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### The Future of Groundwater in the West

James S. Lochhead

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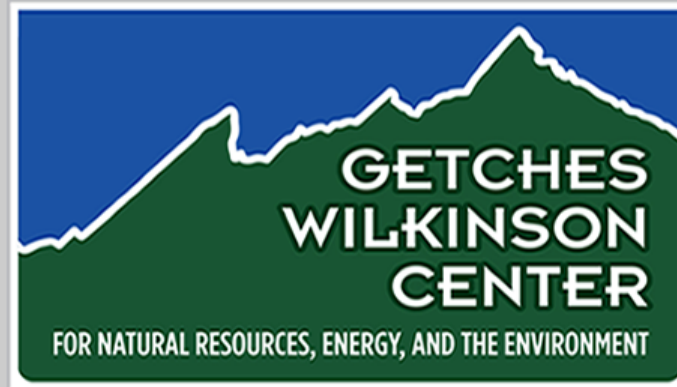
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Natural Resources Law Center  
June 2004 Conference

The Future of Groundwater in the West

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- I. Introduction/Summary
  - a. Scenarios
    - i. Pecos River
    - ii. Snake River
    - iii. Platte River
    - iv. Lower Colorado River
  - b. Themes
    - i. The role of groundwater is under appreciated in its influence on the interstate and intrastate allocation issues, and in environmental problems in the Western U.S.
    - ii. Compact – groundwater not generally contemplated in compact negotiation, but certainly is a part of delivery requirements – TX v. NM; KS v. CO
    - iii. ESA – well users and their effect on surface flows not at the same level of risk as surface users
    - iv. Priority administration issues
      1. Futile Call
      2. Burden of Proof
      3. Historic well depletions
      4. Requirement that the senior “chase” his water by developing tributary groundwater before exercising a call on junior groundwater.
      5. Maximum Utilization
    - v. The only “balanced” systems are those without human influence. Once human development began, whether it was surface diversions that created recharge of aquifers, or groundwater development that depleted aquifers, the groundwater/surface water systems have been out of align.
      1. “Pluses”
        - a. irrigation return flows/recharge
        - b. precipitation
        - c. tributary underflow
        - d. river leakage
        - e. artificial recharge

2. “Minuses”
    - a. springflows
    - b. pumping
    - c. ET
  3. Failure to balance – remain within budget – over long term will result in change in storage, which affects spring and surface flows (reach gains and losses)
  4. “Overappropriated Aquifer” – aquifer in which the average rate of recharge (natural and artificial) is less than the rate of depletion (diversions less recharge) by current and reasonably anticipated usage
- vi. The great battles over water have occurred over surface flow. Yet most of the quantification of surface flow – whether by adjudication of priority or by compact – occurred before the advent of groundwater development. The shifting of the balance between surface and groundwater can be summarized in several phases of development that have occurred in the west.
1. Phase I – Early quantification and development
    - a. Early mining development that was the foundation of the prior appropriation system – first in time was first in right – was premised on surface water use.
    - b. Early interstate allocations through compact and decree were premised on the delivery of surface flows. Little consideration was given to the impact of groundwater development, although state laws integrating ground and surface water have effectively incorporated groundwater in to interstate compacts.
    - c. Early irrigation development was based on gravity direct flow and storage irrigation systems that predated the electric pump.
      - i. In some cases, senior surface water development occurred in the lower reaches of rivers and streams. These rights have been subsequently denied water by upstream junior well development that was not administered (examples are the Pecos River in NM and the Snake River in ID).
      - ii. In other cases, senior development occurred upstream. Return flows from irrigation recharged alluvial aquifers, causing a rise in baseflow conditions and allowing for additional development downstream by juniors. (Examples include the South Platte River in CO and the Snake River in ID)
    - d. The resulting level of development, allocation and administration was premised upon a hydrologic balance that reflected surface water development and recharge.
  2. Phase II – The advent of groundwater development
    - a. With the advent of the electric pump and vast hydroelectric networks that provided inexpensive electricity, groundwater development ensued, opening up new acreage to development and also resulting in the conversion of land from surface irrigation (that was subject to drought) to groundwater irrigation that was more reliable.
    - b. Groundwater development also fueled industrial and municipal growth – economic drivers that were dependent on junior water rights.

