

DNR MEMO

March 8, 2007

TO: Jody Gittens
FROM: Ann Bleed
SUBJECT: Questions Raised During the Hearing on LB 701

This memo is in response to your request for me to address some of the questions that were raised during the testimony on LB 701.

As you know the Republican River Compact, which was approved by the Governor and legislature and ratified by the U. S. Congress in 1943 is a part of State law. The Compact allocates the Virgin Water Supply of the Republican River Basin among the three states of Nebraska, Kansas and Colorado. The Director of the Department of Natural Resources is the State's representative on the Compact Administration and is responsible for ensuring that the State complies with the Compact.

Was the inclusion of ground water use in the Compact calculations a result of the negotiated Settlement of the lawsuit?

In the 1998 lawsuit filed by Kansas, Nebraska argued before the Special Master and the Supreme Court that the Compact does not pertain to ground water use. The Special Master and the Court did not agree. The Special Master issued an opinion stating that ground water uses were to be counted as consumptive uses under the Compact to the extent they depleted stream flow. When Kansas lost their argument that they were entitled to damages for past over pumping by ground water wells, the major issues in the case had been decided. What was left to negotiate was how ground water use and other consumptive uses, as well as the virgin water supply, should be calculated for Compact accounting and compliance. In the negotiations Kansas agreed to allow each state to combine allocations and uses among sub-basins and to allow compliance to be calculated, not on an annual basis, but on the basis of a five-year-running average. Both concessions by Kansas make it easier for Nebraska and Colorado to comply with the Compact.

Is compliance with the Compact the only legal restriction on water use in the basin?

extent conservation activities reduce stream flow, the negotiators were reluctant to include these impacts in the calculations.

The Republican River Compact Settlement agreement calls for the three states and the federal government to conduct studies of the impact of conservation activities on the basin. These studies are underway. There is no question that the impact of conservation activities on the basin's water supply will be a topic of discussion for future Compact administrations.

Some argue that the consumptive use of water from conservation activities should be included as part of the Compact accounting because their inclusion would increase the Virgin Water Supply and allow Nebraska to consume more water. There are two problems with including conservation activities in the calculations: 1) We do not have a good understanding of how much water these activities consume and 2) Although the inclusion of these activities would increase the Virgin Water Supply and the portion of that supply allocated to Nebraska, they would also increase the consumptive use of water debited to Nebraska. The increase in the debit would be more than the increase the credit to Nebraska's allocation.

It is also important to remember that although conservation activities reduce stream flow, they also prevent soil erosion and water pollution and perhaps add to ground water recharge. Perhaps more importantly these activities have allowed some to continue agricultural operations without any irrigation and have allowed others to pump less water. Because conservation activities reduce the need to apply irrigation water and because the consumptive use from conservation activities are not included as part of the calculation of the Compact's Computed Beneficial Consumptive Use of water, the use of conservation methods has reduced the Nebraska's consumptive use numbers in the Compact. To what extent conservation activities have reduced the State Computed Beneficial Consumptive Use of water is unknown, but it could be substantial.

What do we need to do to achieve compliance with the Compact?

Output from ground water modeling by the DNR using an assumption that the drought will continue indicates that if current trends in water use in the basin are not changed, the stream flows and the water levels in the basin's ground water reservoirs will continue to decline, as will Nebraska's overuse of the Compact allocation. Currently Nebraska's overuse is increasing by around 7,500 acre feet a year. If no actions to reduce water use are implemented, the Basin will not only be out of compliance with the Republican River Compact but will also be out of compliance with LB 962.

What will be the impact of reductions in the use of irrigation water on the basin's economy?

There is much concern about the impact of reducing water use on land valuations, the future tax base and on the local economy and community structure. What is not often acknowledged is that these reductions are needed to save the Basin's economy. To maintain a viable irrigated agricultural economic base in the long term, we must achieve a sustainable balance between water supplies and water use.

Can we alleviate the need to reduce water use in the Basin by importing water from other basins or initiating other types of augmentation plans?

Yes, augmentation projects are allowed by the Settlement within the moratorium area as long as both on an annual and a long term basis, there is no increased depletion to the stream as a result of the augmentation project. Outside of the basin and inside the basin but outside the moratorium area there can be augmentation without regard to the limitation within the moratorium area. Such projects could be extremely helpful to alleviate short term stresses during drought years. However, at this point in time it is hard to envision an augmentation project that would supply sufficient water over the long term to achieve Compact compliance or maintain a sustainable water supply. Thus, we have no choice but to decrease the consumptive use of water until on average uses are in balance with the supply.

