Connecticut River	01080205	1.12	167	--	East Windsor	6,700
Enfield[1]	17	CT0100200	415802	723623	Connecticut River	01080205	4.91	116	O	Enfield	42,440
Fairfield[1]	18	CT0101044	410747	731506	Long Island Sound	01100006	7.57	172	F,I	Fairfield	44,040
Farmington[1]	19	CT0100218	414345	724945	Farmington River	01080207	3.24	158	--	Farmington	16,980
										Avon	[3]3,500
Glastonbury[1]	20	CT0100226	414221	723641	Connecticut River	01080205	1.89	113	I	Glastonbury	16,740
Greenwich-Central[1]	21	CT0100234	410056	733741	Greenwich Harbor	01100006	9.83	225	F,I	Greenwich	43,660
Groton (City)[1]	22	CT0101184	412114	720503	Thames River	01100003	1.99	134	--	Groton	14,870
Groton (Town)[1]	23	CT0100242	412017	720458	Thames River	01100003	2.81	121	G,I	Groton	23,270
Highlands	24	CT0101681	412620	715801	Ground-water discharge	01100003	[5].22	92	--	Ledyard	2,400
Jewett City	25	CT0100269	413556	715835	Quinebaug River	01100001	.55	135	O	Griswold	4,060
Kent	26	CT0100277	414334	732832	Housatonic River	01100005	.06	103	--	Kent	580
Killingly[1]	27	CT0101257	414740	715312	Quinebaug River	01100001	2.61	245	F	Killingly	8,810
										Brooklyn	1,850
Litchfield	28	CT0100803	414349	731202	Bantam River	01100005	.61	236	--	Litchfield	3,090
										Morris	490
Manchester[1]	29	CT0100293	414630	723400	Hockanum River	01080205	5.84	123	--	Manchester	47,390
Metropolitan District Commission–Cromwell[1]	30	CT0100307	413517	723905	Connecticut River	01080205	18.32	126	I	Cromwell	10,670
										Berlin	12,940
										Middletown	13,690

Table 6. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Connecticut, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 4)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 4)	Sewered population
Metropolitan District Commission–Cromwell—*Continued*										New Britain	75,040
										Newington	28,680
										Rocky Hill	4,160
Metropolitan District Commission–East Hartford[1]	31	CT0100170	414545	723901	Hockanum River	01080205	11.53	233	--	East Hartford	49,490
Metropolitan District Commission–Hartford[1]	32	CT0100251	414353	723923	Connecticut River	01080205	64.15	304	F,I,O	Hartford	137,650
										Bloomfield	16,700
										West Hartford	56,690
Metropolitan District Commission–Windsor-Poquonock[1]	33	CT0100994	415326	724007	Farmington River	01080207	2.34	95	--	Windsor	23,900
										East Granby	630
Meriden[1]	34	CT0100315	413050	724943	Quinnipiac River	01100004	9.93	179	F,I	Meriden	55,380
Middletown[1]	35	CT0100323	413329	723828	Connecticut River	01080205	4.81	188	O	Middletown	[2]25,290
										Middlefield	240
Milford-Beaver Brook[1]	36	CT0100749	411140	730643	Housatonic River	01100004	2.03	158	--	Milford	12,810
Milford Housatonic[1]	37	CT0101656	411340	730640	Quinnipiac River	01100004	6.39	220	F	Milford	28,500
										Orange	530
Montville[1]	38	CT0100935	412623	720609	Thames River	01100003	.98	119	--	Montville	8,270
Naugatuck[1]	39	CT0100641	412820	730313	Naugatuck River	01100005	6.66	227	I	Naugatuck	27,530
										Middlebury	[3]1,800
New Canaan[1]	40	CT0101273	410821	732852	Fivemile River	01100006	1.35	183	--	New Canaan	7,360
New Hartford	41	CT0100331	415206	725730	Farmington River	01080207	.07	83	--	New Hartford	840
New Haven East Shore[1]	42	CT0100366	411700	725358	New Haven Harbor	01100004	38.72	191	I,O	New Haven	129,200
										East Haven	25,050
										Hamden	47,510
										Woodbridge	1,050
New London[1]	43	CT0100382	412031	720549	Thames River	01100003	5.11	126	F,O	New London	28,150
										East Lyme	1,470
										Waterford	10,820
New Milford[1]	44	CT0100391	413408	732432	Housatonic River	01100005	.44	61	--	New Milford	7,230
Norfolk	45	CT0101231	415957	731355	Blackberry River	01100005	.35	402	F,G,L	Norfolk	870
North Haven[1]	46	CT0100404	412152	725222	Quinnipiac River	01100004	3.60	170	--	North Haven	16,620
										North Branford	4,510
Norwalk[1]	47	CT0101249	410608	732447	Norwalk River	01100006	12.58	186	I,O	Norwalk	65,720
										Wilton	1,790
Norwich[1]	48	CT0100412	413136	720511	Thames River	01100003	7.36	274	O	Norwich	26,890
Plainfield North[1]	49	CT0100447	414313	715508	Moosup River	01100001	.67	143	--	Plainfield	4,310
										Sterling	370
Plainfield Village	50	CT0100439	414007	715542	Mill Brook	01100001	.59	137	--	Plainfield	4,310
Plainville[1]	51	CT0100455	414110	725159	Pequabuck River	01080207	2.06	126	I	Plainville	16,320
Plymouth[1]	52	CT0100463	414008	725932	Pequabuck River	01100005	0.94	108	--	Plymouth	8,700

Table 6. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Connecticut, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 4)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Subbasin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 4)	Sewered population
Portland[1]	53	CT0101150	413408	723845	Connecticut River	01080205	.65	154	O	Portland	4,230
Putnam[1]	54	CT0100960	415430	715430	Quinebaug River	01100001	1.44	185	--	Putnam	7,100
										Woodstock	680
Ridgefield Route 7	55	CT0101451	411853	732800	Norwalk River	01100006	.01	100	--	Ridgefield	[3]100
Ridgefield Main Facility	56	CT0100854	411730	732916	Ridgefield Brook	01100006	.93	194	F	Ridgefield	4,790
Rocky Hill[1]	57	CT0100480	414101	723848	Connecticut River	01080205	6.60	179	G	Rocky Hill	[3]11,800
										Wethersfield	25,160
Salisbury	58	CT0100498	415757	732550	Factory Brook	01100005	.37	274	F,L	Salisbury	1,350
Seymour[1]	59	CT0100501	412158	730519	Naugatuck River	01100005	1.62	160	--	Seymour	10,130
Sharon	60	CT0101052	415302	732917	Ten Mile River	01100005	.06	214	F,L	Sharon	280
Shelton-Riverdale	61	CT0100714	411844	730500	Housatonic River	01100005	1.92	108	O	Shelton	17,710
Simsbury[1]	62	CT0100919	415215	724754	Farmington River	01080207	1.79	139	--	Simsbury	10,400
										Avon	[3]1,200
										Granby	1,250
Somers	63	CT0101605	415855	722935	Woods Stream	01080205	.05	45	G	Somers	1,110
South Windsor[1]	64	CT0100510	414929	723728	Connecticut River	01080205	2.18	84	--	South Windsor	25,920
Southington[1]	65	CT0100536	413405	725259	Quinnipiac River	01100004	4.43	267	F	Southington	16,590
Sprague	66	CT0100978	413657	720400	Shetucket River	01100002	.18	118	F	Sprague	1,530
Stafford[1]	67	CT0101214	415703	721817	Willimantic River	01100002	1.34	224	I	Stafford	5,180
										Ellington	[3]800
Stamford[1]	68	CT0101087	410241	733147	Long Island Sound	01100006	15.83	157	F,I	Stamford	89,370
										Darien	11,630
Stonington-Borough	69	CT0101281	412000	715415	Pawcatuck River	01100003	.19	178	--	Stonington	1,070
Stonington-Mystic	70	CT0100544	412059	715801	Mystic River	01100003	.51	276	--	Stonington	1,850
Stonington-Pawcatuck[1]	71	CT0101290	412100	715015	Long Island Sound	01100003	.33	88	--	Stonington	3,770
Stratford[1]	72	CT0101036	411040	730736	Housatonic River	01100005	7.62	167	I	Stratford	[2]44,510
Suffield[1]	73	CT0100552	415730	723730	Stony Brook	01080205	.96	164	F	Suffield	5,840
Thomaston[1]	74	CT0100781	413842	730448	Naugatuck River	01100005	1.10	186	--	Thomaston	5,900
Thompson[1]	75	CT0100706	415557	715346	Quinebaug River	01100001	.21	99	--	Thompson	2,120
Torrington[1]	76	CT0100579	414645	730658	Naugatuck River	01100005	6.44	203	F,I	Torrington	31,080
										Harwinton	680
University of Connecticut	77	CT0101320	414833	721529	Willimantic River	01100002	1.48	122	--	Mansfield	[2]12,140
Vernon[1]	78	CT0100609	415150	722910	Hockaman River	01080205	4.57	163	I	Vernon	26,260
										Ellington	[3]1,700
Wallingford[1]	79	CT0100617	412646	725017	Quinnipiac River	01100004	6.08	168	F	Wallingford	36,090
Waterbury[1]	80	CT0100625	413119	730236	Naugatuck River	01100005	22.69	187	O	Waterbury	106,240
										Middlebury	1,060
										Watertown	[3]7,600
										Wolcott	6,440
Watertown Fire District[1]	81	CT0100633	413526	730604	Steele Brook	01100005	.82	110	--	Watertown	7,460
West Haven[1]	82	CT0101079	411602	725557	Long Island Sound	01100004	7.82	147	I	West Haven	53,160
Westport[1]	83	CT0100684	410715	732151	Saugatuck River	01100006	1.83	228	O	Westport	8,030
Willimantic[1]	84	CT0101001	414252	721137	Willimantic River	01100002	2.56	126	G,I	Windham	16,870
										Mansfield	3,470
Winchester-Winsted[1]	85	CT0101222	415625	730316	Still River	01080207	1.71	203	--	Winchester	8,440

Table 6. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Connecticut, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 4)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 4)	Sewered population
Windsor Locks[1]	86	CT0101591	415443	723749	Connecticut River	01080205	1.60	131	--	Windsor Locks	12,190
Total							417.47				2,290,940

[1]Classified as a major facility by the USEPA (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992).

[2]Estimated from USEPA Needs Survey database (Larry MacMillan, U.S. Environmental Protection Agency, written commun., 1992).

[3]Data provided by State of Connecticut database (Dennis Greci, Connecticut Department of Environmental Protection, oral commun., 1992).

[4]Average discharge estimated on the basis of sewered population times average self-supplied domestic per capita of 65 gal/d (Solley and others, 1993).

[5]Average discharge determined from USEPA Permit Compliance System database, 1991 data (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992).

The largest numbers of facilities are in the densely populated central corridor that trends north to south along the Connecticut River that includes the greater Hartford and New Haven areas and the southwestern corner of the State from Greenwich to Stratford. These densely populated areas also accounted for the largest volumes of return flow.

Return flows from the 86 municipal wastewater-treatment facilities in Connecticut totalled more than 417 Mgal/d. There were 27 regional wastewater-treatment facilities that serviced areas in more than one MCD. The return flow from each of 23 of these regional facilities was greater than 1 Mgal/d. The Metropolitan District Commission (MDC) treated more than 96 Mgal/d and served 0.431 million people in 1990. The State's largest municipal wastewater-treatment plant, the Hartford Wastewater-Treatment Facility, was under the jurisdiction of the MDC. This facility treated and discharged more than 64 Mgal/d to the Connecticut River during 1990 (table 6). The next largest municipal wastewater-treatment facilities were New Haven East Shore, Bridgeport West, and Waterbury.

Eighty-three of the 86 facilities served 2.287 million people and discharged 417 Mgal/d of wastewater to surface water. The remaining three facilities (Coventry, Deep River and Highlands in Ledyard) served 0.004 million people and discharged less than 1 Mgal/d on a combined basis to ground water. In addition, about 0.993 million people in Connecticut were not served by sewer systems; based on typical wastewater generation of 65 gal/d per person, disposal to ground water from this population was estimated to be almost 65 Mgal/d.

The Connecticut River drainage area subregion (0108) in Connecticut assimilated 153 Mgal/d of wastewater-return flow from a population of 0.816 million (calculated from table 6). Monthly return-flow volumes for 1990 by subregional drainage basin (for example, 0108) and by drainage subbasin (for example, 01080001) are presented in appendix 1. Ninety-one percent (265 Mgal/d) of return flows into the Connecticut Coastal Basins subregion (0110), which includes the Quinebaug, Shetucket, Quinnipiac, and Housatonic Subbasins (table 1, fig. 1), were from municipal wastewater-treatment facilities in the State of Connecticut; the remainder were from facilities in Massachusetts.

Per capita return flow for municipal wastewater-treatment facilities in Connecticut ranged from 45 to 402 gal/d, with a median of 157 gal/d. Of the 19 facilities with per capita return flows greater than 200 gal/d, 15 had at least one potential anomaly-causing factor (table 6), of which the most important appeared to be high infiltration and inflow, industrial-wastewater contributions, and combined sewer overflows. Results of the contingency-table analysis confirm that, in Connecticut, high infiltration and inflow and the presence of industrial-wastewater contributions were statistically associated with the high per capita return-flow values (table 4).

Maine

Maine consists of a largely rural population except in the southern and southeastern sections of the State. During 1990, there were 113 municipal wastewater-treatment facilities in Maine in 111 MCDs that served all or part of 130 MCDs (fig. 5, table 7). Most of the facilities in Maine (73 percent) processed less than 1 Mgal/d on an average day. Sewered population in Maine for 1990 was 0.587 million people or about 48 percent of the State's total population of 1.228 million (U.S. Bureau of the Census, 1991b).

In 1990, return flows from municipal wastewater-treatment facilities in Maine were over 136 Mgal/d. Fourteen regional facilities served 0.232 million people or 38 percent of Maine's sewered population. The city of Portland treated more than 23 Mgal/d and served 0.081 million people in 1990 (table 7). This wastewater was discharged to Casco Bay and the Presumpscot River. Other large facilities included the Lewiston-Auburn and the Kennebec Sanitary District facilities.

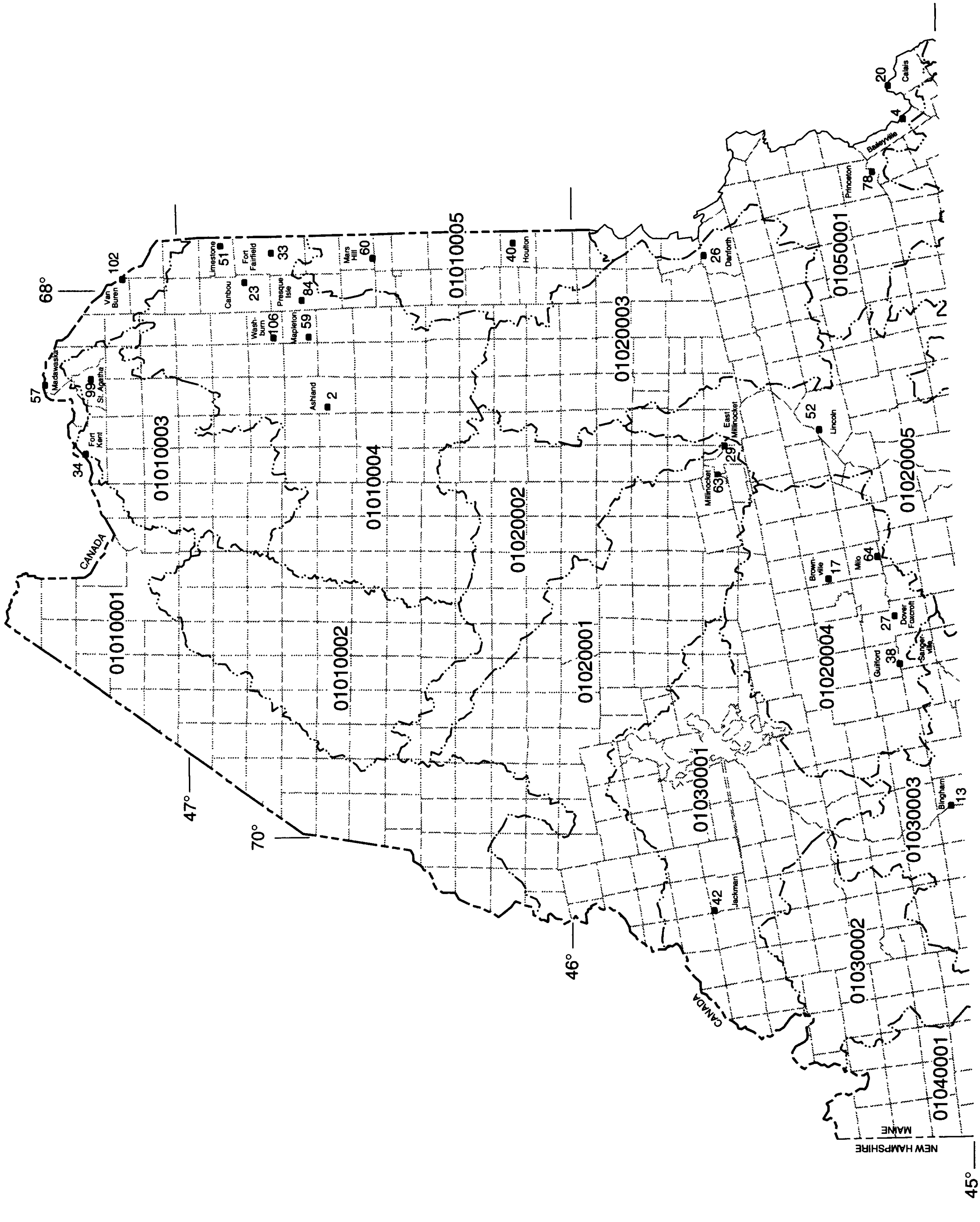
All but three of the 113 facilities in Maine discharged to surface water (136 Mgal/d) and served a sewered population of about 0.585 million (calculated from table 7). The Brownville, Kingfield, and Vassalboro Wastewater Treatment Facilities together served about 0.002 million people and discharged 0.15 Mgal/d of wastewater to ground water. About 0.641 million people in Maine were not connected to a wastewater collection system. This unsewered population generated almost 42 Mgal/d of wastewater (using a coefficient of 65 gal/d per person) that was returned to ground water through on-site septic systems. Thirty-eight percent of the municipal wastewater-return flow from facilities in Maine were in the Saco River Basin subregion (0106), predominantly from the Presumpscot (01060001) River Subbasin (Appendix 1).

Per capita return flows by municipal wastewater-treatment facilities in Maine ranged from 45 to 1,197 gal/d, with a median of 186 gal/d. In many cases, per capita return flows were greater if sewered population values from the USEPA Needs Survey database were used instead of estimates based on the USBC. Forty-eight facilities had per capita return flows greater than 200 gal/d; for all but seven of these facilities, flows can be potentially explained by one or more of the following factors: presence of combined sewers, high infiltration and inflow, and (or) industrial contributions (table 7). However, results of the contingency-table analysis (table 4) indicate that per capita return flows greater than 200 gal/d were not statistically associated with industrial connections to collection systems and high infiltration and inflow. The statistical analysis does not reflect that large seasonal populations or combined sewer overflows in many of these facilities could help to explain the high per capita estimates.

Massachusetts

Massachusetts had more municipal wastewater-treatment facilities (114) than any other New England State. During 1990, these facilities served 4.366 million or almost 73 percent of a total population of 6.015 million (U.S. Bureau of the Census, 1991c). As shown in figure 6, these facilities were in 104 MCDs and were distributed evenly throughout the State. In Massachusetts, 200 of the 351 MCDs were served entirely or in part by sewer systems. Location, return flow, and sewered-population data about each of these facilities is included in table 8.

In 1990, total return flows from municipal wastewater-treatment facilities in Massachusetts were 905 Mgal/d. Eighty-one percent (3.54 million people) of the State's sewered population were connected to 32 regional facilities. The MWRA, an independent agency that sells water and provides sewer services to 43 cities and towns in the greater Boston area, is the largest wastewater system in New England (table 8). The two largest regional systems in the State, the Deer Island and Nut Island facilities, are part of the MWRA. These two facilities served 1.96 million people, or 45 percent of the State's sewered population; the 406 Mgal/d discharged from them accounts for 45 percent of return flows in Massachusetts. Another regional facility, the Greater Lawrence Sewer District, served over half of the population of Salem, New Hampshire (U.S. Bureau of the Census, 1991d) as well as four communities in Massachusetts.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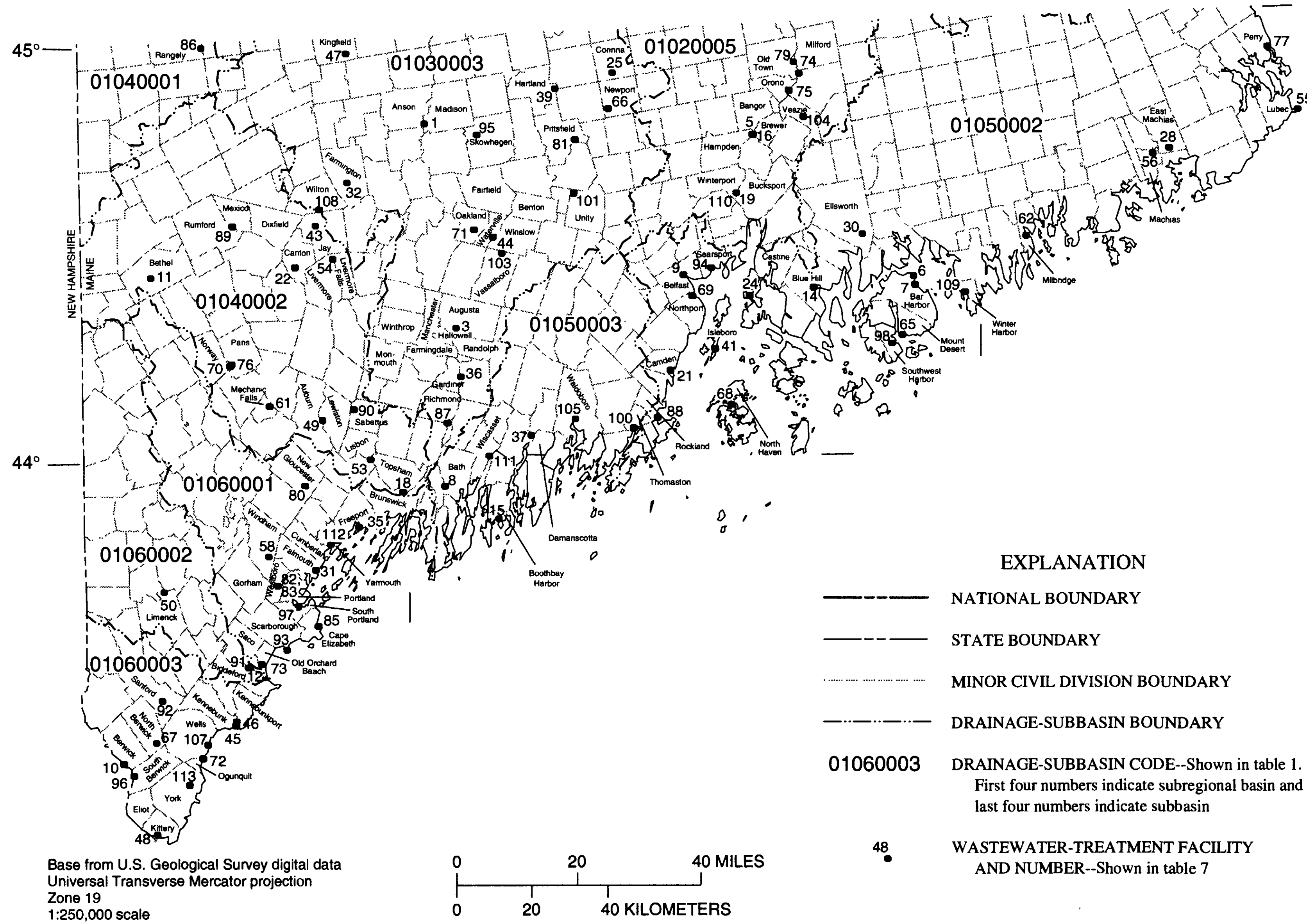


Figure 5. Locations of Minor Civil Division boundaries, drainage-subbasin boundaries, and municipal wastewater-treatment facilities in Maine.

