

# Groundwater and Aquifer Mapping in Vermont

By Eric Hanson, P.H., Source Protection Specialist

During the last several years, a number of towns across Vermont have completed studies to gain a better understanding of groundwater resources within their communities. The impetus for this work varies among towns, from a desire to identify potentially valuable aquifers for future water supply sources, to providing information to help determine possible groundwater resource impacts from proposed land use activities. Some towns just want to gain a better sense and understanding of this important, and often misunderstood, resource. If done thoroughly and accurately, large-scale groundwater mapping can provide invaluable information for public education and town planning purposes.

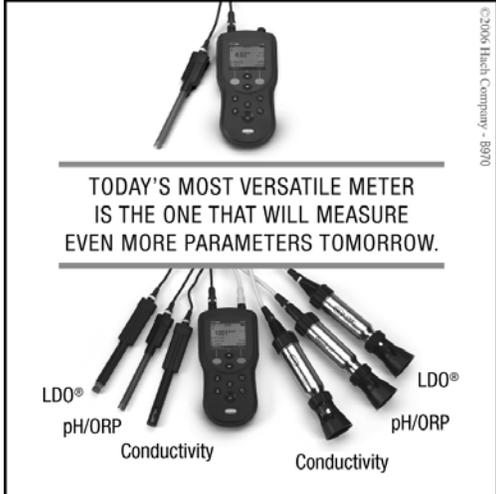
No matter how you look at it, groundwater mapping in Vermont is complex and anything but a straightforward exercise. Thanks to our geography consisting largely of steep mountains and narrow valleys (save for the Champlain Valley) and our complex geology of folded and fractured bedrock of a variety of types, and a wide variety of glacial deposits ranging from almost impermeable clay to loose gravel and boulders, ground-

water and aquifer mapping can indeed be a difficult endeavor. However, with the assistance of the Vermont Geological Survey and, in some cases, private environmental consulting firms, groundwater and aquifer mapping has been completed in a number of Vermont communities representing a wide range of geologic conditions.

Unlike groundwater and aquifer mapping in areas of simpler “layer cake” geology, where large aquifers can be present over vast areas (for example, the Ogallala or High Plains aquifer covers a continuous area extending from South Dakota to Texas), a variety of site-specific methods are used to map groundwater in Vermont. For instance, as many homeowners and public water system operators out there know, the vast majority of wells in Vermont are drilled into bedrock where they, hopefully, intersect water-filled fractures in the bedrock that supply groundwater to the wells. While the precise characteristics of a fractured bedrock aquifer are almost impossible to define unless extensive (and potentially expensive) investigations are completed, a common groundwater mapping technique in Vermont is to carefully map and character-

ize the soils and glacial deposits overlying the bedrock, and then rank these deposits on their potential to allow recharge to the underlying fractured bedrock aquifer. A portion of such a map completed for the Town of Rutland is shown in Figure 1.