Do we have to reduce ground water pumping to achieve Compact compliance?

Yes. Ground water pumping is responsible for over 80 % of the depletions to stream flow that are counted in the Republican River Compact and the impact from ground water pumping is growing. In fact on average the percent of depletions due to ground water use has been increasing by 1% per year. At this rate surface water use will approach zero within 20 years. Thus, over the long term, achieving a balance between supply and use will require reductions in ground water pumping.

Is restricting ground water pumping alone solving the problem on the backs of ground water users?

We are not reducing just ground water pumping. Based on official numbers from the RRCA accounting, since 2002 surface water users have reduced their consumptive use of stream flow by 52%. At the same time, although ground water pumping in the basin has decreased by 3%, due to the lag effect, depletions of stream flow from ground water pumping have increased by 2%.

How long will it take for reductions in ground water pumping to result in increases in base flow to the stream?

There is a lot of inertia in the ground water system. Impacts of well use by a well at some distance from a stream may not be seen for

years, decades or even longer. Likewise, reducing pumping of a well at some distance from the stream may not increase stream flows for many years. The depletions to the stream caused by ground water pumping in 2005 were less than 10% of the total stream depletions occurring that year. The remaining 90% of the depletions were due to well pumping in previous years. If no ground water wells had pumped in 2005, 90% of the total depletions that year would still have occurred.

Nevertheless, based on calculations using the RRCA model and assuming a moderate drought scenario, the reduced allocations restricting ground water pumping implemented by the NRDs throughout the basins will reduce depletions to the stream over the next five years by an average of 7,500 acre feet a year. Reductions in ground water pumping close to the stream produce faster results. Currently over 50,000 acres are enrolled in CREP and EQIP programs. This is expected to reduce depletions to stream flow by 7,200 acre feet by 2012.

How should allocations to surface water and ground water irrigators be made?

First and foremost allocations should have a solid technical basis and be able to be changed as new technical information becomes available. Current law provides for such a process by allowing the Department and the natural resources district to work together to determine what the allocations need to be in order to meet the Compact's requirements. Furthermore, the law requires that before allocations are implemented, they are subject to a public notice and hearing process. Presently, DNR determines how much water is likely to be allocated to Nebraska and then works with the NRDs to establish allocations that will maintain Compact compliance. All this process would be eliminated if the legislature were to set allocations.

What would be a fair way of distributing the allocation among NRDs?

The determination of how much of the allocation should go to each NRD is obviously a question that must be addressed. During negotiations of the Integrated Management Plans in 2004, there was general agreement to base the split of the allocations among NRDs on how much each NRD depleted stream flows between the years 1998 and 2002. This baseline represented the basin development just before the moratorium on new well construction was imposed by the Settlement. The NRDs wanted to have an established baseline because they didn't want the addition of irrigated acres by one NRD to cause another NRD to further reduce pumping to compensate for another NRD's increase in irrigated acres. The concept was that each NRD would share whatever allocation was available to Nebraska or make up overuse based on the average percentage of the total depletions caused by each NRD between the years 1998 - 2002. The end result was that the URNRD accounted for 44% of the depletions, the MRNRD 30%, and the LRNRD 26%.

Another alternative is to set up allocations so that the burden of reducing water use is equally shared across the basin. This objective could be achieved by establishing allocations based on a percentage of

the gross crop irrigation requirements across the basin. These gross crop irrigation requirements (or GIR) vary with precipitation, which on average decreases by one inch for every 25 miles going west (See Figure 1). Splitting the allocation according percentage of the GIR comes very close to equalizing the percent of the gross crop irrigation requirement across the basin.

Setting allocations the same across the basin is a third option. This option however would provide an allocation way above what would be needed for good husbandry in the LRNRD or would reduce the allocations far below what is needed to be viable in the URNRD.

Can the State restrict surface water use to comply with an interstate compact?

Yes. Interstate Compacts are approved by the legislature and the Governor and are part of state law. The Compact is also a federal law adopted by Congress. The State has the responsibility of ensuring that the State is in compliance with the Compact. If necessary to comply with the Compact, the State can restrict both surface water and ground water uses.

