Let's Talk Water – White Pine County Water

By Dr. Mike Strobel

This week, I will again address a question from a reader. This question is somewhat difficult to answer because it has a lot of political implications. However, it's a question many people have asked and so I feel obligated to cover as best I can.

Question: Does White Pine County have that much water to share with the Southern Nevada Water Authority???

Response: That is a really important question and there is not a simple answer. What quantity is enough to provide for the exportation of water and preservation of the resource? That really is a societal decision, not just a science issue. The input of a wide variety of groups, such as the general public, White Pine County residents and water managers, Southern Nevada Water Authority, the State, DOI agencies (Bureau of Land Management, National Park Service, and U.S. Fish and Wildlife Service), legal authorities, environmental groups, and various other groups all need to be considered in determining beneficial use and adequate protection of the resource.

As hydrologists, we can estimate how much water is available in an aquifer and how pumping will affect water levels in an aquifer, but determining what amount of withdrawal is enough and what potential effects are acceptable are decisions for society, and especially of interest to the people and water managers in White Pine County.

In White Pine County, there is a large carbonate aquifer that is possibly many thousands of feet thick in places. This bedrock aquifer is overlain by unconsolidated alluvial sediments that form the aquifer used for most local needs (irrigation and domestic users). In the deep carbonate aquifer, there is a vast amount of water (studies need to be done to further quantify this amount, but present estimates show it to be quite large).

It is probable that large amounts of water can be pumped from this bedrock aquifer and any effects, such as declining water levels, might not be observed for many years or even decades. Initially, water withdrawn would come mainly from storage in the aquifer and not from present recharge. However, it is not known how much water can be pumped from the aquifer without creating significant water-level declines until aquifer tests are completed.

Aquifer tests (pumping the aquifer for sustained periods of time and measuring related declines in water levels) are needed to assess storage and permeability of the aquifer so that potential effects of pumping can be determined. Southern Nevada Water Authority has proposed an aquifer test at a MX site in Lincoln County.

As a hydrologist, I would agree that aquifer tests are needed before we can make accurate estimates of the aquifer properties. But many people have asked what would happen to the water pumped during this long (maybe years) aquifer test? Some people have raised

this question because, as they would argue, if the water is pumped south, either as water supply to Clark County or flow to Lake Mead (and possibly available for return-flow credits for Nevada), then there could become a dependence on the water and the test could become a permanent process. I don't know what the plans are at this time (if the aquifer test will occur and, if so, how the pumped water will ultimately be used during the test).

Also, what is the hydraulic connection between the deep bedrock aquifer and the shallow alluvial aquifer where most existing wells are located? Will pumping from the deep aquifer affect the shallow aquifer and potentially lower water levels and dry up present irrigation and domestic wells?

Conceptually, the alluvial and carbonate aquifers are connected, but the degree of connection is unknown for many basins. Deep wells that extend through the alluvium and into the bedrock are scarce, so our knowledge of the hydraulic connection is really limited. I feel there needs to be a better understanding of this connection before one can be certain that the impact is minimal. This also relates to concerns from the Bureau of Land Management about reducing the water table in the alluvial aquifer and affecting the habitat for sage grouse and other animals and plants.

An additional question being asked is: what affects pumping would have on the springs in the discharge zone? The bedrock aquifer is a large flow system and it discharges in a series of springs in eastern and southern Nevada, such as Muddy Springs. If the water is lowered in the aquifer, will the spring discharge decline, or the springs dry up?

This is a question the National Park Service and the U.S. Fish and Wildlife Service want answered because they are responsible for the threatened and endangered species that live in these springs. Conceptually, spring discharge could be reduced by pumping from the bedrock aquifer, but no one is entirely certain at this point by how much or at what point in time. Estimating potential impacts to spring discharge will depend, in part, on how the system is conceptualized. Hopefully, more data and more studies will allow for better understanding of the aquifer system.

Now, as for the question about what is acceptable to society when weighing the pros and cons of water exportation. In reality, it may be a very long time before any effects are noticeable in the aquifer. Along those lines, once changes are observed in such a huge system, it may be very difficult to reverse those changes (the response either way could be quite delayed).

As I’ve stated before, you can’t stress a system without changing it. Potential effects include declining water levels in bedrock and alluvial aquifers, declining spring discharges, and reducing ground-water discharge to lakes and playas. In some cases, such as water lost to evaporation from playas, this might not be a concern to many people. Because so much of the water in the hydrologic cycle in the Great Basin is lost to evapotranspiration, a reduction in this loss might be insignificant to most people, and maybe even unnoticeable. However, no one can predict the effects with complete

certainty until the system is stressed (such as an aquifer test) and we actually observe the changes.

Let's put the issue in a different perspective (a little less scientific). Suppose you had a huge bank account that you plan to use to ensure the stable future for you and your family. Now, there probably is enough money in your account for you to consider sharing with others who need some extra help or for investing for economic gain. But how much is enough and yet still secure your own future and protect your present way of life? Any additional spending from your account affects the balance, but how much is acceptable, or even noticeable, considering there are many inputs and outputs from your account?

Obviously, each of us would answer this differently and there is a huge spectrum of possible choices that would be offered. This is why water use and potential exportation is an issue for society and not strictly a science issue. Scientists can quantify how much is there, but how it is used and what is acceptable is a decision for society.

Wow, long response and not many answers, but it's a complicated subject. If anyone has other questions, please submit them to the Ely Times or email me at mstrobel@usgs.gov. Next week, we will talk about aquifer (pumping) tests.