ENVIRONMENTAL Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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Aquifer Mapping in New Hampshire

Groundwater has long been regarded as a valuable and important resource in New Hampshire, especially as a source of drinking water. In order to be able to better protect this statewide resource, the New Hampshire Department of Environmental Services, in cooperation with the U. S. Geological Survey, completed a multi-year ($5 million) program of detailed study of the state's sand and gravel aquifers. The goal was to develop a more comprehensive picture of the occurrence of shallow ground water throughout the State building upon reconnaissance level mapping completed in the mid-1970s. Significant aquifers were defined not only in terms of their location and areal extent, but also in terms of their hydraulic properties and internal characteristics. The resulting maps represent a major advance in our knowledge of this valuable, yet vulnerable, natural resource.

Study Areas

For the purposes of the program, the state was divided into 14 study areas whose boundaries largely coincided with natural drainage basins. Work in each study area was completed over a three-year period, consisting of two years of data collection in the field and a third year of data analysis and interpretation. Final products were published as a series of USGS Water Resources Investigations Reports as well as digital GIS datasets.

Process

Initial work consisted of the collection and review of all existing data which related to each study area. This usually included existing surficial geologic maps and the results of any previous hydrogeological studies. Also, well data which have been reported to the New Hampshire Water Well Board by local water well contractors were searched for further clues about subsurface conditions (see fact sheet geo-7). These data compilation efforts helped USGS investigators to target sand and gravel aquifers for inclusion in the next phase of their work. From this review of background information, the USGS teams proceeded into the field where they employed various techniques to determine the three-dimensional extent and internal characteristics of the significant water-bearing deposits. Observation wells were constructed as "windows" into the subsurface. They allowed samples of aquifer materials and associated ground waters to be collected and water levels to be directly measured. Geophysical techniques, such as seismic refraction surveys on land and seismic reflection surveys over water, were used as indirect means of "viewing" the subsurface hydrogeologic environment.

The results of all the field work were then carefully interpreted and used to construct maps which describe the characteristics of the target aquifers. All the aquifer maps were published at a scale of 1:24000, which is the same as the standard USGS 7½-minute topographic quadrangle maps, or a smaller scale of 1:48000 for the larger study areas. Each study area is covered by two sets of map plates, one depicting essentially "raw" data and the other depicting data which are more interpretive in nature. All

mapped data also exist in a computerized format as geographic information system (GIS) shapefiles. Both sets show aquifer boundaries as the line of contact between stratified drift deposits and glacial till deposits. Other data presented by the first set include:

- Locations of seismic lines.
- Locations of borings, observation wells and water supply wells.
- Drainage basin divides.
- Water table elevation contours.

The interpretative map set depicts the following data:

- Saturated thicknesses.
- Transmissivities.
- Material types in four descriptive categories (fine, coarse, fine over coarse and coarse over fine).

Valuable References

These maps and accompanying explanatory text serve as valuable references to municipalities who recognize the need to conserve and protect their ground water resources. By delineating zones with relatively high transmissivities, or, in other words, zones which have the greatest potential to yield water, they to identify areas which could be developed as future municipal water supplies. This potential confers upon such areas the need for the highest level of protection possible so that valuable resources are not lost through needless contamination. By delineating water table elevations, they present a general picture of the directions of ground water flow and therefore allow areas at risk of contamination from chemical spills or other sources to be readily identified. Municipal officials who use the maps as planning tools are presented with a significant opportunity to safeguard New Hampshire's ground water resources while developing them in the common interest.

The maps dramatize the fact that aquifer boundaries do not respect political boundaries. Thus, the ground water stored within such aquifers represents a shared resource which must be managed cooperatively by neighboring communities. The efforts of one community to locally protect an important aquifer can be frustrated without similar action by an adjacent community.

For More Information

Further information and advice can be obtained from the New Hampshire Geological Survey at 271-1974 and regional planning commissions.