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PROCEEDINGS

PERSPECTIVES ON THE EDWARDS AQUIFER (Balcones Fault Zone)

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SWT

Edwards Aquifer Research and Data Center
Southwest Texas State University
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Edwards Aquifer Water for the Guadalupe River Basin

by
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Thank you Dr. Longley ... it is a pleasure to be here. I have the distinct impression that this has been a very successful meeting and one that has imparted a great deal of information about the Aquifer to the people who are in attendance. I could not help but think, as I was listening to the speeches this afternoon and also having been associated with the Aquifer and with the surface water resources of this area for some time, that we seem to be on the horns of a dilemma. We are reaching the point where we are going to have to begin to do something to protect the Aquifer and augment it.

We have tremendous pressures on this region's water resources from population growth. We have reached the point where we are going to have to make some major decisions in order to see that we have adequate future water supplies, and to adequately protect the supplies that we have.

I am going to try to take up where Fred Pfeiffer (the previous speaker) left off, to further his theme. I intend to concentrate my comments on the effects of the Edwards Aquifer on the Guadalupe River Basin. Mr Pfeiffer touched on some of the issues that I want to touch on as well, as he talked about the San Antonio River, its history and its future.

It is necessary that you know the nature and functions of a river authority, so that you understand our area of interest, the responsibilities that we have, and the views that we hold. A river authority is created by the legislature. In the instance of the Guadalupe-Blanco River Authority, we were created specifically to work with, to develop, preserve, and protect the water resources of the Guadalupe River Basin.

The Authority's point of concentration has to be surface water, since ground water is not regulated by the State of Texas. While the Authority has no direct responsibility for ground water, I do not mean that to infer that we ignore it -- quite to the contrary. Ground water resources are a very major aspect of water supply in the basin, and it must be carefully considered as we plan for the development and use of surface water resources.

The Authority's role is not a regulatory role; it is not an agency to conduct studies per se, although we do get involved in certain studies. Our primary role is to develop the surface water resources in response to the need that exists and to protect the resource. It seems obvious that if you develop something, then let it be ruined because of poor quality control you have made a foolish investment. Obviously, there has to be a significant effort by the Authority in the area of protection of surface waters and ground waters as well.

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River authorities are operating organizations. They are organized to put facilities in place for the benefit of the people of their service area, whether that be a reservoir, or whether it be a distribution system for water supply, or whether that be small hydroelectric plants, or wastewater treatment facilities, or water treatment facilities. All of those that relate to the stream, to the river, to the surface waters, are things that we are directed to work with and to participate in. May I underscore that. The point of view that river authorities must take is the practical point of view to develop and protect the water resources.

To carry out our role, the Authority must work with the State and the federal government. We work with the various cities and communities. We work with our sister districts, be that another river authority or a special district such as the Edwards Underground Water District.

Now with that as a background, let me begin with the hydrology of the surface waters in the Guadalupe River Basin and the ground water resource that we are talking about here today. I hasten to point out that there are a number of major aquifers that cross the Guadalupe River Basin and each of those must be given similar consideration. Each aquifer is very different in its physical characteristics and productivity. But relative to hydrology, I simply want to point out the relationship between the Edwards Aquifer and the surface waters of the Guadalupe Basin. Let me give you some very simple statistics which I think will serve our purpose very well. A lot of this statistical data has already been presented, but I hope to give you a different perspective. First of all, let me talk about the springs. These are the discharge points from the aquifer, that have a significant affect on the surface waters of the Guadalupe Basin. The Comal Springs, for example, have a historical average annual discharge, approaching 200,000 acre feet. Our studies, which correlate pretty well with the studies done by the State, by the Edwards district, by the Corps of Engineers, by the Bureau of Reclamation, and others indicate that those springs may discharge as little as 18,960 acre feet a year by the year 2010.

Now think about those two numbers for just a minute because that is very significant in its impact on the surface waters of the river system. A historical average discharge on an annual basis of some 200,000 acre feet versus a 2010 condition that could be as low as 18,960 acre feet a year. That is about 9.5 percent of the historic average. I would hasten to point out that those are averages and there is a danger in the water resource management business when you speak of averages. It is nice to say that we have an average of 200,000 acrefeet a year discharge, whether it is a reservoir or springs or whatever. But, you have got to deal, in terms of water supplies, with critical low flow conditions that occur periodically.

None of us can go through a day without a drink of water. Certainly a city cannot. Many industries cannot continue to function without a firm water supply and cannot afford a short-term outage. So, the average flows are interesting numbers, the peak discharges are interesting numbers, but when you are talking about the practical problem of seeing that people have water supply, you have got to deal with the critical

flows that occur. And if you do not hear anything else that I say today, remember that point, because it underlies everything we are doing in the area of developing water resources, or protecting them, or working with them, from basic supply to water quality problems.

The San Marcos Springs have an average annual discharge of something over 100,000 acre feet. Our studies indicate that in the year 2010 there would continue to be a fairly strong flow from the springs on the order of 65,000 acre feet a year. A 35 percent reduction.

Now let us bring these projected critical spring flows together and then we show a historical average annual production from Comal and San Marcos Springs of over 300,000 acre feet. Our projections show that we might have conditions in the year 2010 where we could have production from these springs of 83,000 acre feet. A net reduction of the Guadalupe River of 217,000 acre feet more or less.

How significant is that compared to the historic flow of the river? Well, if you look at New Braunfels -- if you look at the stream guages there -- we have had annual run-off just below the springs at New Braunfels of 543,780 acre feet. At Comal Springs, if you will remember the numbers, 200,000 acre feet presently from the springs, production down to as low at 18,960. At Victoria in the Lower Guadalupe Basin the average annual run-off in the river is 1,185,000 acre feet. If you subtract the projected reduction in spring flow, the remainder would be 886,000 acre feet per year.

