Heat Used to Study Surface Water-Groundwater Link

The U.S. Geological Survey recently released a new report, "Heat as a Tool for Studying the Movement of Ground Water Near Streams." It describes the use of heat as a no-impact tracer to help discern the interconnections between surface water and shallow groundwater. According to the report's abstract, "Exchanges between streams and shallow groundwater systems play a key role in controlling temperatures not only in streams, but also in their underlying sediments. As a result, analyses of subsurface temperature patterns provide information about surface-water/groundwater interactions."

The first chapter describes the general principals and procedures by which the natural transport of heat can be used to infer the movement of subsurface water near streams. Subsequent chapters describe applications of the use of heat as a tracer in the Rio Grande, the Russian and Santa Clara rivers in California, the Willamette Basin in Oregon, Trout Creek near Lake Tahoe, and Rillito Creek in Tucson.

The 105-page report is USGS Circular 1260, available at water.usgs.gov/pubs/circ/2003/circ1260/

Los Alamos Looking at Possible Contaminant Flowpaths

Hydrologists from Los Alamos National Laboratory (LANL) are looking at how rapidly contaminants from the lab can move through subsurface soils, in response to the discovery of trace levels of tritium, chlorine, and perchlorate in springs in White Rock Canyon of the Rio Grande, less than 10 miles from LANL, reported the *Los Alamos Monitor*. According to the newspaper, state officials and laboratory watchdog groups such as Concerned Citizens for Nuclear Safety (CCNS) view the presence of contaminants as evidence that waste from the laboratory is reaching the regional aquifer. The New Mexico Environment Division (NMED) has suggested the contaminants are moving faster through the subsurface than earlier LANL models indicated, said the article. A September 2004 report released by CCNS cited two specific cases where spring data indicate a connection to LANL, although, according to *The Monitor*, the non-peer-reviewed report diverted somewhat from earlier CCNS findings in concluding data from other areas are questionable.

To address the uncertainties, LANL scientists have developed a new set of conceptual models to form the basis for additional testing to determine paths the contaminants are taking, according to *The Monitor*. One possibility is the presence of a very deep, fast pathway, but the fact that wells between the laboratory and the White Rock Canyon springs have shown no traces of the contaminants complicates the scenario. According to LANL scientists, this "may suggest the aquifer is recharging closer to the Rio Grande than the previous model indicated, or that the springs are not connected to the regional aquifer, but rather they are discharging perched or intermediate water by another pathway that has not been evident," said the paper. The region under investigation is geologically complex, with several major fault systems, making a clear understanding of the relationship between the springs, nearby surface water, and groundwater elusive.

To narrow down the options, LANL scientists plan to study the age of the waters discharging into the Rio Grande, said the article. The presence of younger waters in the springs would imply a faster flowpath from the laboratory. By looking closely at all the compounds present in the water, the scientists also may be able to identify a unique tracer that could implicate a specific source, such as a sewage treatment plant or other contaminant source, that could further restrict flowpath options, according to the report.

NMED and LANL are in the process of drafting a court-ordered consent agreement that will determine much of the water testing and monitoring program over the next decade.

Visit www.lamonitor.com/articles/2004/07/14/headline_news/news01.prt

Scientists Announce Western Mountain Initiative

From the U.S. Geological Survey

On May 27, 2004, a group of federal and university scientists announced the launch of the Western Mountain Initiative, a five-year effort funded by the U.S. Geological Survey to better understand ongoing changes in the mountains of the western United States. Their aim is to unravel the causes of sudden, often unwanted changes in mountainous areas, such as the recent die-off of millions of acres of trees in New Mexico, Arizona, and Southern California.

Some changes can have particularly far-reaching effects on society. "Mountains are the water towers of the West, gathering winter snow that then feeds our rivers, supplying the water so vital to wildlife, agriculture, and cities," said Jill Baron, a USGS scientist in Fort Collins, Colorado. "With rising temperatures, winter snow has been melting earlier. If this trend continues, there will be less water available during long, hot summers."

Rising temperatures also may be partly responsible for another ongoing change the scientists will examine: the widespread melting of glaciers in western mountains.

The consortium will bring together more than a decade of research conducted in national parks and other protected areas in the West. Because these areas have experienced minimal direct intervention by humans, national parks and other protected areas are ideal laboratories for detecting the effects of climatic changes.

"In many ways, mountains are uniquely sensitive to sudden changes, such as those driven by climatic variability and change," said Dave Peterson, a scientist with the U.S. Forest Service in Seattle, Washington.

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"Western mountains are like the proverbial canary in a coal mine. By bringing together a diversity of past and ongoing research, we hope to detect broad trends, identify thresholds and triggers of change, and provide ways to minimize potentially undesirable changes to some of our nation's most valued natural resources."

For additional information about the Western Mountain Initiative, contact Craig Allen at 505-672-3861 ext. 541 or craig_allen@usgs.gov.

California Groups to Evaluate Wetlands Health

From the U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency recently awarded a $200,000 grant to the Southern California Coastal Water Research Project (SCCWP) to assess the health of wetlands in Southern California. SCCWRP will use the money, plus $70,000 of its own, to work with local, state, and federal organizations to assess the condition of wetlands in Southern California by collecting field measurements and evaluating existing data. Testing is underway at approximately 57 sites in five counties on the coast from Santa Barbara to San Diego. The information will be used to identify indicators, such as vegetation, hydrology, and landscape conditions that can be used to measure wetlands health statewide.