Table 7. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Maine, 1990

[Wastewater treatment facilities in **bold** print are Regional facilities. **1990 return flow:** Average discharge determined from USEPA Permit Compliance System database, 1990 data (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992). NPDES, National Pollutant Discharge Elimination System. **Sewered population:** Estimated from USBC (U.S. Bureau of the Census, 1991b; U.S. Bureau of the Census, 1991h). Sewered population numbers are rounded to the nearest 10 people. Possible causes for high per capita use values are indicated by the following codes: F, infiltration and inflow; G, large population in group quarters; I, contributions from industries; L, large seasonal population; and O, combined sewers. Mgal/d, million gallon per day; gal/d, gallons per day. --, not applicable]

Wastewater-treatment facility name	Reference No. (fig. 5)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 5)	Sewered population
Anson-Madison[1]	1	ME0101389	444740	695312	Kennebec River	01030003	4.23	855	L,O	Madison	[2]4,370
										Anson	[2]570
Ashland	2	ME0101087	463807	682453	Aroostook River	01010004	.27	325	F	Ashland	[2]830
Augusta[1]	3	ME0100013	441832	694628	Kennebec River	01030003	4.55	197	I,O	Augusta	16,240
										Hallowell	2,180
										Manchester	800
										Monmouth	1,020
										Winthrop	2,800
Baileyville[1]	4	ME0101320	450909	672314	St. Croix River	01050001	.31	242	F	Baileyville	1,280
Bangor[1]	5	ME0100781	444622	684721	Penobscot River	01020005	[3]7.61	219	F,I,O	Bangor	31,430
										Hampden	3,300
Bar Harbor Hulls Cove	6	ME0101273	442449	681455	Frenchman's Bay	01050002	[4].06	261	L	Bar Harbor	[2]230
Bar Harbor Main[1]	7	ME0101214	442316	681154	Frenchman's Bay	01050002	1.13	350	L,O	Bar Harbor	[2]3,230
Bath[1]	8	ME0100021	435541	694840	Kennebec River	01050003	2.24	242	I,O	Bath	9,250
Belfast[1]	9	ME0101532	442542	690023	Belfast Harbor	01050002	.59	142	I,O	Belfast	[2]4,160
Berwick[1]	10	ME0101397	431456	705028	Salmon Falls River	01060003	.73	270	F,I	Berwick	2,700
Bethel	11	ME0101176	442453	704726	Androscoggin River	01040002	.16	165	--	Bethel	970
Biddeford[1]	12	ME0100048	432923	702631	Saco River	01060002	3.84	237	I,O	Biddeford	16,200
Bingham	13	ME0100056	450210	695154	Jackson Brook	01030003	.12	126	F	Bingham	950
Blue Hill	14	ME0101231	442432	683504	Blue Hill Bay	01050002	[4].03	125	--	Blue Hill	240
Boothbay Harbor[1]	15	ME0100064	435109	693810	Booth Bay Harbor	01050003	.29	254	O	Boothbay Harbor	1,140
Brewer[1]	16	ME0100072	444623	684711	Penobscot River	01020005	3.44	423	I,O	Brewer	8,130
Brownville	17	ME0100099	452114	690303	Ground-water discharge	01020004	[4].03	45	--	Brownville	660
Brunswick[1]	18	ME0100102	435453	695631	Androscoggin River	01060001	2.97	163	--	Brunswick	14,160
									--	Topsham	4,110
Bucksport[1]	19	ME0100111	445457	695651	Penobscot River	01020005	.38	179	O	Bucksport	2,120
Calais[1]	20	ME0100129	451117	671605	St. Croix River	01050001	.53	166	O	Calais	3,200
Camden[1]	21	ME0100137	441235	690349	Camden Harbor	01050002	.78	245	I,L,O	Camden	3,190
Canton	22	ME0102067	442650	701835	Whitney Brook	01040002	[4].04	98	--	Canton	410
Caribou[1]	23	ME0100145	465045	675659	Aroostook River	01010004	1.21	198	I,O	Caribou	6,100
Castine	24	ME0101192	442339	684724	Penobscot Bay	01050002	.15	197	F	Castine	760
Corinna[1]	25	ME0100153	445510	691535	Sebasticook River East Branch	01030003	.61	587	F,I,O	Corinna	[5]1,040
Danforth	26	ME0100161	454003	675221	Baskahegan Stream	01020003	.05	217	--	Danforth	230
Dover Foxcroft	27	ME0100501	451102	691106	Piscataquis River	01020004	[3].32	142	O	Dover-Foxcroft	2,250
East Machias	28	ME0102156	444353	672349	East Machias River	01020005	[4].08	151	--	East Machias	[5]530
East Millinocket	29	ME0100196	453706	683401	Penobscot River West Branch	01020001	.50	233	F,O	East Millinocket	2,150

Table 7. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Maine, 1990 —*Continued*

Wastewater-treatment facility name	Reference No. (fig. 5)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 5)	Sewered population
Ellsworth[1]	30	ME0100889	443207	682517	Blue Hill Bay	01050002	0.55	185	--	Ellsworth	2,980
Falmouth[1]	31	ME0100218	434231	701456	Presumpscot River Estuary	01060001	.95	168	--	Falmouth	4,130
										Cumberland	1,510
Farmington[1]	32	ME0101249	443902	700821	Sandy River	01030003	.47	109	--	Farmington	4,310
Fort Fairfield[1]	33	ME0100226	464637	675028	Aroostook River	01010004	.59	259	F	Fort Fairfield	2,280
Fort Kent[1]	34	ME0100234	471515	683507	Fish River	01010003	.28	96	F	Fort Kent	2,920
Freeport[1]	35	ME0101036	435009	700602	Harraseeket Estuary	01060001	.45	201	--	Freeport	2,240
Gardiner[1]	36	ME0101702	441133	694528	Kennebec River	01030003	1.35	147	F,O	Gardiner	5,130
										Farmingdale	2,170
										Randolph	1,870
Great Salt Bay	37	ME0101516	440313	693121	Damariscotta River	01050003	[4].17	138	--	Damariscotta	[2]1,300
Guilford Sangerville[1]	38	ME0102032	451014	692132	Piscataquis River	01030003	.44	143	F	Guilford	[2]1,090
										Sangerville	[2]1,980
Hartland[1]	39	ME0101443	445251	692706	Sebasticook River	01030003	.91	1,197	I,L	Hartland	760
Houlton[1]	40	ME0101290	460923	674904	Meduxnekeag River	01010005	2.11	302	--	Houlton	[2]6,980
Islesboro	41	ME0100269	441541	685435	Penobscot Bay	01050002	.04	250	F,L	Islesboro	[2]160
Jackman	42	ME0100978	453816	701535	Moose River	01030001	[4].07	88	--	Jackman	800
North Jay	43	ME0101061	443250	701435	Seven Mile Stream	01040002	.04	100	--	Jay	[2]400
Kennebec Sanitary District[1]	44	ME0100854	443132	693922	Kennebec River	01030003	11.62	452	I,O	Waterville	16,200
										Benton	440
										Fairfield	3,750
										Winslow	5,310
Kennebunk[1]	45	ME0100935	432057	702847	Mousam River	01060003	.90	199	I,L,O	Kennebunk	4,530
Kennebunkport[1]	46	ME0101184	432133	702841	Kennebunk River	01060003	.30	233	L	Kennebunk-port	1,290
Kingfield	47	ME0101711	445731	700908	Ground-water discharge	01030003	[4].05	135	--	Kingfield	370
Kittery[1]	48	ME0100285	430521	704535	Piscataqua River	01060003	1.29	228	G	Kittery	4,340
										Eliot	1,330
Lewiston Auburn[1]	49	ME0101478	440501	701238	Androscoggin River	01040002	11.78	207	F,I,O	Lewiston	37,490
										Auburn	19,430
Limerick	50	ME0100871	433955	704324	Little Ossipee River	01060002	.05	139	--	Limerick	360
Limestone[1]	51	ME0101095	465422	674845	Limestone Stream	01010004	.33	57	F,G	Limestone	5,760
Lincoln[1]	52	ME0101796	452235	683030	Penobscot River	01020005	.80	277	F,L,O	Lincoln	2,890
Lisbon[1]	53	ME0100307	435928	700302	Androscoggin River	01040002	.90	133	I	Lisbon	6,750
Livermore Falls[1]	54	ME0100315	442807	701105	Androscoggin River	01040002	.83	177	O	Livermore Falls	2,310
										Jay	[2]2,390
Lubec	55	ME0102016	445150	665914	Machias River	01050002	[4].23	280	L	Lubec	820
Machias[1]	56	ME0100323	444306	672704	Machias River	01050002	.39	212	G,O	Machias	1,840
Madawaska	57	ME0101681	472129	681931	St. John River	01010001	.66	186	--	Madawaska	3,550
Maine Correctional	58	ME0101729	434519	702249	Presumpscot River	01060001	.04	167	--	Windham	[4]240
Mapleton	59	ME0101257	464101	680913	Presque Isle Stream	01010004	.14	264	F	Mapleton	530

Table 7. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Maine, 1990 —*Continued*

Wastewater-treatment facility name	Reference No. (fig. 5)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 5)	Sewered population
Mars Hill	60	ME0101079	463100	675159	Prestile Stream	01010005	0.18	148	O	Mars Hill	1,220
Mechanic Falls[1]	61	ME0100391	440652	702315	Little Androscoggin	01040002	.40	210	F,O	Mechanic Falls	1,900
Milbridge	62	ME0100404	443207	675234	Narragaugus River	01050002	[5].04	65	--	Milbridge	[2]540
Millinocket[1]	63	ME0100803	453812	684021	West Branch Penobscot River	01020001	1.53	224	--	Millinocket	6,840
Milo	64	ME0100439	451342	685812	Piscataquid River	01020004	[4].29	169	--	Milo	1,720
Mount Desert Town[1]	65	ME0101346	441727	681803	Somes Sound	01050002	.22	206	L	Mount Desert	1,070
Newport	66	ME0100447	445001	691621	Sebasticook River East Branch	01030003	.47	299	F,L	Newport	1,570
North Berwick	67	ME0101885	431815	704417	The Great Works River	01060003	.26	220	--	North Berwick	1,180
North Haven	68	ME0101907	440736	685204	Fox Island Thoroughfare	01050002	.04	235	L	North Haven	170
Northport Village	69	ME0100901	442255	685803	Penobscot Bay	01050002	.07	226	F,L	Northport	310
Norway[1]	70	ME0100455	441231	703119	Little Androscoggin River	01040002	.36	145	--	Norway	2,480
Oakland[1]	71	ME0100463	443234	694312	Messalonskee Stream	01030003	.55	259	F,O	Oakland	2,120
Ogunquit[1]	72	ME0100986	431613	703507	Ogunquit River	01060003	.51	630	L	Ogunquit	810
Old Orchard Beach[1]	73	ME0101524	432955	702355	Goosefare Brook	01060001	1.33	186	L	Old Orchard Beach	7,140
Old Town[1]	74	ME0100471	445507	683756	Penobscot River	01020005	1.02	119	O	Old Town	[2]6,770
										Milford	1,780
Orono[1]	75	ME0100498	445241	684000	Penobscot River	01020005	1.77	207	F,O	Orono	8,560
Paris[1]	76	ME0100951	441244	703100	Little Androscoggin River	01040002	.32	115	I	Paris	2,780
Passamaquaddy Pleasant Point	77	ME0100773	445727	670222	Passamaquoddy Bay	01050002	.07	127	--	Perry	[5]550
Passamaquoddy The Strip	78	ME0101737	451403	673444	Grand Falls Flowage	01050001	.02	118	--	Princeton	[2]170
Penobscot Indian Nation	79	ME0101311	445644	683901	Penobscot River	01020005	.06	162	--	Old Town	[2]370
Pineland Center	80	ME0101869	435533	701550	Royal River	01060001	.18	900	F	New Gloucester	[6]200
Pittsfield[1]	81	ME0100528	444535	692257	Sebasticook River	01030003	1.23	319	--	Pittsfield	[2]3,850
Portland (City)[1]	82	ME0102075	434012	701423	Casco Bay	01060001	20.42	333	I,O	Portland	61,270
Portland (Westbrook)[1]	83	ME0100846	434109	702100	Presumpscot River	01060001	2.54	142	F,O	Westbrook	14,360
										Gorham	3,510
Presque Isle[1]	84	ME0100561	464202	680103	Presque Isle Stream	01010004	2.68	324	O	Presque Isle	8,280
Portland Water District											
Cape Elizabeth	85	ME0102121	433528	701248	Pebbles Cove	01060001	.33	58	O	Cape Elizabeth	5,670

Table 7. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Maine, 1990 —*Continued*

Wastewater-treatment facility name	Reference No. (fig. 5)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 5)	Sewered population
Rangely	86	ME0100579	445754	703824	Haley Pond	01040001	0.12	414	F,L	Rangely	290
Richmond	87	ME0100587	440455	694802	Kennebec River	01030003	.30	194	O	Richmond	1,550
Rockland[1]	88	ME0100595	440554	690614	Rockland Harbor	01050003	2.33	332	I	Rockland	7,010
Rumford-Mexico[1]	89	ME0100552	443226	703120	Androscoggin River	01040002	1.50	144	F	Rumford	6,110
										Mexico	2,780
										Dixfield	1,520
Sabattus	90	ME0101842	440638	700629	Sabattus River	01040002	.11	85	--	Sabattus	1,290
Saco[1]	91	ME0101117	432927	702609	Saco River	01060002	1.82	161	O	Saco	11,300
Sanford	92	ME0100617	432417	704316	Mousam River	01060003	2.50	166	F,I,O	Sanford	15,090
Scarborough[1]	93	ME0102059	433137	701838	Atlantic Ocean	01060001	1.06	134	I	Scarborough	7,900
Searsport	94	ME0101966	442709	685447	Searsport Harbor	01050002	.10	109	--	Searsport	920
Skowhegan	95	ME0100625	444608	694246	Kennebec River	01030003	1.42	213	F,O	Skowhegan	6,670
South Berwick	96	ME0100820	431331	704832	Salmon Falls River	01060003	.25	82	F	South Berwick	3,050
South Portland[1]	97	ME0100633	433840	701717	Fore River and Casco Bay	01060001	6.71	297	I,O	South Portland	22,630
Southwest Harbor[1]	98	ME0100641	441624	681926	Atlantic Ocean	01050002	.23	197	--	Southwest Harbor	1,170
St. Agatha	99	ME0100609	471426	681818	Long Lake	01010003	.04	138		St. Agatha	290
Thomaston[1]	100	ME0100668	440420	691105	St. George River	01050003	.61	253	G,O	Thomaston	2,410
Unity	101	ME0101150	443755	692309	Twenty-Five Mile Stream	01030003	.23	511	G,O	Unity	450
Van Buren[1]	102	ME0100684	470927	675556	St. Johns River	01010001	.43	150	O	Van Buren	2,870
Vassalboro	103	ME0100692	442918	693734	Ground-water discharge	01030003	.07	100	--	Vassalboro	700
Veazie	104	ME0100706	[6]445045	[6]684243	Penobscot River	01020005	[5].10	65	--	Veazie	1,500
Waldoboro	105	ME0100714	440537	692235	Medomak River	01050003	.14	139	--	Waldoboro	1,010
Washburn	106	ME0101028	464625	680919	Aroostook River	01010004	[3].14	144	--	Washburn	970
Wells[1]	107	ME0100790	431653	703423	Saco River	01060003	.62	148	--	Wells	4,190
Wilton[1]	108	ME0101915	443509	701355	Wilson Stream	01030003	.19	79	F,I	Wilton	2,390
Winter Harbor	109	ME0100731	442338	680502	Henry Cove	01050002	.13	165	--	Winter Harbor	790
Winterport	110	ME0100749	443759	685043	Penobscot River	01020005	.16	182	F,O	Winterport	880
Wiscasset	111	ME0100757	440015	693940	Sheepscot River	01050003	.17	138	--	Wiscasset	1,230
Yarmouth[1]	112	ME0100765	434729	700956	Royal River	01060001	.66	108	I,O	Yarmouth	6,090
York[1]	113	ME0101222	431055	703613	Cape Neddick River	01060003	1.06	253	--	York	4,190
Total							136.07				586,970

[1]Classified as a major facility by the USEPA (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992).

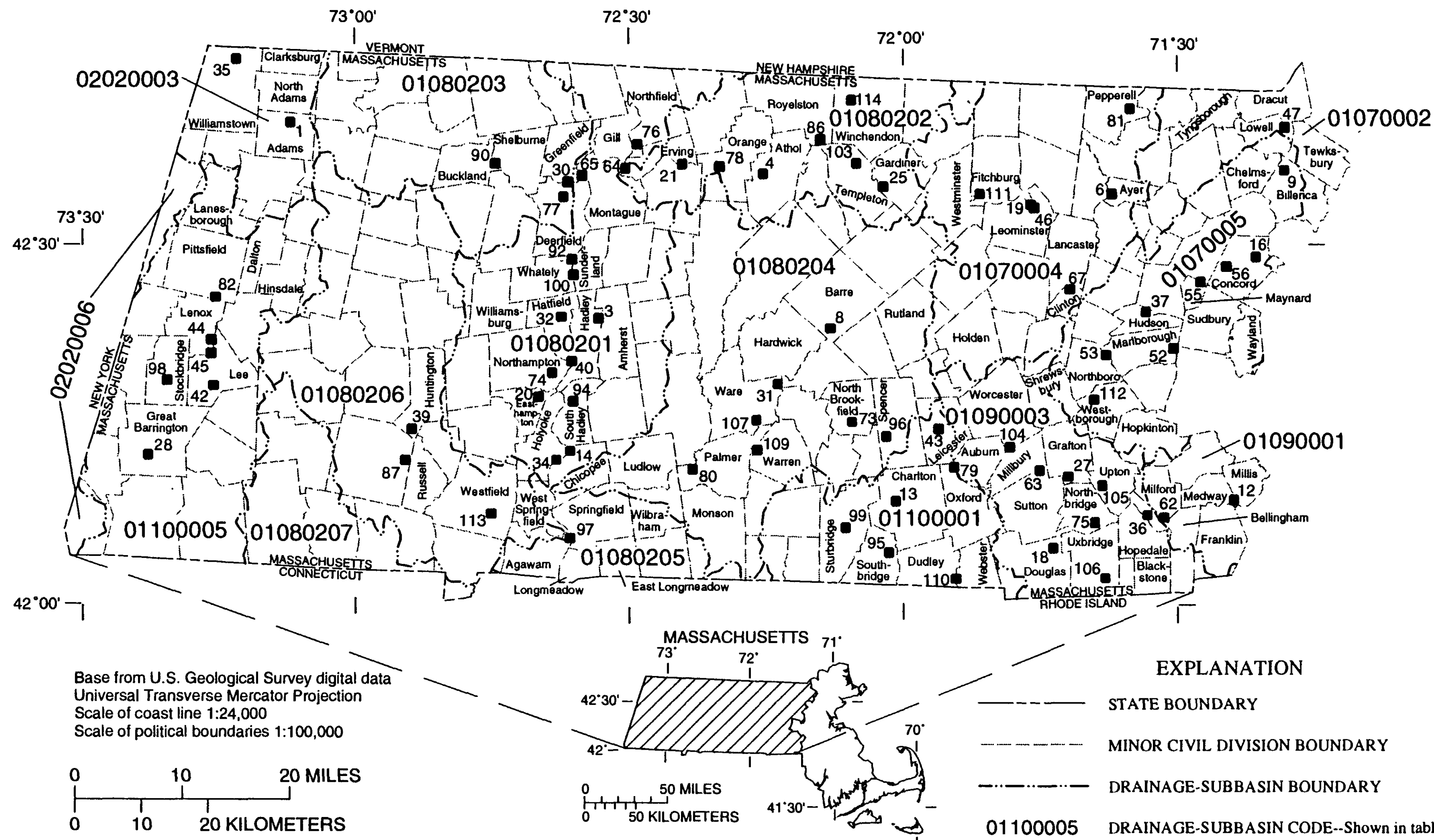
[2]Estimated from USEPA Needs Survey database (Larry MacMillan, U.S. Environmental Protection Agency, written commun., 1992).

[3]Average discharge determined from USEPA Permit Compliance System database, 1991 data (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992).

[4]Data provided by State of Maine database (Maine Department of Environmental Protection, written commun, 1992).

[5]Average discharge estimated on the basis of sewered population times average self-supplied domestic per capita of 65 gallons per day (Solley and others, 1993).

[6]Facility latitude and longitude are estimated as the town centroid.



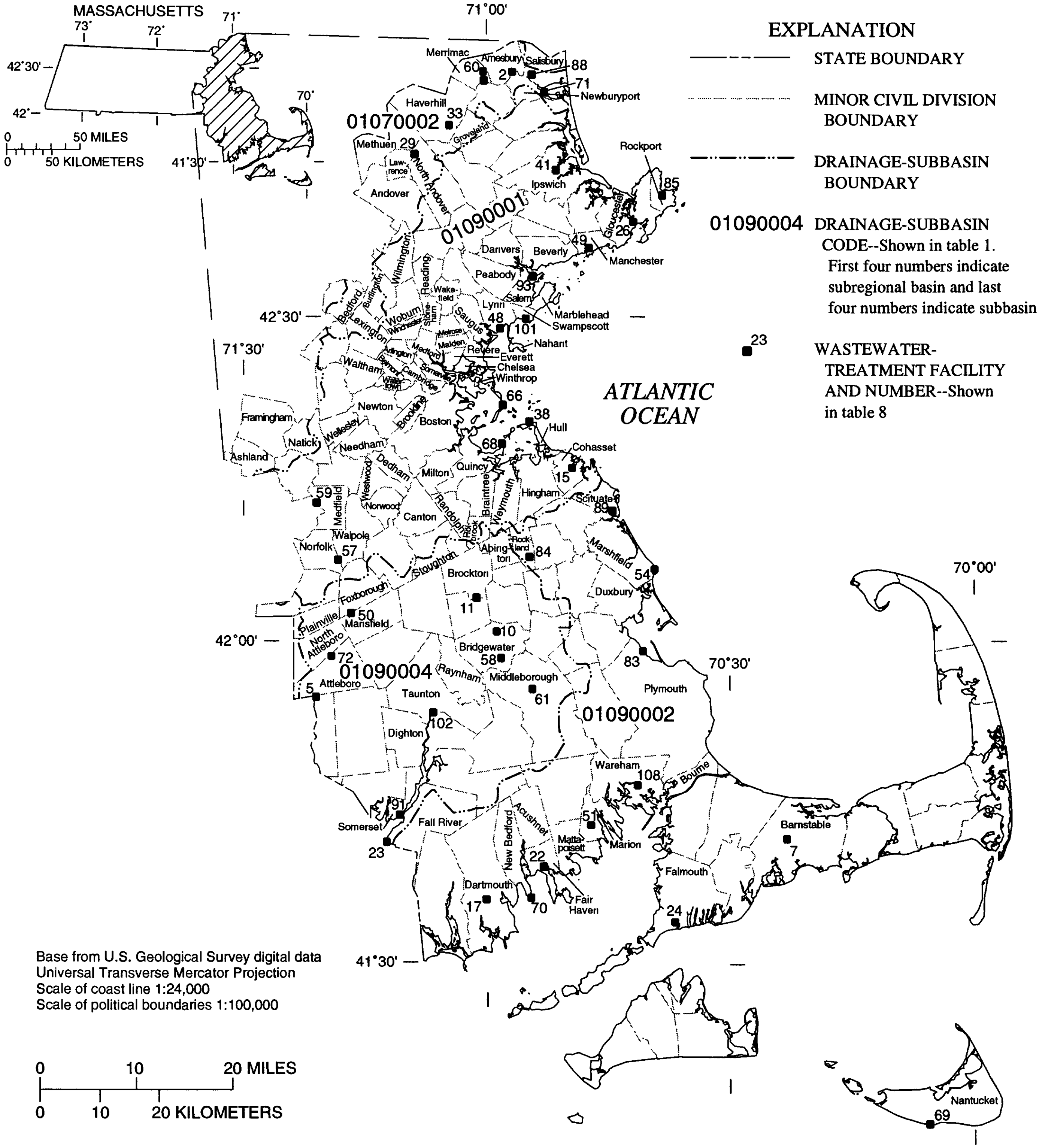
Base from U.S. Geological Survey digital data
Universal Transverse Mercator Projection
Scale of coast line 1:24,000
Scale of political boundaries 1:100,000

EXPLANATION

- STATE BOUNDARY
- MINOR CIVIL DIVISION BOUNDARY
- DRAINAGE-SUBBASIN BOUNDARY
- 01100005 DRAINAGE-SUBBASIN CODE--Shown in table 1. First four numbers indicate subregional basin and last four numbers indicate subbasin
- 40 WASTEWATER-TREATMENT FACILITY AND NUMBER--Shown in table 8

A. Western Massachusetts

Figure 6. Locations of Minor Civil Division boundaries, drainage-subbasin boundaries, and municipal wastewater-treatment facilities in (*A*) western and (*B*) eastern Massachusetts.



B. Eastern Massachusetts

Figure 6. Locations of Minor Civil Division boundaries, drainage-subbasin boundaries, and municipal wastewater-treatment facilities in (*A*) western and (*B*) eastern Massachusetts—*Continued.*

Table 8. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Massachusetts, 1990

[Wastewater treatment facilities in **bold** print are Regional facilities. **1990 return flow:** Average discharge determined from USEPA Permit Compliance System database, 1990 data (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992). NPDES, National Pollutant Discharge Elimination System. **Sewered population:** Estimated from USBC (U.S. Bureau of the Census, 1991c; U.S. Bureau of the Census, 1991i). Sewered population numbers are rounded to the nearest 10 people. Possible causes for high per capita use values are indicated by the following codes: F, infiltration and inflow; G, large population in group quarters; I, contributions from industries; L, large seasonal population; and O, combined sewers. Mgal/d, million gallon per day; gal/d, gallons per day. --, not applicable]

Wastewater-treatment facility name	Reference No. (fig. 6)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return-flow (Mgal/d)	Per capita return flow (gal/d)	Codes	Town (Minor Civil Division) served (fig. 6)	Sewered population
Adams[1]	1	MA0100315	423841	730634	Hoosic River	02020003	2.34	253	I	Adams	9,240
Amesbury[1]	2	MA0101745	425026	705539	Merrimack and Back Rivers	01070002	1.85	137	I	Amesbury	13,510
Amherst[1]	3	MA0100218	422314	723220	Connecticut River	01080201	4.65	149	--	Amherst	31,230
Athol[1]	4	MA0100005	423508	721435	Millers River	01080202	1.56	174	F	Athol	8,980
Attleboro[1]	5	MA0100595	415351	712013	Ten Mile River	01090004	5.35	205	I	Attleboro	26,140
Ayer[1]	6	MA0100013	423339	713613	Nashua River	01070004	1.42	242	--	Ayer	5,870
Barnstable	7	MA0102016	414033	702258	Ground-water discharge	01090002	[2].57	65	--	Barnstable	8,820
Barre	8	MA0103152	422235	720700	Ware River	01080204	[3].14	84	--	Barre	1,670
Billerica[1]	9	MA0101711	423530	711722	Concord River	01070005	2.58	158	I	Billerica	16,310
Bridgewater[1]	10	MA0100641	415943	705804	Town River	01090004	.79	126	--	Bridgewater	6,270
Brockton Regional[1]	11	MA0101010	420245	710030	Salisbury Plain	01090004	14.97	168	I	Brockton	87,960
										Abington	[4]1,340
Charles River[1]	12	MA0102598	420835	712300	Charles River	01090001	3.60	139	--	Medway	5,370
										Bellingham	1,810
										Franklin	15,540
										Millis	3,100
Charlton[1]	13	MA0101141	420827	715944	Cady Brook	01100001	.09	73	--	Charlton	820
Chicopee[1]	14	MA0101508	420908	723733	Chicopee River	01080204	12.58	230	F,I,O	Chicopee	54,590
Cohasset	15	MA0100285	421430	704840	Cohasset Harbor	01090002	[3].08	71	--	Cohasset	1,130
Concord[1]	16	MA0100668	422830	712030	Concord River	01070005	.98	153	--	Concord	6,420
Dartmouth[1]	17	MA0101605	413524	705933	Buzzard's Bay	01090002	1.87	133	--	Dartmouth	14,050
Douglas	18	MA0101095	420440	714240	Mumford River	01090003	[3].15	87	--	Douglas	1,720
East Fitchburg[1]	19	MA0100986	423249	714511	Nashua River North Branch	01070004	8.10	324	I,O	Fitchburg	25,000
Easthampton[1]	20	MA0101478	421644	723851	Connecticut River	01080201	2.47	168	I	Easthampton	14,690
Erving Center[1]	21	MA0101052	423550	722326	Millers River	01080202	1.90	2,676	I	Erving	710
Fairhaven[1]	22	MA0100765	413819	705234	Acushnet River	01090002	2.50	196	--	Fairhaven	11,540
										Mattapoisett	1,190
Fall River[1]	23	MA0100382	414036	711140	Mt. Hope Bay	01090002	30.88	343	I,O	Fall River	89,950
Falmouth	24	MA0101729	413312	703639	Ground-water discharge	01090002	[2].15	65	--	Falmouth	2,350
Gardner[1]	25	MA0100994	423411	720114	Otter River	01080202	3.32	167	I	Gardner	18,730
										Templeton	[4]1,110
Gloucester[1]	26	MA0100625	423645	704050	Gloucester Harbor	01090001	3.34	194	I,O	Gloucester	17,220
Grafton[1]	27	MA0101311	421030	724100	Blackstone River	01090003	1.10	162	--	Grafton	6,790
Great Barrington[1]	28	MA0101524	421123	732129	Housatonic River	01100005	2.99	372	G,I,L	Great Barrington	[4]8,030

Table 8. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Massachusetts, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 6)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return-flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 6)	Sewered population
Greater Lawrence Sewer District[1]	29	MA0100447	424258	710748	Merrimack River	01090001	36.94	243	I,O	North Andover	16,650
										Andover	18,290
										Lawrence	68,430
										Methuen	35,410
										Salem, NH	13,420
Greenfield[1]	30	MA0101214	423417	723555	Green River	01080203	3.70	227	F,I	Greenfield	16,270
Hardwick	31	MA0100102	421800	721247	Ware River	01080204	[5].03	125	--	Hardwick	[4]240
Hatfield	32	MA0101290	422318	723625	Connecticut River	01080201	[5].16	107	--	Hatfield	1,490
Haverhill[1]	33	MA0101621	424535	710332	Merrimack River	01070002	11.45	241	I,O	Haverhill	45,630
										Groveland	1,900
Holyoke[1]	34	MA0101630	421132	723650	Connecticut River	01080201	11.88	283	I,O	Holyoke	41,970
Hoosac[1]	35	MA0100510	424345	731246	Hoosic River	02020003	5.93	255	F,G,I	Williamstown	6,870
										Clarksburg	350
										North Adams	15,990
Hopedale[1]	36	MA0102202	420720	713220	Mill River	01090003	.44	92	--	Hopedale	4,780
Hudson[1]	37	MA0101788	422401	713226	Assabet River	01070005	2.33	165	--	Hudson	14,100
Hull[1]	38	MA0101231	421843	715352	Atlantic Ocean	01090001	1.53	181	L	Hull	8,460
Huntington	39	MA0101265	421355	725240	Westfield River	01080206	[3].09	134	L	Huntington	670
Indian Hill (Hadley)	40	MA0100099	421945	723112	Connecticut River	01080201	[3].31	164	--	Hadley	1,890
Ipswich[1]	41	MA0100609	424129	705019	Greenwood Creek	01090001	1.02	156	--	Ipswich	6,520
Lee[1]	42	MA0100153	421712	731429	Housatonic River	01100005	.90	180	L	Lee	4,990
Leicester	43	MA0101796	421425	715507	Rawson Brook	01100001	[3].14	42	--	Leicester	[4]1,620
Lenox Center	44	MA0100935	422055	731450	Housatonic River	01100005	[3].65	191	--	Lenox	3,400
Lenox Number 2	45	MA0100943	421949	731450	Housatonic River	01100005	[3].08	190	--	Lenox	420
Leominster[1]	46	MA0100617	423246	714510	North Nashua River	01070004	5.81	162	I	Leominster	35,900
Lowell Regional[1]	47	MA0100633	423855	711720	Merrimack River	01070002	27.75	210	I,O	Lowell	101,460
										Chelmsford	7,210
										Dracut	14,070
										Tewksbury	6,710
										Tyngsborough	2,890
Lynn[1]	48	MA0100552	422711	705723	Lynn Harbor (Broad Sound)	01090001	28.30	262	I,O	Lynn	80,470
										Nahant	3,730
										Saugus	23,690
Manchester[1]	49	MA0100871	423424	704620	Manchester Harbor	01090001	.61	170	--	Manchester	3,590
Mansfield[1]	50	MA0101702	415720	710930	Three Mile River	01090004	2.06	148	--	Mansfield	9,340
										Foxborough	4,570
Marion[1]	51	MA0100030	414201	704644	Aucoot Cove	01090002	.45	247	L	Marion	1,820
Marlborough Easterly[1]	52	MA0100498	422101	712928	Hop Brook	01070005	3.09	164	--	Marlborough	18,790

