DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
COMMONWEALTH OF MASSACHUSETTS DIVISION OF WATER RESOURCES
BOSTON, MASSACHUSETTS

HYDROLOGIC INVESTIGATIONS
ATLAS HA–693 (SHEET 1 of 4)

# UNCONSOLIDATED DEPOSITS AND AVAILABILITY OF GROUND WATER

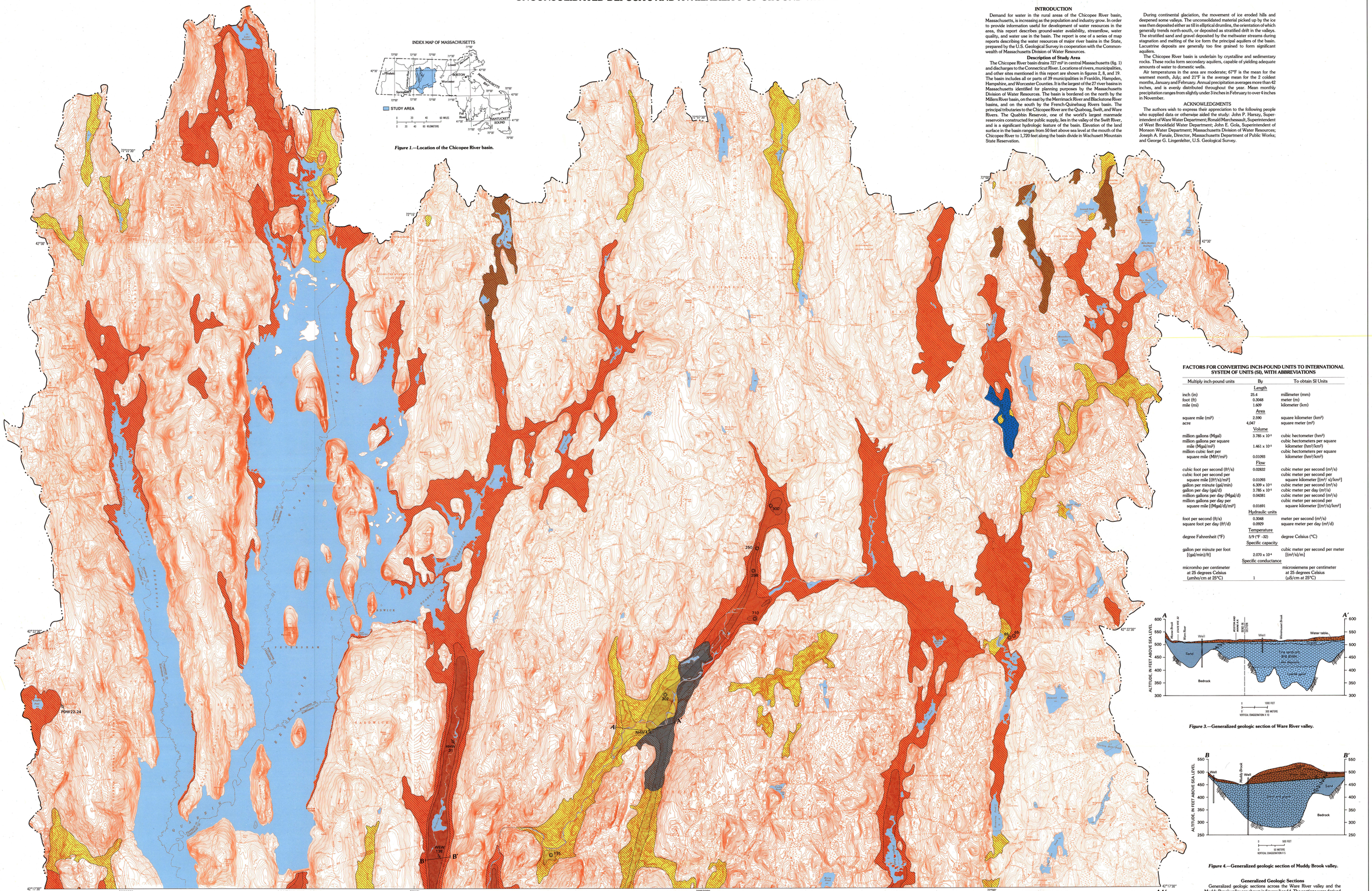


*Figure 2.*—Unconsolidated deposits and availability of ground water

## INTRODUCTION

Demand for water in the rural areas of the Chicopee River basin, Massachusetts, is increasing as the population and industry grow. In order to provide information useful for development of water resources in the area, this report describes ground-water availability, streamflow, water quality, and water use in the basin. The report is one of a series of map reports describing the water resources of major river basins in the State, prepared by the U.S. Geological Survey in cooperation with the Commonwealth of Massachusetts Division of Water Resources.