- c. The result was a new shift in the hydrologic balance. In some cases (Pecos, Snake) upstream groundwater development began to diminish surface supplies to the detriment of downstream seniors. The groundwater development also exacerbated surface flow issues that affected ESA listed fish and birds (Platte River). The result was also a shift in the political balance – through political power, groundwater users and the economic interests supported by groundwater development prevented the integrated management and administration of ground and surface water.
3. Phase III – The integration of ground and surface water use and administration. If it hasn't been already done, can it be done now? If not, what are the consequences?

## II. Pecos River

- a. Intersection of two convergent tracks – the adjudication of priorities in the Pecos River Basin and the development and litigation of the Pecos River compact between Texas and New Mexico.
- b. 1949 Compact required that NM “not deplete by man’s activities the flow of the Pecos River at the New Mexico-Texas state line below an amount which will give Texas a quantity of water equivalent to that available to Texas under the 1947 condition.”
  - i. The “1947 condition” was impossible for NM to meet, because of the lagged effect of groundwater depletions in the Pecos River Basin that had occurred before 1947. But NM exacerbated the situation by approving significant new well development post-1947. NM also followed a litigation strategy of not measuring and revealing the extent of groundwater depletions in the basin. The Supreme Court held the presumption that shortfalls in the basin were attributable to “man’s activities” in the Pecos basin in NM, and found that NM had violated the compact by underdelivering to TX by some 10,000 af/yr.
  - ii. NM was thus forced to “undo” many years of industrial and municipal water development in the Upper Pecos River basin, by somehow reducing depletions in the basin and bringing the river back into a balance. The state did this not by the enforcement of priorities to meet the state line obligation, but by purchasing and retiring irrigated land in the basin.
  - iii. The other concurrent track was the basinwide adjudication of priorities.
  - iv. In the early 20th Century, local water users and the federal government developed the Carlsbad Irrigation Project, which was based on some of the most senior water rights in the basin, and which is located at the bottom of the basin near the TX-NM state line.
  - v. For the same reasons that TX was not receiving water under the “1947 condition,” the CID was not receiving its supply. In the 1970’s, the CID exercised a water rights call, precipitating the basinwide adjudication of priorities. The state struggled with whether, and if so how, to administer priorities in the basin, a process that was complicated by the compact litigation. The state’s position was that it would not administer priorities absent a full basinwide adjudication. Yet the adjudication (like other general adjudications in the West) was mired down in process, lack of budget and litigation. After 30 years, the adjudication was still some 20-30 years from completion. The result was the continued shortage of CID’s rights.

- c. The solution was a state-lead process that brokered a program to resolve both the compact delivery problem and the adjudication problem. There were several keys:
  - i. The state appropriated up to \$60M for purchasing and retiring irrigated lands, to reduce depletions, and for drilling wells to augment river flows in times of drought to meet the state line obligation.
  - ii. The settling parties (CID and upstream groundwater users) agreed on operational mechanisms to deliver water saved from retiring lands from irrigation or pumping either to CID or the state line. The settlement was supported by a state modeling effort.
  - iii. In consideration of a more stable supply, the CID agreed to compromise its priority call, limiting it to less than one-half of its original claim.
  - iv. The settlement shortened the Pecos adjudication by a decade or so. The settlement is now before the adjudication court for approval.
- d. The solution achieved:
  - i. Securing the economic stability of the basin by allowing for continued use of junior upstream wells.
  - ii. Achieving a more stable and reliable supply for the CID
  - iii. Assuring greater certainty in the state's ability to meet state line deliveries.

