91-159

WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

NATIONAL WATER-QUALITY ASSESSMENT PROGRAM—The Connecticut River and Long Island Sound Coastal Rivers

In 1991, the U.S. Geological Survey (USGS) began to implement a full-scale National Water-Quality Assessment (NAWQA) program. The long-term goals of the NAWQA program are to describe the status and trends in the quality of a large, representative part of the Nation's surface- and ground-water resources and to provide a sound, scientific understanding of the primary natural and human factors affecting the quality of these resources. In meeting these goals, the program will provide essential water-quality information for policy makers and managers at national, State, and local levels.

A major component of the NAWQA program will be accomplished through investigations of individual areas, called study units. The 60 study units, which include most of the Nation's major river basins and aquifer systems, range in size from 1,200 to more than 65,000 square miles and include about 60 to 70 percent of the Nation's water use and population served by public water supply. Study-unit investigations are the principal building blocks of the program on which national-level assessment activities are based, and will enable water-quality information at different areal scales to be integrated. In 1991, the Connecticut River and Long Island Sound Coastal Rivers area was among the first 20 NAWQA study units selected for study under the full-scale implementation plan.

STUDY UNIT DESCRIPTION

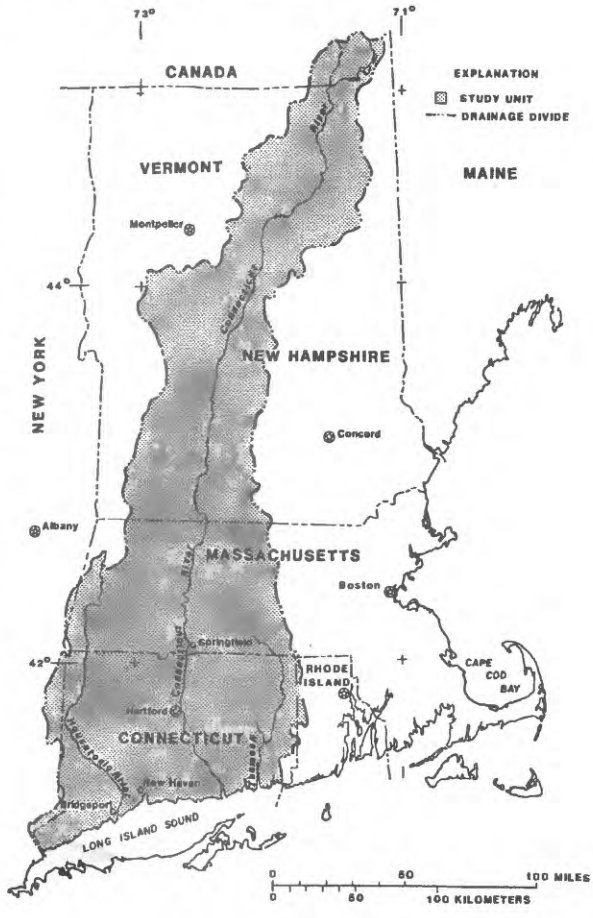
The Connecticut River and Long Island Sound Coastal Rivers NAWQA study unit extends from the Canadian border to coastal Connecticut. The boundaries of the study unit are defined by the drainage divides of the Housatonic and Connecticut River basins on the west and the Thames and Connecticut River basins on the east. The study unit includes eastern Vermont, western New Hampshire, west-central Massachusetts, nearly all of Connecticut, and small parts of New York and Rhode Island, an area of about 15,750 square miles.

Although occupying less than one-half of 1 percent of the total area of the Nation, the study unit is inhabited by about 4.5 million people, or about 2 percent of the Nation's population. The study unit is characterized by diverse population density ranging from the sparsely populated, rural agrarian and wilderness areas of northern Vermont and New Hampshire to the densely populated urban areas of southwestern Connecticut and the south-central part of the Connecticut River valley. The principal economy in the northern part of the study unit is based on agriculture, primarily dairy farming, and seasonal recreation. In the southern part of the study unit, the economy is based predominantly on manufacturing, financial services, and service industries. The principal cities of Hartford, Springfield, Bridgeport, and New Haven are all located in the southern part of the study unit.

PHYSIOGRAPHY AND CLIMATE

The study unit is located entirely within the New England physiographic province, a plateau-like upland that rises gradually from the sea but includes numerous mountain ranges and individual peaks. Altitudes range from sea level in coastal Connecticut to 6,288 feet above sea level at the peak of Mount Washington in the White Mountains of New Hampshire. Most of the area is within the New England Upland section of the province where the topography is characterized by rolling hills and low, rounded mountains interrupted by numerous, generally narrow valleys. The Connecticut River valley forms a broad lowland that extends from a short distance south of the Vermont-New Hampshire-Massachusetts border to within 20 miles of Long Island Sound. The relief is higher in the northern part of the study unit where the Green Mountains of Vermont and the White Mountains of New Hampshire commonly reach altitudes between 2,000 and 4,000 feet above sea level.

The climate differs considerably within the study unit, but is generally temperate and humid. Average annual temperature ranges from less than 40 degrees Fahrenheit in the northern mountainous areas to about 50 degrees Fahrenheit in southwestern coastal Connecticut. Average annual precipitation ranges from about 34 inches at places in the northern end of the Connecticut River valley to more than 65 inches in some mountainous regions. Annual precipitation, however, commonly fluctuates as much as 20 inches from these averages.