Table 8. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Massachusetts, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 6)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return-flow (Mgal/d)	Per capita return flow and codes (gal/d)	Town (Minor Civil Division) served (fig. 6)	Sewered population
Marlborough Westerly[1]	53	MA0100480	422029	713651	Assabet River	01070005	1.69	126 --	Marlborough	10,280
									Northboro	3,120
Marshfield[1]	54	MA0101737	420515	703840	Massachusetts Bay	01090002	.86	76 L	Marshfield	9,950
									Duxbury	1,320
Maynard[1]	55	MA0101001	422627	712629	Assabet River	01070005	1.02	93 I	Maynard	9,630
									Sudbury	640
									Wayland	710
Massachusetts Correctional Institute (MCI)-Concord	56	MA0102245	422742	712340	Concord River	01070005	[3].27	152 --	Concord	1,780
MCI Norfolk-Walpole[1]	57	MA0102253	420615	711729	Stop River to Charles River	01090001	.30	194 --	Norfolk	1,550
MCI-Bridgewater[1]	58	MA0102237	415721	705732	Saw Mill Brook	01090004	.54	129 --	Bridgewater	4,200
Medfield[1]	59	MA0100978	421126	712003	Charles River	01090001	.84	207 --	Medfield	4,060
Merrimac	60	MA0101150	424940	705910	Cobblers Brook	01070002	[3].23	67 --	Merrimac	3,450
Middleborough[1]	61	MA0101591	415430	705346	Nemasket River	01090002	1.28	164 --	Middleborough	7,810
Milford[1]	62	MA0100579	420709	713032	Charles River	01090003	3.73	162 I	Milford	23,070
Millbury[1]	63	MA0100650	421100	714410	Blackstone River	01090003	.85	136 --	Millbury	6,240
Millers Falls Village[1]	64	MA0101516	423526	722937	Millers River	01080202	.54	1,459 I	Erving	[4]370
Montague[1]	65	MA0100137	423448	723421	Connecticut River	01080201	1.25	170 F,I,O	Montague	6,940
									Gill	430
MWRA-Deer Island[1]	66	MA0102351	422303	704813	Boston Harbor	01090001	[6]269.66	238 I,O	Boston	[6]286,850
									Arlington	[6]44,585
									Bedford	[6]10,007
									Belmont	[6]24,201
									Brookline	[6]27,220
									Burlington	[6]21,671
									Cambridge	[6]95,706
									Chelsea	[6]28,681
									Everett	[6]35,665
									Lexington	[6]27,380
									Malden	[6]53,830
									Medford	[6]57,350
									Melrose	[6]28,122
									Newton	[6]41,090
									Reading	[6]20,736
									Revere	[6]42,743
									Somerville	[6]76,134
									Stoneham	[6]21,648
									Wakefield	[6]23,708
									Waltham	[6]57,820
									Watertown	[6]33,251
									Wilmington	[6]1,589
									Winchester	[6]20,064
									Winthrop	[6]18,109
									Woburn	[6]34,505

Table 8. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Massachusetts, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 6)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Subbasin code	1990 return-flow (Mgal/d)	Per capita return flow and codes (gal/d)	Town (Minor Civil Division) served (fig. 6)	Sewered population
MWRA-Clinton[1]	67	MA0100404	422552	714050	Nashua River, South Branch	01070004	2.40	164 --	Clinton	12,930
									Lancaster	1,670
MWRA-Nut Island[1]	68	MA0103268	421644	705717	Boston Harbor, Quincy Bay	01090001	[6]136.36	164 F	Quincy	[6]84,900
									Ashland	[6]6,878
									Boston	[6]286,850
									Braintree	[6]32,922
									Brookline	[6]27,220
									Canton	[6]13,527
									Dedham	[6]21,642
									Framingham	[6]61,090
									Hingham	[6]5,061
									Holbrook	[6]6,293
									Milton	[6]24,182
									Natick	[6]24,713
									Needham	[6]23,975
									Newton	[6]41,090
									Norwood	[6]28,671
									Randolph	[6]29,190
									Stoughton	[6]17,003
									Walpole	[6]11,319
									Wellesley	[6]24,166
									Westwood	[6]9,669
									Weymouth	[6]49,738
Nantucket	69	--	411432	700619	Ground-water discharge	01090002	[2].23	65 --	Nantucket	3,480
New Bedford[1]	70	MA0100781	413531	705406	Buzzards Bay	01090002	28.30	287 I,O	New Bedford	96,520
									Acushnet	1,940
Newburyport[1]	71	MA0101427	424834	705141	Merrimack River	01090001	2.24	146 I,O	Newburyport	15,120
North Attleboro[1]	72	MA0101036	415734	711820	Ten Mile River	01090004	3.61	185 --	North Attleboro	16,150
									Plainville	3,350
North Brookfield[1]	73	MA0101061	421458	720435	Dunn Brook	01080204	.47	147 --	North Brookfield	3,200
Northampton[1]	74	MA0101818	421841	723723	Connecticut River	01080201	5.27	201 F,I	Northampton	25,280
									Williamsburg	980
Northbridge[1]	75	MA0100722	420644	713806	Blackstone River	01090003	1.19	127 --	Northbridge	9,340
Northfield	76	MA0100200	423800	722900	Connecticut River	01080201	[3].33	163 --	Northfield	[4]2,020
Old Deerfield[1]	77	MA0101940	423305	723620	Deerfield River	01080201	.15	341 F	Deerfield	[4]440
Orange[1]	78	MA0101257	423540	721920	Millers River	01080202	1.17	272 --	Orange	4,300
Oxford-Rochdale	79	MA0100170	421115	715325	French River Tributary	01100001	[3].16	68 --	Oxford	2,340
Palmer[1]	80	MA0101168	421053	722157	Chicopee River	01080204	3.58	271 O	Palmer	9,330
									Monson	3,870
Pepperell	81	MA0100064	424025	723430	Nashua River	01070004	[3].19	63 --	Pepperell	3,000

Table 8. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Massachusetts, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 6)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Subbasin code	1990 return-flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 6)	Sewered population
Pittsfield[1]	82	MA0101681	414537	704101	Housatonic River	01100005	14.62	268	F,I	Pittsfield	46,900
										Dalton	6,610
										Hinsdale	720
										Lanesborough	370
Plymouth[1]	83	MA0100587	415750	704012	Plymouth Harbor	01090002	2.36	167	L	Plymouth	14,090
Rockland[1]	84	MA0101923	420627	705359	French Stream	01090002	1.75	121	--	Rockland	11,230
										Abington	3,250
Rockport[1]	85	MA0100145	423907	703712	Sandy Bay	01090001	.73	131	L	Rockport	5,590
Royalston	86	MA0100161	423755	720815	Millers River	01080202	[3].03	176	--	Royalston	170
Russell	87	MA0100960	421119	725318	Westfield River	01080206	[3].13	159	--	Russell	820
Salisbury[1]	88	MA0102873	425011	705313	Creek to Merrimack River	01070002	.38	109	L	Salisbury	3,500
Scituate[1]	89	MA0102695	421034	704345		01090002	1.20	203	L	Scituate	5,920
Shelburne Falls	90	MA0101044	423540	724400	Deerfield River	01080203	[3].21	104	--	Buckland	[4]990
										Shelburne	[4]1,020
Somerset	91	MA0100676	414305	711003	Taunton River	01090004	2.50	164	--	Somerset	15,230
South Deerfield[1]	92	MA0101648	422800	723520	Connecticut River	01080201	.91	291	F,I	Deerfield	[4]3,130
South Essex Sewer District[1]	93	MA0100501	423152	705316	Salem Harbor	01090001	28.01	175	I,O	Salem	37,620
										Beverly	36,180
										Danvers	22,560
										Marblehead	19,420
										Peabody	44,520
South Hadley[1]	94	MA0100455	421218	723518	Connecticut River	01080204	3.45	223	F,I,O	South Hadley	15,450
Southbridge[1]	95	MA0100901	420417	720026	Quinebaugh River	01100001	2.48	152	I	Southbridge	16,350
Spencer[1]	96	MA0100919	421347	720047	Seven Mile River	01080204	.69	106	--	Spencer	6,500
Springfield Bondi Island[1]	97	MA0101613	420508	723514	Connecticut, Chicopee, and Mill Rivers	01080201	48.25	195	I,O	Agawam	24,590
										East Longmeadow	11,430
										Longmeadow	15,170
										Ludlow	12,660
										Springfield	153,930
										West Springfield	26,580
										Wilbraham	3,650
Stockbridge	98	MA0101087	421735	731935	Housatonic River	01100005	[3].23	197	L	Stockbridge	1,170
Sturbridge	99	MA0100421	420615	720513	Quinebaug River	01100001	[3].41	198	I	Sturbridge	2,070
Sunderland	100	MA0101079	422645	723510	Connecticut River	01080201	[3].16	63	--	Sunderland	2,520
Swampscot[1]	101	MA0101907	422803	705412	Nahant Bay	01090001	2.61	191	--	Swampscott	13,640
Taunton[1]	102	MA0100897	415224	710554	Taunton River	01090004	6.51	167	I,O	Taunton	35,330
										Dighton	1,280
										Raynham	2,420
Templeton[3]	103	MA0100340	423601	720414	Otter River	01080202	1.44	713	--	Templeton	[4]2,020

Table 8. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Massachusetts, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 6)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return-flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 6)	Sewered population
Upper Blackstone[3]	104	MA0102369	421255	714725	Blackstone River	01090003	39.23	212	I	Auburn	11,210
										Holden	4,980
										Rutland	2,580
										Sutton	1,060
										Worcester	165,270
Upton[1]	105	MA0100196	420946	713717	West River	01090003	.17	104	--	Upton	1,630
Uxbridge[1]	106	MA0102440	420215	713700	Blackstone River	01090003	.58	96	--	Uxbridge	6,020
Ware[1]	107	MA0100889	421502	721506	Ware River	01080204	.76	126	I	Ware	6,030
Wareham[1]	108	MA0101893	422427	731428	Ground-water discharge	01090002	.57	63	L	Wareham	7,220
										Bourne	1,810
Warren[1]	109	MA0101567	421234	721454	Quaboag River	01080204	.58	205	I	Warren	2,830
Webster[1]	110	MA0100439	420210	715313	French River	01100001	4.43	261	--	Webster	11,840
										Dudley	5,130
West Fitchburg[1]	111	MA0101281	423337	725045	Nashua River, North Branch	01070004	4.61	302	I	Fitchburg	14,150
										Westminster	1,120
Westborough[1]	112	MA0100412	421651	713808	Assabet River	01070005	4.11	134	I	Westborough	10,420
										Hopkinton	1,630
										Shrewsbury	18,510
Westfield[1]	113	MA0101800	420702	724356	Westfield River	01080206	3.24	131	I	Westfield	24,680
Winchendon[1]	114	MA0100862	424105	720451	Millers River	01080202	.71	153	--	Winchendon	4,650
Total							904.73				4,365,705

[1]Classified as a major facility by the USEPA (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992).

[2]Average discharge estimated on the basis of sewered population times average self-supplied domestic per capita of 65 gallons per day (Solley and others, 1993).

[3]Average discharge determined from USEPA Permit Compliance System database, 1991 data (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992).

[4]Estimated from USEPA Needs Survey database (Larry MacMillan, U.S. Environmental Protection Agency, written commun., 1992).

[5]Average discharge determined from the State of Massachusetts database, 1991 data (Massachusetts Department of Environmental Protection, written commun., 1993).

[6]Data provided by Massachusetts Water Resources Authority (J.A. Riccio, Massachusetts Water Resources Authority, written commun., 1993).

Return flows to surface water from 110 municipal wastewater-treatment facilities in Massachusetts that served 4.342 million people totalled 903 Mgal/d. The Barnstable, Falmouth, Nantucket, and Wareham Wastewater Treatment Facilities served 0.024 million people and discharged wastewater return flows of 1.52 Mgal/d to ground water. In addition, the unsewered population in Massachusetts of 1.650 million people discharged about 107 Mgal/d (based on 65 gal/d per person) to ground water.

Seventy-four percent of return flows from municipal wastewater-treatment facilities in Massachusetts were discharged to the Massachusetts-Rhode Island Coastal Basins subregion (0109), 13 percent flow to the Connecticut River Basin subregion (0108), and 9 percent flow to the Merrimack River Basin subregion (0107) (Appendix 1). Return flows from municipal wastewater-treatment facilities in Massachusetts comprised 83 percent (673 Mgal/d) of the total return flows to the Massachusetts-Rhode Island Coastal Basins subregion (0109); 62 percent (80 Mgal/d) of flows to the Merrimack River Basin subregion (0107); and 40 percent (116 Mgal/d) of flows to the Connecticut River Basin subregion (0108) (Appendix 1).

The wastewater-collection systems of three regional facilities in Massachusetts crossed drainage-basin divides. The entire sewered population of Lowell was served by the Lowell Regional Wastewater-Treatment Facility, which is in the Merrimack River Subbasin (01070002). The town, however, straddles two subbasins in almost equal land-area proportions, the Merrimack River Subbasin, and the Concord River Subbasin (01070005). The town of Ludlow, predominantly in the Chicopee River Subbasin (01080204), has a sewer connection to the Springfield Regional Facility, Bondi Island, which is in the Lower Connecticut River Subbasin (01080205). Wastewater generated by about 0.013 million people in Ludlow crossed this drainage divide. Likewise, the town of Rutland straddles the Chicopee River and the Nashua River Subbasins (01080204 and 01070004, respectively), but is connected to the Upper Blackstone Facility in Millbury, which is in the Blackstone River Subbasin (01090003). Wastewater from the sewered population of 0.003 million people in Rutland crossed this drainage divide.

Per capita return flow for municipal wastewater-treatment facilities in Massachusetts ranged from 42 to 2,676 gal/d with a median of 164 gal/d (table 8). Of the 33 facilities with per capita return-flow values over 200 gal/d, 5 had values that were unexplained by any of the 5 possible anomaly-causing factors. The most important factors contributing to the high per capita return flows were the presence of industrial connections to municipal wastewater collection systems and combined sewers. An association between industrial contributions and infiltration and inflow and increasing per capita estimates was demonstrated by the contingency-table analysis shown in table 4. Two extremely high per capita return flows (2,676 and 1,459 Mgal/d) were calculated respectively for the Erving Center and the Millers Falls Wastewater Treatment Facilities, in Erving. The USEPA Industrial Facilities Discharge file indicates that industries contribute wastewater to these facilities, which probably accounted for the high per capita return-flow values in Erving.

New Hampshire

In 1990, 73 municipal wastewater-treatment facilities in 70 MCDs (fig. 7) were operating in New Hampshire. These facilities had customers in 94 out of 260 MCDs in the State. Location, 1990 return flow, and sewered-population data about each municipal wastewater-treatment facility in New Hampshire are presented in table 9. Of the 1.109 million residents in the State (U.S. Bureau of the Census, 1991d), 0.536 million people or 48 percent were connected to a municipal sewer system.

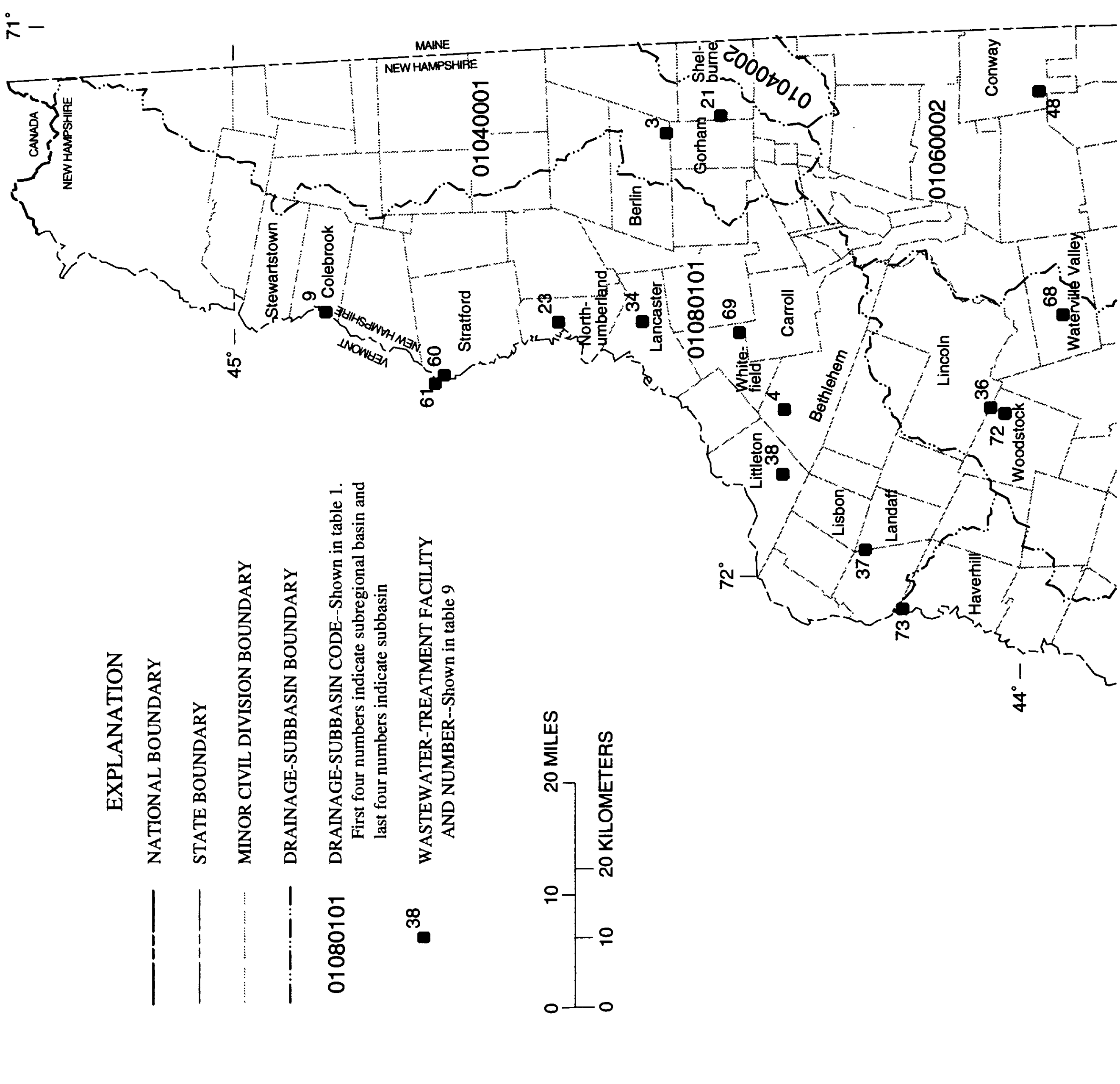
In 1990, return flows from all municipal wastewater-treatment facilities in New Hampshire totalled nearly 83 Mgal/d. Sixteen regional systems served 0.349 million people in 41 towns, comprising 65 percent of the sewered population. The State's largest facility, the Manchester Regional Wastewater Treatment facility, served 0.104 million people from Manchester, Goffstown, Londonderry and Bedford, and discharged an average of 18 Mgal/d to the Merrimack and Piscataquog Rivers during 1990 (table 9). The Nashua and the Franklin Wastewater Treatment Facilities were the second and third largest facilities in New Hampshire. The Woodsville Regional Wastewater Treatment Facility in Haverhill served part of the population of Newbury, Vermont (fig. 9).

Sixty-four of the 73 facilities in the State served 0.533 million people and discharged 82 Mgal/d to surface water. The other seven facilities, the Canaan, Eastman Community Associates in Grantham, Newbury, Ossipee, Sandwich, Wakefield, and Wolfeboro Wastewater Treatment Facilities, discharged a total of 0.2 Mgal/d to ground water through municipal septic systems, sand filters, or spray irrigation. The unsewered population of New Hampshire (0.573 million people) generated about 37 Mgal/d of wastewater daily that was discharged from on-site septic systems to ground water.

Of total return flows from municipal wastewater-treatment facilities in New Hampshire, 50 Mgal/d, or 60 percent, were into the Merrimack River Basin subregion (0107); of this amount, 46 Mgal/d are from within the Merrimack River Subbasin (01070002). Almost 17 Mgal/d, or 20 percent of total flows from New Hampshire facilities were discharged to the Saco River Basin subregion (0106), and 13 Mgal/d, or 16 percent of total flows, were discharged to the Connecticut River Basin subregion (0108). Return flows from municipal wastewater-treatment facilities in New Hampshire contributed 38 percent (50 Mgal/d) of total return flows to the Merrimack River Basin subregion (0107); 24 percent (17 Mgal/d) of total return flows to the Saco River Basin subregion (0106); and 4 percent (13 Mgal/d) of flows to the Connecticut River Basin subregion (0108) (Appendix1).

Per capita return flow for municipal wastewater-treatment facilities in New Hampshire ranged from 49 to 1,000 gal/d with a median of 151 gal/d. Seventeen facilities in the State had a per capita return flow greater than 200 Mgal/d. The per capita use for all but the Colebrook, Lancaster, and Stratford Mill House Wastewater Treatment Facilities can be partially explained by at least one of the five possible anomaly-causing factors (table 9). The largest estimated per capita return flow (1,000 gal/d) was for the town of Waterville Valley. This estimate is based on resident sewered population (note the code "L" in table 9 for large seasonal population). The large reported per capita return flow was probably a result of the ski resort in town, which attracts thousands of people to Waterville Valley during the winter. Many people stay for several days or more at condominiums or hotels but are not residents of the town. A large number of these temporary housing units may be connected to the sewage-collection system but are not counted as sewered population in table 9. Lincoln, also the site of a ski resort, had a large per capita return-flow value of 364 Mgal/d, probably for the same reasons that the estimate for Waterville Valley was large.

Although the association was not statistically significant according to results from the contingency-table analysis (table 4), many of the municipal wastewater-treatment facilities in New Hampshire with per capita return flows greater than 150 gal/d generally had industrial contributions and large infiltration and inflow rates (table 9). In addition, of the 14 facilities in the State with large seasonal populations, 10 had per capita return-flow values greater than 150 gal/d.



EXPLANATION
NATIONAL BOUNDARY
STATE BOUNDARY
MINOR CIVIL DIVISION BOUNDARY
DRAINAGE-SUBBASIN BOUNDARY
01080101 DRAINAGE-SUBBASIN CODE--Shown in table 1. First four numbers indicate subregional basin and last four numbers indicate subbasin
38 WASTEWATER-TREATMENT FACILITY AND NUMBER--Shown in table 9
0 10 20 MILES
0 10 20 KILOMETERS
71°
72°
44°
45°
CANADA
NEW HAMPSHIRE
MAINE
VERMONT
01040001
01040002
01060002
01080101
Stewartstown
Colebrook
Stratford
North-umberland
Lancaster
Berlin
Gorham
Shel-burne
Conway
Carroll
White-field
Bethlehem
Littleton
Lisbon
Landaff
Haverhill
Lincoln
Woodstock
Waterville Valley
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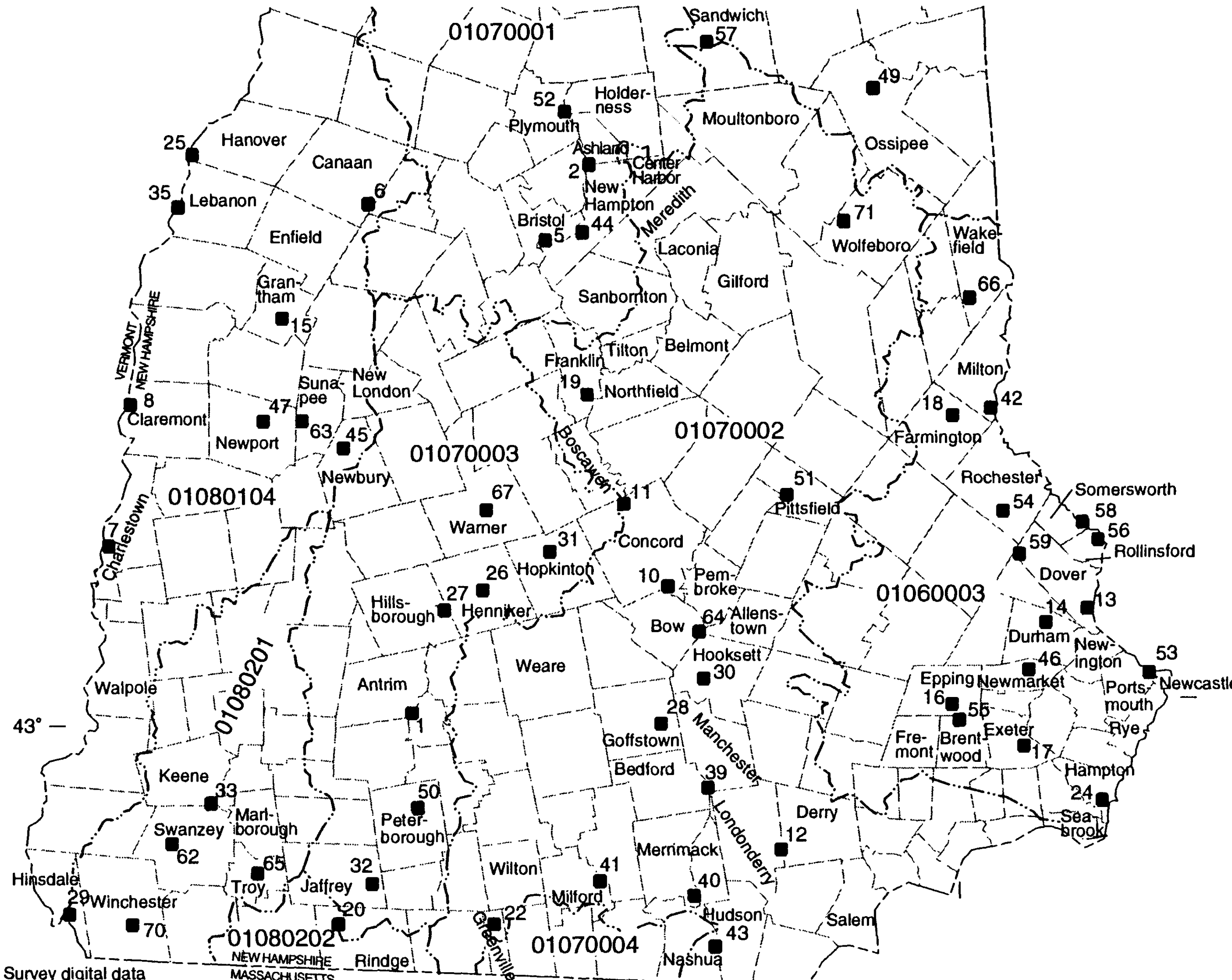


Base from U.S. Geological Survey digital data
New Hampshire State Plane Feet
Scale 1:125,000

Figure 7. Locations of Minor Civil Division boundaries, drainage-subbasin boundaries, and municipal wastewater-treatment facilities in New Hampshire.