Can we achieve significant reductions to stream flow by removing riparian vegetation?

Riparian vegetation, including invasive species such as salt cedar and phragmites, are known to consume tremendous amounts of water. What is not well understood is how to eliminate these species safely and inexpensively and how much water can be saved if these invasive species are eliminated. Based on the assumptions in the RRCA Model, we could achieve a savings of 1,000 acre feet of water a year by eliminating 1% of the phreatophytes, the vegetation along the banks of the Republican River. However, to achieve this level of savings, we could not allow any vegetation to grow where the phreatophytes were removed. If vegetation is allowed to replace the invasive species, the water savings will be less.

The RRNRDs, the University and the DNR are currently establishing demonstration projects in the Republican Basin that will explore various methods of managing riparian vegetation and measure the impacts the management methods have on the consumptive use of water. This work is being funded by the Interrelated Water Management Fund through the Natural Resources Commission and funds from the DNR budget.

What else can be done to reduce the consumptive use of water?

Other methods to reduce water consumption include:

- Developing more efficient ways to use our surface water reservoirs and canals. Optimizing conjunctive use management could also reduce nonbeneficial consumptive use. The DNR and the Bureau of Reclamation are currently studying ways to make

better use of Enders Reservoir and the Frenchman Valley Irrigation District facilities.

- Developing new crop hybrids that use less water to produce the same yields.
- Develop water application techniques that reduce the nonbeneficial use of water. Irrigation scheduling and deficit irrigating are also important tools that may reduce yields, but because field inputs are also reduced, increase farm profits. The University of Nebraska has a number of research, demonstration, and education projects focusing on these water saving techniques. Discussions between the University, DNR and the State's pivot manufacturers are also focusing on how we can achieve the most profit per acre foot of water consumed.

What can we do to try to achieve Compact compliance in the short term?

The fastest way to reduce stream depletions is to reduce the use of surface water and reduce reservoir evaporation. For this reason, we are trying to find ways to do short term water leases for whatever surface water is available in the Basin. Unfortunately, due to low stream flows in the Basin, surface water supplies are very limited. Currently we estimate that there will be about 50,000 acre feet of surface water available for use in 2007. If we leased all of this water we would achieve a benefit toward Compact compliance of around 35,000 acre feet. To lease this water will require funding.

The DNR has examined the possibility of trying to augment stream flows by pumping wells at some distance from the river and transporting this water to the river to augment stream flows. Such an augmentation project within the boundaries of the moratorium would increase stream flows in the short term, but eventually there would be equal or greater depletions to stream flow from the well pumping that would have to be offset to comply with the Compact. To date DNR has not identified any promising projects. However, the RRNRDs, using money from the Interrelated Water Management Program funds are also looking at the potential of augmentation projects. If a viable project can be identified, such projects could be of some use for short term offsets during water-short years.

Reducing ground water pumping in the Quick Response Area also has immediate impacts on stream flow although the full benefit of these reductions will not show up for two to five years, depending on how far away the retired well is from the stream. To achieve Compact compliance in the short term simply by reducing ground water pumping will require severe reductions in allocations in the Quick Response Area. Wells outside of the Quick Response area in the uplands could be allowed higher allocations because in the short term reducing the allocations on these wells would not have much impact on stream flow.

Should allocations be the same for upland wells as for wells in the Quick Response Area?

Eventually, yes but for the near term we may want to consider different allocations for wells in the Quick Response Area in order to maximize the economic income to the basin. The allocations in the Quick Response Area must be very low in order to achieve short term Compact compliance. Putting the same low allocation on the upland wells will not help to achieve Compact compliance in the short term but would decrease the amount of crop revenue that flows into the local economy. Lowering water use to the lowest common denominator would unnecessarily reduce the income of farming operations in the upland areas. Over time, as stream flows increase, we should be able to relax the restrictions on the Quick Response wells, but may have to gradually reduce allocations for the upland wells until allocations for both are equal.

