

Let's Talk Water – The U.S. Geological Survey

By Dr. Mike Strobel

In the coming weeks, I will be writing about the Lincoln County Conservation, Recreation, and Development Act of 2004, signed into law on December 1, 2004. This study is being conducted by the U.S. Geological Survey (USGS) in Nevada and Utah, and the Desert Research Institute (DRI) in order to assess the water resources in eastern Nevada. Many people do not understand how the USGS, as an organization, operates, so I thought it would be useful to first describe the USGS before we discuss the study.

The USGS was established by Congress over 125 years ago (March 3, 1879) with the objective of “classification of the public lands, and examination of the geological structure, mineral resources, and products of the national domain.” Our country was still quite new and much of it unexplored. The USGS had the task of surveying and documenting the topography, geology, and mineral resources of the U.S. and its territories to the west.

In reality, many of these activities were completed as various acts and efforts in the hundred years prior to the formation of the USGS. Congress was very interested in identifying lands that were classified as either mineral or nonmineral. Likewise, surveys of agricultural lands were important for influencing land sales and population migration to the west. Topographic surveys and map construction also were important efforts for establishing roadways and railroad routes.

In 1838, the Corps of Topographical Engineers was established to explore and map U.S. lands in North America. For over 2 decades, geologists worked with the Topographical Engineers in mapping and studying the West. During the 1850s, the Topographical Engineers explored four potential routes for the proposed transcontinental railroad. The importance of these surveys increased as mineral discoveries began to expand, such as gold in California in the late 1840s and gold in Colorado and silver in Nevada in 1859.

In 1867, Congress authorized western exploration in which geology would be the focus of the surveys. Four major surveys took place. One was lead by Clarence King (future first Director of the USGS) which explored the 40th parallel and went across Nevada. A second was lead by Ferdinand Hayden and was tasked with the survey of Nebraska (which, at that time, encompassed a huge area including the western Dakotas). He later was asked to survey the areas of Wyoming and Colorado. The third survey was John Wesley Powell's exploration of the Rocky Mountains in Colorado and Utah and his subsequent trip through the canyons on the Colorado River. The fourth survey is of interest to local readers. It was the exploration of the country south and east of White Pine, Nevada by Lieutenant George Wheeler. The purpose of this survey was to make a reconnaissance to the Colorado River for the establishment of wagon routes and military posts.

Following the Powell and Wheeler expeditions, plans for more thorough and systematic mapping of the territories were considered by Congress. Thus, the USGS was established and placed under the Department of the Interior.

A complete history of the USGS can be found at the USGS website at <http://pubs.usgs.gov/circ/c1050/> where much of this information was obtained. It is very interesting reading, and provides many more details than I can include in this short article.

Today, the USGS is a different organization than it was when first established. The USGS is made up of about 10,000 scientists, technicians and support staff located in about 400 offices in every State and in many other countries. There are four major disciplines of research and data collection within the USGS, which include Geology, Water Resources, Biological Resources, and Geography. Each of these has their own organizational structure, but provides expertise and interaction with other disciplines on various projects and efforts.

The mission of the USGS is to serve the Nation by providing reliable scientific information to (1) describe and understand the Earth; (2) minimize loss of life and property from natural disasters; (3) manage water, biological, energy, and mineral resources; and (4) enhance and protect our quality of life. The four major areas of focus for the USGS are natural hazards, resources, the environment, and information and data management.

It seems that many people associate the USGS with natural disasters, such as floods, earthquakes, and volcanoes. And rightfully so, because this is a part of our science that makes headlines and gets news coverage. The USGS is the organization that is there when these big events occur. Even movies quite often show the USGS on the scene of natural disasters. My personal favorite is Dante's Peak, where Pierce Brosnan plays a USGS scientist who saves the day. Take my word for it, I look nothing like Pierce Brosnan and USGS vehicles are not equipped to drive through deep rivers, but the USGS does study volcanoes and earthquakes, as well as many other natural hazards.

Besides the study of natural hazards, the USGS has many other roles that may not be as dramatic, but are no less important. The USGS is the primary science agency for the Department of the Interior. This means that we supply scientific data, interpretation, and consultation to other Interior agencies, such as BLM, National Park Service, Bureau of Reclamation, Bureau of Indian Affairs, Office of Surface Mining, and many others.