### Description of Study Area

The Chicopee River basin drains 727 mi² in central Massachusetts (fig. 1) and discharges to the Connecticut River. Locations of rivers, municipalities, and other sites mentioned in this report are shown in figures 2, 8, and 19. The basin includes all or parts of 39 municipalities in Franklin, Hampden, Hampshire, and Worcester Counties. It is the largest of the 27 river basins in Massachusetts identified for planning purposes by the Massachusetts Division of Water Resources. The basin is bordered on the north by the Millers River basin, on the east by the Merrimack River and Blackstone River basins, and on the south by the French-Quinebaug Rivers basin. The principal tributaries to the Chicopee River are the Quaboag, Swift, and Ware Rivers. The Quabbin Reservoir, one of the world's largest manmade reservoirs constructed for public supply, lies in the valley of the Swift River, and is a significant hydrologic feature of the basin. Elevation of the land surface in the basin ranges from 50 feet above sea level at the mouth of the Chicopee River to 1,720 feet along the basin divide in Wachusett Mountain State Reservation.

*Figure 1.*—Location of the Chicopee River basin.

During continental glaciation, the movement of ice eroded hills and deepened some valleys. The unconsolidated material picked up by the ice was then deposited either as till in elliptical drumlins, the orientation of which generally trends north-south, or deposited as stratified drift in the valleys. The stratified sand and gravel deposited by the meltwater streams during stagnation and melting of the ice form the principal aquifers of the basin. Lacustrine deposits are generally too fine grained to form significant aquifers.

The Chicopee River basin is underlain by crystalline and sedimentary rocks. These rocks form secondary aquifers, capable of yielding adequate amounts of water to domestic wells.

Air temperatures in the area are moderate; 67°F is the mean for the warmest month, July; and 21°F is the average mean for the 2 coldest months, January and February. Annual precipitation averages more than 42 inches, and is evenly distributed throughout the year. Mean monthly precipitation ranges from slightly under 3 inches in February to over 4 inches in November.

## ACKNOWLEDGMENTS

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### FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM OF UNITS (SI), WITH ABBREVIATIONS

| Multiply inch-pound units | By | To obtain SI Units |
|---|---|---|
| **Length** | | |
| inch (in) | 25.4 | millimeter (mm) |
| foot (ft) | 0.3048 | meter (m) |
| mile (mi) | 1.609 | kilometer (km) |
| **Area** | | |
| square mile (mi²) | 2.590 | square kilometer (km²) |
| acre | 4,047 | square meter (m²) |
| **Volume** | | |
| million gallons (Mgal) | $3.785 \times 10^{-3}$ | cubic hectometer (hm³) |
| million gallons per square mile (Mgal/mi²) | $1.461 \times 10^{-3}$ | cubic hectometers per square kilometer (hm³/km²) |
| million cubic feet per square mile (Mft³/mi²) | 0.01093 | cubic hectometers per square kilometer (hm³/km²) |
| **Flow** | | |
| cubic foot per second (ft³/s) | 0.02832 | cubic meter per second (m³/s) |
| cubic foot per second per square mile [(ft³/s)/mi²] | 0.01093 | cubic meter per second per square kilometer [(m³/ s)/km²] |
| gallon per minute (gal/min) | $6.309 \times 10^{-5}$ | cubic meter per second (m³/s) |
| gallon per day (gal/d) | $3.785 \times 10^{-3}$ | cubic meter per day (m³/s) |
| million gallons per day (Mgal/d) | 0.04381 | cubic meter per second (m³/s) |
| million gallons per day per square mile [(Mgal/d)/mi²] | 0.01691 | cubic meter per second per square kilometer [(m³/s)/km²] |
| **Hydraulic units** | | |
| foot per second (ft/s) | 0.3048 | meter per second (m³/s) |
| square foot per day (ft²/d) | 0.0929 | square meter per day (m²/d) |
| **Temperature** | | |
| degree Fahrenheit (°F) | 5/9 (°F –32) | degree Celsius (°C) |
| **Specific capacity** | | |
| gallon per minute per foot [(gal/min)/ft] | $2.070 \times 10^{-4}$ | cubic meter per second per meter [(m³/s)/m] |
| **Specific conductance** | | |
| micromho per centimeter at 25 degrees Celsius (μmho/cm at 25°C) | 1 | microsiemens per centimeter at 25 degrees Celsius (μS/cm at 25°C) |




*Figure 3.*—Generalized geologic section of Ware River valley.




*Figure 4.*—Generalized geologic section of Muddy Brook valley.

### Generalized Geologic Sections

Generalized geologic sections across the Ware River valley and the Muddy Brook valley are shown in figures 3 and 4. The sections were derived from seismicrefraction data and lithologic logs of borings and wells.

Base from U.S. Geological Survey
1:24,000 topographic quadrangles

# WATER RESOURCES OF THE CHICOPEE RIVER BASIN, MASSACHUSETTS

by

**Bruce E. Krejmas and Anthony Maevsky**

**1986**

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