Summary Concept Proposal

Regional Assessment of the Availability and Quality of Ground-Water Resources In the Merrimack River Watershed, New Hampshire

Proposed by the NH Geological Survey and the U.S. Geological Survey
In cooperation with the
Nashua and Southern New Hampshire Regional Planning Commissions

Introductions and Problem Statement

Nearly the entire combined area of four regional planning commissions (RPCs), the Nashua, Southern New Hampshire, Central, and Lakes, are within the Merrimack River watershed. Population growth and development in the 4 RPCs in the past few decades has placed increasing demands and stresses on the Merrimack River. New growth, and associated water uses in the watershed, will impact flow in the Merrimack River and it's tributaries during critical periods of low flow. Of the 7 towns adjacent to the Merrimack River in the Nashua and Southern NH RPCs, 25% of their water supply is served by ground water (MRWC, 2002). However, water supply in the towns that are not adjacent to the Merrimack River is almost entirely supplied by ground-water sources. In 2005, the SNHPC and NRPC identified a number of water-supply issues presented in the study *1990 Water Supply Study* (R.F. Weston, 1990) that still required action today. These issues included a better quantification of ground-water resources available for meeting water-supply demands in the region and a better understanding of water quality and contaminants in wells. This study also indicated that based on 2020 population projections it will become increasingly difficult for public water-supply systems to meet demands.