Inflow into the bays and estuaries at the mouth of the Guadalupe River has averaged 1,600,000 acre feet annually. Extremes that have been recorded include a discharge in excess of 2,000,000 acre feet during a period of high rainfall and a discharge of less than 500,000 acre feet during periods of drought. Again, it is the critical low flow conditions that we have to consider.

The Edwards contribution to the surface waters of the Guadalupe Basin is substantial. The most worrisome thing about the water supply problem then goes back to the one point I asked you to remember and that is dealing with critical flows. The Guadalupe River, in the area of New Braunfels all the way down to Gonzales where it junctures with San Marcos River has gone dry historically. In the drought of the 1950's it was dry. Even with some small return flows, for all practical purposes, it was dry. You cannot continue to function with no water in cities, as I said before. Industries cannot continue. Remember the critical low flow conditions in the Guadalupe River occurred as the result of a severe drought, but at a time, as you saw from some of the previous presentations, of much lower use of the Edwards Aquifer.

What are the other problems during periods of critical low flow? Let me point out one more. When we pull that base flow out from under the river through reduction in spring flow, we have also harmed the river environment. The ecology of the stream has been changed rather drastically. It tends to come back, especially when we have periods of good rainfall. But in the future, we are predicting low flow conditions are going to happen more frequently.

What about the bays and estuaries. There can be significant environmental change there as well. Now it is not a total loss, in my view. We still have the flood waters coming down and the influx of nutrients and the reduction in salinity at critical times to meet the needs of the aquatic life, or marine life. Nevertheless when we reduce base flow of the river, we make a significant change in the regimen of the river and it could have rather drastic environmental effects at times.

I think the impact of low flow conditions on water supply and the environment in the Lower Guadalupe River is not generally recognized by the public in this area. That is, those of us that live in the area from Uvalde across to San Marcos. Since we do not think about it, it certainly is not translated into political action necessary to resolve the problem of timely surface water resource development.

There are a good many people in the Lower Guadalupe River Basin and adjacent areas whose economic welfare is dependent upon the river that is fed at least in part by spring flow in the Upper Guadalupe Basin. Included in this region are the cities of Corpus Christi, Victoria, Port Lavaca, Gonzales, Goliad, Cuero and a number of others. The Authority, the State and many others are responsible to see that their economies stay viable with an adequate water supply just as is required in this area.

One of the solutions is the development of surface water to augment shortages. Both to augment the Edwards Aquifer in the sense that it becomes inadequate in the future and to augment the shortage in river flows that has occurred as a result of the diminution of the spring flow from the Edwards. To date, we have developed Canyon Reservoir, and one of the major reasons for that development was in fact a recognition by the GBRA Board of Directors that as the spring flows diminish, augmentation of the river flow would be needed. Canyon Reservoir was constructed beginning in 1957 and was completed in 1964. The Reservoir has been a tremendous benefit since that time. The Authority has constructed another smaller reservoir on Coleto Creek in Victoria and Goliad Counties to serve as a water supply and cooling pond for Central Power and Light Company's coal fired Coleto Creek Power Station.

What potential is there for additional development of water resources? We have a number of dam sites that have been identified as being geographically practical, hydrologically feasible, but certainly expensive. I would not dwell on them, but let me describe them very quickly: Dam 7, which is above Canyon on the Guadalupe River really does not have a significant yield when you honor all existing downstream water rights but given some subordination of downstream water rights the site could develop some additional yield in the upper basin. Clopton's Crossing on the Blanco River near Wimberley, could develop a yield somewhere around 32,000 acre feet a year. A small project on Plum Creek called Lockhart Reservoir, could develop a yield of about 5,635 acre feet per year. Cuero Reservoir Stage 1 and 2 located on the Guadalupe River in DeWitt and Gonzales Counties, can develop a yield approaching 235,000 acre feet a year. The total developable water in the Guadalupe River Basin over

and above the historic, or natural river flows, is some 319,000 acre feet per annum.

The cost to build these reservoirs will be enormous. Development of these water resources is going to take a great deal of time and effort, and it is not going to come easily. The political problems associated with water resource development are substantial. If you think about the political problem for just a minute you will readily understand why development of surface water resources in this area is so difficult. Think of what it costs presently to take water from the groundwater source and pump it, chlorinate it, then put it into the municipal system for distribution. Compare that to the cost of developing a surface water reseroivr, then transporting it to the point of use by pumping through a pipeline, then treating it at a water treatment plant and putting it under pressure into the municipal system. The relative costs are substantially higher.

Now, if I were a citizen not involved in water resource management and development, worrying about my utility bills, worrying about the costs of sending my kids to college and a multitude of other things, I certainly am going to tend to resist any increase in my rates in order to develop surface water resources. I would be able to think of a lot of reasons why I would resist development all the way from putting that good land under water, to environmental problems of various kinds, to the excessive cost. And in fact, that is what we see occurring. The danger is, and it has been eluded to before -- I will simply restate it -- it takes us probably on the order of 10 to 20 years to put a major public surface water reservoir in place. Now how many of you sitting out in the audience, or living in this area, are inclined to make a move 20 years in advance, or say 10 years in advance, when you are not even sure it is necessary. The political problem is a very difficult one to overcome. There is one great equalizer and teacher -- drought. When drought comes, it is going to be surprising as how many people are going to become much wiser and decide that it is time to proceed with water resource development. The danger in that is if we wait until drought occurs, it is probable that we will have done some very real damage to our area, to our economy and to many individuals.

Thank you very much.