"In California, wetlands loss and degradation resulting from urbanization is being counteracted to some degree by a tremendous public investment in wetland conservation, restoration, and management," said Dr. Martha Sutula, senior scientist at SCCWRP. "This project will contribute to a statewide effort to develop diagnostic tools and data needed to implement affordable monitoring of California's wetland resources."

According to EPA, more than 90 percent of the wetlands in California have been converted to urban, agricultural, and other uses. Numerous groups statewide, including public agencies and environmental nonprofits, are working to restore thousands of acres of wetlands in California. More than one third of the nation's threatened and endangered species need wetlands for survival. Wetlands reduce flood risks, recharge aquifers, and protect drinking water from pollution.

The EPA also awarded $250,000 to the Association of Bay Area Governments to assess wetlands in northern California.

Visit www.epa.gov and www.sccwrp.org.

Regional Aquifer Study Funded in West Texas

Five universities in Texas have been funded by the U.S. Department of Agriculture to study water resources in West Texas, reported the *Odessa American*. Researchers from Sul Ross State University, Southwest Texas State University, Angelo State University, Lamar University, and Sam Houston State University will investigate West Texas aquifer systems, groundwater resources, conservation practices, and water use in the area. Preliminarily called the Sustainable Agricultural Water Conservation and the Rio Grande Basin project, work was scheduled to begin in June, according to the article.

The goal of the project is to determine how much water is in the aquifers and to provide information to help water managers in Texas and Mexico better allocate their resources. The *Desert Mountain Times* of Alpine, Texas reported that initial federal funding for the project is $1.8 million for the first year. According to the *Times*, Sul Ross Associate Professor Kevin Urbancyzk said the project will more than double the number of springs and wells being monitored in the area, and will include development of a regional groundwater database that is accessible on the Internet.

Visit www.oaoa.com and www.dmtimes.net.

Land Use Reflected in Water Quality of Salt Lake Region

From the U.S. Geological Survey

Water samples collected by the U.S. Geological Survey in the Great Salt Lake watershed, including parts of Utah, Idaho, and Wyoming, generally meet existing guidelines for drinking water and the protection of aquatic life, although water quality in some specific areas has elevated concentrations of pesticides, volatile

organic compounds (VOCs), nutrients, chloride, and elements such as arsenic and lead, according to the results of a five-year water quality study by the USGS.

Rivers and Streams

More than 80 percent of the samples collected from streams affected by agricultural and a combination of mixed land uses had phosphorus concentrations that exceeded the U.S. EPA desired goal of 0.1 milligrams per liter (mg/l) to prevent nuisance plant growth in streams. Although nutrients occur naturally in streams, additional and potentially elevated sources include agricultural and urban runoff and wastewater discharge.

In many streams near the mountain front, aquatic communities have been impacted by increased water temperature and nutrient and dissolved-solid concentrations as a result of water diversion, mainly for irrigation. Continued drought conditions and increasing demands for water in the areas surrounding the Great Salt Lake make this an ongoing water-quality issue, said Thiros.

At least one pesticide was detected in all but one of the 24 streams sampled. Insecticides — most commonly carbaryl, diazinon, and malathion — were detected more frequently in urban streams than agricultural streams. Diazinon was detected in about 90 percent of 42 samples from the urbanized Little Cottonwood Creek, but in only about 4 percent of 26 samples from Cub River, classified as agricultural. Thiros suggested that this is most likely because nutrients, pesticides, and VOCs accumulate between storms on impervious surfaces in urban areas and then are transported to streams in storm runoff. During the winter of 1999, for example, chloride concentrations in Little Cottonwood Creek often exceeded the EPA aquatic-life guideline following winter storms and the application of salt to area roads.

Aquatic-life guidelines for arsenic, cadmium, copper, lead, mercury, silver, and zinc were exceeded in sediment samples from streams that were affected by mine-tailing deposits and smelters (including some in urbanized streams). In areas with little mining or urban influence, such as the Bear River basin, trace-element concentrations were low compared to those measured in other parts of the nation.

Groundwater

The USGS study revealed that the median concentration of nitrate (6.8 mg/l) in shallow groundwater underlying residential and commercial land in Salt Lake Valley was almost five times the national median (1.4 mg/l) for groundwater studies in similar urban areas and was the highest measured in 34 urban studies across the nation. Thiros said that although nitrate does occur naturally in groundwater, elevated concentrations in urban and agricultural areas could result from leaking septic systems and sewer pipes, as well as from fertilizer applications. Even though this shallow water is not currently used for drinking, Thiros said the potential exists for contaminated water in the shallow aquifer to move downward to the underlying aquifer that is used as a public supply.

VOCs and pesticides were detected in water from 23 of 31 public-supply wells sampled in Salt Lake Valley, mostly at very low concentrations. The widespread occurrence of the VOC chloroform in Salt Lake Valley is likely a result of chlorinated public-supply water used to irrigate lawns and gardens in residential areas that then recharges the deeper aquifer. Although the concentration of these compounds measured in groundwater used for public supply is not a known health concern according to current standards, the occurrence of these compounds in the deeper groundwater presents the possibility that water with a higher concentration may enter this aquifer in the future.

The USGS report, "Water Quality in the Great Salt Lake Basins, Utah, Idaho, and Wyoming, 1998-2001," is available at water.usgs.gov/nawqa/nawqa_sumr.html. The water-quality conditions summarized in this report are discussed in detail in other reports that can be accessed at ut.water.usgs.gov/nawqa/pubs.htm.