

The KENTUCKY Ground-Water Monitoring NETWORK




Jackson Purchase Perspective

Interagency Technical Advisory Committee

University of Kentucky Water Resources Research Institute
 Kentucky Geological Survey
 Kentucky Department for Environmental Protection
 Division of Water
 Division of Waste Management
 Kentucky Department for Surface Mining Reclamation
 and Enforcement
 University of Kentucky College of Agriculture
 U.S. Geological Survey
 Kentucky Division of Conservation
 Kentucky Society of Professional Engineers
 Kentucky Professional Geologists
 Kentucky Rural Water Association
 Kentucky Department of Agriculture, Division of Pesticides
 Kentucky Cabinet for Human Resources, Division of
 Environmental Sanitation and Community Safety
 Kentucky Protection and Regulation Cabinet, Department
 of Mines and Minerals
 Kentucky Ground-Water Association

Network

 Citizens of the Commonwealth are dependent upon clean, reliable ground-water resources. According to the 1990 U.S. Census, about one in four Kentuckians (approximately 900,000) uses ground water from wells and springs in their homes, schools, and businesses. All of Kentucky's streams and rivers are sustained by ground water during periods of low rainfall.

Information on the quality and quantity of ground-water resources in Kentucky is inadequate for most uses. Baseline information is needed by industry and government agencies for public policy matters. This information includes documentation of the wide-ranging natural variability of ground-water quality in each region. Just as important, identifying subsurface zones that have different ground-water quality will in many cases reduce costs and raise the likelihood of obtaining an adequate ground-water supply for the homeowner, agriculture, municipalities, and industry.

A Kentucky Ground Water Consensus Group, with representation from State, Federal, local, industrial, and public interests, was established in 1993 to consider State needs in this vital area. One of their recommendations was to establish a ground-water monitoring network to be administered by the Kentucky Geological Survey. The goals of this network are to characterize and monitor the occurrence, quantity, and quality of Kentucky's ground water, and to support a data base that is readily available to the public, and upon which reliable policy decisions can be based. Legislation will be introduced in the 1996 session of the Kentucky General Assembly for statutory authority for such a network.

Coordination

An interagency advisory board is developing a framework for the Network. This framework will be used to coordinate with other data-collection efforts in the State and build an appropriate information base on ground-water resources.

Increased coordination of ground-water data collection and data reporting among agencies is a priority. This will limit redundant efforts, make certain that data from various sources are available for use, and assure that the information collected by this network can be used for multiple purposes.

First step

Information in the Kentucky Ground-Water Data Repository, housed at the Kentucky Geological Survey, is being summarized by the KGS. State agencies are required (KRS 151:035) to provide non-proprietary ground-water information to the Repository; this procedure centralizes the information for more efficient public access. However, the water-quality analyses that are now available are poorly distributed across the State and most lack sufficient analyses of elements, ions, and organic chemicals to sufficiently characterize the quality of ground water for human use. Some preliminary findings concerning ground water in the Jackson Purchase Region are provided in this pamphlet.

Collection

Wide gaps in existing ground-water data for Kentucky need to be filled. Collection and annual reporting of standardized information will be a major contribution of the Network. New information will be stored in the data repository and made available for public use.

Summaries and characterization

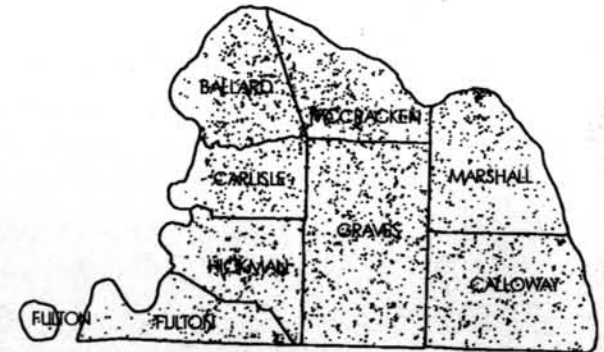
The location and character of the State's ground-water resources will be determined, and the information will be accessible. Characterization of the aquifers will include defining well yield, normal variations in ground-water quality, and ground-water flow systems that directly influence water quality.

Jackson Purchase

Approximately 43,600 residents are served by 19,500 private water wells in the Jackson Purchase Region of western Kentucky (U.S. Census, 1990). In addition, ground water is the source for several public supplies that serve over 108,000 people in homes, schools, and businesses.

Distribution of private-well users

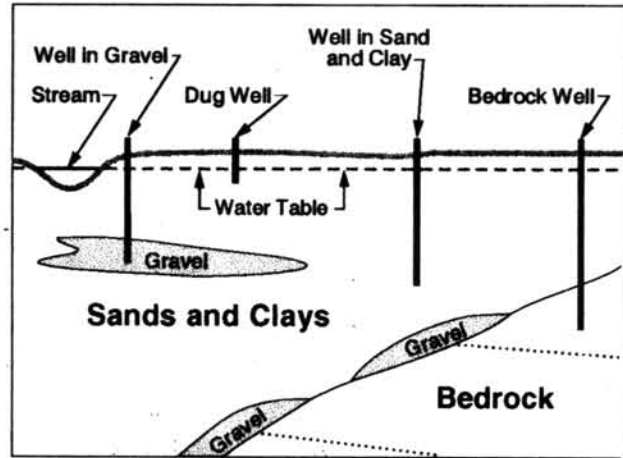
The following figure shows the distribution of wells used for water supply in the Jackson Purchase Region. Over half of the residents depend on ground water for household supplies.