### III. Snake River

- a. ESPA – extends over most of southern Idaho, holds 2-300 maf, historically discharging some 10 maf to the Snake River through spring flows.
- b. Not long after the turn of the century, over 600,000 ac had been developed by surface irrigation, some 9 maf of storage, fully appropriating surface flows.
- c. At the same time, hydroelectric power generation developed, resulting in senior water rights downstream for hydro generation.
- d. The effect of this surface development changed the hydrologic regime of the river. Spreading water across the vast area overlying the ESPA increased groundwater storage, and increased discharges to the river. Then things changed.
- e. The advent of groundwater pumping after WWII resulted in a dramatic increase in irrigated acreage – and also a trend back downward in stream flows as lands were converted from surface to groundwater irrigation.
- f. Reductions in spring flow discharge and surface flows were exacerbated by efficiencies in surface irrigation and high lift pumps.
- g. Now over 2 million acres irrigated, 1 million acres from groundwater.
- h. Since the 1950's, spring discharges and flows in the Snake River have declined steadily.
- i. At a time about coincident with increased spring discharges, a large aquaculture industry developed based on appropriations of springflows. This is a high economic value industry.
- j. In the late 1970's, faced with declining river flows and no state administration of junior well priorities, Idaho Power Company initiated litigation against some 7500 junior well diversions, asserting injury to the company's water rights at its Swan Falls and other hydroelectric facilities. Settlement of the litigation between IPC and the state, among

other things, initiated the Snake River Basin Adjudication, and created a subordination of IPC's rights to specific groundwater rights.

k. Last year, frustrated by years of inaction in the administration of junior well priorities, the holders of senior spring rights (mostly for fish culture facilities) initiated calls. The IDWR took the entire irrigation season to make a decision, and in most cases denied the calls. Where the calls were honored, they were of limited geographic extent and did not take into account the cumulative effect of lagged depletions.

i. Issues:

1. Burden of proof – the Director of the IDWR found that the burden was on the senior spring users to prove injury by specific junior well diversions.
2. Whether the spring users can depend on the level of discharge at the time of their appropriation, a level that was higher than historic because of the surface irrigation of the early 1900's
3. Whether the senior is required to “chase” his appropriation by drilling wells to supplement diminished spring supplies.
4. Whether the IDWR should look to multiple year injury in determining whether to curtail diversions by junior wells, or whether only injury within the current year should be considered.
5. Geographic scope of the call, whether a water rights call should extend to junior pumping throughout the aquifer, or only within a limited water district or area.

ii. Current administrative and judicial proceedings have been stayed until March 2005, to see if the Idaho legislature can produce any solutions. Interim committee appointed to recommend legislation addressing recharge, mitigation of seniors and other issues.

1. In the meantime, river and spring levels continue to decline. Added to the debate is litigation in the Snake and Columbia River basins over the role of flow augmentation in the recovery of listed species of salmon. Flow augmentation is an obligation of the federal Upper Snake projects in Idaho, but reduction in groundwater depletions is not an issue, because of the lack of a federal nexus to well pumping. Thus, surface water users are in part filling a hole in the river created by groundwater pumping.

#### IV. Platte River

- a. The Platte River represents an illustration of both the interstate and environmental implications of groundwater development.
- b. Nebraska sued Wyoming over upstream well development, while at the same time unregulated well development in Nebraska depleted the flow of the Platte River, to the detriment of endangered species in the river.
- c. Nebraska and Wyoming have settled their litigation, and through the development of the Platte River Program, Nebraska has begun to deal with the integration of groundwater and surface water in the basin.

#### V. Lower Colorado River

- a. One hears a lot about the Colorado River Compact, which allocates the right to consume water, and the negotiations with California over that state's over use of Colorado River water.

- b. Relatively little attention has been paid the role of groundwater development in the recent history of the river.
- c. Much of the justification for the development of the CAP was the need for Arizona to get a handle on groundwater overdrafts in that state.
- d. The development of the Arizona groundwater bank, by which AZ began to make full use of its Colorado River entitlement by putting Colorado River water in the ground, played a key role in the negotiations to reduce California's use of surplus Colorado River water.

