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KRCD
Kings River Conservation District

Water. Power. Environment. Reliable resources for the Valley.

IRRIGATION NEWS

Dealing With KRCD's Groundwater Supply

Groundwater is a vital resource within the Kings River Conservation District. It serves to augment the available surface deliveries that growers depend upon, as well as being the major source of domestic water for the cities and individual homes within the District. In some areas of the District, groundwater is the only source of irrigation water available. It has long been recognized that this resource is limited and the need to manage it correctly is real. Over the years, many different projects have been implemented to facilitate this management.

To better understand the current condition of the groundwater supply underneath different areas of the District, three groundwater management areas were established to compliment the Department of Water Resources well surveys. Each of these areas has a systematic sampling program in place to measure depths to groundwater. Sampling occurs twice a year, in order to catch the aquifer at its maximum (spring) and minimum (fall) values.

The measured depth to groundwater has increased over the years, with the average depth increasing by 20 feet during the period 1986 to 2000. A mild recovery occurred during the wet years of 1995 to 1999 (five foot decrease in depth) but began dropping again in 2000. It is estimated that the loss of storage during this period totaled 2,557,500 acre-feet, according to the 2000 Annual Groundwater Report, published by KRCD. That amount equates to 2 ½ times the capacity of Pine Flat Reservoir.

In view of this problem, the KRCD has joined other Kings River interests in pursuing various recharge options for the groundwater basin. Increased regulatory burdens (SB 1938) have prompted the formation of the Kings River Groundwater Coordination Committee.

The obvious solution is the utilization of floodwater. A portion of this water is normally lost to the District (through the James Bypass and the Mendota Pool) due to the lack of adequate storage or conveyance facilities downstream from Pine Flat Reservoir. A key limiting factor with this approach is that potential solutions must be able to accept large volumes of water within short periods of time.

Some irrigation Districts had the foresight to construct recharge basins long ago. Consolidated Irrigation District began groundwater recharge in the early 1930's. The District currently has 46 basins covering 1,300 acres dedicated to groundwater recharge and continues to investigate new opportunities today.

Fresno Irrigation District also has a number of basins available for recharge. In addition to these basins, FID has the Waldron Pond complex, a water bank designed to provide both groundwater recharge and augmented supplies during dryer years. Ten percent of all deliveries to this project are reserved for groundwater recharge.

KRCD has joined with the Fresno Irrigation District, Alta Irrigation District, Consolidated Irrigation District and the Department of Water Resources in forming the Upper Basin Integrated Storage Investigations (ISI) program. This program will examine how flood releases can be better utilized to maximize groundwater recharge in the upper portions of the Kings River alluvial fan, as well as groundwater management programs within each respective District. Many cities plan to participate.

The North Fork Conjunctive Water Management Group is studying ways to augment existing supplies for growers in the western parts of the KRCD, where surface water supplies are more restricted.

Direct recharge is being studied in the portions of the District where the depth to groundwater problem is more acute. The McMullin project originally sought to place recharge basins directly over the existing groundwater depression for direct recharge, and also construct surface delivery systems to enable local growers to utilize flood water in place of pumped water, a concept called in-lieu recharge. This project is a cooperative effort between KRCD and the affected irrigation Districts along with private growers. Geologic issues within the study area need to be addressed before any basins are constructed.

It is part of KRCD's mission to provide proper stewardship of the resources provided by the Kings River for all those within our service area. Continued groundwater management is essential in order to insure an adequate and reliable water supply to all water users within the District.

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How The Valley's Groundwater Began

Groundwater is one of those resources that many feel will be around forever. It is a finite resource in the short term, although with proper management and with adequate means of replacing what is used, it can last almost indefinitely. There are several ways to replace groundwater, some natural, some by accident, and some by design. According to a 1999 report published by the KRCD, there are 9 existing recharge programs in place within the district. How groundwater originated, and how it can be replaced is the focus of this article.

The groundwater available today is water that was trapped within the alluvial deposits that formed the floor of the valley. The geologic stresses that pushed the Sierra Nevada upward also folded and lifted some of the deposits into what is now called the Coast Range. This process trapped the water within the basin, preventing its escape to the west. When surface water stood for long periods of time, clays would settle out and the saturated layers below became isolated. These layers would be covered by more alluvium, thus preserving the water indefinitely.

Groundwater recharge occurs naturally as water moves across the soil surface. River bottoms tend to be excellent sources of recharge, as they are typically close to the local water table. Canals also add to the recharge potential of a region, a fact that complicates the lives of canal managers due to channel losses.

The classical method of groundwater recharge is to impound water in a basin. The site selected should have sufficient soil permeability to allow the water to infiltrate the soil freely. A key consideration is surface area, not depth. The more area that can be covered, the greater the fraction of water that is infiltrated and less is lost to evaporation.

An alternate method of groundwater recharge that takes advantage of the same principles as basins is "in-lieu" recharge. Under this method, the use of surface water supplies (when available) are encouraged instead of using pumped water, thus reducing the demands on the aquifer. Typically, this is done with floodwater, and the water is spread upon the land when it is out of production. This method, in conjunction with dedicated basins, is thought to offer the best chance of correcting an existing overdraft problem in the western portions of the district.

One other method that has been studied is the direct injection of water into the aquifer. The problem is that the aquifer generally does not accept the water back as quickly as it releases it, and the risks of contamination are higher. Also, because of settling within the aquifer after the water is extracted, the volume that an aquifer can hold is reduced.

One of the more intriguing solutions for groundwater recharge is the concept of a water bank. Water banks are essentially recharge basins that work more like a reservoir than a recharge basin, because the water placed within the local aquifer can be extracted again when conditions warrant. In order for the facility to achieve its goals of groundwater recharge, a portion of the water delivered must be set aside solely for recharge purposes.

Water banks have the advantage of lower costs when compared to full-scale reservoirs, but they cannot hold the same volume of water, and they may not be able to handle sudden surges in water delivery. Their utility lies in the storage of available water, delivered at controlled rates when supplies permit.

Water banks that use direct injection have the advantages of no evaporative losses and continued use of the land surface for agriculture or housing. Another benefit that some studies in Australia have pointed to is that water stored in such aquifers for a month or more come back cleaner than when it went in. Potentially, this could mean that adequately treated water can be used for recharge purposes.

The solution to the groundwater overdraft problem will require an integrated approach of various recharge methods and increased efficiencies in water use. KRCD, through its On-Farm program, is committed to assisting growers use their available supplies more effectively. Contact the Eric at (559) 237 5567, ext 117 to discuss your irrigation related questions, to schedule a free pump test, or to have a free irrigation system evaluation.

REMINDER !

If you apply irrigation water to your agricultural property, you are subject to the regulations set forth by the Agricultural Discharge Waiver. If you haven't already selected your means of compliance (Individual Compliance or Coalition Member) you need to make your decision soon. Call (559) 237-5567 if you have any questions or to join the Kings River Sub-Watershed Water Quality Coalition.

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