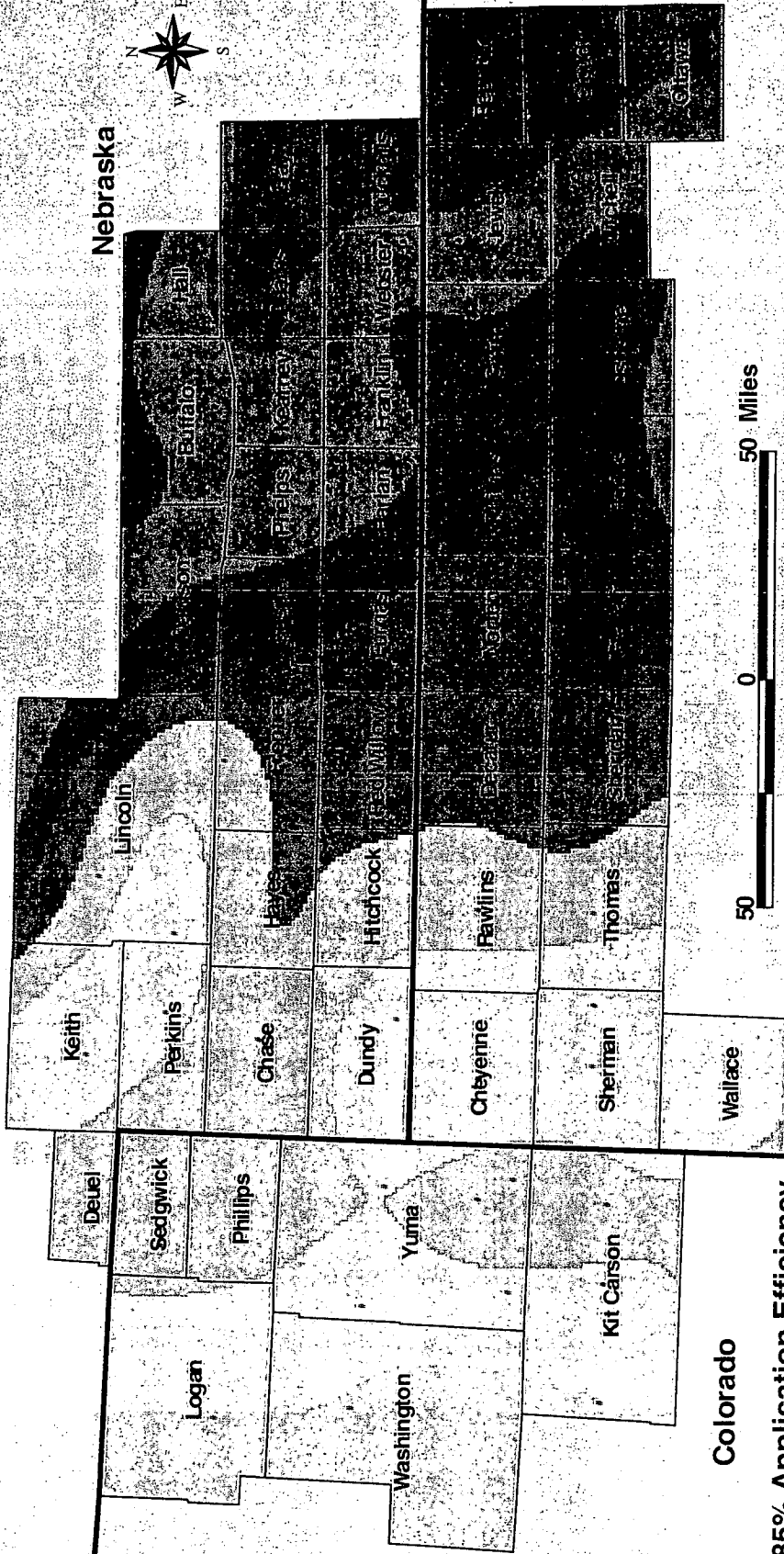
How could we impose unequal allocations on Quick Response Area wells and upland wells and still be fair?

Fairness could be achieved by compensating those water users close to the stream that are subject to increased restrictions to the extent their allocations were less than the allocations for the upland wells. For example if an upland well is allowed to pump 9 inches and a user in the quick response area is only allowed to pump 3 inches, the user in the quick response area could be paid "damages" equal to the value of the extra restriction of 6 inches of water.

