

Aquifer Recharge for a Living Santa Fe River

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This year there is a good snow pack in the upper watershed that will yield good runoff into the Santa Fe reservoirs. With little risk, the City of Santa Fe could conduct an aquifer recharge evaluation by controlled slow release of water from Nichols Reservoir to the Santa Fe river. From the river channel, the water will seep into the shallow aquifer and recharge the City's riverside wells completed in the deeper aquifer. The river will serve as a living conduit to transfer the City's water from above-ground storage in reservoirs, to below-ground storage in the aquifer. As it flows from the reservoir to the aquifer, the controlled release of water will revive the river while conserving and protecting the City's drinking water supply.

When the City manages the river for aquifer recharge, other benefits are possible: live stream flows through downtown, seasonal trout fishing and shady riverside bosque parks. However, under a recharge program a living river will be a benefit of good supply practice, not an extravagant amenity. Providing a nearby example, Albuquerque has recently begun an investigation of aquifer recharge via discharges of 1,000 acre foot per year of Rio Grande water to dry arroyos in the valley. The Albuquerque project is driven solely by the need to protect their water supply: aesthetics, recreational amenities and riparian habitat do not figure in their plans.

The extent of the perennially flowing reach would obviously depend on the interaction of geology, seasonal weather conditions and the details of the release program. It is not far-fetched to plan for restoration of a trout fishery below Nichols Reservoir through the Nature Conservancy park, through the Canyon neighborhood wildlife Preserve, past Cerro Gordo Park, past Patrick Smith Park and through downtown. Perhaps surface flow would end near St. Francis Drive in dry weather and continue as far as Frenchy's Park in wet years.

New Mexico law allows "conjunctive use" of surface and ground water. This means that water rights for surface reservoirs and well systems may be combined where rivers and aquifers are hydraulically connected. Cities can use more river water in wet years and more ground water in dry years as long as their total diversions remain within the combined total of their established surface and ground water rights. Conjunctive use of surface and groundwater is intended to allow flexible management of municipal supplies and promote aquifer storage and recovery programs, just as proposed here.

Questions remain regarding the precise geologic pathways and rates of recharge to the City wells from river flow. However, numerous recharge investigations over the years (USGS 1963, Speigel and Baldwin; USGS 1994, Anderholm) have found that flow in the Santa Fe River provides significant recharge to the aquifer serving the City wells. Recently the City has supported other studies of the interaction between the Santa Fe River and the aquifer (Watershed West & Daniel B. Stephens Assoc., 2002) which

confirmed a strong hydraulic connection. Still other studies on seepage and recharge have been done by state agencies and the City's own hydrologists. All have found consistent rates of seepage into the shallow aquifer from flows in the Santa Fe river in the well field reach. Evapotranspiration and evaporation losses are estimated at 5% to 10% of recharge rates. These "losses" support healthy cottonwoods and parks along the river that the public loves. The City is currently working with the USGS on a noble gas isotope recharge investigation which will provide additional resolution of locations and rates of recharge. Other studies will be needed to implement a long term recharge program.

To have a recharge program, we need a reservoir management plan that incorporates recharge goals in addition to drinking water treatment and flood control needs. As long as release rates are kept low, all flows can be infiltrated within the recharge zone of the existing City wells. A 1,000 acre foot per year recharge program would average only 1.4 cfs released from Nichols Reservoir. Mid winter snow melt and water use forecasts should be considered and release plans adjusted accordingly. In dry years there are also good technical arguments for preferential storage of water in the ground versus in reservoirs exposed to greater evaporation. Even if conditions don't predict a reservoir spill, the program could call for some recharge release.

It is not too soon to begin releasing water to anticipate the snowmelt that will arrive in April through June. Very slow releases could continue through the end of 2007 and then be re-evaluated for 2008. A recharge program should operate in dry years as well as wet. This year of good snow pack just makes it easier to decide to conduct a trial aquifer recharge program. Gaining confidence in managing reservoir releases for recharge is the first step to reviving the living river.

Our mountain front geology sustained a little trout creek which attracted natives and their successors who placed their first wells in the area it recharges. We don't need to spend a lot of energy and money to pump or treat our native water prior to recharge. We don't need to build more reservoirs, buy more land or float municipal bonds to pay for recharge. These advantages enable us to reach for stream restoration in addition to recharge. All we need is planning and agreement on extending the goals for our river.