GEOLOGY AND HYDROLOGY

Bedrock in the study unit ranges in age from Precambrian to Mesozoic and includes crystalline igneous rocks (granite, syenite, anorthosite, and pegmatite) and metamorphic rocks (gneiss, schist, phyllite, slate, and quartzite) in the New England Upland, Green Mountain, and White Mountain areas. The Connecticut River valley lowland is underlain by a sequence of interbedded sedimentary rocks (sandstone, conglomerate, and shale) intruded by igneous rocks (diabase and basalt). Some of the valleys in western New England and eastern New York are underlain by carbonate rocks (limestone, dolomite, and marble). Pleistocene glacial erosion and deposition left a nearly continuous layer of till over the bedrock. During the retreat of the glaciers, meltwater streams deposited stratified drift (sand, gravel, silt, and clay) in most valleys.

The Connecticut River is the principal river, extending 383 miles from its source in the Connecticut Lakes of northern New Hampshire to its outlet at Long Island Sound. The river drains 11,260 square miles, or about 72 percent of the study unit. Flow of the Connecticut River near the Connecticut-Massachusetts border averages about 10,600 million gallons per day. Other major streams include the Housatonic and Thames Rivers, which together drain 3,420 square miles or about 20 percent of the study unit. Numerous smaller streams and rivers that flow directly into Long Island Sound collectively drain 1,070 square miles in coastal parts of the study unit.

Two principal types of aquifers underlie the study unit, unconsolidated stratified-drift aquifers and fractured bedrock aquifers. Stratified-drift aquifers are generally the most productive sources of ground water in the study unit, but they are not evenly distributed. The unconsolidated, stratified-drift aquifers store and transmit water through interconnected pores between individual grains of sediment. Differences in the thickness, extent, and permeability of the stratified-drift aquifers, and the proximity and size of surface-water bodies that are sources of recharge, significantly influence the availability of water. Fractured bedrock aquifers underlie the entire study unit and are an important source of water for self-supplied domestic, commercial, and industrial users. Bedrock aquifers primarily store and transmit water through intersecting fractures in consolidated rock. Well yields depend on the number, size, and degree of interconnection of water-bearing fractures. Relatively large yields of wells that tap bedrock aquifers in some places in the study unit have been associated with major fault zones and with areas where the bedrock is overlain by saturated stratified drift.

WATER USE AND WATER-QUALITY ISSUES

Total freshwater withdrawals in the study unit during 1985 were about 1,850 million gallons per day. Surface water is the dominant source, supplying 90 percent (1,657 million gallons per day) of the freshwater used. About two-thirds of the surface-water withdrawals were for thermoelectric power generation. Ground water supplied 10 percent (193 million gallons per day) of the freshwater used, mostly for public- and self-supplied domestic use. Nearly three-quarters of all ground-water withdrawals in the study unit were from aquifers in Connecticut.

The major water-quality issues in the study unit are related to land and water use, but differ somewhat in the headwater, downstream, and coastal areas. Some water-quality concerns are more specific to surface waters or to ground waters, while others are broader issues affecting both resources. The principal water-quality issues are the effects of:

- Nutrients, metals, and organic chemicals from combined storm- and sanitary-sewer overflows, municipal wastewater-treatment-plant effluents, and industrial discharges on the productivity and diversity of aquatic life, and on the chemical quality of water and sediments in the receiving surface-water bodies;
- Point-source contaminants from waste-storage and disposal sites (landfills, lagoons, pits, and ponds), and from unregulated discharges, leaks, or spills of chemicals, oil, or wastes that may occur from leaky underground storage tanks or during transport or transfer operations on surface- and ground-water quality;
- Nonpoint-source contaminants from agricultural (fertilizer and pesticide applications), residential (septic-system effluents, road salt, and lawn and garden chemicals), and urban (runoff from streets and parking lots, and hydrocarbon and other organic chemical leaks and spills) land use on surface- and ground-water quality;
- Acidic precipitation on streams, lakes, and ground-water resources in poorly buffered watersheds;
- Nutrients, pesticides, and sediment transported by runoff from agricultural and forested areas on the productivity and diversity of aquatic life, and on the chemical quality of water and sediments in the receiving surface-water bodies;
- Recharge of degraded surface water or salt-water intrusion caused by ground-water withdrawals on ground-water quality; and
- High concentrations of naturally occurring radionuclides and trace elements in some aquifers on the suitability of ground water for drinking-water supply or for other uses.

COMMUNICATION AND COORDINATION

Communication and coordination between USGS personnel and other interested scientists and water-management organizations are critical components of the NAWQA program. Each of the study-unit investigations will have a local liaison committee consisting of representatives from Federal, State, and local agencies, and from universities and the private sector. Specific activities of each liaison committee will include exchange of information about water-quality issues of regional and local interest; identification of sources of data and information; assistance in the design and scope of project products; and review of project planning documents and reports. A liaison committee for the Connecticut River and Long Island Sound Coastal Rivers study unit will be formed in 1991.

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Information on technical reports and hydrologic data related to the NAWQA program can be obtained from:

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