*(continued on reverse)*



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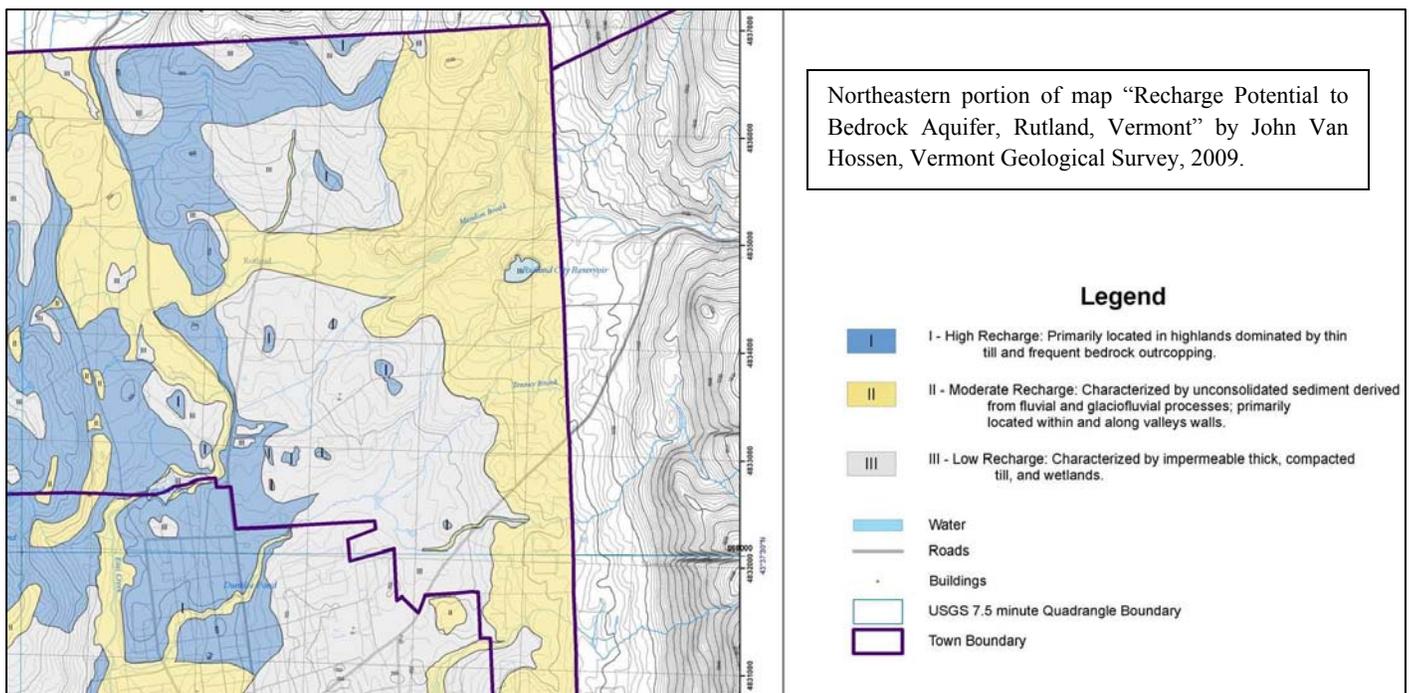
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Of course, there are many other techniques used to map groundwater in Vermont, including the identification of potentially significant aquifers (both fractured bedrock and gravel aquifers), detailed mapping of the overburden (i.e., the glacial till, clay, sand, and gravel materials than can overlay the bedrock), groundwater table contour mapping, mapping the thicknesses of overburden and potential sand and gravel aquifers, and detailed bedrock mapping with information about thrusts, faults, and fractures. Examples of groundwater and aquifer maps can be explored on-line at the Vermont Geological Survey website at <http://www.anr.state.vt.us/DEC/GEO/grndwaterinx.htm>.

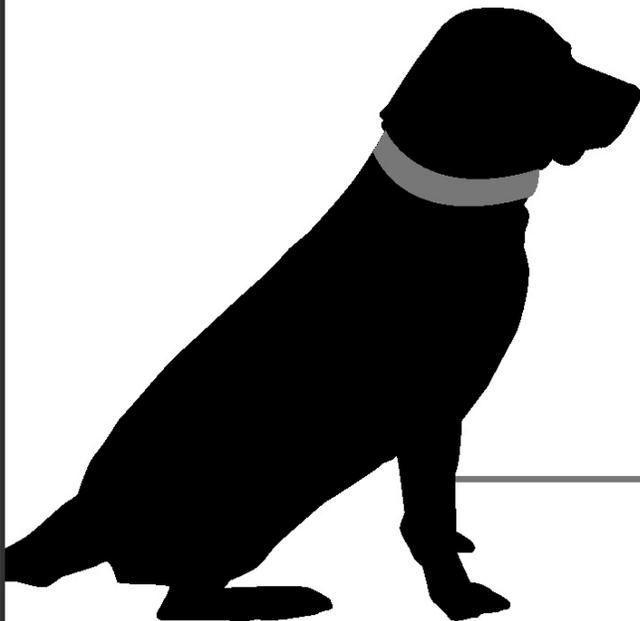
Towns wishing to explore the opportunity of completing groundwater mapping in their communities can derive their interest from involved citizens, a town committee such as a conservation commission or planning commission,

or local natural resource groups. It is up to the towns to determine how to best fund groundwater and aquifer mapping projects. One option for partial funding of such projects is from the U.S. Geological Survey's National Cooperative Geologic Mapping Program STATEMAP program. STATEMAP funds from the federal level are matched by state funds to help pay for the geologic mapping that is used, along with water well data, as a basis to define recharge areas and potential high and low yield areas in a town. Typically, interested towns are also expected to provide some funding towards the completion of the groundwater resource maps. Funding levels can vary among towns. In Vermont, the STATEMAP program is administered by the Vermont State Geologist Laurence Becker. Due to limited funding, only a handful of projects

are accepted for completion each year. Communities wishing to learn more about this potential funding source can contact Mr. Becker at the Vermont Geological Survey (ph: 802-241-3496, email: [laurence.becker@state.vt.us](mailto:laurence.becker@state.vt.us)). Additionally, you can contact me at the Vermont Rural Water Association (ph: 802-660-4988 ext. 327, email: [ehanson@vtruralwater.org](mailto:ehanson@vtruralwater.org)) to learn more on how to proceed with groundwater mapping projects and town planning considerations.

Groundwater and aquifer mapping for Vermont towns can provide valuable information that can help with community planning and resource protection for those communities wishing to work towards protection of this invaluable resource into the future. We at the Vermont Rural Water Association look forward to working with communities with such an interest. ●

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