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Water Trading Can Reduce the Cost and Increase the Effectiveness of Groundwater Allocation

Christopher L. Thompson
University of Nebraska-Lincoln, cthompson2@unl.edu

Ray Supalla
rsupalla1@unl.edu

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Market Report	Yr Ago	4 Wks Ago	1/4/08
Livestock and Products, Weekly Average			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight	$87.69	$92.91	$92.97
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb.	115.28	119.77	116.13
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb.	*	110.71	100.75
Choice Boxed Beef, 600-750 lb. Carcass	146.26	148.33	145.08
Western Corn Belt Base Hog Price Carcass, Negotiated	56.03	54.38	47.57
Feeder Pigs, National Direct 50 lbs, FOB	*	36.71	47.23
Pork Carcass Cutout, 185 lb. Carcass, 51-52% Lean	63.37	59.00	57.21
Slaughter Lambs, Ch. & Pr., Heavy, Wooled, South Dakota, Direct	*	92.25	92.63
National Carcass Lamb Cutout, FOB	247.67	265.18	262.11
Crops, Daily Spot Prices			
Wheat, No. 1, H.W. Imperial, bu.	4.25	8.82	8.76
Corn, No. 2, Yellow Omaha, bu.	3.36	4.01	4.49
Soybeans, No. 1, Yellow Omaha, bu.	6.33	10.80	11.70
Grain Sorghum, No. 2, Yellow Dorchester, cwt.	5.57	7.12	7.89
Oats, No. 2, Heavy Minneapolis, MN , bu.	2.75	2.90	3.33
Hay			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.	135.00	135.00	135.00
Alfalfa, Large Rounds, Good Platte Valley, ton.	87.50	85.00	85.00
Grass Hay, Large Rounds, Good Northeast Nebraska, ton.	82.50	*	*

* No market.

In the September 5, 2007 issue of the *Cornhusker Economics* we argued that cap and trade water markets could significantly reduce the cost of groundwater allocation. Capping the total amount of water pumped with an allocation, and then permitting allocating rights to be traded, reduces control costs because water can move to where it is most valuable. Irrigators with inefficient irrigation systems or relatively unproductive land sell all or part of their allocation rights to irrigators with more productive operations at a mutually agreed upon price that makes both parties better off with no change in total pumping. Subsequent work suggests that cap and trade markets may be able to increase the effectiveness of a groundwater allocation program as well as reduce costs.

In the Republican Basin the objective of groundwater allocation programs is to reduce the amount of water consumed by limiting the amount that can be pumped. Water is consumed when it is lost to the basin through evaporation, transpiration by plants or other forces. Water that is pumped, but returned to the aquifer or the river for later use, is classified as unconsumed. The effectiveness of a groundwater allocation program is appropriately measured by the change in consumptive use which occurs as a result of limiting the amount that can be pumped. This means that it is important to consider whether water markets under a cap and trade policy could change consumptive use, even if the total amount pumped in the basin remains the same.

In our analysis of a typical case in the Republican Basin we found that the impact of a water market on the effectiveness of allocation policy depended on the size of the allocation. Markets were found to reduce consumptive use by up to 5 percent for allocations ranging

from about 5 to 13 inches for an illustrative Frontier County case (Figure 1). At an allocation above 13 inches, a trade would actually increase consumptive use because the efficient party would be selling water that they otherwise would not pump to an inefficient party that would use it. At allocations below about 5 inches, trading also increased consumptive use, but this is of little concern from a policy perspective because such low allocations are unlikely to be seriously considered.

