MODEL FOR OPTOMIZING REGIONAL OR STATEWIDE GROUND-WATER MONITORING IN COMPLEX GEOLOGIC TERRANE

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ABSTRACT

The state of New Hampshire appropriated funds to expand the state's ground-water monitoring network. Currently the state collects data from 22 wells installed mainly in the shallow, stratified drift aquifers in the state. Although 97 percent of all water wells in New Hampshire are drilled into crystalline bedrock, *only one well* in the current network monitors this important statewide aquifer. Moreover, this bedrock well is only 102.7 feet deep, which is significantly less than the average depth of all bedrock wells in the state (mean TD = 359.9 feet).

The network appropriation will only be sufficient to install approximately 12 additional bedrock wells, so it is imperative that the state optimize the monitoring network design in order to collect meaningful information. New Hampshire is underlain by crystalline bedrock that is represented by 154 formations that are either plutonic, metamorphic, or volcanic in origin. The state's Ground Water Well Inventory database currently has records for 109,875 private and public wells, which includes well depth, yield, and aquifer type (bedrock or surficial) information. Histograms showing the relationship of yield as a function of depth, and the distribution of total depths, can vary considerably among rock types. This information, combined with GIS tools, census data, and the 1:250,000 state geologic map, made it possible to rank the most productive formations so they can be targeted for monitoring. The ranking was based on the formation area, number of wells, and population served.

The bedrock wells will be installed in remote locations or conservation lands to represent ambient or non-stressed ground water conditions. Dual piezometers or well nests will be installed at each site and screened at elevations above and below the median well depth specific to a formation to capture variation in water quality and water levels in the vertical dimension. This optimization model may be applicable to many areas of the country underlain by complex geology, and could provide meaningful data that can be integrated into a national monitoring effort.

KEYWORDS

Monitoring, ground water, yield, geology, optimize