– PAGE 43 FOLLOWS –

Table 9. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in New Hampshire, 1990

[Wastewater-treatment facilities in **bold** print are Regional facilities. **1990 return flow:** Average discharge determined from the State of New Hampshire database (Frederick Chormann, New Hampshire Department of Environmental Services, oral commun., 1992). NPDES, National Pollutant Discharge Elimination System. **Sewered population:** Estimated from USBC (U.S. Bureau of the Census, 1991d; U.S. Bureau of the Census, 1991j). Sewered population numbers are rounded to the nearest 10 people. Possible causes for high per capita use values are indicated by the following codes: F, infiltration and inflow; G, large population in group quarters; I, contributions from industries; L, large seasonal population; and O, combined sewers. Mgal/d, million gallon per day; gal/d, gallon per day. --, not applicable]

Wastewater-treatment facility name	Reference No. (fig. 7)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)	Town (Minor Civil Division) served (fig. 7)	Sewered population
Antrim	1	NH0100561	430144	715602	Contoocook River	01070003	0.10	81 F,L	Antrim	860
									Bennington	370
Ashland[1]	2	NH0100005	434124	713843	Squam River	01070001	.33	340 I,L	Ashland	970
Berlin[1]	3	NH0100013	442712	711108	Androscoggin River	01040001	2.45	214 O	Berlin	11,470
Bethlehem	4	NH0100501	441806	714056	Ammonoosuc River	01080101	.21	200 L	Bethlehem	1,050
Bristol	5	NH0100021	433542	714312	Pemigewassett River	01070001	.19	181 L	Bristol	1,050
Canaan (new in 1991)	6		433845	715955	Ground-water discharge	01080104	[2].01	65 L	Canaan	150
Charlestown[1]	7	NH0100765	431340	722550	Connecticut River	01080104	.12	49 F	Charlestown	2,460
Claremont	8	NH0101257	432359	722340	Sugar River	01080104	1.57	152 F,I	Claremont	10,310
Colebrook	9	NH0100315	445403	713014	Connecticut River	01080101	.34	221 --	Colebrook	1,540
Concord-Hall Street[1]	10	NH0100901	431054	713111	Merrimack River	01070002	4.06	158 I	Concord	25,540
									Bow	100
Concord-Penacook[1]	11	NH0100331	431657	713511	Merrimack River	01070002	.89	127 F,I	Concord	5,600
									Boscawen	1,420
Derry[1]	12	NH0100056	425146	712010	Merrimack River	01070002	1.55	107 --	Derry	14,460
Dover[1] (new facility 1991)	13	NH0100064	431030	705130	Varney Brook	01060003	2.92	133 I	Dover	21,980
Durham[1]	14	NH0100455	430806	705413	Oyster River Estuary	01060003	1.02	143 G	Durham	7,150
Eastman Community Associates	15		433030	720645	Ground-water discharge	01080104	[2].03	65 --	Grantham	[3]490
Epping	16	NH0100692	430221	710332	Lamprey River	01060003	.16	95 --	Epping	1,680
Exeter[1]	17	NH0100871	425905	705651	Squamscott River	01060003	1.93	183 F,I,O	Exeter	10,560
Farmington[1]	18	NH0100854	432313	710303	Cocheco River	01060003	[4].25	102 F	Farmington	2,440
Franklin[1]	19	NH0100960	432446	713905	Merrimack River	01070002	[4]5.60	177 I,L	Franklin	6,270
									Belmont	2,470
									Center Harbor	210
									Gilford	2,730
									Laconia	14,590
									Meredith	1,680
									Moultonboro	100
									Northfield	1,830
									Sanbornton	190
									Tilton	1,480
Franklin Pierce College	20	NH0101044	424615	720330	Tributary Pearly Lake	01080202	[2].03	65 --	Rindge	520
Gorham	21	NH0100927	442322	710917	Androscoggin River	01040001	.78	321 F	Gorham	2,430
Greenville	22	NH0100919	424619	714824	Souhegan River	01070002	.10	79 F	Greenville	1,270

Table 9. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in New Hampshire, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 7)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Subbasin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 7)	Sewered population
Groveton-Northumberland....	23	NH0100226	443538	713112	Ammonoosuc River	01080101	0.24	140	--	Northumberland	[5]1,720
Hampton[1]................	24	NH0100625	425519	704913	Tide Mill Creek	01060003	[4]2.30	202	L	Hampton	10,840
										Rye	540
Hanover[1]....................	25	NH0100099	434145	721756	Connecticut River	01080104	1.44	221	F,G	Hanover	6,510
Henniker[1]..................	26	NH0100102	431033	714901	Contoocook River	01070003	.19	110	G	Henniker	1,720
Hillsborough............	27	NH0100111	430910	715257	Contoocook River	01070003	.52	278	F,L	Hillsborough	1,870
Hillsborough County Home...................	28	NH0100439	430045	713200	Piscataquog River	01070002	[2].05	65	--	Goffstown	760
Hinsdale[1]..................	29	NH0100382	424650	722935	Ashuelot River	01080202	.32	194	--	Hinsdale	1,650
Hooksett[1]..................	30	NH0100129	430414	712745	Merrimack River	01070002	.52	107	F	Hooksett	4,860
Hopkinton................	31	NH0100579	431323	714247	Contoocook River	01070003	.05	78	--	Hopkinton	640
Jaffrey[1].....................	32	NH0100595	424923	715947	Contoocook River	01070003	.61	210	F,I	Jaffrey	2,910
Keene[1]......................	33	NH0100790	425454	721554	Ashuelot River	01080201	3.52	156	F,I	Swanzey	[5]700
										Keene	20,790
										Marlborough	1,110
Lancaster[1].................	34	NH0100145	442906	713544	Connecticut River	01080101	.86	339	--	Lancaster	2,540
Lebanon[1].................	35	NH0100366	433814	721925	Mascoma River	01080104	1.70	158	F,I,O	Lebanon	9,560
										Enfield	1,180
Lincoln[1]....................	36	NH0100706	440214	714030	East Pemigewasset	01070001	.44	364	L	Lincoln	1,210
Lisbon......................	37	NH0100421	441205	715546	Ammonoosuc River	01080101	[2].07	65	--	Lisbon	1,050
										Landaff	50
Littleton[1]...................	38	NH0100153	441827	714737	Ammonoosuc River	01080101	.87	194	--	Littleton	4,480
Manchester[1]............	39	NH0100447	425630	712731	Merrimack and Piscataquog Rivers	01070002	18.34	177	I,O	Manchester	94,110
										Goffstown	6,370
										Londonderry	2,420
										Bedford	730
Merrimack[1]................	40	NH0100161	424838	712834	Merrimack River	01070002	3.23	259	F,I	Merrimack	12,470
Milford[1]...................	41	NH0100471	424938	713737	Souhegan River	01070002	1.08	114	F	Milford	7,910
										Wilton	1,560
Milton.......................	42	NH0100676	432341	705912	Salmon Falls River	01060003	.04	71	L	Milton	560
Nashua[1]....................	43	NH0100170	424446	712637	Merrimack and Nashua River	01070002	9.65	113	I,O	Nashua	75,230
										Hudson	10,340
New Hampton Village.................	44	NH0100358	433615	713930	Hatchery Brook	01070001	[2].01	65	--	New Hampton	220
Newbury...................	45	--	432200	720222	Ground-water discharge	01080104	[2].02	65	--	Newbury	[3]370
Newmarket[1]..............	46	NH0100196	430432	705601	Lamprey River	01060003	[4].54	95	F	Newmarket	5,660
Newport[1]..................	47	NH0100200	432237	721054	Sugar River	01080104	.72	194	--	Newport	3,710
North Conway[1].........	48	NH0101354	440115	710716	Saco River	01060002	[2].13	65	--	Conway	1,940
Ossipee.....................	49	NH0101125	434530	710845	Ground-water discharge	01060002	[2].03	65	--	Ossipee	410
Peterborough[1]...........	50	NH0100650	425440	715547	Contoocook River	01070003	.38	138	I	Peterborough	2,750
Pittsfield[1]..................	51	NH0100986	431730	711930	Suncook River	01070002	.31	136	F,I	Pittsfield	2,280

Table 9. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in New Hampshire, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 7)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 7)	Sewered population
Plymouth Village[1]	52	NH0100242	434509	714108	Pemigewasset River	01070001	0.42	108	G	Plymouth	3,640
										Holderness	150
Portsmouth-Pierce Island	53	NH0100234	430423	704427	Piscataqua River	01060003	[4]2.44	97	O	Portsmouth	24,510
										New Castle	530
Rochester[1]	54	NH0100668	431613	705822	Cocheco River	01060003	3.46	206	F	Rochester	16,790
Rockingham County Home	55	NH0100609	430100	710300	Ice Pond Brook	01060003	[2].02	65	--	Brentwood	[5]330
Rollinsford	56	NH0100251	431402	704902	Salmon Falls River	01060003	[2].09	65	--	Rollinsford	1,360
Sandwich	57	--	434830	712630	Ground-water discharge	01070002	[2].01	65	--	Sandwich	120
Somersworth[1]	58	NH0100277	431506	705030	Salmon Falls River	01060003	1.22	149	I	Somersworth	8,180
Strafford County Home	59	NH0100641	431300	705700	Cocheco River	01060003	[2].02	65	--	Dover	[5]310
Stratford Mill House	60	NH0101214	444430	713715	Kimball Brook	01080101	.02	222	L	Stratford	90
Stratford Village	61	NH0100536	444505	713750	Connecticut River	01080101	.03	214	--	Stratford	140
Swanzey	62	NH0101150	425157	721943	Ashuelot River	01080201	.05	71	--	Swanzey	[5]700
Sunapee-New London[1]	63	NH0100544	432246	720650	Sugar River	01080104	.37	359	L	Sunapee	770
										New London	260
Suncook-Allenstown[1]	64	NH0100714	430740	712750	Merrimack River	01070002	.57	83	--	Allenstown	2,860
										Pembroke	4,010
Troy	65	NH0101052	425000	721123	Ashuelot River	01080201	.13	107	--	Troy	1,210
Wakefield	66	--	433215	710155	Ground-water discharge	01060003	[2].01	65	--	Wakefield	150
Warner Village Fire District	67	NH0100498	431634	714841	Warner River	01070003	.06	109	F	Warner	550
Waterville Valley[1]	68	NH0100781	435645	713043	Mad River	01070001	.15	1,000	L	Waterville Valley	150
Whitefield	69	NH0100510	442135	713238	Johns River	01080101	.11	122	L	Whitefield	900
Winchester	70	NH0100404	424605	722330	Ashuelot River	01080201	.15	115	F	Winchester	1,300
Wolfeboro	71	--	433530	711310	Ground-water discharge	01070002	[2].10	65	--	Wolfeboro	1,480
Woodstock	72	NH0101273	440012	714050	Pemigewasset River	01070001	[2].03	65	--	Woodstock	530
Woodsville	73	NH0100978			Ammonoosuc River	01080101	[2].13	65	--	Haverhill	1,450
										Newbury, Vt.	[5]540
Total							82.40				536,200

[1]Classified as a major facility by the USEPA (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992).

[2]Average discharge estimated on the basis of sewered population times average self-supplied domestic per capita of 65 gallons per day (Solley and others, 1993).

[3]Determined from telephone conversations with wastewater-treatment-facility or town personnel.

[4]Determined from USEPA Permit Compliance System database, 1990 data (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992).

[5]Estimated from USEPA Needs Survey database (Larry MacMillan, U.S. Environmental Protection Agency, written commun., 1992).

Rhode Island

Rhode Island had 20 municipal wastewater-treatment facilities in 18 different MCDs (fig. 8, table 10) in 1990. Twenty-nine of a total of 39 MCDs in the State were served entirely or in part by public sewer systems. The estimated total sewered population of the State was 0.689 million or 69 percent of the total population of 1.003 million in 1990 (U.S. Bureau of the Census, 1991e).

Return flows to rivers and the Atlantic Ocean in 1990 from municipal-treatment facilities totalled 136 Mgal/d. Seven regional facilities served 0.528 million people and accounted for 109 Mgal/d, or 80 percent of total daily return flows from municipal wastewater-treatment facilities in Rhode Island. The largest facility, Fields Point in Providence, is administered by the Narragansett Bay Commission and served 0.210 million people in parts of Cranston, Johnston, Lincoln, and North Providence in addition to Providence. This facility treated and discharged more than 55 Mgal/d. The facility in Woonsocket served parts of Woonsocket, North Smithfield, and Blackstone, Massachusetts (fig. 6*A*).

All return flows from municipal wastewater-treatment facilities were to surface-water bodies. The 0.314 million unsewered population in Rhode Island generated approximately 20 Mgal/d of wastewater that was returned through septic systems to ground water.

The State of Rhode Island is contained within the Massachusetts-Rhode Island Coastal Basins subregion (0109). As this basin also includes return flows from the Boston area, Rhode Island only accounted for 17 percent (136 Mgal/d) of total return flows in 1990 to the Massachusetts-Rhode Island Coastal Basins (Appendix 1). Ninety percent (122 Mgal/d) of the total wastewater-return flows generated in Rhode Island were from the Narragansett River Subbasin (01090004).

Like Massachusetts, Rhode Island had a regional facility with part of its collection system in a different subbasin than the facility. Rhode Island's second-largest facility, the Blackstone Valley District Commission, Bucklin Point Facility discharged 23 Mgal/d into the Narragansett River Subbasin (01090004). That facility had sewered customers in the town of Cumberland, which was entirely contained in the Blackstone River Subbasin (01090003) (fig. 8).

Per capita return-flow values for municipal wastewater-treatment facilities in Rhode Island ranged from 79 to 450 gal/d, with a median of 184 gal/d. Although six facilities in the State had per capita return-flow values greater than 200 gal/d, all of these high values can likely be explained by at least one of the five possible anomaly-causing factors. The most frequently identified factors were the presence of industrial contributions, a large seasonal population, and combined sewer overflows. Fourteen of the facilities had at least one industrial connection. No contingency-table analysis was done for Rhode Island because of an insufficient sample size.

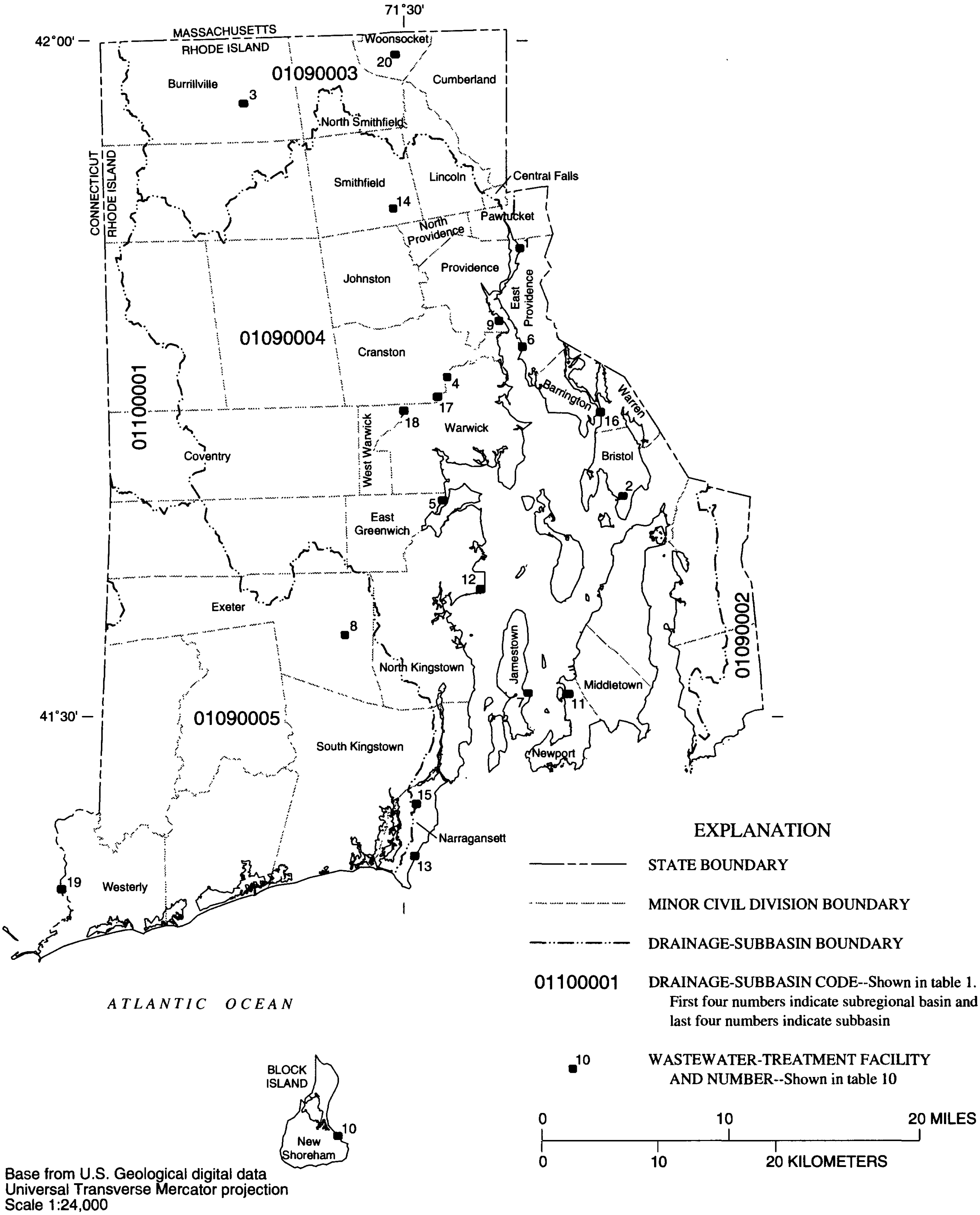


Figure 8. Locations of Minor Civil Division boundaries, drainage-subbasin boundaries, and municipal wastewater-treatment facilities in Rhode Island.

Table 10. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Rhode Island, 1990

[Wastewater treatment facilities in **bold** print are Regional facilities. **1990 return flow:** Average discharge determined from USEPA Permit Compliance System database, 1990 data (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992). NPDES, National Pollutant Discharge Elimination System. **Sewered population:** Estimated from USBC (U.S. Bureau of the Census, 1991e; U.S. Bureau of the Census, 1991k). Sewered population numbers are rounded to the nearest 10 people. Possible causes for high per capita use values are indicated by the following codes: F, infiltration and inflow; G, large population in group quarters; I, contributions from industries; L, large seasonal population; and O, combined sewers. Mgal/d, million gallon per day; gal/d, gallons per day. --, not applicable]

Wastewater-treatment facility name	Reference No. (fig. 8)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 8)	Sewered population
Blackstone Valley District Commission—Bucklin Point Facility[1]	1	RI0100072	415104	712207	Seekonk River	01090004	22.83	174	I,O	East Providence	16,330
										Central Falls	17,190
										Cumberland	14,050
										Lincoln	12,160
										Pawtucket	71,160
Bristol[1]	2	RI0100005	413942	711549	Narragansett Bay	01090004	2.33	115	F,I	Bristol	20,310
Burrillville[1]	3	RI0100455	415742	713910	Clear River	01090003	.57	79	--	Burrillville	7,180
Cranston[1]	4	RI0100013	414509	712635	Pawtuxet River	01090004	12.27	184	I	Cranston	66,820
East Greenwich[1]	5	RI0100030	413930	712653	Greenwich Cove	01090004	.82	192	F,I	East Greenwich	4,270
East Providence[1]	6	RI0100048	414630	712158	Seekonk River	01090004	4.53	94	I	East Providence	32,640
										Barrington	15,740
Jamestown[1]	7	RI0100366	413037	712138	Narragansett Bay	01090004	.42	194	L	Jamestown	2,170
Ladd School	8	RI0100081	413317	713254	Queen River	01090005	.05	294	--	Exeter	170
Narragansett Bay Commission—Fields Point Facility[1]	9	RI0100315	414741	712324	Providence River	01090004	55.14	263	I,O	Providence	158,840
										Cranston	1,850
										Johnston	16,940
										Lincoln	640
										North Providence	31,540
New Shoreham[1]	10	RI0100196	411017	713318	Rhode Island Sound	01090005	.09	450	L	New Shoreham	200
Newport[1]	11	RI0100293	413035	711908	Newport Harbor	01090004	9.78	219	I,O	Newport	27,670
										Middletown	17,060
Rhode Island Port Authority Quonsett Point[1]	12	RI0100404	413523	712432	Narragansett Bay	01090004	.77	209	I	North Kingstown	3,680
Scarborough[1]	13	RI0100188	412307	712837	Rhode Island Sound	01090004	.74	289	I	Narragansett	[2]2,560
Smithfield[1]	14	RI0100251	415255	712955	Woonasquatucket River	01090004	1.30	96	--	Smithfield	13,610
South Kingstown[1]	15	RI0100374	412529	712831	Rhode Island Sound	01090005	2.58	174	I,L	Narragansett	6,020
										South Kingstown	8,850
Warren[1]	16	RI0100056	414333	711710	Warren River	01090004	2.00	198	F	Warren	10,080
Warwick[1]	17	RI0100234	414415	712712	Pawtuxet River	01090004	3.52	99	F,I	Warwick	35,440
West Warwick[1]	18	RI0100153	414337	712917	Pawtuxet River	01090004	5.72	183	I	West Warwick	27,620
										Coventry	3,720
Westerly[1]	19	RI0100064	412134	715010	Pawcatuck River	01090005	2.14	185	I,L	Westerly	11,560

Table 10. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Rhode Island, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 8)	NPDES No.	Latitude ° ′ ″	Longitude ° ′ ″	Receiving water body	Subbasin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)	Town (Minor Civil Division) served (fig. 8)	Sewered population
Woonsocket[1]	20	RI0100111	420000	712948	Blackstone River	01090003	7.93	164 I	Woonsocket	42,840
									North Smithfield	2,880
									Blackstone, Mass.	2,490
Total							135.53			689,220

[1]Classified as a major facility by the USEPA (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992).
[2]Estimated from USEPA Needs Survey database (Larry MacMillan, U.S. Environmental Protection Agency, written commun., 1992).

Vermont

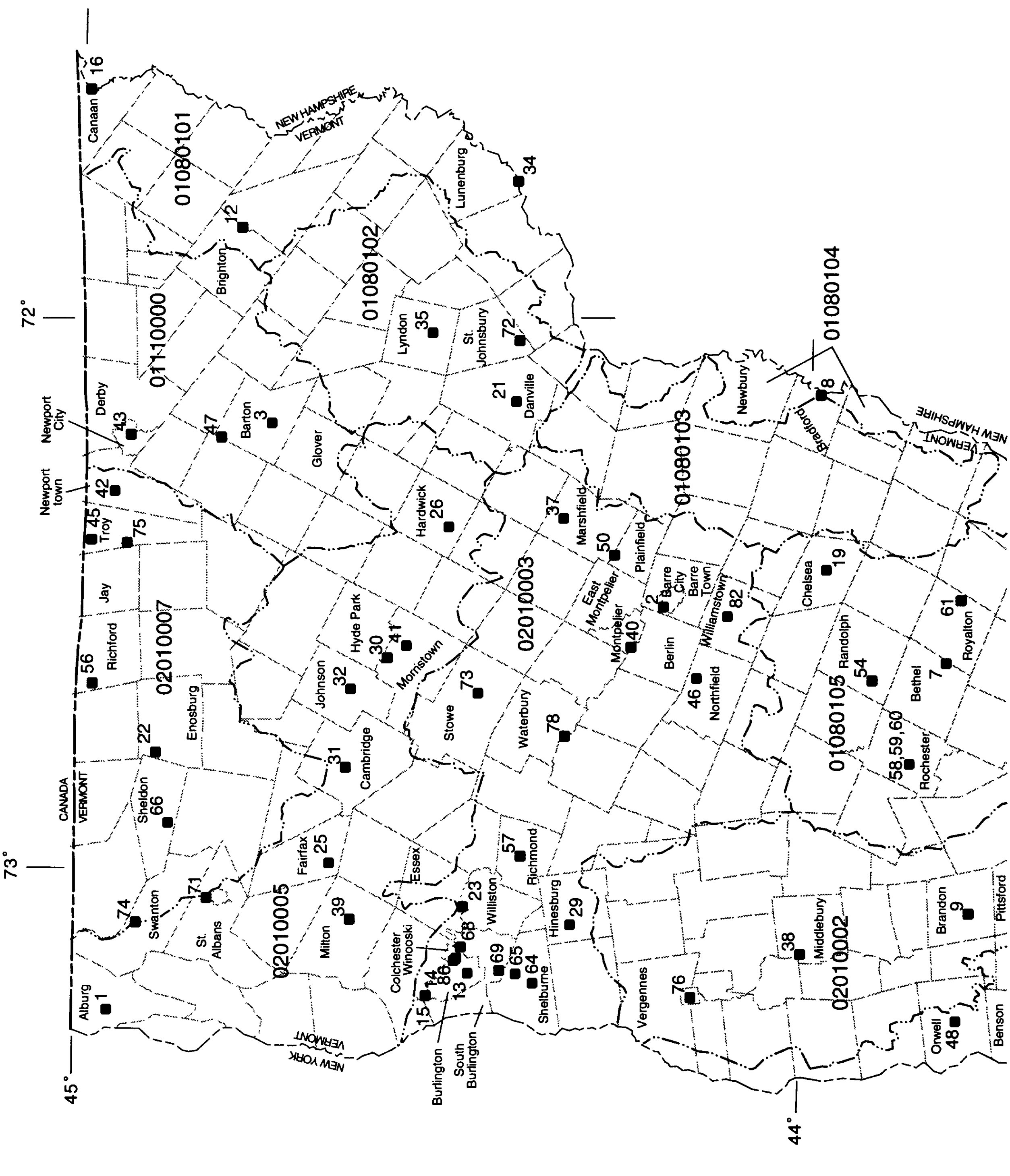
During 1990-92, there were 84 municipal wastewater-treatment facilities in 76 MCDs in Vermont (fig. 9). These facilities served all or parts of 86 MCDs in the State. Location, return flow, and sewered-population data about each municipal wastewater-treatment facility in Vermont is included in table 11. Total sewered population was approximately 0.248 million, or 44 percent of the State's population of 0.563 million (U.S. Bureau of the Census, 1991f). Like Maine, most of Vermont's residents lived in rural communities throughout the State where the majority of households are on individual septic systems.

Return-flow data for the minor municipal wastewater-treatment facilities in Vermont were only available for 1992 from the VDEC (table 11), so these data are presented along with 1990 data for the major facilities. Return flows from municipal wastewater-treatment facilities in Vermont totalled 49 Mgal/d. Twelve regional facilities in the State served 0.105 million people, or 42 percent of the total State sewered population. The Burlington area on Lake Champlain, which includes the towns of Colchester, Winooski, Burlington, and South Burlington, contained six facilities serving 0.057 million people, or 23 percent of the State's sewered population. Two regional facilities in Vermont (Canaan and Bellows Falls, table 11) had service connections in New Hampshire for the towns of Stewartstown, and Walpole (fig. 7), respectively.

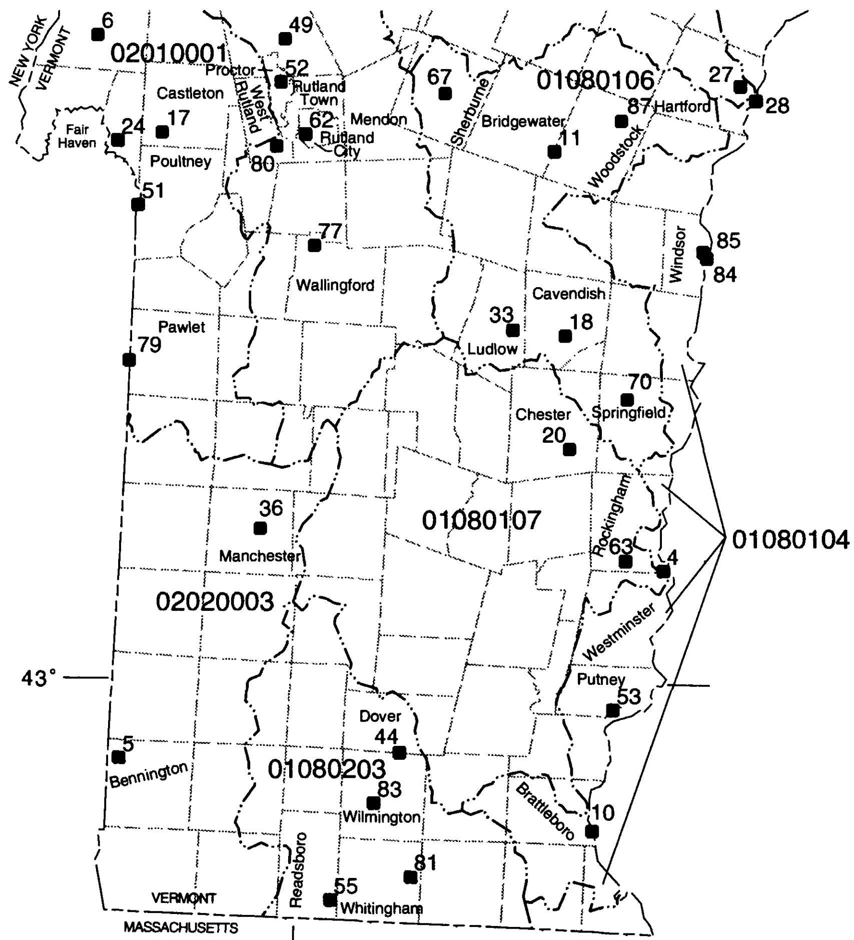
Return flows from 81 municipal wastewater-treatment facilities in Vermont were into surface-water bodies. These facilities served 0.247 million people who generated 49 Mgal/d of wastewater. Three facilities in Vermont discharged 0.2 Mgal/d of wastewater to ground water: Hyde Park, Newport Center Town, and the North Branch Fire District 1 in Dover. Return flows to ground water from unsewered homes in Vermont were about 20 Mgal/d (0.314 million unsewered population times 65 gal/d per person).

