

Town Master Plans guide development and can be used to assess and manage future water needs. Nearby towns that share an aquifer must coordinate development goals to accommodate stakeholders' concerns about the limits of the regional ground water resource.

Homeowners in the Seacoast Watershed need to use common sense about safeguarding the area around their wells (maintain septic systems, be careful with garden chemicals, automotive fluids, etc.). All citizens should be aware of potential risks to ground water in their local area (gas stations, construction sites, parking lot runoff, etc.).

All communities can help in protecting ground water quality and managing resources for long-term sustainability by supporting protection regulations, working with environmental organizations and by practicing water conservation, recycling, proper disposal of hazardous waste, etc.

Ground water education is the foundation of fair, sustainable and resilient water use decisions. Education provides an understanding of water resources so that citizens recognize cause and effect impacts.

## SEACOAST WATER ISSUES

The population of the Seacoast Watershed area (Strafford and Rockingham counties) is projected to increase by over 25 percent to about 500,000 people by 2025. Sustainable use among competing water needs will require a flexible but resilient management process based on valid science and cooperation among neighbors. Scientific investigations must quantify the water "budget" so that regional planners and towns may determine the most appropriate mix of future land and water uses in New Hampshire's Seacoast Region.

## SOURCES OF ADDITIONAL INFORMATION

**American Ground Water Trust** (603-228-5444)  
[www.agwt.org](http://www.agwt.org) and [www.privatewell.com](http://www.privatewell.com)

*Click on [Ground Water Information](#) for well and ground water background; click on [Links](#) for additional contacts.*

**NH Geological Survey** (603-271-3503)

<http://www.des.state.nh.us/geo.htm>

*Information on NH geology and ground water*

**NH Dept of Environmental Services**

<http://www.des.state.nh.us/factsheets/geo/geo-7.htm>

*NH Well Inventory (603-271-3503)*

<http://www.des.state.nh.us/factsheets/ws/ws-23-1.htm>

*Water Well Regulations (603-271-3503)*

**United States Environmental Protection Agency**

<http://www.epa.gov/water/>

*Information on U.S. water resources and science*

**United States Geological Survey**

<http://search.usgs.gov> (603-226-7800)

*Technical and educational information on ground water resources and the geology of the United States*

### ***Ground Water Withdrawal Permits***

The NHDES Water Supply Division reviews applications to withdraw ground water at quantities greater than 57,600 gallons per day. Water users withdrawing more than 20,000 gallons per day on average must register the usage with the NH Geological Survey. Upon request, these records are available for public review.

### ***Master Plans and Zoning Ordinances***

Towns maintain copies of these documents, which contain the vision for a town's future development. The zoning ordinances should contain an aquifer overlay district or other specific rules for managing and controlling activities that could cause ground water contamination.



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Partial funding for the preparation of this document was provided through a Local Source Water Protection Grant administered by the NH Department of Environmental Services (Grant #SWP-077).

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Information for citizens and communities

# GROUND WATER

in the

## SEACOAST REGION

of

## NEW HAMPSHIRE



## GROUND WATER USE

Three out of five people in New Hampshire are supplied with drinking water from wells. Many water utilities and 200,000 private wells in the State use ground water sources.

There are 43 towns in the 980 square mile Seacoast Watershed that drains to the Atlantic Ocean. Seventeen of these towns abut estuaries and tidal rivers. They include: Dover, Durham, Madbury, and Rollinsford in Strafford County and Exeter, Greenland, Hampton, Hampton Falls, New Castle, Newfields, Newington, Newmarket, North Hampton, Portsmouth, Rye, Seabrook, and Stratham in Rockingham County. Since 1970, there has been a 40% increase in population in the Seacoast Region. This growth and development has increased the demand for water while reducing the available supply because of contamination, increased runoff to rivers and reduced recharge to aquifers.

## WATERSHEDS AND GROUND WATER

A watershed is the area of the whole landscape that collects and directs flow to a particular river system. A watershed can be imagined as a bathtub. The bathtub sides represent the topographic high points along the watershed perimeter and the drain hole is the downstream outlet. The watershed's plumbing system includes streams, rivers, wetlands and all sub-surface water. The Seacoast Watershed includes the rivers and their tributaries that drain into the Atlantic Ocean and all the ground water that flows into those rivers.

## GEOLOGY AND HYDROLOGY BASICS

All water is part of the hydrologic system, which describes the continuous movement of water through the land and atmosphere. The geology of a region provides important controls on the hydrology of the water flowing through and over the earth.

Ground water is contained in cracks and fractures in bedrock and between the particles of soil, sand, gravel or clay that may overlie the bedrock. An aquifer is a geologic formation that stores ground water. Travel time may be slow, but eventually ground water will flow to wells, springs, streams,

rivers, lakes, ponds, wetlands, estuaries or to the ocean. Rain and snowmelt infiltrate the ground to replenish (recharge) ground water. Infiltration occurs best when the ground is vegetated and not paved over. Vegetation reduces the rate of runoff flow allowing time for seepage to occur into the ground. Ground water sustains flow to streams and wetlands and is very important for surface water habitats. Maintaining freshwater flows into estuaries such as the Great Bay is essential for an estuary's ecology.

Ground water in the Seacoast area occurs in fractures in bedrock (most private wells), and in sand and gravel layers that were deposited by water flowing from melting glaciers (most town wells). During the time of the last glaciation, sea level changes resulted in clay layers being deposited on top of some of the sands. Some of the Seacoast's wells are drilled into sands that are beneath (confined by) the clays.

## GROUND WATER SUSTAINABILITY

Fresh water resources are renewable over the long-term, but are finite in the short-term. To provide a sustainable water supply and maintain natural habitats for flora and fauna, we should not use more water than is replenished. Hydrological "accounting" in a watershed is called a water budget and in its simplest form is:

**Water in** (rain, snow, etc.) equals **Water out** (evaporation, transpiration by plants), plus or minus **Change of storage** (water underground in aquifers or in wetlands, rivers, lakes, etc.).

The "accounting" is often calculated using average annual precipitation as budget "income." Storm water or treated wastewater that is released outside the watershed area will change the water budget equation (usually increasing "water out"). For water planning purposes, the budget (water in) should be based on worst-case drought year conditions. Not only

annual inputs vary. The frequency, intensity and duration of precipitation events has great significance for recharge and estimates of usable amounts of water.

## CONTAMINATION

Contaminated aquifers are a net loss to the usable budget. Although effects on water quality may result from natural causes (e.g., arsenic, fluoride, radon from bedrock sources), the real quality concerns result from human activities. In the last 20 years, much has been achieved in reducing point-source pollution from industry, but non-point source pollution, resulting from growing populations and accompanying urban and suburban infrastructure are an ongoing concern in New Hampshire's Seacoast Watershed.

## SPRAWL IMPACTS

Population growth and associated construction of homes, businesses, and highways increases runoff and reduces recharge to aquifers. Gas stations increase risks of fuel leakage and contamination from compounds such as MtBE. Human activities in yards and gardens pose quality problems from spilled gasoline, excessive use of garden chemicals, etc. Waste water disposal by septic systems may recharge 80% or more of household water use, but poorly operating septic systems add unwanted nutrients to ground water. Management of wastewater is a major issue in areas experiencing increasing population density. There are growing concerns about trace amounts of medicines and other personal care products in wastewater from both treatment works and from septic system disposal.

## CITIZEN AND COMMUNITY RESPONSIBILITIES

While Mother Nature's layers of soil and rock protect ground water, good stewardship through proper agricultural land use practices, regulatory guidelines for industry, zoning laws and improved well construction standards also serve to protect the integrity of ground water resources.