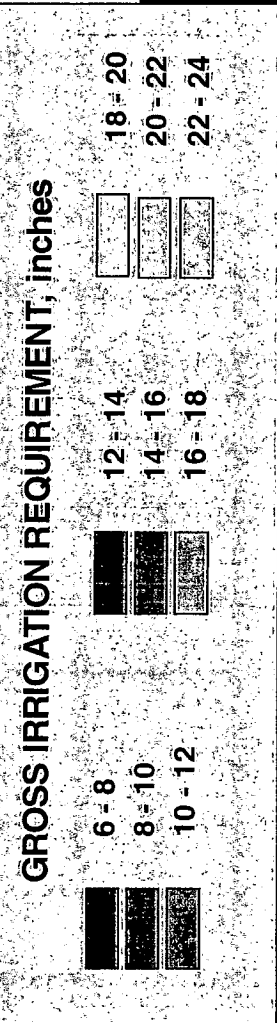
Is there a need for increased funding for water management in the basin?

Yes. Funding will be absolutely necessary if the Republican River Basin is to achieve a balance between its allocation and consumptive uses under the Compact in a timely manner without placing severe economic burdens on surface water users and ground water users in the Quick Response Area.

Nebraska



Kansas



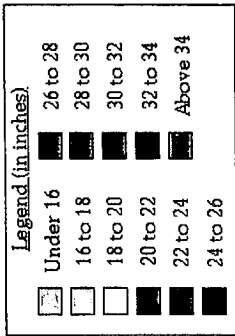
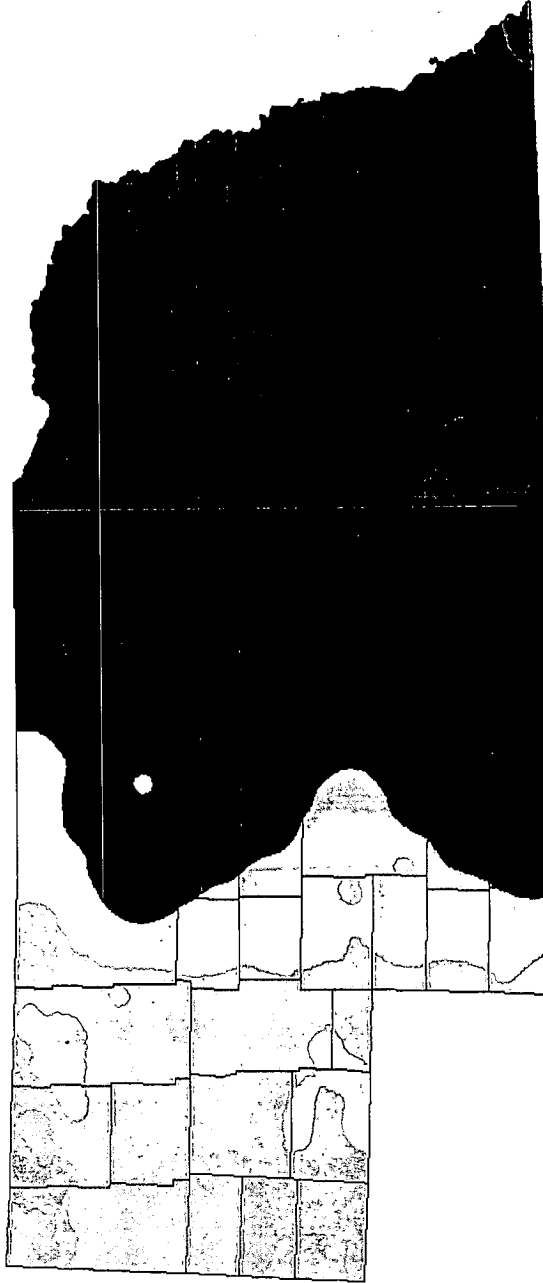
Colorado

85% Application Efficiency

COPIED FROM AVAILABLE SOURCE

Must consider variation of precipitation across basin when developing compliance requirements

Average Annual Precipitation
Nebraska



Oregon Climate Service
Oregon State University

This map is a plot of 1961-1990 annual average precipitation contours from NOAA Cooperative stations and (where appropriate) USDA-NRCS SNOTEL stations. Christopher Daly used the PRISM model to generate the gridded estimates from which this map was derived; the modeled grid was approximately 4x4 km latitude/longitude, and was resampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Welsberg and Nathaniel DeYoung. Funding was provided by USDA-NRCS National Water and Climate Center.

Period: 1961-1990