Return flows into the Richelieu-Lake Champlain River Basin subregion (0201) from municipal wastewater-treatment facilities in Vermont totalled 34 Mgal/d, or 69 percent of Vermont's total return flows. The Richelieu-Lake Champlain River Basin also includes parts of Canada and New York but does not include areas in any of the other New England States. Most of the return flow (19 Mgal/d) that was discharged from Vermont into this basin was from the Winooski River Subbasin (02010003), which included Burlington, Montpelier, and Barre. Nine Mgal/d, or 19 percent of Vermont's total return flows, was discharged from facilities in Vermont into the Connecticut River Basin subregion (0108). Three percent of the total return flow into the Connecticut River Basin from municipal wastewater-treatment facilities was from Vermont facilities.

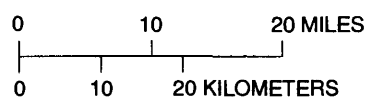
Per capita return flow for municipal wastewater-treatment facilities in Vermont ranged from 29 to 484 gal/d, with a median of 135 gal/d. There were 22 facilities with per capita return flows greater than 200 gal/d, of which 3 were unexplained by any of the five possible anomaly-causing factors. St. Albans and Northfield, with per capita return flows of 471 and 484 gal/d, respectively, each had four possible causes for these high values. High per capita return-flow values were most influenced by the presence of combined sewers, high infiltration and inflow, industrial contributions, and high seasonal populations. Results from a contingency-table analysis (table 4) indicate that there is a statistically significant association in Vermont between high per capita return-flow values and industrial contributions and high infiltration and inflow.



72°
73°
45°
44°
CANADA
VERMONT
NEW HAMPSHIRE
VERMONT
NEW YORK
VERMONT
01080101
01080102
01080103
01080104
01080105
01110000
02010007
02010005
02010003
02010002
Canaan 16
Brighton 12
Lunenburg 34
Lyndon 35
St. Johnsbury 72
Danville 21
Newbury
Bradford 8
Derby
Newport City 43
Newport town 42
Troy 45
75
Barton 3
47
Glover
Hardwick 26
Marshfield 37
Plainfield 50
East Montpelier
Barre City 2
Barre Town
Williamstown 82
Chelsea 19
Montpelier 40
Berlin
Northfield 46
Randolph 54
Royalton 61
Bethel 7
Rochester 58,59,60
Jay
Richford 56
Enosburg
Hyde Park 30
41
Morristown
Johnson 32
Stowe 73
Waterbury 78
Cambridge 31
22
Sheldon 66
Fairfax 25
Essex 23
Richmond 57
Williston
Hinesburg 29
Swanton 74
St. Albans 71
Milton 39
Colchester
Winooski 68
86
14
13
15
69
65
64
Shelburne
Burlington
South Burlington
Alburg 1
Vergennes 76
Middlebury 38
Brandon 9
Pittsford
Orwell 48
Benson



Base from U.S. Geological Survey GIRAS data
Converted to Vermont State Plane Meters
1:250,000 scale



EXPLANATION

— — — —	NATIONAL BOUNDARY
— - - —	STATE BOUNDARY
....	MINOR CIVIL DIVISION BOUNDARY
—··—··—	DRAINAGE-SUBBASIN BOUNDARY
01080107	DRAINAGE-SUBBASIN CODE--Shown in table 1. First four numbers indicate subregional basin and last four numbers indicate subbasin
■ 40	WASTEWATER-TREATMENT FACILITY AND NUMBER--Shown in table 11

Figure 9. Locations of Minor Civil Division boundaries, drainage-subbasin boundaries, and municipal wastewater-treatment facilities in Vermont.

Table 11. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Vermont, 1990

[Wastewater treatment facilities in **bold** print are Regional facilities. **1990 return flow:** Average discharge determined from USEPA Permit Compliance System database, 1990 data (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992). NPDES, National Pollutant Discharge Elimination System. **Sewered population:** Estimated from USBC (U.S. Bureau of the Census, 1991f; U.S. Bureau of the Census, 1991l). Sewered population numbers are rounded to the nearest 10 people. Possible causes for high per capita use values are indicated by the following codes: F, infiltration and inflow; G, large population in group quarters; I, contributions from industries; L, large seasonal population; and O, combined sewers. Mgal/d, million gallon per day; gal/d, gallon per day. --, not applicable]

Wastewater-treatment facility name	Reference No. (fig. 9)	NPDES number	Latitude	Longitude	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 9)	Sewered population
Alburg	1	VT0100005	445754	731810	Lake Champlain	02010005	[1]0.07	233	L	Alburg	300
Barre City[2]	2	VT0100889	441238	723121	Stevens Branch	02010003	3.12	204	--	Barre City	9,460
										Barre Town	5,710
										Berlin	150
Barton	3	VT0100641	444454	721036	Barton River	01110000	[1].10	100	F,L,O	Barton	820
										Glover	[3]180
Bellows Falls[2]	4	VT0100013	430742	722654	Connecticut River	01080104	.47	96	--	Rockingham	3,280
										Westminster	380
										Walpole, N.H.	1,220
Bennington[2]	5	VT0100021	425455	731532	Walloomsac River	02020003	4.57	362	F	Bennington	12,610
Benson	6	VT0100498	434230	731840	Hubbardton River	02010001	[1].01	77	--	Benson	130
Bethel	7	VT0100048	434930	723725	Connecticut River	01080105	[1].07	123	L	Bethel	570
Bradford	8	VT0100803	435952	720710	Waits River	01080104	[1].06	67	F	Bradford	900
Brandon	9	VT0100056	434723	730529	Neshobe River	02010002	[1].31	130	F,O	Brandon	2,380
Brattleboro[2]	10	VT0100064	425029	723259	Connecticut River	01080104	1.87	175	--	Brattleboro	10,690
Bridgewater	11	VT0100846	433511	723712	Ottauquechee River	01080106	[1].01	91	--	Bridgewater	110
Brighton	12	VT0100072	444720	714810	Clyde River	01080101	[1].10	132	F,G,L	Brighton	760
Burlington Main[2]	13	VT0100153	442818	731318	Lake Champlain	02010003	4.20	164	O	Burlington	25,430
										South Burlington	[3]150
Burlington Riverside[2]	14	VT0100307	442915	731138	Winooski River	02010003	.83	165	--	Burlington	5,030
Burlington-North End[2]	15	VT0100226	443140	731557	Winooski River	02010003	1.36	165	F,O	Burlington	8,240
Canaan	16	VT0100625	445940	713220	Connecticut River	01080101	.15	152	L	Canaan	580
Castleton[2]	17	VT0100897	433614	731238	Castleton River	02010001	.25	150	F,G,I,L	Castleton	1,670
Cavendish	18	VT0100862	432308	723602	Black River	01080106	[1].07	135	F,I,L	Cavendish	520
Chelsea	19	VT0100943	435918	722700	White River First Branch	02010005	[1].03	83	F	Chelsea	360
Chester	20	VT0100081	431540	723530	Williams River	01080107	[1].08	74	F	Chester	1,080
Danville	21	VT0100633	442450	720800	Water Andric	01080102	[1].03	125	L	Danville	240
Enosburg Falls	22	VT0100102	445407	724833	Missisquoi River	02010007	[1].30	214	I,O	Enosburg	1,400
Essex Junction[2]	23	VT0100111	442830	730715	Winooski River	02010003	1.48	102	--	Essex	12,080
										Williston	2,490
Fairfax	24	VT0101087	443945	730055	Lamoille River	02010005	[1].03	55	F	Fairfax	550
Fair Haven[2]	25	VT0100129	433533	731646	Castleton River	02010001	[1].24	105	--	Fair Haven	2,280
Hardwick	26	VT0100137	443018	722224	Lamoille River	02010005	[1].19	124	F,O	Hardwick	1,530
Hartford–Quechee Service	27	VT0100978	433940	722020	Ottauquechee River	01080105	[1].16	168	--	Hartford	950
Hartford–White River Junction[2]	28	VT0101010	433844	721855	White and Connecticut Rivers	01080104	.91	169	F,O,L	Hartford	5,380
Hinesburg[2]	29	VT0101028	441957	730731	Laplatte River	02010003	.19	160	I	Hinesburg	1,190
Hyde Park	30	VT0100838	443515	723730	Ground-water discharge	02010005	[4].03	65	--	Hyde Park	370

Table 11. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Vermont, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 9)	NPDES number	Latitude	Longitude	Receiving water body	Sub-basin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 9)	Sewered population
Jeffersonville	31	VT0101150	443835	725004	Lamoille River	02010005	[1]0.02	57	--	Cambridge	350
Johnson	32	VT0100901	443806	724100	Gihon River	02010005	[1]0.14	93	G	Johnson	1,510
Ludlow[2]	33	VT0100145	432330	724045	Black River	01080106	.43	328	F,I,O	Ludlow	1,310
Lunenburg Fire District 2	34	VT0101061	442445	714250	Connecticut River	01080101	[1].05	200	F,L,O	Lunenburg	250
Lyndonville[2]	35	VT0100595	443143	720012	Passumpsic River	01080102	.65	241	F,G,O	Lyndon	2,700
Manchester Town	36	VT0100170	431008	730308	Bourne Brook	02020003	[1].28	188	L	Manchester	1,490
Marshfield	37	VT0100471	442052	722120	Winooski River	02010003	[1].01	29	--	Marshfield	[5]340
Middlebury[2]	38	VT0100188	440105	731023	Otter Creek	02010002	1.18	202	O	Middlebury	5,840
Milton[2]	39	VT0100684	443802	730732	Arrowhead Mountain Lake	02010005	[1].15	94	F	Milton	1,590
Montpelier[2]	40	VT0100196	441518	723602	Winooski River	02010003	2.12	253	F,O	Montpelier	7,990
										Berlin	380
Morrisville Villlage	41	VT0100480	443342	723607	Lamoille River	02010005	[1].33	147	F	Morristown	2,250
Newport Center Town	42	VT0101036	445739	721835	Ground-water discharge	02010007	[1].02	48	L	Newport Town	420
Newport City[2]	43	VT0100200	445624	721200	Clyde River	01110000	.90	173	I,O	Newport City	4,300
										Derby	900
North Branch Fire District 1 Dover	44	VT0100218	425531	725022	Ground-water discharge	01080203	[1].13	131	--	Dover	990
North Troy	45	VT0100234	445938	722355	Missisquoi River	02010007	[1].06	97	F	Troy	[3]620
Northfield[2]	46	VT0100242	440952	723927	Dog River	02010003	1.24	471	F,G,I,O	Northfield	2,630
Orleans Village	47	VT0100251	444858	721215	Barton River	01110000	[1].10	125	F	Barton	800
Orwell	48	VT0100676	434820	731740	East Creek	02010001	[1].02	105	L	Orwell	190
Pittsford	49	VT0100692	434230	730140	Furnace Brook	02010002	[1].05	57	--	Pittsford	870
Plainfield	50	VT0100781	441640	722530	Winooski River	02010003	[1].06	82	F	Plainfield	630
										Marshfield	100
Poultney[2]	51	VT0100269	433126	731445	Poultney River	02010001	.37	220	F,G,L,O	Poultney	1,680
Proctor	52	VT0100528	433942	730200	Otter Creek	02010002	[1].22	121	F	Proctor	1,820
Putney	53	VT0100277	425824	723124	Sacketts Brook	01080104	[1].04	93	--	Putney	430
Randolph	54	VT0100285	435533	723927	White River Third Branch	01080105	[1].26	106	G,O	Randolph	2,460
Readsboro	55	VT0100731	424540	725620	Deerfield River	01080203	[1].02	41	L	Readsboro	490
Richford	56	VT0100790	445924	724051	Missisquoi River	02010007	.35	233	F,O	Richford	1,500
Richmond Village	57	VT0100617	442412	725951	Winooski River	02010003	[1].08	67	--	Richmond	1,190
Rochester 1	58		435230	724844	Ground-water discharge	01080105	[4].01	65	--	Rochester	150
Rochester 2	59		435225	724844	Ground-water discharge	01080105	[4].01	65	--	Rochester	150
Rochester 3	60		435215	724844	Ground-water discharge	01080105	[4].01	65	--	Rochester	150
Royalton	61	VT0100854	434816	723017	White River	01080105	[1].03	79	F	Royalton	380
Rutland (Main plant)[2]	62	VT0100871	433614	725941	Otter and East Creeks	02010002	5.56	291	I,O	Rutland City	18,120
										Rutland Town	670
										Mendon	340
Saxtons River	63	VT0100609	430820	723020	Saxtons River	01080107	[1].04	93	--	Rockingham	430
Shelburne Fire District 2	64	VT0100820	442259	731416	Laplatte River	02010003	[1].26	190	--	Shelburne	1,370

Table 11. Description of municipal wastewater-treatment-facility sites, return flows, and sewered population in Vermont, 1990—*Continued*

Wastewater-treatment facility name	Reference No. (fig. 9)	NPDES number	Latitude	Longitude	Receiving water body	Subbasin code	1990 return flow (Mgal/d)	Per capita return flow and codes (gal/d)		Town (Minor Civil Division) served (fig. 9)	Sewered population
Shelburne Crown Road Fire District 1	65	VT0100331	442421	731317	Lake Champlain	02010003	[1]0.28	204	--	Shelburne	1,370
Sheldon Springs	66	VT0100340	445300	725636	Missisquoi River	02010007	[1].02	82	--	Sheldon	245
Sherburne Fire District 1	67	VT0101141	433905	724713	Ottauquechee River	01080106	[1].09	225	--	Sherburne	[3]400
South Burlington Airport[2]	68	VT0100366	442854	731017	Winooski River	02010003	1.22	129	F,G	South Burlington	6,440
										Colchester	3,030
South Burlington (Bartlett)	69	VT0100358	442544	731255	Lake Champlain	02010003	.75	266	--	South Burlington	2,820
Springfield (Clinton)[2]	70	VT0100374	431901	723022	Black River	01080106	1.70	264	F,I,O	Springfield	6,440
St Albans[2]	71	VT0100323	444947	730514	Lake Champlain	02010005	3.45	470	F,I,L,O	St. Albans	7,340
St. Johnsbury[2]	72	VT0100579	442436	720100	Passumpsic River	01080102	1.06	125	O	St Johnsbury	[3]8,500
Stowe	73	VT0100455	442748	724118	Waterbury River	02010003	[1].13	131	G,L	Stowe	990
Swanton Village[2]	74	VT0100501	445534	730805	Missisquoi River	02010007	.77	216	F,I,L,O	Swanton	3,570
Troy and Jay	75	VT0100391	445640	722430	Missisquoi River	02010007	[1].06	240	F	Troy	[3]210
										Jay	[3]40
Vergennes	76	VT0100404	441001	731534	Otter Creek	02010002	.46	182	G,I	Vergennes	2,530
Wallingford Fire District 1	77	VT0100552	432855	725837	Otter Creek	02010002	[1].11	115	F,L	Wallingford	960
Waterbury	78	VT0100463	442042	724607	Winooski River	02010003	[1].23	112	F	Waterbury	2,060
West Pawlet	79	VT0101192	432115	731513	Indian River	02010001	[1].02	69	L	Pawlet	290
West Rutland[2]	80	VT0100714	433526	730219	Clarendon River	02010002	.26	125	--	West Rutland	2,080
Whitingham Jacksonville	81	VT0101044	424720	724913	North River East Branch	01080203	[1].02	74	L	Whitingham	270
Williamstown	82	VT0100722	440720	723220	Stevens Branch	02010003	[1].06	70	F	Williamstown	860
Wilmington	83	VT0100706	425210	725236	Deerfield River	01080203	[1].09	87	L,O	Wilmington	1,030
Windsor Main[2]	84	VT0100919	432820	722317	Connecticut River	01080104	.47	160	I,O	Windsor	2,930
Windsor-Weston Heights	85	VT0100447	432842	722336	Connecticut River	01080104	[1].01	91	--	Windsor	110
Winooski[2]	86	VT0100510	442926	731151	Winooski River	02010003	.98	148	F,O	Winooski	6,610
Woodstock Main	87	VT0100757	433724	723118	Ottauquechee River	01080106	[1].25	156	F,L,O	Woodstock	1,600
Total							48.94				248,440

[1]Data provided by State of Vermont database, 1992 data (Virginia Little, Vermont Department of Environmental Conservation, written commun., 1992).
[2]Classified as a major facility by the USEPA (Ed Kim, U.S. Environmental Protection Agency, written commun., 1992).
[3]Provided by a telephone conversation with wastewater-treatment-facility or town personnel.
[4]Estimated on the basis of sewered population times average self-supplied domestic per capita of 65 gallons per day (Solley and others, 1993).
[5]Estimated from USEPA Needs Survey database (Larry MacMillan, U.S. Environmental Protection Agency, written commun., 1992).

WASTEWATER COLLECTION AND RETURN FLOW IN NEW ENGLAND

In New England, return flows of treated water from 490 municipal wastewater-treatment facilities totalled about 1,725 Mgal/d during 1990. A summary of the return-flow data described for each State is in table 12. These 490 facilities served 66 percent of the population (8.717 million) in the six States and discharged 1,723 Mgal/d of treated wastewater to surface water and 2 Mgal/d to ground water. Twenty-two percent (106 facilities) of these were regional facilities that served populations of more than one MCD. Four facilities had collection systems in two States. Six hundred and fifty-one out of 1,606 MCDs in New England were at least partially sewered. In New England, the two largest municipal wastewater-treatment facility return flows were from the Deer Island (270 Mgal/d) and the Nut Island (136 Mgal/d) facilities into Boston Harbor (table 8).

Median per capita return flow from municipal wastewater-treatment facilities for the New England States ranged from 135 gal/d in Vermont to 186 gal/d in Maine (table 5). The median per capita return-flow value for all municipal wastewater-treatment facilities in New England was 167 gal/d, which incorporates the net amount of wastewater that was conveyed through collection systems from domestic, commercial, industrial, infiltration and inflow, or combined sewers, and the loss of water through exfiltration.

The estimated aggregate volume of wastewater discharged to ground water from on-site septic systems for the unsewered population of New England was 291 Mgal/d in 1990 (table 12). Adding this amount to the volume of return flow from municipal wastewater-treatment facilities results in a total wastewater return-flow volume of 2,016 Mgal/d, of which 86 percent was treated at a public facility, and the remaining 14 percent was discharged directly to ground water from septic systems. This aggregate return-flow volume

Table 12. Summary of return-flow data for the sewered and unsewered population in New England, by State, 1990

[**Total population:** U.S. Bureau of the Census, (1991a-f). **Estimated return flow from septic systems:** Number reflects estimate of unsewered population calculated as the difference between the State total population and sewered population times 65 gal/d per person. Mgal/d, million gallons per day; <, less than; gal/d, gallon per day]

State	Total population (millions)	Sewered population				Unsewered population	
		1990 total return flow (Mgal/d)	1990 sewered population (millions)	Return flows to surface water (Mgal/d)	Return flows to ground water (Mgal/d)	1990 unsewered population (millions)	Estimated return flow from septic systems (Mgal/d)
Connecticut	3.284	417	2.291	417	<1	0.993	65
Maine	1.228	136	.587	136	<1	.641	42
Massachusetts	6.015	905	4.366	903	2	1.650	107
New Hampshire	1.109	82	.536	82	<1	.573	37
Rhode Island	1.003	136	.689	136	0	.314	20
Vermont	.563	49	.248	49	<1	.314	20
New England	13.203	1,725	8.717	1,723	2	4.485	291

does not include amounts contributed by unsewered commercial or industrial establishments. Further refinements to a water-use model would include estimates of return flows from unsewered commercial and industrial establishments.

A comparison of sewered and unsewered populations for the New England States is shown in figure 10. Each of the three mostly rural States (Maine, New Hampshire, and Vermont) had nearly equal sewered and unsewered populations. Conversely, the three more densely populated States (Connecticut, Massachusetts, and Rhode Island) had significantly larger sewered populations than unsewered populations because a larger percentage of people lived in urban areas than in rural areas.

Wastewater discharged into brackish or **saline water** (ocean or estuary) is unavailable for reuse as freshwater unless treated; however, wastewater discharged into freshwater becomes part of the instream flow of a river and can be withdrawn for reuse. Because populations tend to concentrate at or near coastal areas, many of the municipal wastewater-treatment facilities in Maine and Rhode Island, and some in Connecticut and Massachusetts, discharged directly into the Atlantic Ocean or its bays, inlets, or estuaries. In New England, 61 facilities discharged into saline or brackish water, including tidal rivers, for a total return flow of 680 Mgal/d, or 39 percent of the total return flows from municipal wastewater-treatment

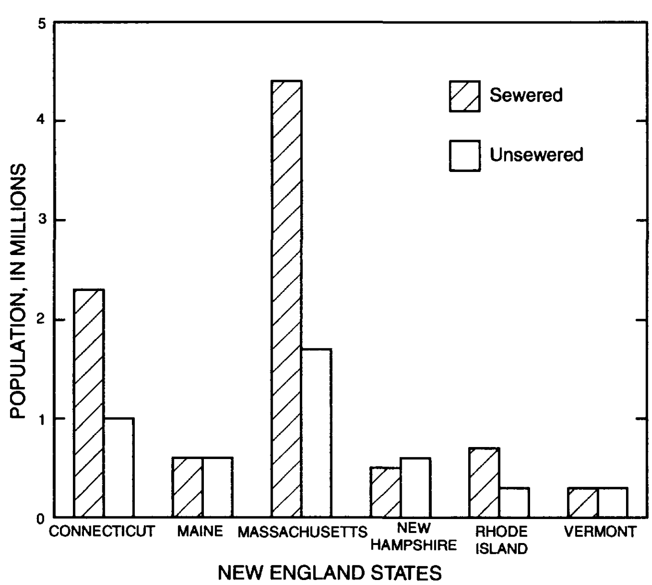


Figure 10. Sewered and unsewered populations in the New England States for 1990.

facilities (Appendix 1). Return flows from facilities in Massachusetts were discharged into saline water at a rate of 533 Mgal/d or 78 percent of total return flows into saline water from municipal wastewater-treatment facilities in New England; 80 Mgal/d or 12 percent were discharged from Connecticut, 43 Mgal/d or 6 percent were discharged from Maine, 18 Mgal/d or almost 3 percent were discharged from Rhode Island, and 6 Mgal/d or less than 1 percent were discharged from New Hampshire.

A review of data on municipal wastewater-treatment facilities in New England shows some anomalies when comparing data among the States. For example, although Vermont had the lowest total sewered population of the six States (table 12), it had more municipal wastewater-treatment facilities (87) than Connecticut (86), New Hampshire (73) and Rhode Island (20). Similarly, Maine and Massachusetts had about the same number of facilities (115 and 113, respectively), yet the facilities in Massachusetts served more than seven times the population of those in Maine (table 12). Possible reasons why the number of facilities were significantly different from State to State include extent of urbanization, availability of State and Federal dollars to supplement local sources of funding for construction of a new facility, feasibility of tying into an existing nearby facility, local topography, and the present water quality of the receiving water body. Even if an existing facility in a nearby area has the design capacity to accept the additional load from a new wastewater-collection system, it could be more costly if the wastewater needs to be pumped to a high elevation for treatment. Thus, it is more common to see a few large facilities in flat areas and many but small facilities in areas of varying topography. For example, three facilities served the hilly, 10.5-mi^2 city of Burlington, Vermont (table 11), whereas a single facility served the flat 68.3-mi^2 glacial-outwash plain of Central Falls, Cumberland, East Providence, Lincoln, and Pawtucket, Rhode Island (table 10).

Monthly total return flows for all municipal wastewater-treatment facilities in New England ranged from 1,415 Mgal/d in September to 1,996 Mgal/d in April (fig. 11, Appendix 1). Inflows from surface runoff and infiltration of ground water from leaks into wastewater-collection systems during spring snowmelt contributed to the large volumes of water in the spring. Similarly, exfiltration which occurs when the water table is below sewer pipes during dry periods, contributes towards low return flows during the

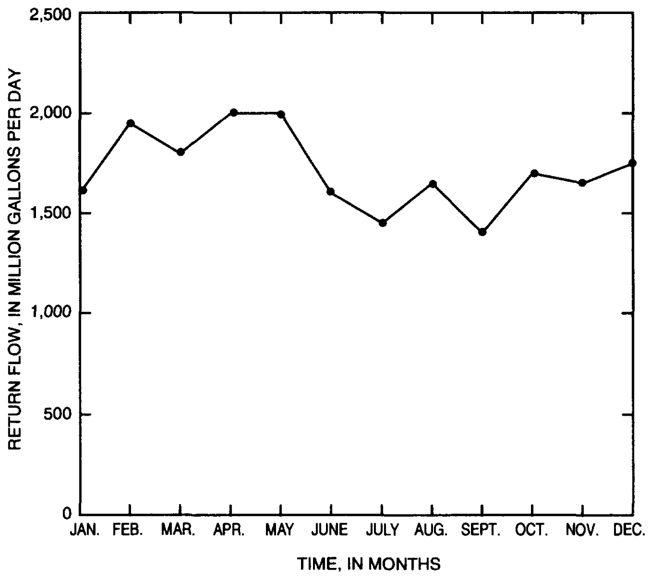


Figure 11. Monthly variations in total return flows from municipal wastewater-treatment facilities in New England, 1990.

summer and early autumn. Monthly fluctuations can also indicate seasonal differences in populations for small summer communities such as Old Orchard Beach in Maine (fig. 5) and Hampton in New Hampshire (fig. 7). In addition, return flows that were greater during September through June than during July or August probably represent an influx of students in small towns with large universities such as Amherst, Massachusetts (fig. 6*A*); Durham, New Hampshire; and Orono, Maine.

WASTEWATER COLLECTION AND RETURN FLOW BY DRAINAGE BASIN

Wastewater-collection and return-flow data are grouped by drainage basins and subbasins for easier use in the planning and allocation of water resources. States that are implementing watershed-management programs will be able to determine the total volume of return flow for entire drainage basins rather than just for drainage areas in the State. This total volume can be used to compare significant gains or losses of water through interbasin transfers to or from drainage basins. Water availability is affected by interbasin transfers because water can be withdrawn and discharged into different basins (water can be used in either the basin of withdrawal or discharge). This gain or loss has to be included in any water-use analysis because the transfer represents a gain or loss to the volume of water available for use in either of the affected basins. There is also a loss of water to a basin if a large proportion of the total return flow from the basin is discharged into saline water. Although an analysis of unsewered total return flows by drainage basin, similar to the sewered analysis done in each State, would be useful (Marc Loiselle, Maine Geological Survey, written commun., 1994), population data are not available from the USBC by drainage basin and, therefore, was not included in this report.

The Massachusetts-Rhode Island Coastal Basins subregion (0109), with 67 municipal wastewater-treatment facilities each discharging more than 0.01 Mgal/d (Appendix 1), had the largest total return flow (808 Mgal/d) of all the subregional drainage basins inventoried for this report. More than half (406 Mgal/d) of the total return flows can be attributed to the two MWRA facilities (Deer Island and Nut Island) serving Boston and the surrounding area (table 8). About 201 Mgal/d of the wastewater return flows from these two facilities was withdrawn from a reservoir in the Connecticut River Basin subregion (0108), and about 114 Mgal/d was withdrawn from a reservoir in the Merrimack River Basin subregion (0107) (Bratton, 1991). This water, withdrawn from the Connecticut and Merrimack River Basins and discharged into the Massachusetts-Rhode Island Coastal Basins, constituted a large interbasin transfer of water.

Other large interbasin transfers (at the drainage subbasin level) were in Connecticut. Some of the water discharged in the Lower Connecticut River Subbasin (01080205) (fig. 1) from the Hartford area was withdrawn from reservoirs in the Farmington River Subbasin (01080207). Water discharged in the Shetucket River Subbasin (01100002) originated in the Lower Connecticut River Subbasin (01080205) (Howard Sternberg, Connecticut Department of Environmental Protection, oral commun., 1993).