The USGS maintains a neutral, unbiased approach to scientific data collection, interpretation, and presentation. Across the country, we work in partnership with over 2,000 Federal, State, county, local, and Tribal agencies. Some of our funds are allocated from Congress, but most of our budget is based on agencies that fund our research and data collection and on a Federal matching fund process where we use allocated dollars to match funds from other agencies in order to partner in the science. These matching funds

allow many State and local agencies to work with the USGS at a cost that is less of a burden to local resources.

One thing that sets the USGS apart from many other government agencies is that we are not a regulatory authority. In other words, we do not oversee or dictate how lands and natural resources are managed. We supply the data and scientific information for managers to make informed decisions, but we are completely neutral on how those resources are managed. This point is important for the upcoming water study in eastern Nevada because people need to be clear that the USGS efforts will offer scientific information about the water resources, but how those resources are managed will be a decision for society, not the USGS.

Maintaining a neutral, unbiased standing on management issues for natural resources has allowed the USGS to be considered the authority in the field of earth sciences within the Federal Government. Our data and interpretations carry much weight in hearings and court cases concerning resource management because we look only at the science and are not influenced by outside pressures, political directions, or personal preferences. We have extensive quality assurance procedures to make sure our science is accurate and our interpretations remain neutral.

One of the strengths of the USGS is the ability to carry out large-scale, multi-disciplinary investigations that increase our understanding of Earth and provide decision-makers with the tools and information they need to address issues of social concern. For example, since 1889, the USGS has maintained a nationwide streamgaging network that is used to assess streamflow at local, regional, and national scales. Presently, there are almost 7,000 gages operated in cooperation with other agencies. The USGS has carried out many national programs, such as the Regional Aquifer System Analysis (RASA) and National Water Quality Assessment (NAWQA), both of which had large study units in Nevada.

Many of the topics I have discussed in previous versions of this column have addressed areas of research carried out by geologists in our Geologic Discipline. Geologic mapping of large areas and systematic mapping of 7.5 minute quadrangles across the country are completed by this group. Also, research that uses geophysics and the study of volcanoes, earthquakes, petroleum reserves and many other areas of geologic sciences is conducted by the Geologic Discipline.

The Biological Resources Discipline of the USGS is a recent addition to our organization. Their focus is on the flora and fauna in our environment. Distribution of certain plant species, the documentation and occurrence of threatened and endangered plants and animals, migration patterns of large mammals, and the effects of human impacts on the biota are just some areas of study for the Biological Resources Discipline.

The Geography Discipline (previously called the National Mapping Program) is responsible for producing the topographic maps with which many people are familiar. The Geography Discipline also use airplane imagery, satellite coverages, and space shuttle photos to document the complex surface of the Earth. Many investigative studies,

such as land use changes over time and models for socio-economic impacts based on population growth, also are part of this group.

The largest discipline of the USGS is Water Resources. As I mentioned earlier, this group conducts streamgaging across the country and carries out many large-scale studies. The Water Resources Discipline covers ground water, surface water, water quality, data management, and numerous focused specialties, such as geochemistry, geophysics, ET studies, GIS, and other areas. There is a Water office in each of the States, whereas the other three disciplines are mainly located in regional offices and science centers.

In Nevada, the USGS has a number of offices. The District office for Water (and where the State Representative for the USGS is located) is in Carson City. Water also has offices in Henderson (Las Vegas), which we share with Biological Resources folks, and small offices in Elko and Mercury. Geology has a small office in Reno on the UNR campus. Besides the shared space in Henderson, Biology also shares office space with the U.S. Fish and Wildlife Service and BLM in Reno.

In the ongoing ground-water study in eastern Nevada, the project is being lead by the Water offices in Carson City and Henderson. The Utah efforts are run out of Salt Lake City. Participation from the Geologic Discipline is mainly out of Denver, but people from Reno, Sacramento, and Menlo Park also are involved. USGS involvement in the ground-water study in eastern Nevada will be from a wide range of experts from across the region.

On a personal note, the USGS is an outstanding organization and I am very proud to be part of this agency. Throughout college, while studying geology and hydrology, it was evident to me that most of the publications, numerical models, and earth science expertise were attributed to the USGS. As I saw it, the USGS was the earth science authority and I held the organization in such high esteem. When I was lucky enough to be offered a job, I was on cloud nine. And 17 years later, I am still as honored, proud, and humbled to be part of this organization as I was on my first day.

Next week, I will begin a discussion of the water study in eastern Nevada. This probably will take up a few columns, because I hope to give as much detail as possible so that everyone knows what we plan to accomplish. If you have any questions about the USGS, please contact me in care of the Ely Times or at mstrobel@usgs.gov.