## VI. Colorado

- a. Although it continues to face challenges, Colorado appears generally ahead of other western states in the integration of ground and surface water administration and management. This can be attributed to:
  - i. The 1969 Act, which did away with the cumbersome, expensive and time-consuming practice of basinwide general adjudications, and replaced them with basinwide adjudications on a case-by-case basis.
  - ii. The tributary presumption, and the development of management tools like plans for augmentation and exchanges.
  - iii. Burden of Proof– cf. CRS 37-92-502(2) – “no such discontinuance shall be ordered unless the diversion is causing or will cause material injury to such water rights having senior priorities.” Factors:
    - 1. current and prospective volumes of water in and tributary to the stream;
    - 2. distance and type of stream bed between diversion points;
    - 3. water velocities, surface and underground;
    - 4. probable duration of available flow;
    - 5. predictable return flow.
  - 6. *Alamosa-La Jara Water Users v. Gould* – “To the extent that the water court ruling disapproves the rules because they presume material injury to senior water rights from all underground diversions in the valley, and to the extent the rules require the division engineer to re-prove in each individual well determination the existence of material injury which has already been proven on a valley-wide basis, the ruling is in error.” 674 P.2d 914, 928. See *Fellhauer v. People*, 447 P. 2d 986, 991. “[W]here, as here, streams are over-appropriated and underground water diversions from an aquifer have been found to significantly affect stream flow, it may be presumed that each underground diversion materially injures senior appropriators. The state engineer, therefore, will not be required to repeat for every well curtailed the painstaking analysis which lead to the aquifer-wide determination of material injury.” 674 P. 2d 914, 931.
  - 7. Cf. *SRJ I Venture v. Smith Cattle*, 820 P.2d 341, in which junior well owners successfully challenged declaratory judgment action by senior surface rights.
  - 8. Requirement that the senior “chase” his water by developing tributary groundwater before exercising a call on junior groundwater. *Kuiper v. Well Owners Conservation Association*, 490 P. 2d 268, 283 – “[I]t is not the present state of the law that the State Engineer is required to compel a person with a senior surface priority to use his groundwater to apply on that priority before he



makes a call.” But cf. *Gould* – “To the degree Well Owners precludes consideration of the reasonable-means-of diversion requirement as a method of maximizing utilization of integrated underground and surface waters, we overrule Well Owners. The water court held that, under certain circumstances, surface stream appropriators may be required to withdraw underground water tributary to the stream in order to satisfy their surface appropriations. We affirm this legal conclusion...” *Gould* 674 P. 2d 914, 934-5. Because the case was remanded and settled, there has not been a full litigation of these issues. The Rio Grande rules are due shortly.

9. Maximum Utilization – premised on the notion that ground and surface water should be developed in a conjunctive – and sustainable – manner; that development of the resource will be balanced; unfortunately, that balance has been impossible to achieve. “[T]he objective of ‘maximum use’ administration is ‘optimum use.’ Optimum use administration can only be achieved with proper regard for all significant factors, including environmental and economic concerns.” *Gould* 674 P. 2d 914, 935. (Suggesting further that such a balancing might include a requirement that the junior fund the drilling of wells by the senior.)

## VII. Conclusion

- a. The integration of ground and surface water management remains one of the greatest challenges in the West – whether it can be done protecting the rights of senior surface users, not disrupting economies built on junior priorities. Lesson from Colorado is that it is better to bite the bullet and get it done. Interminable general adjudications don’t help. Quantification of the right and determination of priority are essential elements in conjunctive management and maximum utilization.
- b. One of the biggest unresolved problems is the exempt domestic situation – over 200,000 exempt domestic permits in Colorado alone. These permits have fueled sprawl growth and cumulative impacts. Is it constitutional? What about compact administration?
- c. Groundwater recharge and management will be an increasingly important tool, given evaporation losses associated with surface storage, the lack of new reservoir locations, and the permitting. But these need to be undertaken in priority, and without injury to seniors.
- d. Groundwater will continue to be an issue in interstate allocations and disputes. Example – can Arizona continue to bank 3-500,000 af/yr in the face of a continuing drought?
- e. Can groundwater development continue to be immune from the environmental responsibilities, especially ESA, that surface water users have borne?