

Estimating the Short and Long-term Economic and Social Impacts Associated with the Current Drought in Southern Colorado

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Location of the work and Project Team: The study will focus on drought impacted areas in southern Colorado. The project team will consist of researchers in the Department of Agricultural and Resource Economics (DARE) at Colorado State University.

Purpose and Need:

Agricultural producers throughout southern Colorado are currently suffering through drought conditions comparable to 2002; one of the worst droughts on record. The objective of this study is to develop a better understanding of the immediate and longer term economic and social impacts associated with the current drought.

Water is a critical input to most agricultural activities. As a result, water shortages lead to immediate reductions in output and lost revenues for agricultural producers. Given the critical role that agriculture plays in most rural communities, the initial revenue losses associated with decreased production represent only a portion of the true impact. Reduced spending by agricultural producers (via “backward linkages”) negatively impacts households (lost income) and producers in other industries, both locally and throughout Colorado.

These additional production related impacts (commonly referred to as indirect and induced impacts) can amount to two times the direct impact associated with lost output; yet they still do not capture the full impact of drought on rural communities and the State as a whole. Evidence of this comes from Schuck et. al (2003 and 2005) who surveyed Colorado farmers and ranchers following the 2002 drought. The authors found that as a result of drought related reductions in household income, agricultural households experienced lower living standards, were forced to pursue additional, off-farm employment opportunities, and were more likely to seek federal assistance. Moreover, the findings suggested that the drought had a significant impact on the resiliency of farming operations, increasing the likelihood that producers would permanently decrease or cease agricultural operations.

The bottom line: impacts of drought extend far beyond the immediate losses in revenue associated with reduced output levels. Estimates of drought impacts which only consider the direct, indirect, and induced production losses provide an incomplete, and potentially understated, picture of the true impacts. Despite this, few studies exist which provide insight into the impacts of drought beyond those associated with the immediate production impacts. Our goal with this study is to close this gap; using a combination of existing regional economic models and survey work to develop a more complete view of the impacts associated with the current drought.

Methods and Project Outline:

The proposed analysis will be conducted in two phases: Phase One using regional economic models to develop estimates of the short-term economic impacts; Phase Two using surveys to

collect data that will be used to generate a better understanding of the longer term impacts of the drought. A more detailed overview of each Phase is provided below:

Phase One: During this phase the research team will utilize the (already built) Colorado Equilibrium Displacement Programming (CEDMP) model to estimate the short-term economic impacts of the current drought to the agricultural sector. The CEDMP, developed at CSU, is a basin-level model of Colorado agriculture that offers several advantages over more traditional input-output models (e.g., Implan). Unlike input-output models, the CEDMP model reflects farmer risk profiles and price expectations, captures both forward and backward production linkages within the agricultural sector, and will also allow us to estimate consumer surplus losses resulting from price changes. In sum, the CEDMP provides a more accurate reflection of the production impacts associated with drought (see Davies et. al, 2010 for more information the model).

Output from the CEDMP model will be input into a traditional input-output model to generate estimates of the direct, indirect, and induced economic impacts to other, agriculture-related industries. Together, the two regional models will present a more accurate picture of the short-term economic impacts than approaches used in past studies.

Phase One Tasks/Timeline (assumed start date of 10/15/2011):

Phase One, Task One: October 15th-January; collect background production data, prepare CEDMP and IMPLAN for model runs

Phase One, Task Two: January-April; conduct impact analysis using CEDMP and IMPLAN models

Phase One, Task Three: April-June; Prepare Phase One report and preview results with relevant parties

Phase One, Task Four: June; Submit final report and fact sheets, present project findings

* All tasks and phases will be complete by June 30, 2012

Phase Two: The general objective of this phase is to describe the managerial response of farms and ranches during the ongoing drought, identifying the current financial standing of these farms and ranches and assessing their ability to respond to both financial challenges and opportunities during the next three to five years. This information will be collected via a survey and is useful in refining the estimates of the economic impact study because it suggests how the asset base and purchasing behavior of farms and ranches change with persistent drought. These changes have ripple effects that flow through the general economy. As an example, if ranchers choose to depopulate the cow herd in response to poor forage conditions, the reduction in the ranch's asset base decreases local feedlot placements, reduces demand for corn silage locally and impacts the ranch balance sheet. Likewise, this curtails the manager's ability to take advantage of

favorable price conditions. Impacts of this type are not typically captured in standard regional economic models.

Surveys will be designed, delivered and results summarized by undergraduate students participating in the Farm Credit Services of Southern Colorado Student Board of Directors. These students are agriculture business majors who have completed upper division finance and agribusiness management classes. The students will work under the direction of Agriculture Economics faculty (James Pritchett , Dawn Thilmany and Norman Dalsted), together with a graduate research assistant. Survey results will be presented to the Farm Credit Services of Southern Colorado Board of Directors at their annual meeting. Farm Credit Services of Southern Colorado is interested in having the students complete the drought study, and are willing to assist with expenses and paying the students a small stipend.