The Connecticut Coastal subregion (0110, 292 Mgal/d), the Connecticut River subregion (0108, 291 Mgal/d), and the Merrimack River subregion (0107, 130 Mgal/d) Basins produced the second, third, and fourth largest volumes of return flows, with 73, 113, and 48 municipal wastewater-treatment facilities discharging into these respective basins (Appendix 1). Sewered population in the remaining nine subregional basins in New England generated return flows of

204 Mgal/d (Appendix 1). Each of the four drainage basins with the largest return flows are contained entirely or almost entirely in New England. Drainage subbasins with the largest volumes of return flows were the Charles River Subbasin (01090001), 516 Mgal/d; the Narragansett River Subbasin (01090004), 159 Mgal/d; and the Lower Connecticut River Subbasin (01080205), 130 Mgal/d (Appendix 1).

Eighty-one percent (551 Mgal/d) of return flows into saline water were from the Massachusetts-Rhode Island Coastal Basins subregion (0109), 12 percent (80 Mgal/d) were from the Connecticut Coastal Basins subregion (0110), 6 percent (42 Mgal/d) were from the Saco River Basin subregion (0106), and 1 percent (7 Mgal/d) were from the Maine Coastal Basins subregion (0105) (Appendix 1). Because all of the water originates as fresh water, the amount discharged into saline water is a loss to the freshwater hydrologic system.

SUMMARY

Site-specific data were compiled from Federal, State, and local sources for municipal wastewater-collection systems, treatment facilities, and return flows in New England. Methods of quality control were developed and are described in this report. The quality-control procedures included the use of GIS to verify facility locations, corroboration of return-flow and some sewered-population data from several sources, and calculation of a per capita return-flow value for each municipal wastewater-treatment facility. Municipal wastewater-treatment facilities with industrial contributions, high infiltration and inflow, combined sewer overflows, high seasonal populations, or populations in group quarters were identified. In addition, a contingency-table analysis was done to determine if there is a statistical association between industries or infiltration and inflow and increasing ranges of per capita wastewater-return-flow values. An association between these factors was identified in Connecticut, Massachusetts, and Vermont. No statistical association was found in Maine and New Hampshire and the test was not done for Rhode Island because of insufficient sample size.

During 1990, 490 municipal wastewater-treatment facilities served approximately 67 percent of New England's population; of these facilities, 106 were regional facilities that served more than 1 MCD and 4 served customers in more than 1 State. Return flows from the 490 facilities totalled nearly 1,725 Mgal/d. In 1990, Massachusetts accounted for the largest volume of return flows in 1990 (905 Mgal/d), followed by Connecticut (417 Mgal/d), Maine (138 Mgal/d), Rhode Island (136 Mgal/d), New Hampshire (83 Mgal/d), and Vermont (49 Mgal/d. The more densely populated States of Massachusetts, Rhode Island, and Connecticut had the highest percentage of population sewered in New England with 73, 69, and 70 percent of their populations sewered, respectively.

In 1990, the Massachusetts-Rhode Island Coastal River Basins accounted for the largest return flow (808 Mgal/d), followed by the Connecticut Coastal Basins (292 Mgal/d), the Connecticut River Basin (291 Mgal/d), the Merrimack River Basin (130 Mgal/d), and the Saco River Basin (68 Mgal/d). Return flows from the eight other drainage basins in New England totalled 136 Mgal/d.

Several cases of interbasin transfers of water were present in the study area. In Massachusetts and Connecticut, large volumes of water were withdrawn by public suppliers from reservoirs, conveyed to users in other basins, and discharged to waters outside the basins containing the reservoirs. The two largest return-flow volumes in New England from individual municipal wastewater-treatment facilities (the MWRA facilities, Deer Island and Nut Island) were from the Massachusetts-Rhode Island Coastal Basins subregion (0109); these return flows predominantly were composed of water that was withdrawn from reservoirs in the Connecticut and Merrimack River Basins subregions (0108 and 0107). Also, the wastewater-collection systems for the regional facilities of Lowell, Springfield, Upper Blackstone in Massachusetts, and Blackstone Valley District Commission in Rhode Island had customers in towns that were in different subbasins than the facilities.

Estimates of return flow from the aggregate unsewered residential population of each State were done to provide a more complete analysis of return flows in New England in 1990. Return flows from on-site septic systems in New England totalled about 291 Mgal/d. Combined return flows from septic systems and treated municipal wastewater return flows were 2,016 Mgal/d. This aggregate return flow, however, does not include amounts contributed by unsewered commercial or industrial establishments.

The volume of wastewater-treatment-facility return flows discharged into brackish or saline water was about 680 Mgal/d, or 39 percent of total return flows from municipal wastewater-treatment facilities in New England. Massachusetts discharged the largest volume (533 Mgal/d) of treated wastewater into saline water in 1990, followed by Connecticut (80 Mgal/d), Maine (43 Mgal/d), Rhode Island (18 Mgal/d), and New Hampshire (6 Mgal/d). By drainage basin, the volume of return flows into saline water in New England in descending order was from the Massachusetts-Rhode Island Coastal Basins (551 Mgal/d), the Connecticut Coastal Basins (80 Mgal/d), the Saco River Basin (42 Mgal/d), and the Maine Coastal Basins (7 Mgal/d).

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- PAGE 61 FOLLOWS

APPENDIX 1

– PAGE 63 FOLLOWS

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990

[Data from Seabar and others, 1987. If the annual average daily flow was estimated on the basis of population (as noted in tables 6-11), then each month's mean daily return flows were assumed to be that same value. MWRA, Massachusetts Water Resources Authority; MCI, Massachusetts Correctional Institute; MDC, Metropolitan District Commission; Mgal/d, Million gallons per day. --, no data]

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d: Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01010001	Madawaska	Maine	Fresh	0.66	0.36	0.38	0.69	0.94	0.84	0.52	--	0.47	0.46	1.00	0.91	0.73
	Van Buren	Maine	Fresh	.43	.40	.41	.58	.68	.42	.26	0.26	.29	.28	.64	.53	.37
Total				1.09	.76	.79	1.27	1.62	1.26	.78	.26	.76	.74	1.64	1.44	1.10
01010003	Fort Kent	Maine	Fresh	.28	.21	.23	.34	.47	.34	.21	.20	.23	.23	.32	.32	.28
	St. Agatha	Maine	Fresh	.04	.02	.02	.03	.09	.04	.02	.02	.02	.02	.08	.05	.04
Total				.32	.23	.25	.37	.56	.38	.23	.22	.25	.25	.40	.37	.32
01010004	Ashland Sewer District	Maine	Fresh	.27	.12	.12	--	.55	.34	.21	.21	.21	.17	.46	.31	.30
	Caribou	Maine	Fresh	1.21	.48	.51	1.18	2.04	1.15	1.01	.90	.92	.74	2.05	2.10	1.50
	Fort Fairfield	Maine	Fresh	.59	.39	.39	.63	1.05	.64	.45	.41	.49	.40	.80	.77	.66
	Limestone Sewer District	Maine	Fresh	.33	.14	.14	.30	.87	.27	.19	.18	.17	.14	.61	.48	.42
	Mapleton Sewer District	Maine	Fresh	.14	.04	.04	.08	.18	.07	.05	.04	.04	.04	.11	.11	.89
	Presque Isle	Maine	Fresh	2.68	1.41	1.41	3.19	4.43	2.86	2.07	1.86	2.13	1.90	3.88	3.86	3.12
	Washburn	Maine	Fresh	.14	.17	.14	.18	.25	.11	.31	--	.06	.05	.17	.10	.08
Total				5.36	2.75	2.74	5.56	9.36	5.44	4.29	3.58	4.01	3.44	8.07	7.72	6.97
01010005	Houlton Water	Maine	Fresh	2.11	1.00	1.10	2.60	2.90	1.50	1.70	1.20	2.80	1.70	2.40	3.90	2.50
	Mars Hill	Maine	Fresh	.18	.07	.08	.19	.41	.20	.12	.08	.10	.03	.28	.34	.26
Total				2.29	1.07	1.18	2.79	3.31	1.70	1.82	1.28	2.90	1.73	2.68	4.24	2.76
Total for basin [1]0101				9.06	4.82	4.95	9.99	14.84	8.78	7.12	5.34	7.92	6.16	12.79	13.76	11.14
01020001	East Millinocket	Maine	Fresh	.50	.30	.36	.65	.80	.60	.44	.30	.33	.27	.57	.73	.67
	Millinocket	Maine	Fresh	1.53	1.15	1.11	1.55	1.96	1.82	1.72	1.16	1.10	1.04	1.72	2.07	1.99
Total				2.03	1.45	1.47	2.20	2.76	2.42	2.16	1.46	1.43	1.31	2.29	2.80	2.66
01020003	Danforth	Maine	Fresh	.05	.06	.06	.06	.06	.05	.04	.03	.03	.03	.05	.06	.06
Total				.05	.06	.06	.06	.06	.05	.04	.03	.03	.03	.05	.06	.06
01020004	Brownville	Maine	Fresh	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
	Dover-Foxcroft	Maine	Fresh	.32	--	--	--	--	--	--	--	.25	.27	.40	.39	.31
	Milo Water District	Maine	Fresh	.29	.29	.29	.29	.29	.29	.29	.29	.29	.29	.29	.29	.29
Total				.64	.32	.32	.32	.32	.32	.32	.32	.57	.59	.72	.71	.63
01020005	Bangor	Maine	Fresh	7.61	6.36	6.54	11.99	11.21	7.92	5.68	5.72	6.99	6.09	6.65	8.93	7.21
	Brewer	Maine	Fresh	3.44	4.33	4.53	3.88	4.08	3.42	3.24	2.71	2.56	2.42	2.85	3.42	3.86
	Bucksport	Maine	Fresh	.38	.37	.38	.44	.52	.44	.39	.29	.26	.21	.35	.41	.49
	East Machias	Maine	Fresh	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
	Lincoln	Maine	Fresh	.80	.62	.64	1.04	1.14	1.04	.69	.51	.56	.47	.80	1.00	1.05
	Old Town	Maine	Fresh	1.02	.87	1.03	1.27	1.38	1.11	.93	.87	.78	.68	.90	1.07	1.33

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01020005	Orono	Maine	Fresh	1.77	1.57	1.99	2.34	2.65	1.84	1.49	1.15	1.10	1.21	1.98	1.70	2.24
	Penobscot Indian Nation	Maine	Fresh	.06	.06	.06	.06	.06	.05	.05	.05	.05	.05	.06	.06	.07
	Veazie	Maine	Fresh	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
	Winterport	Maine	Fresh	.16	.17	.17	.23	.25	.19	.16	.11	.10	.07	.16	--	--
Total				15.42	14.53	15.51	21.44	21.47	16.19	12.81	11.58	12.57	11.38	13.93	16.76	16.42
Total for basin [1]0102				18.14	16.36	17.36	24.02	24.61	18.98	15.33	13.39	14.61	13.31	16.99	20.33	19.77
01030001	Jackman Sewer District	Maine	Fresh	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07
Total				.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07
01030003	Anson-Madison	Maine	Fresh	4.23	3.99	4.15	4.40	4.26	4.30	4.06	4.19	4.07	4.00	4.50	4.49	4.40
	Augusta	Maine	Fresh	4.55	3.44	4.48	5.77	5.86	5.07	3.91	3.50	3.41	3.20	4.87	5.10	5.94
	Bingham	Maine	Fresh	.12	.08	.08	.13	.22	.19	.08	.06	.08	.07	.14	.17	.10
	Corinna Sewer District	Maine	Fresh	.61	.45	.65	.82	.78	.57	.65	.42	.66	.49	.59	.54	.67
	Farmington	Maine	Fresh	.47	.49	.46	.58	.55	.49	.40	.39	.38	.38	.49	.55	.55
	Gardiner	Maine	Fresh	1.35	1.11	1.38	1.83	1.89	1.83	1.00	.80	.87	.89	1.37	1.54	1.71
	Guilford-Sangerville	Maine	Fresh	.44	.42	.45	.52	.51	.45	.46	.34	.34	.37	.47	.47	.47
	Hartland	Maine	Fresh	.91	.96	.98	1.03	1.04	1.11	.96	.72	1.07	.82	.74	.70	.75
	Kennebec	Maine	Fresh	11.62	9.89	10.79	12.88	12.96	12.32	11.00	9.45	8.96	8.93	12.43	14.58	15.29
	Kingfield	Maine	Fresh	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
	Newport	Maine	Fresh	.47	.31	.41	.57	.72	.65	.54	.47	.30	.25	.41	.42	.55
	Oakland	Maine	Fresh	.55	.46	.53	.69	.73	.67	.56	.42	.44	.39	.54	.65	
	Pittsfield	Maine	Fresh	1.23	1.39	1.10	1.35	1.45	1.09	1.08	1.11	1.30	1.03	1.12	1.14	1.54
	Richmond	Maine	Fresh	.30	.29	.26	.38	.38	.45	.20	.17	.15	.13	.32	.39	.48
	Skowhegan	Maine	Fresh	1.42	.92	1.11	1.82	1.97	1.73	1.53	1.38	1.08	.87	1.31	1.62	1.71
	Unity	Maine	Fresh	.23	--	--	--	.25	.19	.25	--	--	--	--	--	--
	Vassalboro	Maine	Fresh	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07
	Wilton	Maine	Fresh	.19	.19	.19	.22	.22	.22	.18	.17	.17	.16	.19	.19	.19
Total				28.81	24.49	27.14	33.10	33.89	31.43	26.99	23.69	23.39	22.10	29.62	32.68	34.47
Total for basin [1]0103				28.88	24.56	27.21	33.17	33.96	31.50	27.06	23.76	23.46	22.17	29.69	32.75	34.54
01040001	Berlin	N.H.	Fresh	2.45	2.42	2.82	2.76	3.48	2.40	1.89	--	2.32	1.48	2.44	2.49	2.43
	Gorham	N.H.	Fresh	.78	.63	.75	.95	.92	.80	.73	.63	.83	.55	.79	.89	.82
	Rangely	Maine	Fresh	.12	.11	.12	.15	.15	.14	.12	.11	.13	.09	.14	.11	.09
Total				3.35	3.16	3.69	3.86	4.55	3.35	2.74	.74	3.28	2.13	3.37	3.49	3.34
01040002	Bethel	Maine	Fresh	.16	.10	.12	.20	.20	.15	.15	.12	.18	.12	.17	.20	.23
	Canton	Maine	Fresh	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
	Jay	Maine	Fresh	.04	.03	.03	.04	.03	.03	.03	.03	.04	.03	.04	.04	.05

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01040002	Lewiston-Auburn	Maine	Fresh	11.78	10.20	11.60	15.41	15.11	12.62	11.52	9.40	8.77	8.17	11.08	13.29	14.26
	Lisbon	Maine	Fresh	.90	.52	.47	.87	.82	.87	1.09	.90	.89	.88	1.11	1.44	--
	Livermore Falls	Maine	Fresh	.83	.65	.70	1.03	1.11	.97	.81	.57	.52	.48	.83	1.10	1.21
	Mechanic Falls	Maine	Fresh	.40	.24	.36	.60	.65	.52	.40	.27	.24	.19	.32	.46	.54
	Norway	Maine	Fresh	.36	.80	.30	.30	.30	.30	.30	.30	.30	.30	.30	--	.45
	Paris	Maine	Fresh	.32	.36	.42	.42	.38	.37	.32	.23	.23	.23	.29	.28	.36
	Rumford-Mexico	Maine	Fresh	1.50	1.09	1.24	1.92	2.11	1.89	1.47	1.09	1.45	1.03	1.63	1.59	1.54
	Sabattus	Maine	Fresh	.11	.08	.11	--	.12	.13	.13	--	.08	.09	.11	.12	.13
Total				16.44	14.11	15.39	20.83	20.87	17.90	16.24	12.95	12.75	11.56	15.92	18.56	18.80
Total for basin [1]0104				19.79	17.27	19.08	24.68	25.42	21.24	18.99	13.69	16.03	13.68	19.30	22.05	22.15
01050001	Baileyville	Maine	Fresh	.31	.35	.33	.48	.50	.42	.18	.12	.08	.13	.28	.36	.47
	Calais	Maine	Fresh	.53	.30	.31	.48	.71	.58	.46	.38	.34	.41	.67	.85	.83
	Passamaquoddy, The Strip	Maine	Fresh	.02	.02	.02	.02	.02	.01	.01	.01	.01	.01	.02	.03	.04
Total				.86	.68	.66	.98	1.22	1.01	.65	.51	.43	.55	.97	1.25	1.33
01050002	Bar Harbor, Hulls Cove	Maine	Saline	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
	Bar Harbor, Main	Maine	Saline	1.13	1.15	1.18	1.09	1.10	1.26	1.17	1.05	1.19	.93	.99	1.18	1.30
	Belfast	Maine	Saline	.59	.52	.55	.70	.75	.63	.57	.44	.45	.38	.62	.71	.81
	Blue Hill	Maine	Fresh	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
	Camden	Maine	Saline	.78	.76	.83	.92	1.14	.92	.47	.59	.62	.46	.63	.77	1.21
	Castine	Maine	Saline	.15	.16	.17	.17	.21	.16	.15	.10	.11	.09	.13	.16	.16
	Ellsworth	Maine	Saline	.55	.56	.54	.62	.69	.62	.56	.42	.49	.41	.50	.55	.64
	Islesboro	Maine	Saline	.04	.05	.05	.06	.08	.03	.02	.02	.02	.01	.03	.06	.00
	Lubec	Maine	Fresh	.23	.23	.23	.23	.23	.23	.23	.23	.23	.23	.23	.23	.23
	Machias	Maine	Fresh	.39	.43	.35	.41	.47	.46	.26	.28	.27	.30	.45	.46	.51
	Milbridge	Maine	Fresh	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
	Mount Desert	Maine	Saline	.22	.28	.25	.27	.34	.23	.20	.14	.15	.09	.12	.24	.37
	North Haven	Maine	Fresh	.04	.06	.05	.03	.03	.03	.03	.03	.03	.03	.03	.04	.05
	Northport Village Corporation	Maine	Saline	.07	.05	.07	.08	.11	.09	.06	.03	--	--	.04	.06	.07
	Passamaquaddy, Pleasant Point	Maine	Saline	.07	.06	.06	.07	.09	.08	.06	.05	.07	.06	.07	.08	.10
	Searsport	Maine	Saline	.10	.09	.09	.10	.10	.09	.09	.09	.10	.09	.10	.10	.10
	Southwest Harbor	Maine	Saline	.23	.26	.25	.21	.24	.24	.23	.23	.24	.17	.19	.23	.25
	Winter Harbor	Maine	Saline	.13	.16	.14	.14	.19	.16	.12	.11	.09	.05	.11	.14	.17
Total				4.85	4.95	4.93	5.23	5.88	5.36	4.35	3.94	4.17	3.44	4.36	5.14	6.10

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01050003	Bath	Maine	Fresh	2.24	2.33	2.57	2.80	3.04	2.37	2.00	1.43	1.39	1.13	2.40	2.50	2.91
	Boothbay Harbor	Maine	Saline	.29	.23	.26	.22	.31	.25	.29	.31	.34	.27	.32	.31	.36
	Great Salt Bay	Maine	Fresh	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17
	Rockland	Maine	Saline	2.33	2.62	2.53	2.64	2.93	2.51	2.15	1.52	1.30	1.51	2.34	2.70	3.18
	Thomaston	Maine	Fresh	.61	.71	.79	.72	.81	.71	.45	.27	.31	.27	.49	.65	1.09
	Waldoboro	Maine	Saline	.14	.14	.15	.15	.17	.13	.08	--	.10	.11	--	.15	.19
	Wiscasset	Maine	Saline	.17	.18	.18	.18	.20	.17	.18	.15	.15	.13	.16	.18	.21
Total				5.95	6.39	6.65	6.89	7.63	6.32	5.31	3.85	3.77	3.59	5.88	6.66	8.09
Total for basin [1]0105				11.66	12.01	12.24	13.10	14.73	12.69	10.31	8.29	8.37	7.58	11.21	13.04	15.53
01060001	Brunswick	Maine	Fresh	2.97	2.28	2.52	2.84	3.58	3.34	3.33	3.50	2.48	2.21	2.49	3.28	3.75
	Falmouth	Maine	Saline	.95	.75	.89	1.04	1.24	1.24	.91	.76	.64	.61	.75	1.16	1.36
	Freeport	Maine	Saline	.45	.25	.41	.54	.61	.44	.41	.37	.38	.35	.36	.63	.71
	Maine Correctional Center	Maine	Fresh	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
	Pineland Center	Maine	Fresh	.18	.16	.16	.22	.34	.33	.14	.12	.12	.12	.13	.14	.15
	Portland City	Maine	Saline	20.42	16.49	21.02	21.25	24.30	24.26	21.78	14.50	13.42	15.81	21.48	24.52	26.18
	Portland, Westbrook	Maine	Fresh	2.54	2.07	2.59	3.11	3.59	2.98	2.13	1.74	1.85	1.78	2.70	2.86	3.07
	Portland, Cape Elizabeth	Maine	Saline	.33	.29	.37	.38	.44	.36	.31	.23	.20	.18	.30	.40	.49
	South Portland	Maine	Saline	6.71	6.08	7.35	7.76	9.19	8.06	6.66	5.55	4.99	4.20	5.41	7.16	8.10
	Yarmouth	Maine	Saline	.66	.58	.65	.65	.85	.70	.64	.59	.54	.49	.63	.77	.85
Total				35.25	28.98	35.99	37.81	44.18	41.73	36.34	27.41	24.67	25.79	34.29	40.96	44.71
01060002	Biddeford	Maine	Fresh	3.84	3.41	4.04	4.14	4.44	4.23	3.94	3.39	3.39	3.31	3.89	3.78	4.10
	Limerick	Maine	Fresh	.05	.03	.03	.06	.08	.06	.08	--	.04	.03	.05	.05	.06
	North Conway	N.H.	Fresh	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13
	Old Orchard Beach	Maine	Fresh	1.33	.93	1.11	1.10	1.36	1.33	1.51	1.93	1.72	.99	1.11	1.38	1.46
	Ossipee	N.H.	Fresh	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
	Saco	Maine	Saline	1.82	1.51	2.01	1.96	2.39	1.99	1.78	1.53	1.57	1.13	1.41	2.19	2.35
	Scarborough	Maine	Saline	1.06	.89	1.01	1.07	1.16	1.10	1.07	1.07	1.03	.85	1.03	1.18	1.23
Total				8.26	6.94	8.36	8.49	9.59	8.87	8.54	8.08	7.90	6.46	7.66	8.74	9.35
01060003	Berwick	Maine	Fresh	.73	.75	.82	.83	.96	.76	.66	.46	.78	.61	.72	.69	.70
	Dover	N.H.	Fresh	2.92	2.30	3.05	2.71	3.34	3.22	2.56	--	2.28	2.41	3.21	3.38	3.63
	Durham	N.H.	Saline	1.02	.60	1.47	1.30	1.43	1.26	.66	.54	.60	.88	1.19	1.13	1.13
	Epping	N.H.	Fresh	.16	.15	.20	.19	.24	.21	.17	.09	.10	.09	.15	.31	.06
	Exeter	N.H.	Fresh	1.93	1.44	2.48	2.02	2.53	2.65	1.79	1.53	1.82	1.16	1.65	1.94	2.10
	Farmington	N.H.	Fresh	.25	.22	.28	.35	.36	.35	.23	.18	.21	.19	.20	.22	.25
	Hampton	N.H.	Saline	2.30	1.91	2.19	1.92	2.24	2.32	2.30	2.77	2.78	2.01	2.38	2.46	2.29

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01060003	Kennebunk	Maine	Fresh	0.90	0.55	0.74	0.79	1.10	0.90	0.93	0.83	0.91	0.96	--	1.04	1.16
	Kennebunkport	Maine	Saline	.30	.20	.28	.25	.29	.28	.32	.36	.37	.27	0.36	.27	.30
	Kittery	Maine	Saline	1.29	1.21	1.61	1.25	1.35	1.24	1.10	.98	1.23	1.08	1.67	1.41	1.30
	Milton	N.H.	Fresh	.04	.04	.04	.04	--	.05	.04	.03	.05	.04	.05	.04	.05
	Newmarket	N.H.	Fresh	.54	.49	.65	.56	.66	.80	.48	.41	.44	.42	.51	.59	.47
	North Berwick	Maine	Fresh	.26	.09	.10	.24	.26	--	--	--	--	--	.38	.48	.29
	Ogunquit	Maine	Saline	.51	.24	.42	.36	.53	.60	.55	.70	.71	.44	.63	.45	.49
	Portsmouth, Pierce Island	N.H.	Saline	2.44	4.60	6.20	1.88	2.30	2.20	2.00	1.50	1.65	1.60	1.90	1.70	1.70
	Rochester	N.H.	Fresh	3.46	2.79	3.69	4.20	4.94	4.46	1.41	2.42	2.95	2.57	3.38	4.00	4.67
	Rockingham County Home	N.H.	Fresh	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
	Rollinsford	N.H.	Fresh	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
	Sanford	Maine	Fresh	2.50	2.09	2.45	2.80	2.97	3.14	2.74	2.32	2.14	1.80	2.06	2.74	2.70
	Somersworth	N.H.	Fresh	1.22	1.25	1.44	1.28	1.41	1.38	1.24	1.00	1.08	1.00	1.17	1.22	1.24
	South Berwick	Maine	Fresh	.25	.24	.27	.27	.33	.31	.23	.20	.21	.19	.22	.27	.31
	Strafford County Home	N.H.	Fresh	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
	Wakefield	N.H.	Fresh	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
	Wells	Maine	Saline	.62	.30	.36	.33	.46	.52	.65	1.27	1.33	.68	.59	.47	.46
	York	Maine	Saline	1.06	.58	1.10	1.14	1.07	1.24	1.28	1.35	1.21	.78	.85	1.06	1.03
Total				24.84	22.17	29.99	24.84	28.91	28.04	21.48	19.07	22.99	19.32	23.41	25.99	26.47
Total for basin [1]0106				68.35	58.09	74.34	71.14	82.68	78.64	66.35	54.56	55.56	51.57	65.35	75.70	80.53
01070001	Ashland	N.H.	Fresh	.33	.42	.40	.53	.50	.53	.93	.01	.33	.00	.00	.00	.32
	Bristol	N.H.	Fresh	.19	.16	.17	.13	.19	.22	.23	.17	.25	.16	.19	.21	.20
	Lincoln	N.H.	Fresh	.44	.37	.46	.49	.42	.42	.42	.53	.66	.38	.43	.32	.40
	New Hampton Village	N.H.	Fresh	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
	Plymouth Village	N.H.	Fresh	.42	.20	.32	.49	.55	.51	.37	.30	.57	.42	.50	.46	.41
	Waterville Valley	N.H.	Fresh	.15	.21	.23	.18	.16	.12	.08	.10	.17	.10	.16	.14	.12
	Woodstock	N.H.	Fresh	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
Total				1.57	1.39	1.63	1.86	1.86	1.84	2.07	1.16	2.02	1.10	1.31	1.16	1.50
01070002	Amesbury	Mass.	Fresh	1.85	1.41	2.39	2.10	2.58	2.46	1.72	1.11	1.39	1.31	2.02	1.92	1.76
	Concord, Hall Street	N.H.	Fresh	4.06	3.61	3.92	4.36	4.24	4.24	4.13	3.86	4.27	3.89	4.08	4.11	4.00
	Concord, Penacook	N.H.	Fresh	.89	.61	.89	1.17	1.07	1.05	.77	.65	.95	.72	.91	1.00	.84
	Derry	N.H.	Fresh	1.55	1.25	1.59	1.65	1.95	2.19	.53	1.30	1.42	1.42	2.20	1.81	1.23
	Franklin	N.H.	Fresh	5.60	4.11	5.56	6.86	--	6.64	5.79	5.21	5.82	4.12	5.27	5.32	6.90
	Greenville	N.H.	Fresh	.10	.08	.12	.15	.13	.11	.08	.08	.09	.07	.07	.07	.10
	Haverhill	Mass.	Fresh	11.45	10.54	13.39	12.39	13.77	12.88	10.99	9.75	10.20	9.32	11.56	11.35	11.28

