



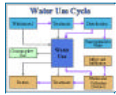
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[NH SEACOAST PROJECT HOMEPAGE:](#)

WATER-USE ASSESSMENT

Analysis of Water Use in the Piscataqua River and Coastal Watersheds, Southeastern New Hampshire

WHAT IS WATER USE?



Water-use activities, as defined in this project, pertain to human activities that utilize and transfer ground and surface waters (see [Water Use Cycle Figure](#)). Water-use activities begin when water is *diverted* or *withdrawn* from surface- or ground-water *resources* and *conveyed* to the place of use. The *withdrawal* may be (1) by the *user* or (2) by a community water *system*, in which case the water is conveyed to the user through a *distribution system*. *Water use* by a user or group of users in a geographic area (areal *aggregate* of users) refers to water that is used for a specific purpose, such as for drinking or bathing (*domestic* activities), watering plants (*irrigation*), or *industrial* processing. Water becomes *wastewater* during use. Wastewater is typically conveyed to either a wastewater-treatment facility for treatment and discharge to a stream or the ground or is returned directly to the ground through septic systems (collectively called *return flow*). *Consumptive use* is water that evaporates or is incorporated into a product during use and is unavailable for additional use within the area (Horn, 2000). Water can also be *transferred* from one drainage basin into another; water leaving a hydrologic system is termed an *export*, water entering a hydrologic system is termed an *import*.

STUDY OBJECTIVES

The primary objective of this project element is to assess the quantity of all current and projected water uses within each town in the Seacoast study area (see [figure 1](#)). This assessment will provide information that can be used for local and regional water-resource planning and management. Another major objective is to provide historical, current, and projected withdrawal and return flow data, and alternative water use scenarios that can be utilized in conjunction with a ground-water-flow model to assess effects of water-use activities on water resources in the region.

Specific objectives of the water-use assessment include:

1. [Develop estimates of all current \(2002\) water-use activities at the census-block scale.](#)
2. [Develop estimates of future water-use activities by town in coordination with local and regional planners.](#)
3. [Develop estimates of historical, current, and future water-use activities for input to the ground-water-flow model.](#)
4. [Store all data in the USGS National Water Information Systems database, specifically the Site-specific Water-Use Data System \(SWUDS\).](#)

1. Estimates of all current (2002) water-use activities

Estimates of water-use activities will include withdrawals, use, consumptive use, return flow, and transfers for major and minor (less than 20,000 gallons per day) users by town at the census-block scale. (Census blocks are the smallest geographic areas for which the U.S. Census Bureau collects and tabulates Census data). Results for each town will be summarized in a map and a diagram.

Approach

Initial efforts will focus on compilation and analysis of data on

- (1) major water users (using more than 20,000 gallons per day);
- (2) community water and wastewater systems;
- (3) minor commercial, industrial, and irrigation users aggregated by census block; and
- (4) domestic users aggregated by census block.

Data on major water users (1) will primarily be obtained from the NHDES Water-use Registration database. Data on community water and wastewater systems (2) will be obtained from NHDES and through interviews with the larger systems. Water-use estimates for commercial and industrial use (3) will be based on coefficients developed for the study area and applied by type of business and number of employees. Estimates of domestic water use (4) will be made on a census-block level using estimating relations developed specifically for this study area.

Estimating domestic water use (4)

Understanding the range and variability of per-capita water-use coefficients throughout the study area is essential to accurately estimate current use and future demands on water resources. In the seacoast study area in 1995, domestic water use was estimated as slightly more than 50% of total use assuming a generalized per capita coefficient of 70 gallons per day. However, a recent detailed study in coastal Connecticut has shown per-capita water use can vary from as little as 50 gallons per day to as much as 1,000 gallons per day depending upon lot size, housing type, household income, type of supply (community, dug well, drilled well), and water-use infrastructure (pools and landscape-irrigation systems). Thus, an accurate assessment of actual per capita use in the study area is critical to understanding relations between water availability and demand in the region.

There are two primary approaches to understanding domestic water use: **(A)** development of statistical models, and **(B)** understanding patterns of water use through surveys coordinated with Middle Schools in the seacoast area.

- (A).** Develop statistical models (multi-variate regression) for annual and seasonal per-capita use. Estimate consumptive use based on difference between summer and winter use.

The statistical models will be based on:

- o Metered domestic-use data from community-water systems
- o Census-block data (population and number of households) and census block-group data (household size and type, and income).
- o Community tax-assessor data (lot size, units in structure, age of structure, assessed value of structure, pool presence)

- (B).** Evaluate the patterns of domestic use based on attitudes on availability and cost of water and interest in water conservation

in conjunction with Middle Schools in the seacoast area.

This part of the study will evaluate the patterns of indoor and outdoor domestic water use associated with family attitudes on the availability and cost of water and interest in water conservation. This information will supplement metered domestic-use data obtained directly from community water systems. In exchange, families will become more familiar with where their water comes from, how they use it, and how they can conserve it. For more information on this collaborative investigation with Middle School students, see the [Residential Water-Use Project packet](#).



2. Estimates of future water-use activities by town

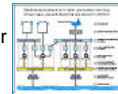
The water-use coefficients developed during the project will be combined with population growth projections to estimate future water use for each town. The population growth projections and areas targeted for commercial, industrial, and domestic development will be generated by State, Regional, and/or town planners.

3. Estimates of historical, current, and future water-use activities for the model area

For the 14 towns located within the ground-water-flow model study area (see [figure 2](#)), additional water-use estimates will be generated to support model calibration and analysis. Estimates of historical, current, and future water-use activities will be developed. Estimates of future water-use activities will be integrated with a number of likely alternative water management scenarios to assess their potential effect on the water resources. (See section on [Ground-water-flow model](#)).

4. Water-use data storage in the Site-specific Water-Use Data System

The water-use database of the USGS National Water Information System (NWIS) has recently been redesigned. This database, the Site-specific Water-Use Data System (SWUDS), provides detailed tracking and analysis of measured and unmeasured water uses. SWUDS is network-based, in that it links water-use activities from withdrawal, through use, to return. The database includes water-use quantities for both single users and areal aggregates of users (state, county, town, basin, and census block). Analysis of metered, permitted, or estimated water-use rates for a specific time period (month or year) can be compared, because SWUDS can store a separate water-use rate for each method used and time period. (See [water-use system figure](#)).



PRODUCTS

A **USGS report** will document the methodology employed and estimates of current and projected future water use by community. The report will include the following for each of the 43 towns in the study area:



Tables summarizing current and future water-use budgets including water withdrawals, use, returns, transfers, consumptive use, inflow and infiltration, and unaccounted-for water. [\[Example table\]](#)



Schematics summarizing current water-use including water withdrawals, use, returns, transfers, consumptive use, inflow and infiltration, and unaccounted-for water. [\[Example schematic\]](#)



Maps showing census blocks annotated to show ranges in current water use, and current service areas for distribution and collection systems. [\[Example map\]](#)

REFERENCE

Horn, M.A., 2000, Method for Estimating Water Use and Interbasin Transfers of Freshwater and Wastewater in an Urbanized Basin: U.S. Geological Survey Water-Resources Investigations Report 99-4287, 34 p.

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