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# Potential Economic Impact of Drought on Rafting Activity

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# CORNHUSKER ECONOMICS

## Potential Economic Impact of Drought on Rafting Activity

Market Report	Yr Ago	4 Wks Ago	4/18/08
<b><u>Livestock and Products,</u></b>			
<b><u>Weekly Average</u></b>			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight.....	\$96.11	\$89.95	\$90.39
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb.....	128.44	120.81	116.63
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb.....	108.62	102.21	104.25
Choice Boxed Beef, 600-750 lb. Carcass.....	166.79	141.98	149.03
Western Corn Belt Base Hog Price Carcass, Negotiated.....	66.58	50.31	66.90
Feeder Pigs, National Direct 50 lbs, FOB.....	65.84	53.57	55.77
Pork Carcass Cutout, 185 lb. Carcass, 51-52% Lean.....	69.66	56.78	67.10
Slaughter Lambs, Ch. & Pr., Heavy, Woolled, South Dakota, Direct.....	87.50	92.50	87.00
National Carcass Lamb Cutout, FOB.....	242.47	262.10	250.45
<b><u>Crops,</u></b>			
<b><u>Daily Spot Prices</u></b>			
Wheat, No. 1, H.W. Imperial, bu.....	4.81	9.62	8.44
Corn, No. 2, Yellow Omaha, bu.....	3.40	4.73	5.49
Soybeans, No. 1, Yellow Omaha, bu.....	6.70	11.09	12.63
Grain Sorghum, No. 2, Yellow Dorchester, cwt.....	5.43	8.18	9.37
Oats, No. 2, Heavy Minneapolis, MN, bu.....	2.72	3.28	3.73
<b><u>Hay</u></b>			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.....	135.00	135.00	*
Alfalfa, Large Rounds, Good Platte Valley, ton.....	92.50	85.00	*
Grass Hay, Large Rounds, Premium Nebraska, ton.....	90.00	*	*
* No market.			

As part of a research project with the National Drought Mitigation Center, we have been studying the impact of drought on the Colorado rafting industry. During our research we conducted personal interviews with seven outfitters operating in the Upper Arkansas River and Colorado Department of Natural Resources officials, represented by the Arkansas Headwaters Recreational Area (AHRA). The customer distribution for this river for the last twenty-year period is shown in Figure 1 (on next page). Compared to previous seasons, the 2002 season had a dramatic decrease in the total number of customers. This season was impacted due to several factors, including a general decline in the economy, reduced travel, reduced streamflow due to drought and increased forest fires. In our research, we tried to determine what percentage of the decline in 2002 was due to reduced streamflow, compared to other factors.

A recent analysis by Loomis (2008) estimates that an acre foot of water on the Arkansas River contributes around \$358 to the state economy through non-consumptive canoeing and fishing activity. Loomis estimates that a significant decrease (around 50%) in the flow level would cut 1,000 jobs in rafting, and around 2,000 jobs in fishing and other tourism related jobs.

### Our Study

The data we examined was provided by the AHRA, who collect daily trip logs of operators from the Upper Arkansas River. The data variables include the total number of customers served, the boat put-in and take-out sites and the number of boats and employees for each day. We matched this data with the daily temperature, precipitation and instream flow values from the United States Geological Society (USGS). Our main goal was to see how the daily fluctuations in riverflow affected the customer demand, and if the lower flows in 2002 may have contributed to the decline in customer numbers. The hydrograph (Figure 2 on next page) gives the summary of the average flow per month for the past forty years.

### Method

We examined the years 2000 to 2006, as this period covers pre-drought, drought and post-drought seasons. The data includes