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01070002	Hillsborough County Home	N.H.	Fresh	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	Hooksett	N.H.	Fresh	.52	.46	.56	.59	.60	.57	.46	.42	.48	.48	.52	.56	.58
	Lowell Regional	Mass.	Fresh	27.75	23.70	34.10	29.80	31.90	32.30	25.40	26.00	25.10	21.80	29.10	26.50	27.30
	Manchester	N.H.	Fresh	18.34	14.23	22.25	20.84	20.67	21.07	17.13	14.29	20.10	14.53	16.55	18.47	19.97
	Merrimac	Mass.	Fresh	.23	.24	.23	.23	.23	.23	.23	.22	.23	.23	.23	.22	.24
	Merrimack	N.H.	Fresh	3.23	3.13	3.25	3.53	3.54	3.40	3.35	3.21	3.21	3.11	3.24	2.99	2.85
	Milford	N.H.	Fresh	1.08	.90	1.23	1.31	1.40	1.40	.93	.81	.94	--	.91	.97	1.03
	Nashua	N.H.	Fresh	9.65	10.16	10.19	12.12	11.17	10.00	10.39	6.16	7.87	8.47	8.97	9.22	11.03
	Pittsfield	N.H.	Fresh	.31	.27	.33	.37	.39	.36	.31	.23	.31	.27	.28	.29	.30
	Salisbury	Mass.	Fresh	.38	.26	.33	.29	.38	.44	.44	.53	.54	.36	.39	.32	.30
	Sandwich	N.H.	Fresh	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
	Suncook-Allenstown	N.H.	Fresh	.57	.41	.50	.59	.61	.65	.49	--	.49	.49	.58	.69	.74
	Wolfeboro	N.H.	Fresh	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
Total				87.72	75.52	100.99	98.51	94.78	100.14	83.30	73.98	83.54	70.77	87.04	85.96	90.59
01070003	Antrim	N.H.	Fresh	.10	.07	.09	.12	.11	.12	.08	--	.10	.07	.09	.10	.10
	Henniker	N.H.	Fresh	.19	.11	.15	.19	.23	.17	.19	.20	.25	.21	.25	.21	.14
	Hillsborough	N.H.	Fresh	.52	.46	.56	.59	.60	.57	.46	.42	.48	.48	.52	.56	.58
	Hopkinton	N.H.	Fresh	.05	.04	.04	.05	.06	.07	.06	.05	.06	.05	.06	.05	.04
	Jaffrey	N.H.	Fresh	.61	.51	.66	.82	.78	.74	.53	.35	.52	--	.50	.54	.71
	Peterborough	N.H.	Fresh	.38	.36	.30	.37	.46	.42	.42	.40	.40	.35	.38	.37	.40
	Warner Village Fire District	N.H.	Fresh	.05	.05	.06	.08	.07	.07	.05	.05	.06	.04	--	--	.00
Total				1.90	1.59	1.85	2.22	2.32	2.16	1.79	1.46	1.87	1.20	1.79	1.83	1.97
01070004	Ayer	Mass.	Fresh	1.42	1.24	1.64	1.51	1.48	1.56	1.32	1.15	1.46	1.31	1.52	1.43	1.39
	East Fitchburg	Mass.	Fresh	8.10	8.10	10.40	9.80	9.30	9.60	6.60	5.60	6.70	5.80	8.30	8.40	8.60
	Leominster Department of Public Works	Mass.	Fresh	5.81	4.50	7.90	6.40	7.20	7.80	5.30	4.10	4.70	3.90	5.50	5.90	6.50
	MWRA, Clinton	Mass.	Fresh	2.40	2.14	3.13	2.74	2.89	2.80	2.26	1.77	2.01	1.76	2.39	2.41	2.48
	Pepperell	Mass.	Fresh	.19	.24	.24	.18	.17	.18	.17	.16	.18	.19	.17	.17	--
	West Fitchburg	Mass.	Fresh	4.61	4.57	5.34	5.57	5.30	5.04	5.04	3.76	4.56	4.33	4.53	3.51	3.73
Total				22.53	20.79	28.65	26.20	26.35	26.98	20.69	16.54	19.62	17.29	22.41	21.82	22.70
01070005	Billerica	Mass.	Fresh	2.58	2.47	3.27	2.80	3.02	2.90	2.58	2.10	2.04	2.00	2.65	2.66	2.44
	Concord	Mass.	Fresh	.98	.79	1.07	.85	1.14	1.14	1.08	.85	.92	.89	1.08	1.08	.91
	Hudson	Mass.	Fresh	2.33	2.14	2.90	2.56	2.79	2.82	2.29	1.92	1.97	1.92	2.37	2.09	2.19

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01070005	Marlborough Easterly	Mass.	Fresh	3.09	2.90	4.30	3.60	3.94	4.00	2.90	2.28	2.30	2.10	2.86	2.80	3.10
	Marlborough Westerly	Mass.	Fresh	1.69	1.51	1.97	1.86	1.98	2.13	1.91	1.51	1.52	1.41	1.61	1.43	1.40
	Maynard	Mass.	Fresh	1.02	.95	1.17	1.07	1.19	1.22	1.10	.95	.96	.84	.92	.96	.92
	MCI-Concord	Mass.	Fresh	.27	.28	.27	.31	.30	.30	.20	.04	.21	.36	.33	.33	.35
	Westborough	Mass.	Fresh	4.11	3.88	5.16	4.35	4.37	4.65	3.98	3.32	3.26	3.30	4.24	4.28	4.53
Total				16.07	14.91	20.11	17.39	18.73	19.15	16.04	12.96	13.18	12.82	16.06	15.63	15.84
Total for basin [1]0107				129.79	114.21	153.22	146.17	144.03	150.2	123.89	106.10	120.23	103.18	128.62	126.40	132.61
01080101	Bethlehem	N.H.	Fresh	.21	.12	.11	.16	.14	.16	--	.30	.26	--	.23	.26	.27
	Brighton	Vt.	Fresh	.10	.08	.07	.09	.13	.08	.06	.07	.07	.07	.07	.07	.06
	Canaan	Vt.	Fresh	.15	.14	.13	.17	.16	.15	.12	.11	.11	.11	.11	.12	.13
	Colebrook	N.H.	Fresh	.34	.22	.38	.43	--	--	.34	.34	.32	.27	.38	.35	.34
	Groveton-Northumberland	N.H.	Fresh	.24	.17	.31	.31	.43	.30	.19	.18	.18	.13	.24	.20	.24
	Lancaster	N.H.	Fresh	.86	.64	.83	1.17	.95	.95	.87	.00	1.08	.61	1.20	.32	.95
	Lisbon	N.H.	Fresh	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07
	Littleton	N.H.	Fresh	.87	--	--	--	--	.91	--	.92	1.02	.66	.90	.89	.81
	Lunenburg, Fire District 2	Vt.	Fresh	.05	.05	.04	.08	.09	.04	.02	.03	.04	.04	.04	.07	.04
	Stratford, Millhouse	N.H.	Fresh	.02	.03	.02	.02	.02	.02	.02	.02	.02	--	--	.02	.03
	Stratford, Village	N.H.	Fresh	.03	.03	.04	.04	.04	.03	.03	.03	.03	--	--	.03	.04
	Whitefield	N.H.	Fresh	.11	.11	.10	.12	.12	.12	.13	.11	.13	.09	.11	.12	--
	Woodsville	N.H.	Fresh	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13
Total				3.18	1.77	2.23	2.80	2.29	2.96	1.98	2.31	3.44	2.17	3.48	2.66	3.11
01080102	Danville	Vt.	Fresh	.03	.03	.03	.04	.04	.04	.02	.03	.02	.04	.05	.01	.03
	Lyndonville	Vt.	Fresh	.65	.49	.57	.82	1.22	.60	.48	.44	.51	.30	.81	.75	.87
	St. Johnsbury	Vt.	Fresh	1.06	.80	.90	1.50	1.20	.80	.90	.90	1.10	.80	1.20	1.18	1.41
Total				1.74	1.32	1.50	2.36	2.47	1.44	1.39	1.36	1.63	1.13	2.06	1.94	2.31
01080104	Bellows Falls	Vt.	Fresh	.47	.44	.53	.54	.44	.49	.40	.35	.53	.43	.49	.47	.51
	Bradford	Vt.	Fresh	.06	.06	.05	.06	.08	.07	.05	.05	.05	.05	.05	.06	.06
	Brattleboro	Vt.	Fresh	1.87	1.65	1.95	2.48	2.27	2.10	1.71	1.55	1.83	1.56	1.73	1.75	1.88
	Canaan	N.H.	Fresh	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
	Charlestown	N.H.	Fresh	.12	.14	.13	.15	.18	.17	.10	.09	.15	.04	.11	.11	.14
	Claremont	N.H.	Fresh	1.57	1.65	1.81	2.10	2.00	1.87	1.37	1.25	1.61	1.17	1.27	1.33	1.45
	Eastman Community Associates	N.H.	Fresh	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
	Hanover	N.H.	Fresh	1.44	1.39	1.49	1.67	1.65	1.70	1.30	1.23	1.36	1.22	1.49	1.50	1.28

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01080104	Hartford, White River Junction	Vt.	Fresh	0.91	0.89	0.95	1.12	1.03	1.10	0.99	0.85	0.88	0.78	0.78	0.73	0.78
	Lebanon	N.H.	Fresh	1.70	1.41	1.69	2.22	1.94	2.06	1.58	1.26	1.75	1.27	1.58	1.72	1.90
	Newbury	N.H.	Fresh	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
	Newport	N.H.	Fresh	.72	.52	.71	1.17	.57	.88	.69	.62	1.08	.57	.72	.61	.53
	Putney	Vt.	Fresh	.04	.04	.03	.04	.04	.04	.03	.03	.03	.04	.04	.04	.03
	Sunapee, New London	N.H.	Fresh	.37	--	.40	.44	.38	.39	.31	.33	.47	.31	.33	.33	.35
	Windsor, Main	Vt.	Fresh	.47	.56	.61	.60	.52	.52	.42	.37	.45	.39	.41	.36	.40
	Windsor, Weston Heights	Vt.	Fresh	.01	.02	.01	.01	.02	.01	.02	.02	.01	.01	.01	.02	.01
Total				9.81	8.82	10.43	12.67	11.18	11.46	9.03	8.05	10.26	7.89	9.06	9.08	9.37
01080105	Bethel	Vt.	Fresh	.07	.07	.07	.08	.07	.06	.05	.06	.07	.07	.08	.08	.08
	Hartford, Quechee Service	Vt.	Fresh	.16	.17	.14	.14	.17	.15	.15	.15	.17	.19	.20	.17	.15
	Randolph	Vt.	Fresh	.26	.20	.21	.25	.23	.31	.30	.31	.28	.28	.25	.28	.23
	Royalton	Vt.	Fresh	.03	.03	.03	.04	.04	.04	.03	.03	.03	.03	.03	.03	.02
Total				.52	.47	.45	.51	.50	.55	.52	.55	.54	.58	.56	.56	.48
01080106	Bridgewater	Vt.	Fresh	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
	Cavendish	Vt.	Fresh	.07	.08	.08	.10	.09	.08	.08	.05	.05	.05	.05	.05	.06
	Ludlow	Vt.	Fresh	.43	.46	.56	.69	.65	.56	.35	.24	.34	.21	.28	.34	.49
	Sherburne, Fire District 1	Vt.	Fresh	.09	.13	.15	.13	.09	.05	.05	.08	.09	.07	.08	.08	.12
	Springfield, Clinton	Vt.	Fresh	1.70	1.46	1.60	2.15	2.11	2.06	1.78	1.40	1.71	1.36	1.65	1.48	1.66
	Woodstock, Main	Vt.	Fresh	.25	.23	.21	.30	.28	.30	.25	.25	.27	.26	.26	.20	.19
Total				2.55	2.37	2.60	3.38	3.23	3.05	2.52	2.03	2.47	1.96	2.34	2.16	2.51
01080107	Chester	Vt.	Fresh	.08	.08	.08	.09	.09	.08	.08	.08	.07	.07	.07	.07	.07
	Saxtons River	Vt.	Fresh	.04	.03	.03	.03	.04	.04	.04	.03	.03	.04	.04	.04	.03
Total				.12	.11	.11	.12	.13	.12	.12	.11	.10	.10	.11	.11	.11
01080201	Amherst	Mass.	Fresh	4.65	4.00	6.11	5.52	5.76	5.69	3.58	3.48	4.02	4.00	4.36	4.50	4.80
	Easthampton	Mass.	Fresh	2.47	2.00	3.10	2.90	3.30	3.20	2.40	1.90	2.30	1.80	2.00	2.30	2.40
	Hatfield	Mass.	Fresh	.16	.18	.18	.22	.17	.17	.12	.10	.13	.14	.17	.18	.20
	Holyoke	Mass.	Fresh	11.88	10.60	14.40	14.80	13.90	14.00	11.80	9.10	11.60	9.30	10.60	11.20	11.20
	Indian Hill, Hadley	Mass.	Fresh	.31	.28	.29	.30	.29	.30	.27	.28	.30	.31	.34	.36	.36
	Keene	N.H.	Fresh	3.52	2.84	3.60	5.11	4.66	4.11	3.44	2.36	2.27	2.41	3.42	3.94	4.10
	Montague	Mass.	Fresh	1.25	1.23	1.33	1.50	1.41	1.29	1.19	.93	1.17	1.10	1.26	1.29	1.34
	Northampton	Mass.	Fresh	5.27	4.80	5.80	6.10	6.40	6.80	5.80	5.30	4.70	4.20	4.50	4.29	4.54
	Northfield	Mass.	Fresh	.33	.32	.40	.44	.36	.35	.19	.15	.20	.27	.47	.41	.41

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01080201	Old Deerfield	Mass.	Fresh	0.15	0.12	0.13	0.19	0.27	0.25	0.18	0.09	0.10	0.11	0.13	0.12	0.11
	South Deerfield	Mass.	Fresh	.91	.62	.89	1.10	1.16	.87	.86	.86	.89	.90	.89	.90	.92
	Springfield, Bondi Island	Mass.	Fresh	48.25	46.50	51.90	50.70	53.30	54.50	47.70	42.10	50.60	43.30	46.10	45.20	47.10
	Sunderland	Mass.	Fresh	.16	.16	.17	.20	.17	.17	.14	.13	.13	.15	.17	.17	.19
	Swanzey	N.H.	Fresh	.05	.04	.06	.05	.05	.05	.03	.04	.05	.05	.06	.06	.06
	Troy	N.H.	Fresh	.13	.10	.10	.13	.16	.16	.16	.10	.16	.13	.13	.15	.13
	Winchester	N.H.	Fresh	.15	.11	.13	.19	.20	.18	.14	.12	.15	.13	.12	.18	--
Total				79.64	73.89	88.60	89.45	91.55	92.10	78.00	67.05	78.77	68.30	74.71	75.25	77.86
01080202	Athol	Mass.	Fresh	1.56	1.30	1.68	1.97	1.82	1.86	1.57	1.37	1.47	1.39	1.24	1.37	1.72
	Erving Center	Mass.	Fresh	1.90	1.73	2.03	1.78	1.96	1.83	1.94	2.02	2.02	1.89	2.05	1.86	1.70
	Franklin Pierce College	N.H.	Fresh	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
	Gardner	Mass.	Fresh	3.32	2.50	4.20	4.20	4.21	4.45	3.23	2.41	2.74	2.36	2.76	2.92	3.81
	Hinsdale	N.H.	Fresh	.32	.25	.35	.52	.50	.43	.30	.17	.24	.21	.24	.33	.36
	Millers Falls Village	Mass.	Fresh	.54	.49	.57	.53	.55	.55	.60	.50	.58	.52	.52	.49	.52
	Orange	Mass.	Fresh	1.17	.89	1.33	1.61	1.31	1.43	.85	.77	1.24	.60	1.01	1.42	1.54
	Royalston	Mass.	Fresh	.03	.02	.03	.04	.03	.04	.02	.01	.02	.03	.04	.04	.05
	Templeton	Mass.	Fresh	1.44	1.72	1.66	1.69	1.76	1.51	1.47	1.34	1.40	1.21	1.16	1.27	1.14
	Winchendon	Mass.	Fresh	.71	.41	.88	.91	.89	.91	--	.39	.55	.98	.61	.71	.59
Total				11.02	9.33	12.76	13.28	13.06	13.04	10.02	9.01	10.29	9.21	9.65	10.44	11.45
01080203	Greenfield	Mass.	Fresh	3.70	2.83	3.94	4.88	5.40	4.89	2.87	2.07	3.36	2.30	3.60	4.02	4.20
	North Branch Fire District 1, Dover	Vt.	Fresh	.13	.28	.30	.16	.09	.07	.08	.09	.09	.07	.07	.09	.14
	Readsboro	Vt.	Fresh	.02	.02	.02	.03	.03	.02	.02	.02	.03	.02	.02	.03	.03
	Shelburne Falls	Mass.	Fresh	.21	.20	.23	.30	.27	.27	.16	.13	.15	.16	.23	.20	.23
	Whitingham, Jacksonville	Vt.	Fresh	.02	.02	.01	.02	.02	.02	.02	.01	.01	.01	.01	.02	.02
	Wilmington	Vt.	Fresh	.09	.09	.08	.11	.09	.09	.09	.08	.08	.08	.08	.08	.08
Total				4.17	3.45	4.59	5.49	5.90	5.35	3.23	2.40	3.72	2.64	4.01	4.43	4.70
01080204	Barre	Mass.	Fresh	.14	.13	.14	.16	.14	.16	.12	.11	.13	.13	.13	.14	.16
	Chicopee	Mass.	Fresh	12.58	11.30	13.30	13.90	14.90	14.30	12.20	10.10	13.10	11.10	12.10	11.40	13.30
	Hardwick	Mass.	Fresh	.03	.03	.03	.03	--	.03	.03	.03	.03	--	.03	.03	.03
	North Brookfield	Mass.	Fresh	.47	.42	.64	.53	.53	.59	.38	.29	.30	.28	.41	.57	.64
	Palmer	Mass.	Fresh	3.58	3.50	3.90	3.60	3.70	4.10	3.40	2.85	3.90	3.20	3.85	3.33	3.60
	South Hadley	Mass.	Fresh	3.45	3.04	4.24	4.38	4.30	4.36	2.97	2.39	3.02	2.35	3.29	3.41	3.68
	Spencer	Mass.	Fresh	.69	.58	.86	.75	.87	.71	.52	.54	.62	.57	.75	.70	.78

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01080204	Ware	Mass.	Fresh	0.76	0.65	0.90	0.88	0.84	0.95	0.78	0.64	0.80	0.64	0.68	0.66	0.71
	Warren	Mass.	Fresh	.58	.51	.54	.64	.61	.70	.69	.62	.62	.53	.58	.47	.43
Total				22.28	20.16	24.55	24.86	25.89	25.88	21.08	17.56	22.52	18.79	21.82	20.70	23.32
01080205	Deep River	Conn.	Fresh	.07	--	--	--	--	--	--	--	--	--	--	--	.07
	East Hampton	Conn.	Fresh	.96	.95	1.17	1.00	1.12	1.13	.92	.83	.85	.81	.96	.89	.86
	East Windsor	Conn.	Fresh	1.12	.92	1.22	1.20	1.25	1.14	1.04	.91	1.17	1.00	1.14	1.17	1.25
	Enfield	Conn.	Fresh	4.91	4.37	5.90	4.74	5.68	5.31	3.99	3.61	5.42	4.22	4.97	5.17	5.54
	Glastonbury	Conn.	Fresh	1.89	1.89	2.07	1.95	1.91	2.06	1.93	1.71	1.80	1.73	1.86	1.83	1.90
	MDC, Hartford	Conn.	Fresh	64.15	66.45	73.60	70.00	74.70	76.10	67.00	48.45	55.48	50.97	57.02	60.50	69.56
	Manchester	Conn.	Fresh	5.84	5.45	6.43	6.01	6.55	7.24	6.92	5.85	4.47	4.60	4.68	4.85	6.98
	MDC, Cromwell	Conn.	Fresh	18.32	19.19	22.98	18.90	21.10	19.18	16.75	14.16	17.17	14.36	18.44	18.10	19.55
	MDC, East Hartford	Conn.	Fresh	11.53	11.47	12.95	12.40	12.90	12.80	12.01	11.30	12.25	11.46	10.91	7.94	9.97
	Middletown	Conn.	Fresh	4.81	4.84	5.42	4.70	5.60	5.96	4.39	3.99	4.35	3.70	4.50	4.24	6.08
	Portland	Conn.	Fresh	.65	.63	.81	.66	.77	.78	.63	.53	.57	.54	.62	.58	.63
	Rocky Hill	Conn.	Fresh	6.60	7.45	9.53	6.52	8.50	8.42	6.38	3.80	5.15	4.00	6.26	6.16	7.08
	Somers	Conn.	Fresh	.05	.05	.06	.06	.06	.06	.05	.04	.06	.04	.05	.05	.05
	South Windsor	Conn.	Fresh	2.18	2.36	2.59	2.27	2.40	2.35	2.10	1.89	2.08	1.87	2.11	2.05	2.07
	Suffield	Conn.	Fresh	.96	.91	1.18	.98	1.20	1.28	1.02	.70	.92	.60	.86	.85	.98
	Vernon	Conn.	Fresh	4.57	4.75	5.78	5.24	5.50	5.54	4.41	3.51	4.16	3.76	4.22	3.90	4.09
	Windsor Locks	Conn.	Fresh	1.60	1.54	1.79	1.66	1.75	1.63	1.40	1.20	1.64	1.28	1.62	1.83	1.88
Total				130.21	133.23	153.49	138.29	150.99	150.97	130.94	102.47	117.54	104.94	120.22	120.11	138.54
01080206	Huntington	Mass.	Fresh	.09	.09	.09	.11	.10	.11	.09	.08	.09	.08	.08	.08	.09
	Russell	Mass.	Fresh	.13	.14	.15	.21	.11	--	.08	.11	.08	--	--	--	--
	Westfield	Mass.	Fresh	3.24	2.86	3.62	3.49	4.03	3.90	3.01	2.44	3.46	2.75	3.14	3.10	3.08
Total				3.46	3.09	3.86	3.81	4.23	4.00	3.18	2.63	3.63	2.83	3.22	3.18	3.18
01080207	Bristol, Main	Conn.	Fresh	10.76	9.79	12.44	11.35	12.30	11.72	9.70	7.75	8.92	14.40	9.34	10.58	10.88
	Canton	Conn.	Fresh	.50	.45	.56	.53	.59	.56	.50	.41	.52	.42	.46	.47	.51
	Farmington	Conn.	Fresh	3.24	3.14	3.69	3.57	3.70	3.57	3.15	2.81	2.95	2.84	3.07	3.19	3.25
	New Hartford	Conn.	Fresh	.07	.08	.08	.08	.08	.08	.07	.06	.07	.07	.08	.08	.08
	Plainville	Conn.	Fresh	2.06	1.93	1.99	2.91	2.04	2.07	1.60	1.52	1.52	2.24	2.41	1.73	2.70
	Simsbury	Conn.	Fresh	1.79	1.64	2.14	2.13	1.90	1.84	1.76	1.60	1.70	1.62	1.70	1.70	1.80
	Winchester	Conn.	Fresh	1.71	1.37	1.84	1.83	1.92	1.83	1.65	1.84	1.79	1.48	1.60	1.64	1.73
	MDC, Windsor/ Poquonack	Conn.	Fresh	2.34	1.99	2.44	2.30	2.49	2.71	2.29	2.14	2.57	1.90	2.37	2.50	2.40
Total				22.47	20.39	25.18	24.70	25.02	24.38	20.72	18.13	20.05	24.98	21.02	21.89	23.35
Total for basin [1]0108				291.17	278.39	330.35	321.69	336.43	335.31	282.74	233.68	274.97	245.53	272.26	272.52	300.29

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01090001	Charles River	Mass.	Fresh	3.60	3.32	4.11	3.75	4.15	3.97	3.40	2.97	3.40	3.07	3.72	3.69	3.65
	Gloucester	Mass.	Saline	3.34	3.04	4.33	3.23	4.60	4.30	3.10	2.60	3.30	2.40	3.40	2.88	2.91
	Greater Lawrence Sewer District	Mass.	Fresh	36.94	37.40	41.90	37.90	40.40	42.70	34.70	30.00	33.90	29.80	39.40	37.30	37.90
	Hull	Mass.	Saline	1.53	1.43	1.76	1.28	1.66	1.94	1.49	1.48	1.78	1.39	1.47	1.38	1.34
	Ipswich	Mass.	Fresh	1.02	.07	1.31	1.13	1.49	1.26	.86	.92	1.35	1.14	.95	.82	.89
	Lynn	Mass.	Saline	28.30	25.40	32.90	23.50	32.20	30.20	--	23.60	31.20	24.00	30.80	28.70	28.80
	Manchester	Mass.	Fresh	.61	.51	.78	.60	.84	.78	--	.40	.53	.61	.53	.54	.55
	MCI Norfolk-Walpole	Mass.	Fresh	.30	.29	.34	.31	.33	.31	0.30	.29	.34	.30	.29	.28	.28
	Medfield	Mass.	Fresh	.84	.78	.98	.78	.92	.97	.79	.76	.92	.70	.90	.83	.77
	MWRA, Deer Island	Mass.	Saline	269.66	254.00	306.00	255.00	302.00	304.97	254.00	243.00	279.00	236.00	287.00	260.00	255.00
	MWRA, Nut Island	Mass.	Saline	136.36	127.70	184.71	145.36	168.23	167.20	131.87	103.74	123.86	102.14	141.89	118.50	121.12
	Newburyport	Mass.	Fresh	2.24	2.90	3.10	2.80	2.60	1.95	2.05	1.90	1.80	1.60	2.20	1.60	2.36
	Rockport	Mass.	Saline	.73	.40	.64	.50	.80	.80	.90	.90	.90	.67	.80	.70	.70
	South Essex Sewer District	Mass.	Saline	28.01	26.97	--	28.30	28.27	28.18	28.07	28.10	28.42	28.45	28.28	27.39	27.69
	Swampscott	Mass.	Saline	2.61	2.30	3.60	2.70	3.90	4.40	3.00	1.40	2.70	1.30	2.00	1.80	2.20
Total				516.09	486.51	586.46	507.14	592.39	593.93	464.53	442.06	513.39	433.57	543.62	486.41	486.16
01090002	Barnstable	Mass.	Fresh	.57	.57	.57	.57	.57	.57	.57	.57	.57	.57	.57	.57	.57
	Cohasset	Mass.	Saline	.08	.11	.09	.10	.08	.06	.06	.06	.07	.08	.08	.11	.10
	Dartmouth	Mass.	Saline	1.87	2.06	2.48	2.01	2.35	1.92	1.52	1.48	1.85	1.62	1.59	1.62	1.90
	Fairhaven	Mass.	Fresh	2.50	3.00	3.58	2.67	3.16	2.70	2.00	2.09	2.25	1.90	1.92	2.08	2.60
	Fall River	Mass.	Saline	30.88	35.20	36.60	36.80	40.70	40.70	36.70	30.40	22.40	21.10	22.90	21.80	25.20
	Falmouth	Mass.	Fresh	.15	.15	.15	.15	.15	.15	.15	.15	.15	.15	.15	.15	.15
	Marion	Mass.	Saline	.45	.55	.72	.55	.68	.58	.40	.31	.29	.28	.29	.30	.38
	Marshfield	Mass.	Saline	.86	.91	1.08	.87	.95	1.03	1.00	.94	.93	.80	.82	.79	.21
	Middleborough	Mass.	Fresh	1.28	1.17	1.07	1.17	1.45	1.60	1.38	1.32	1.39	1.23	1.22	1.18	1.22
	Nantucket	Mass.	Fresh	.23	.23	.23	.23	.23	.23	.23	.23	.23	.23	.23	.23	.23
	New Bedford	Mass.	Saline	28.30	29.88	31.80	30.60	30.30	28.60	25.10	25.20	29.40	26.60	27.30	25.60	29.20
	Plymouth	Mass.	Fresh	2.36	2.27	2.31	2.31	2.42	2.49	2.50	2.46	2.44	2.35	2.31	2.23	2.22
	Rockland	Mass.	Fresh	1.75	2.10	2.90	2.30	2.50	2.55	1.60	1.10	1.20	1.10	1.10	1.20	1.30
	Scituate	Mass.	Fresh	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
	Wareham	Mass.	Fresh	.57	.27	.30	.42	.53	.65	.76	.85	.93	.67	.51	.53	.43
Total				73.05	79.68	85.08	81.95	87.27	85.02	75.17	68.35	65.31	59.88	62.19	59.60	66.91

