

U.S. Department of the Interior
U.S. Geological Survey

The U.S. Geological Survey Streamflow and Observation-Well Network in Massachusetts and Rhode Island

By PHILLIP J. ZARRIELLO and ROY S. SOCOLOW

Open-File Report 03-277

In cooperation with the
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL MANAGEMENT;
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION;
METROPOLITAN DISTRICT COMMISSION; WATER RESOURCES BOARD;
RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT;
PROVIDENCE WATER SUPPLY BOARD; and the
U.S. ARMY CORPS OF ENGINEERS

Northborough, Massachusetts
2003

U.S. DEPARTMENT OF THE INTERIOR

GALE A. NORTON, Secretary

U.S. GEOLOGICAL SURVEY

Charles G. Groat, Director

Any use of trade, product, or firm names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government.

For additional information write to:

Chief, Massachusetts–Rhode Island District
U.S. Geological Survey
10 Bearfoot Road
Northborough, MA 01532

or visit our Web site at
<http://ma.water.usgs.gov>

Copies of this report can be purchased from:

U.S. Geological Survey
Branch of Information Services
Box 25286
Denver, CO 80225-0286

CONTENTS

Abstract	1
Introduction.....	2
Purpose and Scope.....	2
Acknowledgments	2
Previous Studies.....	3
Network Objectives.....	4
National Interest.....	8
State Interest.....	12
Other Interest.....	12
Trends in the Network.....	14
Modernization of Streamflow Monitoring.....	15
Modernization of Ground-Water-Level Monitoring	17
Correlated Streamgauge Stations.....	18
Streamgauge-Station Metrics.....	19
Record Length	19
Regulation	19
Physiographic Region.....	20
Basin Characteristics	22
Physical Characteristics.....	22
Land-Cover Characteristics.....	24
Combined Metrics	24
Observation-Well Metrics.....	29
Record Length	19
Physiographic Region.....	20
Geologic Material.....	30
Well Depth.....	30
Future Directions of the Monitoring Network	32
Summary	33
References Cited	34
Appendix 1: Streamgauge Stations, Observation Wells, and Summary Tables by Major Basin in Massachusetts and Rhode Island.....	37
Appendix 2: Table of Correlated Streamgauge Stations in Massachusetts and Rhode Island	109

FIGURES

1. Bar graph showing the number of U.S. Geological Survey streamgauge stations operated in Massachusetts and Rhode Island by category of data use, 2000 water year	5
2. Map showing the locations of streamgauge stations in Massachusetts and Rhode Island identified for inclusion in the National Streamflow Information Program (NSIP)	10
3–6. Bar graphs showing:	
3. Number of continuous streamgauge stations reported annually, 1900 to 2000	15
4. Number of observation well records reported annually, 1900 to 2000	16
5. Record length of streamgauge stations for (A) all stations (includes discontinued stations), and (B) stations active during the 2000 water year.....	19
6. Number of streamgauge stations affected by regulation, 2000 water year	20
7. Map showing the physiographic regions, major river basins, and the streamflow station and observation-well network, 2000 water year	21

8.	Bar graph showing distribution of streamgage stations by physiographic region, 2000 water year.....	22
9.	Box plots showing summary of selected basin characteristics upstream of active streamgage stations, 2000 water year: (A) physical characteristics, and (B) land-cover characteristics.....	23
10–19.	Bar graphs showing:	
10.	Number of streamgage stations by drainage-area size for (A) active stations during the 2000 water year, and (B) discontinued stations	24
11.	Number of active streamgage stations by physiographic region and years of record, 2000 water year	25
12.	Number of active streamgage stations by physiographic region and regulation, 2000 water year	26
13.	Number of active streamgage stations by drainage-area size and physiographic region, 2000 water year	26
14.	Number of active streamgage stations by regulation and record length, 2000 water year.....	27
15.	Number of active streamgage stations by record length and drainage-area size, 2000 water year	28
16.	Number of active streamgage stations by drainage-area size and regulation, 2000 water year	28
17.	Record length of observation wells, 2000 water year	30
18.	Number of observation wells in the 2000 water year by physiographic region and type of geologic material in which the well is finished	31
19.	Box plots showing depths of observation wells by (A) type of geologic material, and (B) physiographic region, 2000 water year	32

TABLES

1.	Streamgage stations in Massachusetts and Rhode Island identified for inclusion in the U.S. Geological Survey National Streamflow Information Program (NSIP)	9
2.	Streamgage stations in Massachusetts and Rhode Island included in the U.S. Geological Survey national Hydro-Climatic Data Network (HCDN).....	11
3.	Observation wells in Massachusetts and Rhode Island included in the U.S. Geological Survey national Collection of Basic Records (CBR) observation-well network.....	12
4.	Additional streamgage stations identified in a monitoring needs assessment survey.....	14
5.	Number of active streamgage stations unaffected by regulation, tabulated by drainage-area range and physiographic region, 2000 water year	29
6.	Number of active streamgage stations unaffected by regulation, or unaffected by regulation at high flows, tabulated by drainage-area range and physiographic region, 2000 water year.....	29

CONVERSION FACTORS, VERTICAL COORDINATE INFORMATION, HORIZONTAL COORDINATE INFORMATION, AND ACRONYMS

CONVERSION FACTORS

Multiply	By	To obtain
mile (mi)	1.609	kilometer (km)
square mile (mi ²)	2.590	square kilometer (km ²)

VERTICAL COORDINATE INFORMATION

Vertical coordinate information is referenced to the North American Vertical Datum of 1929 (NGVD 29). Elevation, as used in this report, refers to distance above NGVD 29.

HORIZONTAL COORDINATE INFORMATION

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83),

ACRONYMS

ACOE	U.S. Army Corps of Engineers
ADCP	Acoustic Doppler Current Profiler
ADVMS	Acoustic Doppler Velocity Meters
DCP	Digital Collection Platforms
EOEA	Massachusetts Executive Office of Environmental Affairs
MA-RI	Massachusetts and Rhode Island
MADDEM	Massachusetts Department of Environmental Management
MADEP	Massachusetts Department of Environmental Protection
MWRA	Massachusetts Water Resources Authority
MDC	Metropolitan District Commission
MDC-DWM	Massachusetts Metropolitan District Commission Division of Watershed Management
NWIS	National Water Information System
NWS	National Weather Service
PWSB	Providence Water Supply Board
RIDEM	Rhode Island Department of Environmental Management
RIWRB	Rhode Island Water Resources Board
SAS	Statistical Analysis System
USGS	U.S. Geological Survey