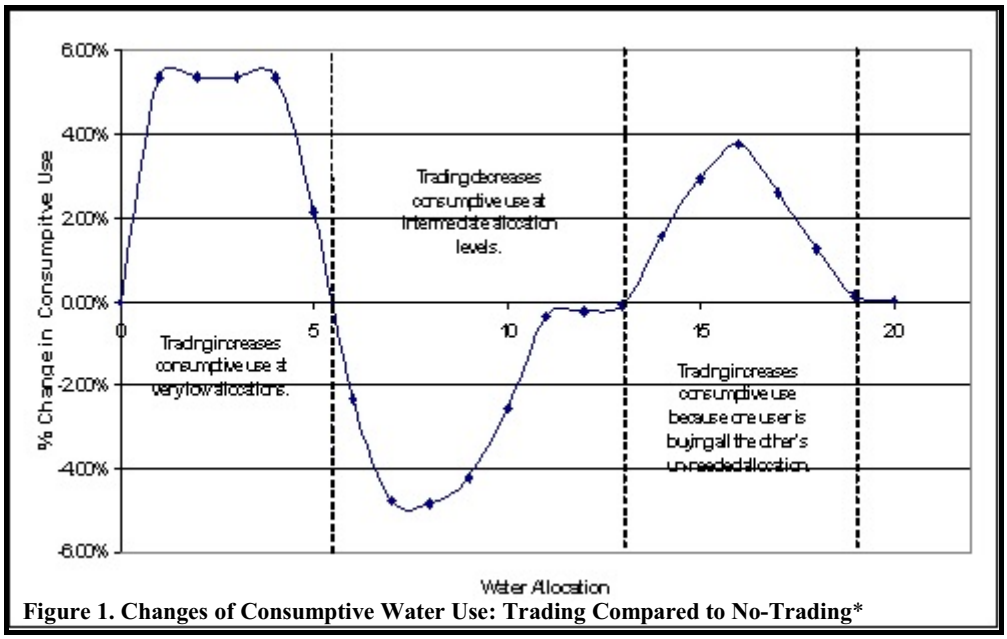

Figure 1. Changes of Consumptive Water Use: Trading Compared to No-Trading*

What causes consumptive use to decrease with no change in the total amount pumped when water trading is allowed? Essentially, trading reduces consumptive use whenever trading incentives result in moving water to a well or field where the incremental increase in consumptive use from applying the transferred water is less than the consumption which occurred in the previous use. This would happen for example, if you had two cases which were identical except for the cost of pumping. In this case trading incentives would result in pumping more water from the low cost well and less from the high cost well. Consumptive use goes down from this trade because as the amount of water applied to a unit of land increases, the proportion that is consumed decreases. Hence, the reduced consumptive use from applying less water with the high cost well is greater than the increased consumptive use from applying the same amount of additional water through the low cost well.

This analysis provides evidence that it may be possible to use water markets to both reduce the cost and increase the effectiveness of groundwater allocations which are designed to reduce consumptive use. However, policy makers should proceed with caution because there are circumstances where consumptive use could increase rather than decrease as a result of trades which occur under a cap and trade policy. The most obvious is the case depicted in Figure 1, where at high allocation levels trading increases consumptive use as water moves from efficient wells where it is not needed to wells where it is needed. There may also be combinations of efficiency and economic factors which were not considered here that would result in trades that increase consumptive use at the intermediate allocation levels. Further research is needed to determine when market trading would increase and when it would decrease the effectiveness of allocation policies. In the meantime, it is encouraging to observe that cap and trade water markets may be a more cost effective groundwater management policy than most observers have suggested.

* These estimates describe results where UNL's Water Optimizer was used to optimally allocate water between two fields, one operated by an Efficient Producer and the other by an Inefficient Producer in Frontier County. The Efficient Producer was assumed to produce yields that were 25 percent above average on a fine textured soil, using a very efficient irrigation system (0.8) with a water cost of $4 per inch. The Inefficient Producer was assumed to produce yields that were 25 percent less than average on course textured soil, using an inefficient irrigation system (0.5) with a water cost of $8 per inch.

Christopher L. Thompson, (402) 472-8602
Water Resource Research Associate
cthompson2@unl.edu

Raymond J. Supalla, (402) 472-1792
Professor
rsupalla1@unl.edu
Dept. of Agricultural Economics
University of Nebraska-Lincoln