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01090003	Burrillville Sewer Commission	R.I.	Fresh	0.57	0.54	0.64	0.55	0.60	0.60	0.41	0.37	0.45	0.31	0.79	0.74	0.84
	Douglas	Mass.	Fresh	.15	.16	.13	.20	.18	.14	.13	.12	.15	.16	.15	.17	.16
	Grafton	Mass.	Fresh	1.10	0.98	1.35	1.19	1.22	1.27	1.01	0.84	0.97	0.95	1.12	1.08	1.17
	Hopedale	Mass.	Fresh	.44	.43	.52	.49	.55	.54	.46	.41	.43	.34	.43	.33	.37
	Milford	Mass.	Fresh	3.73	3.29	4.99	4.14	4.60	4.39	3.29	2.69	3.59	2.41	3.53	3.77	4.10
	Millbury	Mass.	Fresh	.85	.87	1.23	1.03	.97	1.07	.94	.78	.60	.47	.59	.72	.88
	Northbridge	Mass.	Fresh	1.19	1.00	1.40	1.20	1.44	1.50	1.00	.80	1.20	.90	1.20	1.30	1.30
	Upper Blackstone	Mass.	Fresh	39.23	36.10	49.30	41.70	46.60	49.60	35.10	29.30	34.10	29.20	41.70	38.30	39.70
	Upton	Mass.	Fresh	.17	.15	.21	.19	.21	.20	.14	.12	.20	.15	.17	.16	.18
	Uxbridge	Mass.	Fresh	.58	.57	.74	.69	.67	.67	.46	.46	.54	.47	.54	.57	.59
	Woonsocket	R.I.	Fresh	7.93	7.51	9.78	8.09	9.67	9.40	7.14	5.67	8.07	5.83	8.24	7.54	8.21
Total				55.94	51.58	70.29	59.47	66.70	69.38	50.09	41.56	50.29	41.19	58.46	54.67	57.49
01090004	Attleboro	Mass.	Fresh	5.35	5.20	5.66	5.40	6.20	5.90	5.20	4.64	5.25	4.90	5.04	5.21	5.62
	Blackstone, Bucklin Point	R.I.	Fresh	22.83	22.85	25.02	22.97	25.18	24.30	22.38	20.98	22.66	20.20	20.28	22.88	24.21
	Bridgewater	Mass.	Fresh	.79	.83	.97	.82	--	.84	.69	.71	.69	.75	.75	.77	.86
	Bristol	R.I.	Saline	2.33	2.30	2.90	2.90	4.20	3.80	2.40	1.70	1.40	1.10	1.40	1.50	2.30
	Brockton Regional	Mass.	Fresh	14.97	--	20.91	16.92	19.57	18.64	14.34	11.12	14.01	11.62	11.52	11.85	14.20
	Cranston	R.I.	Fresh	12.27	10.75	13.40	14.00	14.50	13.20	11.70	10.40	11.40	11.50	11.93	12.20	12.30
	East Greenwich	R.I.	Saline	.82	.75	.83	.85	.95	.95	.86	.81	.79	.74	.74	.76	.76
	East Providence	R.I.	Fresh	4.53	5.70	7.20	5.30	6.40	5.30	4.90	3.70	3.40	3.00	3.00	3.10	3.40
	Jamestown	R.I.	Saline	.42	.62	.85	.46	.75	.54	.30	.28	.27	.22	.22	.23	.37
	Mansfield	Mass.	Fresh	2.06	1.98	2.85	2.50	2.83	2.65	2.16	1.60	1.96	1.54	1.51	1.54	1.63
	MCI-Bridgewater	Mass.	Fresh	.54	.34	.47	.42	.37	.34	.47	.74	.74	1.27	.57	.40	.37
	Narragansett Bay Commission, Fields Point	R.I.	Fresh	55.14	56.99	62.30	52.60	59.60	59.92	53.47	53.87	60.88	48.12	51.42	49.02	53.50
	Newport	R.I.	Saline	9.78	10.40	12.20	9.80	12.00	11.00	8.80	8.50	6.00	9.30	9.60	9.40	10.40
	North Attleborough	Mass.	Fresh	3.61	4.00	5.06	3.72	4.72	4.23	3.29	2.64	3.79	2.66	2.89	2.95	3.35
	Quonset Point	R.I.	Saline	.77	.87	1.08	.90	1.03	.93	.77	.72	.69	.57	.53	.55	.64
	Scarborough	R.I.	Saline	.74	.83	.81	.67	.83	.81	.65	.81	.80	.67	.64	.60	.73
	Smithfield Sewer Authority	R.I.	Fresh	1.30	1.40	1.60	1.36	1.50	1.33	1.18	.94	1.15	1.19	1.27	1.27	1.44
	Somerset	Mass.	Fresh	2.50	2.96	3.90	2.80	3.37	3.02	2.53	1.96	1.86	1.60	1.67	1.85	--
	Taunton	Mass.	Fresh	6.51	7.40	8.80	7.20	7.70	7.30	6.50	6.30	6.10	5.00	5.00	5.10	5.70

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01090004	Warren	R.I.	Fresh	2.00	2.59	2.73	1.97	2.82	2.75	1.99	1.48	1.25	.96	1.76	1.84	1.91
	Warwick	R.I.	Fresh	3.52	3.59	3.77	3.63	3.84	3.84	3.60	3.33	3.40	3.29	3.38	3.28	3.29
	West Warwick	R.I.	Fresh	5.72	6.40	7.70	6.30	7.30	7.20	5.60	4.80	5.10	3.60	4.40	4.80	5.40
Total				158.50	148.74	191.00	163.48	185.66	178.79	153.78	142.02	153.59	133.81	139.52	141.10	152.38
01090005	Ladd School	R.I.	Fresh	0.05	.06	.08	.06	.05	.04	.04	.04	.04	.06	.04	.04	--
	New Shoreham	R.I.	Saline	.09	.04	.04	.03	.05	.08	.12	.18	.19	.13	.07	.05	.05
	South Kingstown	R.I.	Saline	2.58	2.76	3.05	2.65	3.11	2.82	2.34	2.16	1.83	2.54	2.72	2.37	2.60
	Westerly	R.I.	Fresh	2.14	2.23	2.60	2.50	2.30	2.50	2.10	1.90	1.95	1.60	2.12	2.08	1.84
Total				4.86	5.09	5.78	5.24	5.51	5.44	4.60	4.29	4.01	4.32	4.96	4.55	4.50
Total for basin [1]0109				808.44	771.60	938.60	817.29	937.54	932.56	748.17	698.27	786.59	672.77	808.74	746.33	767.44
01100001	Charlton	Mass.	Fresh	.09	.09	.10	.09	.09	.09	.05	.03	.03	.03	.41	.05	.07
	Jewett City	Conn.	Fresh	.55	.60	.69	.58	.62	.63	.52	.46	.51	.46	.51	.49	.55
	Killingly	Conn.	Fresh	2.61	2.25	2.74	2.89	2.90	3.09	2.72	2.27	2.59	2.28	2.59	2.42	2.59
	Leicester Water Supply	Mass.	Fresh	.14	--	.18	.21	.15	.14	.09	.07	.10	.13	.15	.18	.16
	Oxford-Rochdale	Mass.	Fresh	.16	.19	.19	.24	.18	.17	.10	.08	.11	.13	.17	.19	.18
	Plainfield North	Conn.	Fresh	.67	.65	.88	.67	.82	.83	.59	.44	.61	.47	.69	.66	.80
	Plainfield Village	Conn.	Fresh	.59	.48	.58	.47	.51	.58	.51	.43	.62	.69	.75	.71	.74
	Putnam	Conn.	Fresh	1.44	1.28	1.58	1.46	1.52	1.64	1.54	1.23	1.22	1.13	1.44	1.59	1.67
	Southbridge	Mass.	Fresh	2.48	2.34	3.16	--	2.92	3.05	2.15	1.76	2.41	2.11	2.19	2.08	3.10
	Sturbridge	Mass.	Fresh	.41	.31	.36	.43	.43	.43	.41	.43	.46	.45	.48	.41	.36
	Thompson	Conn.	Fresh	.21	.21	.28	.22	.23	.25	.19	.15	.17	.15	.20	.20	.22
	Webster	Mass.	Fresh	4.43	4.00	4.00	4.60	4.80	5.10	4.20	3.00	5.00	4.00	5.06	4.89	4.52
Total				13.78	12.40	14.74	11.85	15.16	16.00	13.08	10.35	13.83	12.02	14.63	13.87	14.96
01100002	Coventry	Conn.	Fresh	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
	Sprague	Conn.	Fresh	.18	.16	.17	.19	.22	.25	.17	.15	.18	.15	.18	.17	.19
	Stafford	Conn.	Fresh	1.34	1.30	1.58	1.52	1.54	1.71	1.44	1.14	1.18	.97	1.23	1.14	1.29
	University of Connecticut	Conn.	Fresh	1.48	1.00	2.10	1.80	1.80	1.10	.70	.30	1.20	1.50	2.10	2.20	2.00
	Willimantic	Conn.	Fresh	2.56	2.52	2.94	2.51	2.83	2.95	2.41	2.10	2.10	2.23	2.70	2.64	2.82
Total				5.62	5.04	6.85	6.08	6.45	6.07	4.78	3.75	4.72	4.91	6.27	6.21	6.36
01100003	Groton Town	Conn.	Fresh	2.81	2.89	3.31	2.76	3.01	3.13	2.71	2.56	2.85	2.54	2.72	2.51	2.76
	Groton City	Conn.	Fresh	1.99	2.16	2.42	2.15	2.35	2.16	1.87	1.78	1.96	1.65	1.81	1.69	1.86
	Highlands	Conn.	Fresh	.22	.22	.22	.22	.22	.22	.22	.22	.22	.22	.22	.22	.22
	Montville	Conn.	Fresh	.98	.98	1.06	.89	.89	1.05	.89	.90	1.01	.91	1.04	.99	1.12
	New London	Conn.	Fresh	5.11	4.72	5.98	5.15	6.10	6.00	4.82	4.68	5.44	4.48	4.75	4.27	4.92
	Norwich	Conn.	Fresh	7.36	8.00	9.80	7.60	9.80	9.50	5.40	5.00	5.90	4.50	6.80	6.90	9.10

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01100003	Stonington, Borough	Conn.	Fresh	0.19	0.15	0.16	0.14	0.19	0.22	0.23	0.19	0.24	0.20	0.19	--	--
	Stonington, Pawcatuck	Conn.	Saline	.33	.33	.33	.29	.33	.32	.32	.32	.34	.34	.34	.32	.33
	Stonington, Mystic	Conn.	Fresh	.51	.51	.58	.52	.52	.49	.49	.59	.50	.48	.46	.46	.50
Total				19.50	19.96	23.85	19.71	23.41	23.10	16.95	16.23	18.46	15.31	18.32	17.36	20.81
01100004	Branford	Conn.	Fresh	2.62	3.15	3.00	2.48	3.40	3.30	2.52	2.34	2.54	2.13	2.60	1.77	2.26
	Cheshire	Conn.	Fresh	2.07	2.11	2.35	2.08	2.13	2.39	2.02	1.75	1.94	1.80	1.98	2.07	2.26
	Meriden	Conn.	Fresh	9.93	9.90	12.00	10.10	12.60	12.90	9.40	7.30	8.90	6.90	8.90	8.90	11.40
	Milford, Beaver Brook	Conn.	Fresh	2.03	2.50	2.20	1.80	2.30	2.60	2.20	1.80	1.80	1.70	1.80	1.80	1.90
	Milford, Housatonic	Conn.	Fresh	6.39	5.20	6.70	6.20	7.40	7.70	6.60	6.00	6.40	5.60	6.50	5.90	6.50
	New Haven, East Shore	Conn.	Saline	38.72	35.26	35.28	30.30	38.00	43.80	39.67	39.49	44.80	37.27	41.61	37.71	41.43
	North Haven	Conn.	Fresh	3.60	3.12	4.28	4.36	4.18	3.82	3.18	2.96	3.37	3.10	3.39	3.53	3.98
	Southington	Conn.	Fresh	4.43	4.25	4.89	4.50	5.30	5.30	4.60	4.00	4.00	3.70	4.10	4.10	4.40
	Wallingford	Conn.	Fresh	6.08	6.31	7.02	5.98	7.31	7.30	5.57	4.77	5.50	4.94	5.91	5.56	6.84
	West Haven	Conn.	Saline	7.82	7.10	7.60	9.30	8.50	8.80	7.30	7.70	9.60	6.20	7.60	6.70	7.40
Total				83.69	78.90	85.32	77.10	91.12	97.91	83.06	78.11	88.85	73.34	84.39	78.04	88.37
01100005	Ansonia	Conn.	Fresh	2.67	2.56	3.22	2.92	3.34	3.68	2.75	2.22	2.07	1.81	2.15	2.43	2.94
	Beacon Falls	Conn.	Fresh	.19	.23	.24	.21	.21	.22	.17	.14	.15	.14	.17	.18	.24
	Bethel	Conn.	Fresh	1.08	1.00	1.20	1.10	1.20	1.20	1.10	1.00	1.10	.99	1.00	1.00	1.10
	Canaan Fire District	Conn.	Fresh	.23	.13	.21	.20	.32	.32	.24	.18	.23	.19	.23	.24	.30
	Danbury	Conn.	Fresh	7.93	8.10	9.10	8.80	8.80	8.60	7.10	6.50	8.10	6.60	7.30	7.70	8.40
	Derby	Conn.	Fresh	1.74	1.74	2.07	1.86	2.24	2.12	1.61	1.37	1.47	1.27	1.51	1.65	1.97
	Great Barrington	Mass.	Fresh	2.99	2.55	3.31	3.52	3.23	3.51	2.67	2.29	3.33	2.52	3.16	2.89	2.88
	Kent	Conn.	Fresh	.06	.07	.07	.06	.07	.08	.05	.05	.06	.06	.07	.06	.05
	Lee	Mass.	Fresh	.90	.77	1.01	.95	.97	1.13	.88	.79	1.01	.75	.85	.82	.89
	Lenox Center	Mass.	Fresh	.65	.70	.65	.80	.66	.67	.55	.52	.56	.59	.67	.73	.77
	Lenox 2	Mass.	Fresh	.08	.10	.09	.10	.09	.09	.07	.05	.05	.07	.10	.11	.11
	Litchfield	Conn.	Fresh	.61	.50	.73	.73	.76	.81	.52	.41	.67	.38	.50	.57	.78
	Naugatuck	Conn.	Fresh	6.66	6.59	7.57	7.51	7.50	8.20	6.70	5.50	5.50	5.50	6.20	6.00	7.10
	New Milford	Conn.	Fresh	.44	.31	.36	.35	.45	.37	.34	.27	.77	--	.53	.52	.55
	Norfolk	Conn.	Fresh	.35	.29	.45	.42	.48	.52	.27	.19	.31	.16	.28	.33	.46
	Pittsfield	Mass.	Fresh	14.62	11.30	15.20	18.50	16.33	18.66	14.67	11.30	14.50	12.30	14.20	14.50	14.00
	Plymouth	Conn.	Fresh	.94	.88	1.06	1.01	1.04	1.06	--	.77	.87	.80	.88	.94	1.04
	Salisbury	Conn.	Fresh	.37	.35	.42	.41	.47	.47	.34	.27	.35	.30	.36	.36	.39
	Seymour	Conn.	Fresh	1.62	1.58	1.78	1.67	1.80	1.90	1.65	1.48	1.45	1.34	1.46	1.68	1.69
	Sharon	Conn.	Fresh	.06	.04	.06	.15	.07	.08	.05	.03	.04	.02	--	--	.04
	Shelton, Riverdale	Conn.	Fresh	1.92	1.99	2.25	1.87	1.81	2.02	1.85	1.70	1.88	1.64	1.90	2.00	2.19

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01100005	Stockbridge	Mass.	Fresh	0.23	0.26	0.25	0.27	0.23	0.25	0.24	0.23	0.23	0.21	0.21	0.21	0.22
	Stratford	Conn.	Fresh	7.62	7.23	9.00	7.61	9.46	10.18	6.80	5.21	5.66	5.26	7.37	8.05	9.61
	Thomaston	Conn.	Fresh	1.10	.90	1.70	1.18	1.20	1.20	.94	1.04	1.02	.93	.99	1.00	1.07
	Torrington	Conn.	Fresh	6.44	4.60	6.80	7.30	7.90	8.09	6.18	5.23	7.47	5.05	5.85	5.92	6.94
	Waterbury	Conn.	Fresh	22.69	21.40	26.57	24.14	25.50	25.40	21.60	18.69	21.52	18.78	21.56	22.58	24.57
	Watertown Fire District	Conn.	Fresh	.82	.63	.75	.75	.89	.82	.69	.76	1.00	.88	.84	.85	1.02
Total				85.01	76.79	96.11	94.38	97.02	01.64	80.02	68.18	81.35	68.54	80.33	83.31	91.32
01100006	Bridgeport East	Conn.	Fresh	10.87	13.90	10.70	9.85	12.00	12.44	9.99	9.40	10.20	9.59	11.10	10.52	10.80
	Bridgeport West	Conn.	Fresh	23.57	23.40	23.90	21.80	24.60	27.80	21.90	21.60	23.30	21.28	24.50	23.19	25.53
	Fairfield	Conn.	Saline	7.57	7.99	8.75	8.10	9.20	9.70	8.00	6.70	6.20	5.30	7.10	6.60	7.20
	Greenwich, Central	Conn.	Saline	9.83	9.60	10.30	9.90	11.90	13.80	9.10	7.10	9.30	7.50	9.00	9.10	11.30
	New Canaan	Conn.	Fresh	1.35	1.30	2.20	1.50	1.60	1.70	1.10	.90	1.00	0.90	1.10	1.30	1.60
	Norwalk	Conn.	Fresh	12.58	12.70	13.30	13.10	14.70	15.80	11.80	10.60	11.30	8.90	11.30	12.10	15.40
	Ridgefield, Route 7	Conn.	Fresh	.01	.02	.01	.01	.01	.01	.01	.01	.01	.01	.02	.02	.02
	Ridgefield, Main	Conn.	Fresh	.93	.84	1.01	1.40	1.61	1.50	.97	.44	.61	.45	.60	.77	.99
	Stamford	Conn.	Saline	15.83	16.00	16.00	17.00	18.00	17.00	14.00	12.00	16.00	16.00	16.00	16.00	16.00
	Westport	Conn.	Fresh	1.83	2.50	2.30	1.80	2.00	2.10	1.70	1.50	1.60	1.40	1.70	1.60	1.80
Total				84.37	88.25	88.47	84.46	95.62	101.85	78.57	70.25	79.52	71.33	82.42	81.20	90.64
Total for basin [1]0110				291.97	281.34	315.34	293.59	328.78	346.57	276.46	246.87	286.73	245.45	286.36	279.98	312.45
01110000	Barton	Vt.	Fresh	.10	.09	.09	.10	.12	.11	.09	.10	.09	.10	.08	.09	.07
	Newport City	Vt.	Fresh	.90	.84	.81	.96	1.00	.92	.83	.92	.96	.77	1.02	.89	.88
	Orleans Village	Vt.	Fresh	.10	.10	.09	.10	.12	.12	.09	.09	.09	.08	.09	.10	.09
Total for basin [1]0111				1.10	1.04	.99	1.17	1.24	1.15	1.02	1.11	1.13	.95	1.19	1.08	1.05
02010001	Benson	Vt.	Fresh	.01	.01	.02	.01	.01	.01	.01	.00	.00	.01	.01	.01	.01
	Castleton	Vt.	Fresh	.25	.26	.20	.27	.36	.30	.25	.23	.24	.27	.16	.24	.20
	Fair Haven	Vt.	Fresh	.24	.19	.19	.21	.26	.27	.27	.25	.24	.26	.26	.26	.24
	Orwell	Vt.	Fresh	.02	.02	.01	.02	.03	.03	.03	.02	.03	.02	.02	.03	.02
	Poultney	Vt.	Fresh	.37	.29	.40	.48	.52	.49	.30	.21	.30	.25	.33	.41	.41
	West Pawlet	Vt.	Fresh	.02	.02	.02	.02	.02	.02	.02	.02	.01	.01	.02	.01	.01
Total				.91	.79	.84	1.00	1.19	1.12	.87	.73	.83	.82	.79	.96	.89
02010002	Brandon	Vt.	Fresh	.31	.28	.28	.30	.38	.41	.31	.27	.27	.28	.27	.32	.29
	Middlebury	Vt.	Fresh	1.18	1.00	1.13	1.24	1.45	1.37	.94	.93	1.18	.82	1.37	1.55	1.25
	Pittsford	Vt.	Fresh	.05	.04	.04	.06	.06	.06	.05	.05	.05	.05	.05	.06	.06
	Proctor	Vt.	Fresh	.22	.18	.16	.16	.30	.28	.26	.22	.18	.19	.18	.22	.28

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
02010002	Rutland, Main	Vt.	Fresh	5.56	--	--	--	--	--	--	4.21	5.48	--	5.55	5.98	6.60
	Vergennes	Vt.	Fresh	.46	0.40	0.49	0.49	0.57	0.44	0.45	.47	.45	0.46	.47	.46	.44
	Wallingford, Fire District 1	Vt.	Fresh	.11	.11	.11	.11	.13	.12	.11	.10	.10	.09	.09	.10	.11
	West Rutland	Vt.	Fresh	.26	.25	.32	.32	.32	.35	.24	.18	.20	.19	.24	.26	.27
Total				8.15	2.26	2.53	2.67	3.21	3.02	2.36	6.43	7.90	2.07	8.22	8.95	9.29
02010003	Barre City	Vt.	Fresh	3.12	2.58	2.92	3.48	3.90	3.34	2.88	2.72	3.24	2.49	3.08	3.36	3.47
	Burlington, Main	Vt.	Fresh	4.20	3.89	3.95	4.45	5.10	4.38	4.08	3.89	4.21	3.43	4.32	4.45	4.31
	Burlington, Riverside	Vt.	Fresh	.83	.71	.89	.89	.97	.76	.66	.71	.83	.87	.96	.93	.81
	Burlington, North End	Vt.	Fresh	1.36	1.03	1.17	1.45	1.73	1.51	1.28	1.29	1.37	1.12	1.33	1.55	1.48
	Essex Junction	Vt.	Fresh	1.48	1.26	1.40	1.42	1.63	1.61	1.40	1.39	1.50	1.33	1.53	1.65	1.60
	Hinesburg	Vt.	Fresh	.19	.12	.16	.17	.21	.18	.16	.19	.23	.18	.20	.24	.22
	Marshfield	Vt.	Fresh	.01	.01	.02	.02	.02	.01	.02	.01	.02	.02	.01	.01	.01
	Montpelier	Vt.	Fresh	2.12	2.26	2.34	3.00	3.10	2.20	1.60	1.40	1.80	1.20	2.10	2.40	2.00
	Northfield	Vt.	Fresh	1.24	1.15	1.20	1.38	1.36	1.15	1.24	1.18	1.19	1.24	1.28	1.22	1.30
	Plainfield	Vt.	Fresh	.06	.06	.06	.07	.08	.06	.05	.05	.05	.05	.05	.06	.05
	Richmond Village	Vt.	Fresh	.08	.07	.06	.07	.08	.08	.07	.08	.08	.07	.08	.09	.10
	Shelburne, Fire District 2	Vt.	Fresh	.26	.20	.19	.26	.39	.23	.23	.20	.24	.25	.27	.34	.30
	Shelburne, Crown Road Fire District 1	Vt.	Fresh	.28	.25	.23	.28	.37	.30	.29	.25	.27	.25	.26	.32	.27
	South Burlington, Airport	Vt.	Fresh	1.22	1.02	1.12	1.20	1.30	1.20	1.20	1.17	1.26	1.13	1.28	1.35	1.38
	South Burlington, Bartlett's Bay	Vt.	Fresh	.75	.62	.70	.77	.83	.80	.69	.67	.76	.62	.79	.86	.86
	Stowe	Vt.	Fresh	.13	.13	.13	.16	.18	.13	.12	.12	.12	.11	.11	.10	.10
	Waterbury	Vt.	Fresh	.23	.23	.22	.27	.30	.27	.21	.21	.21	.24	.22	.21	.16
	Williamstown	Vt.	Fresh	.06	.07	.06	.07	.08	.10	.06	.04	.04	.05	.05	.07	.05
	Winooski	Vt.	Fresh	.98	.82	1.06	1.13	1.33	1.04	.90	.71	.78	.64	.98	1.24	1.16
Total				18.60	16.47	17.84	20.52	22.95	19.35	17.12	16.29	18.20	15.27	18.91	20.45	19.63

Appendix 1. Summary of municipal wastewater-treatment facilities and mean daily return flows by subregional drainage basins and subbasins in New England, 1990—*Continued*

Drainage-subbasin code	Wastewater-treatment facility name	State	Type of receiving water	Average daily return flow (Mgal/d)	Mean daily flows, in Mgal/d											
					Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
02010005	Alburg	Vt.	Fresh	0.07	0.06	0.07	0.08	0.11	0.07	0.06	0.05	0.05	0.06	0.05	0.08	0.07
	Chelsea	Vt.	Fresh	.03	.03	.03	.04	.04	.03	.02	.02	.02	.02	.03	.03	.03
	Fairfax	Vt.	Fresh	.03	.03	.03	.05	.05	.03	.04	.01	.04	.02	.01	.04	.02
	Hardwick	Vt.	Fresh	.19	.24	.20	.33	.29	.19	.14	.13	.12	.13	.15	.17	.14
	Hyde Park	Vt.	Fresh	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
	Jeffersonville	Vt.	Fresh	.02	.03	.02	.02	.03	.02	.03	.02	.02	.02	.02	.03	.03
	Johnson	Vt.	Fresh	.14	.12	.14	.16	.22	.14	.09	.11	.12	.16	.15	.16	.14
	Milton	Vt.	Fresh	.15	.14	.13	.15	.18	.17	.16	.15	.15	.14	.14	.16	.15
	Morrisville Village	Vt.	Fresh	0.33	0.31	0.31	0.37	0.41	0.36	0.31	0.31	0.32	0.31	0.29	0.33	0.31
	St. Albans	Vt.	Fresh	3.45	3.27	3.75	4.12	4.60	3.70	2.78	2.82	3.28	2.31	3.44	3.67	3.71
Total				4.43	4.24	4.71	5.33	5.96	4.73	3.64	3.64	4.15	3.19	4.30	4.69	4.61
02010007	Enosburg Falls	Vt.	Fresh	.30	.22	.23	.36	.54	.30	.22	.21	.21	.25	.31	.45	.31
	Newport Center	Vt.	Fresh	.02	.02	.02	.02	.02	.03	.02	.02	.02	.02	.02	.02	.02
	North Troy	Vt.	Fresh	.06	.00	.06	.07	.12	.06	.05	.05	.05	.05	.05	.07	.06
	Richford	Vt.	Fresh	.35	.28	.30	.44	.49	.33	.28	.28	.31	.40	.37	.39	.30
	Sheldon Springs	Vt.	Fresh	.02	.02	.02	.02	.03	.02	.01	.01	.02	.03	.03	.04	.03
	Swanton Village	Vt.	Fresh	.77	.55	.78	.85	1.29	.84	.68	.53	.67	.63	.83	.83	.79
	Troy-Jay	Vt.	Fresh	.06	.07	.07	.08	.06	.06	.05	.05	.06	.05	.06	.06	.03
Total				1.58	1.16	1.47	1.84	2.55	1.62	1.31	1.15	1.34	1.43	1.67	1.85	1.54
Total for basin [1]0201				33.67	24.92	27.39	31.37	35.85	29.83	25.31	28.24	32.43	22.79	33.88	36.89	35.97
02020003	Adams	Mass.	Fresh	2.34	2.24	2.75	2.85	2.66	2.98	2.55	1.83	2.23	1.91	1.96	1.99	2.10
	Bennington	Vt.	Fresh	4.57	3.52	4.81	5.31	5.14	5.46	4.42	3.64	5.21	4.13	4.10	4.46	4.59
	Hoosac	Mass.	Fresh	5.93	5.22	7.63	8.55	8.05	7.92	4.84	3.91	5.17	3.78	4.46	5.46	6.17
	Manchester	Vt.	Fresh	.28	.25	.27	.28	.31	.30	.26	.31	.22	.25	.25	.33	.31
Total for basin [1]0202				13.12	11.23	15.46	16.99	16.16	16.66	12.07	9.69	12.83	10.07	10.76	12.24	13.16
Total for New England				1,725.14	1,615.84	1,936.54	1,804.36	1,996.28	1,984.18	1,614.83	1,442.98	1,640.85	1,415.20	1,697.15	1,653.06	1,746.61

[1]Subregional drainage-basin names are listed in table 1.