The figure at right shows the distribution of private water-well users in each county (U.S. Census, 1990). Three counties have over 5,000 private well users, three counties have between 1,000 and 5,000 users, and one county has fewer than 1,000 users.

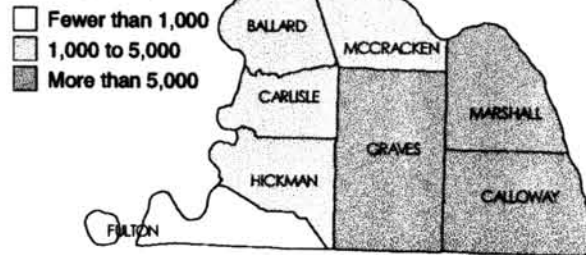
Aquifers

Geologic materials that can yield enough water to supply a household well are called aquifers. Sand, gravel, and bedrock act as aquifers in the Jackson Purchase Region. The figure below



shows aquifers typical of the region. Sand and gravel deposits are the primary aquifers, and yields of 200 gallons per minute (gpm) can be obtained throughout most of the Jackson Purchase. Some gravel layers produce over 1,000 gpm. Bedrock aquifers are often used in the northern and eastern parts of the region.

Number of domestic well users by county



Wells drilled into bedrock aquifers generally produce less water than overlying aquifers, but the yields are still ample for most domestic and agricultural uses, and the water is generally of good quality.

Condition of supplies

The Jackson Purchase Region is nearly surrounded by the Ohio, Tennessee, and Mississippi Rivers, and receives abundant rainfall, providing constant recharge to aquifers. The relatively fresh recharge waters from these sources provide high-quality ground water. The total dissolved solids content, which is a measure of the dissolved mineral content in the water, is typically very low. Water derived from sand and gravel deposits can be hard, which means it contains high concentrations of calcium and magnesium. Hard water can discolor clothes and clog pipes. High iron concentration, which causes staining and imparts a bad taste, is also found in the same sand and gravel deposits. Hydrogen sulfide, which imparts a "rotten egg" smell to water, can be encountered in localized areas.

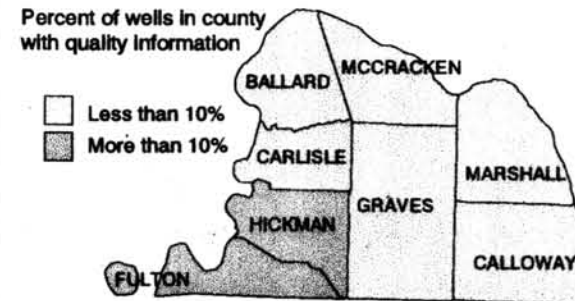
The quantity and quality of water supplies greatly affect the quality of life and the economic development of the area. Therefore, information concerning dependable, high-quality ground-water sources needs to be updated and made more accessible.

How much information is available?

As part of the KGS summary of information in the Ground-Water Data Repository, the number of wells tested in three important categories of water quality were compared with the total number of private wells in the Jackson Purchase. The categories are bacteria content, man-made organic chemicals, and major ions (the most abundant elements and ions that determine ground-water quality). Although ground water is heavily used in the region, the table at upper right shows that information is available for less than five out of 100 wells in any of the three categories. The following figure shows how this information is distributed among the counties in the Purchase region.

Information in the Ground-Water Data Repository as of June 1995		
Category of wells and springs	Number of wells and springs in region	Percentage of wells and springs in region
Total sites in region	19,500*	100.0%
Records in Repository	2,561	13.1%
Records with any quality analyses	1,431	7.3%
Bacteria analyses	52	0.3%
Organic analyses	314	1.6%
Major-ion analyses	921	4.7%
*U.S. Census Bureau, 1990—Household wells only		

The following figure shows how this information is distributed among the counties in the Jackson Purchase Region. The majority of well samples have been analyzed for just a few elements or other constituents.



Improving the information base

The most valuable ground-water data that are recorded on paper should be computerized and transferred to the Ground-Water Data Repository. Selected ground-water data submissions to State agencies should be in a computerized format, where possible.

The Network is coordinating its activities with other data-collection activities in the State. An interagency advisory board is creating a framework for data collection by the Network, and will provide continued input as to the most-needed ground-water information. The Network will fill many gaps in the data to provide baseline information.

The Kentucky Ground-Water Monitoring Network will characterize the quality and quantity of ground-water resources in each region. Summaries will include the horizontal and vertical patterns of ground-water quality and quantity. Information will be available in reports, including annual reports. Raw data will be available in various formats through the Kentucky Ground-Water Data Repository.

For more information, contact Jim Dinger at the Kentucky Geological Survey, (859) 257-5500 ext. 163.