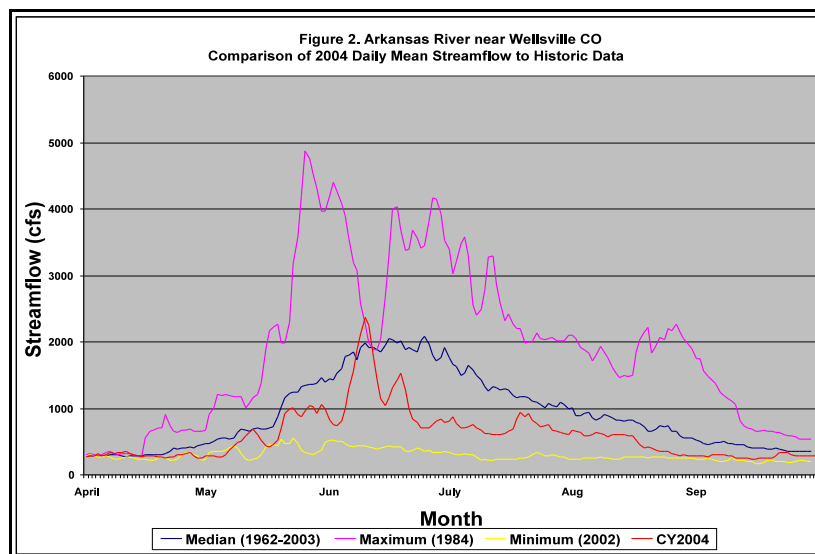
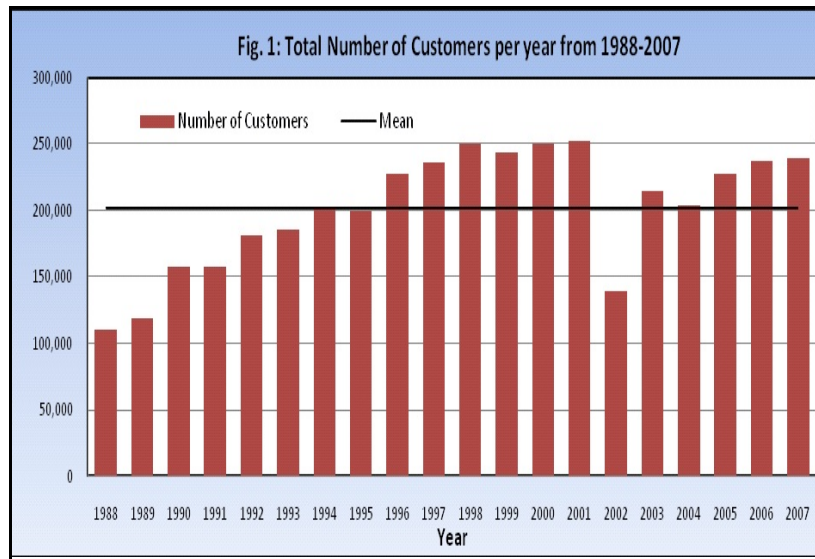
daily observations of total number of customers, average daily river flow, maximum daily temperature and total daily precipitation. We estimated how the number of customers on the Arkansas River was impacted by weather variables like flow, temperature and precipitation. We also accounted for the general impact of 2002, and the seasonal variation of customers.

The initial results show that the relationship between flow and customer demand is not linear. This means that when the riverflow is low, we expect higher flow to lead to more customers. Beyond a certain level, the customer demand decreases if the riverflow continues to increase. The results also suggest that higher temperatures increase demand for rafting, and higher precipitation reduces demand. The demand is highest during the month of July followed by August and June.

The most interesting finding of the analysis is that after controlling for all the variations in weather, riverflows did predict that the customer numbers would be lower in the year 2002. However, the reduction in customer numbers was greater than the reduced streamflow would suggest. What this means is that factors other than direct impacts of the drought affected the overall decline in customer numbers.

The second interesting finding was that during the earlier part of the 2002 season (April, May and early June), the actual customer numbers were higher than what the model predicted. However, later in the season (mid-June through August), the actual customer numbers were lower than predicted.

So the next obvious question is, what then really happened during that period? Our research so far is limited to data analyses only. The causation for that can be attributed to many things. During our interviews with the outfitters and based on the survey responses we received, most of the outfitters expressed concern over the media coverage of the drought and wildfire events during the 2002 season. Some of them also said that most of their reservations were cancelled in the days following Colorado Governor Bill Owen's comment on national media, stating that all of Colorado was burning. However, we do not have hard data to relate any one of those to the decline in customer numbers.



## Conclusion

This research is a work in progress. One of the main objectives was to see if the lower flows could be attributed to the customer decline in the 2002 drought season. Overall, this does seem to be true. Lower flows indicate decline in customers, however, this is not the only reason for the decline in customers. There are unexplained variables that affected demand during the 2002 season. In recent days there has been increased interest in the economic implications of drought and climate change; most of them being negative. There are many other external factors such as media image, response from the government, price of gas, the national economy, that might have a greater impact than the cause itself. Therefore, studies like these need to be done more frequently to get a grasp of the true story, the real impacts of drought, and how these impacts can be reduced.

## References

Loomis, J. (2008). "The Economic Contribution of Instream Flows in Colorado: How Angling And Rafting Use Increase With Instream Flows," Colorado State University Extension Publication. Retrieved on March 22, 2008 from: <http://dare.colostate.edu/pubs/edr08-02.pdf>.

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