The survey design will be based on the recommendations of an advisory committee and accepted methods. While details have not yet been established, the survey will build off of previous work by Schuck et. al (2003 and 2005) and likely have the following characteristics:

- (a) Be internet based in order to improve response rates and decrease costs;
- (b) Target farmers, ranchers, local lenders, local agribusiness and government officials;
- (c) Include Likert-scale based behavioral questions¹
- (d) Include categorical, quantitative questions ²
- (e) Hold all responses as confidential.

Survey responses add to the breadth and depth of the knowledge that stakeholders have in assessing the impact of the recent drought on agricultural producers. This information is particularly useful in:

- a) Targeting future technical and financial assistance to farmers, ranchers, communities and businesses in southern Colorado. This information is of particular importance to CSU Extension, USDA-NRCS, USDA-FSA, Colorado Department of Agriculture and commodity and ag advocacy organizations;

¹ e.g., Please rate the following statement according to your level of agreement.

If the drought persists, my operation will need to increase the amount of term debt that it currently uses to finance operations.(Check one response)

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

² e.g., The current number of cows on my ranch is between (check one response:)

- ☐ 0 and 49 cows
- ☐ 50 to 149 cows
- ☐ 150 to 299 cows
- ☐ 300 to 499 cows
- ☐ 500 cows or greater

- b) Communicating the effectiveness of crop and pasture, range and forage insurance programs to USDA-Risk Management Agency;
- c) Assessing the outcomes of changes made to Colorado Drought Mitigation and Response plan that was substantially revised in 2010. Recommendations for future adaptation can be drawn from the survey responses, but would certainly need be part of a larger effort;
- d) Identifying the perceived success of local drought management strategies to assist in future planning;
- e) Informing policymakers who may be part of disaster assistance and commodity program hearings for Farm Bill 2012.

Fact sheets that combine the economic impact analysis and survey results will be written in the context of the issues noted above. As an example, a fact sheet can focus on the use and effectiveness of pasture, range and forage management insurance that was recently made available in Colorado.

Phase Two Tasks/Timeline (assumed start date of 10/15/2011 :

Phase Two, Task One: October 15th-January; prepare survey

Phase Two, Task Two: January-February; administer survey and collect responses

Phase Two, Task Three: February-April; analyze survey data

Undergraduate students working on *Phase Two* of the project will present preliminary results to Farm Credit Services in late April.

Phase Two, Task Four: April-June; Prepare Phase Two report, including a series of fact sheets summarizing survey results

Phase Two Task Five: June; Submit final report and fact sheets, present project findings

* All tasks and phases will be complete by June 30, 2012

Deliverables:

The project team will prepare and deliver a detailed report and an executive summary for decision makers to the CWCB and CDA. The final report and summary will be available on the CWCB, CDA and Colorado Water Institute websites. A project summary will also be prepared for submission to an outlet similar to Colorado Water. In addition to the project summary, a series of fact sheets will be prepared (as discussed above). Fact sheets will be delivered to the CWCB, CDA and accessible via their website. Oral presentations of project findings will be given to the CWCB, CDA and other interested parties.

Budget: We are requesting a total of 60K; including approximately 35K for Phase One and 25K for Phase Two. A detailed breakdown of the budget for each phase is provided below. Survey materials and supplemental funds for undergraduate researchers will be provided by Farm Credit Services of Southern Colorado.

Phase One:

Personnel	Description	Amount	Task
	1 month faculty time	10,442	.1 P1T1 .2 P1T2 .6 P1T3 .1 P1T4
	6 months graduate research assistant #1 (plus tuition)	16,509	.1 P1T1 .6 P1T2 .3 P1T3
	4 months graduate research assistant #2	7,227	.6 P1T1 .4 P1T4
	Total Personnel	34,253	
Other	Travel*	575	.2 P1T1 .4 P1T3 .4 P1T4
	Total Other	575	
	Total	34,753	

Phase Two:

Personnel	Description	Amount	Task
	1 month faculty time	10,442	.1 P2T1 .2 P2T3 .6 P2T4 .1 P1T5
	4.5 months graduate research assistant (plus tuition)	13,531	.1 P2T1 .1 P2T2 .5 P2T3 .2 P2T4 .1 P2T5
	Total Salary	23,973	
Other	Travel*	288	.5 P2T1 .5 P2T5
	Misc Survey Supplies**	403	P2T2
	Total Other	690	
	Total	24,663	

Colorado Water Conservation Board – will cover costs associated with phase one (\$34,753)

Colorado Department of Agriculture – will cover costs associated with phase two (\$24,663)

*Split of travel expenses across tasks is approximate. Travel expenses include resources sufficient for approximately 10-15 trips to locations throughout the Front Range and southern Colorado. Trips will be taken for project meetings, data collection/surveys and presenting project results.

**Misc Survey Supplies include expenses associated with survey distribution and reminders (e.g. stamps, postcards, etc.). These funds will be used to supplement resources provided by Farm Credit Services of Southern Colorado.