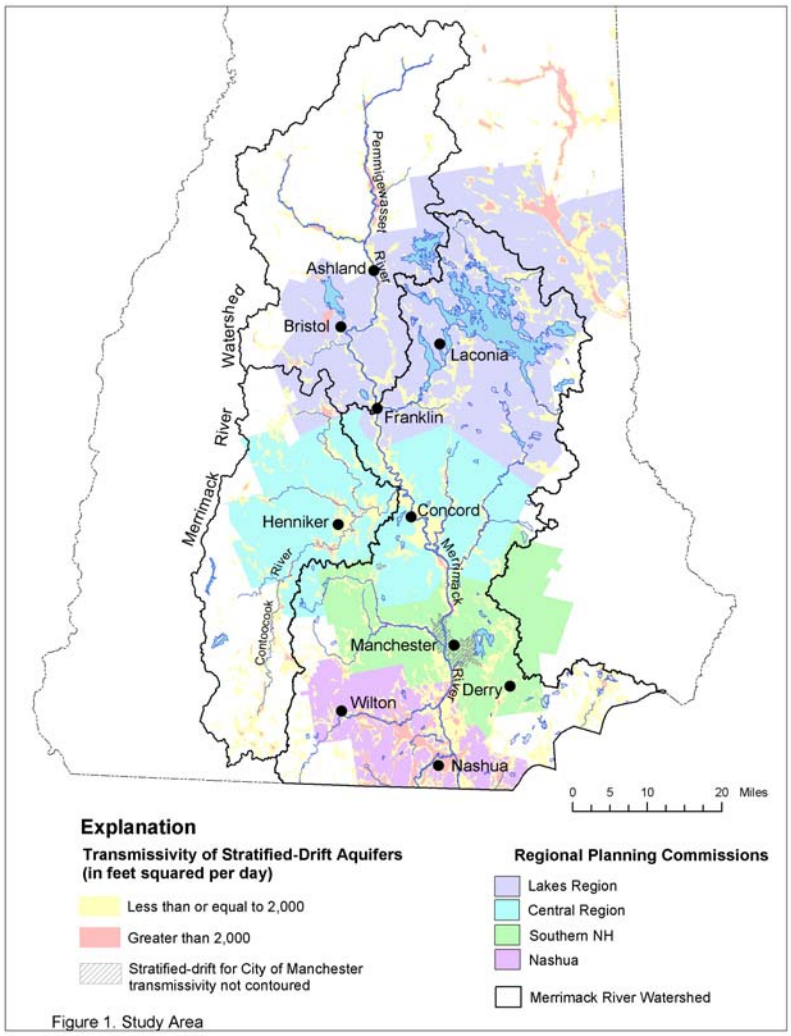

Figure 1. Study Area

Approach and Products

A phase I study is proposed that provides the Nashua and Southern New Hampshire Regional Planning Commissions with new tools and data needed to make informed decisions about ground-water availability and quality. Phase II, conducted at a later date, would include the Central and Lakes RPC areas. The general approach proposed by this investigation follows the methodology developed by NHGS and USGS in their investigation of water availability in the Seacoast area. Assessment of water-resource availability requires integration of several components including: geologic and hydrologic data compilation, monitoring well and streamgage networks, water-use assessment, water-quality assessment, and simulation of future uses and water availability. The components listed below are integrated in the water supply and availability assessment and are designed to provide detailed GIS products for use at the municipality, regional, and state planning level.

Components of Investigation and Responsible Agency (total cost $1,200k*)

1. Geohydrologic Data Compilation – NHGS $130k
   Basic geohydrologic data are needed throughout the RPCs for analysis of water supply. Existing ground-water data that has been generated by various Federal, state, and local agencies and the private sector, will be geo-referenced and incorporated into Geographic Information System (GIS) databases. These databases will be suitable for computer-based analyses.
2. Streamflow and Ground-Water Monitoring Networks - $210k (USGS $140 and NHGS $70k)
   Streamflow gages and ground-water level data are needed to quantify hydrologic characteristics in sub-watersheds of the Merrimack River basin. A regional water-resources monitoring program will be developed by enhancing existing networks of streamgages and ground-water wells to adequately monitor water supply and quality conditions for the future. The USGS is responsible for streamflow monitoring networks and the NHGS is responsible for ground-water monitoring networks.
3. Surficial Geologic Mapping – NHGS $160k
   Detailed geologic information is needed for water availability studies in a format that supports hydrologic analysis. A seamless GIS coverage of the surficial geology will be created for the combined areas of the SNRPC and NRPC by converting existing 1:24,000-scale maps to digital form and remapping selected geologic contacts as necessary. Surficial thickness maps will also be developed and existing stratified-drift aquifer maps updated using information collected in components 1 and 2 above.
4. Water-Use Assessments – USGS $200k
   A detailed water-use assessment, using uniform methods, is needed for all the towns in the RPCs to quantify current water uses and estimate uses into the future. Water use will be quantified based on metered water-use data, detailed business information, and census and demographic data. Coefficients will be developed for various types of water use (residential, commercial, industrial) to allow detailed estimates of current and future (2030) water use to be calculated and tabulated by town.
5. Water-Quality Assessments – $300k (NHGS $150 and USGS $150k)
   Multiple scales of investigation are suggested – regional that would define conditions throughout the study area; and site-specific that would define how certain features or land uses affect selected contaminants. Assess sub-regional occurrence of arsenic, uranium, fluoride, nitrate, VOCs, and other contaminants in bedrock aquifers to the extent possible with existing data and develop a monitoring plan based on the former to better characterize water quality with new data. Simultaneously, individual well studies will characterize local controls on contaminants. This component will be conducted jointly by the NHGS and USGS where NHGS will be responsible for assessment of contaminants of concern in specific areas and USGS will be responsible for regional analysis of contaminants. This component uses data from components 1-4 above and will produce valuable information for resource management and citizen action.
6. Ground-Water Resource Modeling – USGS $200k
   Ground-water models are needed to assess the impact of future demands (withdrawals) on the ground-and surface-water systems. Sub-regional ground-water flow models, linked to the USACE surface-water model, will be developed for critical growth areas. The models developed would be designed to incorporate surface-water flow and reservoir systems, detailed water-use projections, and allow for optimization of ground- and surface-water withdrawals. Modeling uses data and analysis from all components above and will provide tools for planning and analysis of future scenarios.

* Federal components of the study will receive 25 to 50% matching funds.