



Ag and
Resource
Economics

Economy-wide Impacts of Groundwater Curtailment in the Republican River Basin of Colorado:

Update 11/19/2024

Rebecca Hill

Dale Manning

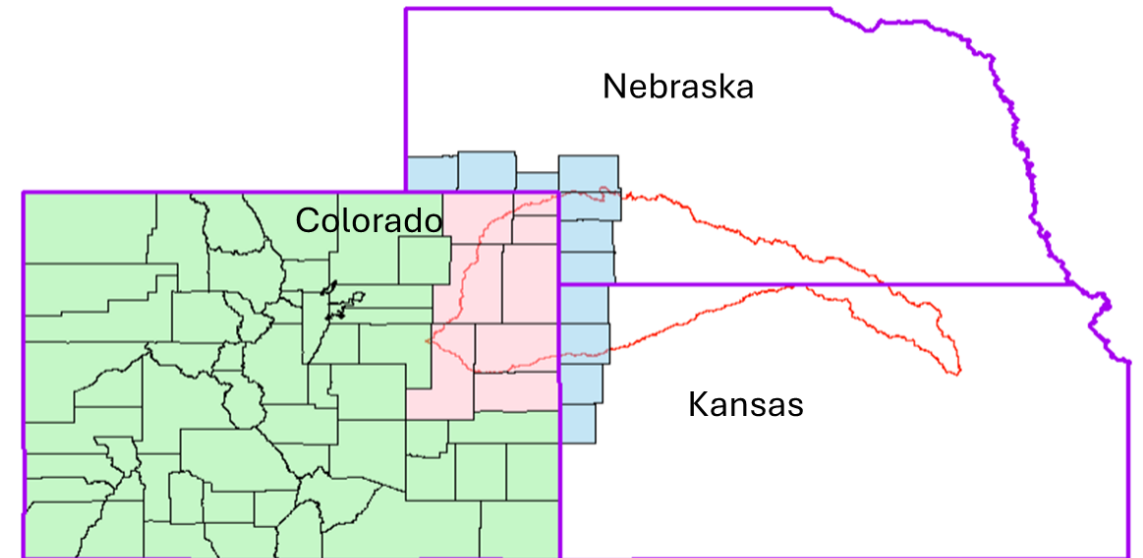
Jordan Suter

Innocent Vomitadyo

Study Motivation

- In 2016 CO agreed to reduce irrigated acres in the South Fork Focus Zone by 25,000 acres by 12/31/2029.
 - Threatened curtailment of all groundwater irrigation in the entire Republican River Basin if 25,000-acre target is not achieved.

- HB23-1220 calls on CSU to conduct a study to quantify the impact of this potential curtailment on the regional economy.



- Impacts (sales, employment, government revenue) quantified in 3 areas.
 - CO counties within the Republican River Basin
 - Remaining CO counties
 - Neighboring counties in Nebraska and Kansas that border Colorado counties in the Basin

Timeline & deliverables

- Progress report (draft results) – January 1, 2025
 - Present progress report and request feedback from RRWCD and other stakeholders – spring/summer 2025
 - Present progress report to the Joint Committee of the Agricultural Committees and the Water Resources and Agriculture Review Committee – 2025 calendar year.
- Final report – January 1, 2026
 - Post final report to the CSU Water Center Website
 - Present final report to RRWCD and other stakeholders – spring/summer 2026
 - Present final report to the committees mentioned above – 2026 calendar year

Regional analysis: Input-Output Modeling with IMPLAN

- IMPLAN is a data tool that captures the linkages between sectors and allows us to quantify these effects
- Simulate curtailment on approximately 526,000 irrigated acres in CO's Rep River Basin (*direct effect*)
- This changes demand for local inputs and labor in other sectors (*indirect effects*)
- Reduces household incomes, further affecting demand for local goods and services (*induced effects*)
- Other effects:
 - Changes in local government revenues and expenditures
 - Spillovers into the rest of CO and neighboring states

Scenarios in the event of curtailment

- Irrigated acreage in the CO Republican River region converts to:
 1. Fallow
 2. Pasture
 3. Proportions of fallow, pasture, dryland based on how land is currently allocated on EQIP acreage.
 4. Proportions of fallow, pasture, dryland are derived from statistical modeling that accounts for variation in soil characteristics and location.

Baseline crop acreage for 8-county study area

		Avg. Acres (2020-2023)	2022 Acres
Irrigated	Corn	458,174	462,846
	Hay	78,259	78,192
	Other grain	60,811	60,063
	Other non-grain	66,627	62,772
Dryland	Corn	640,275	665,185
	Fallow	1,004,775	1,125,246
	Hay	47,756	45,666
	Other grain	1,373,763	1,269,414
	Other non-grain	374,676	354,857
	Grazing	4,632,787	4,613,419
Total		8,737,901	8,737,660

- “Other grain” includes sorghum and winter wheat
- “Other non-grain” includes dry beans, soybeans, and “other crops”
- Total agricultural acreage varies slightly year-to-year, leading to a difference in the total row.

Scenario 1: All irrigated acreage converts to fallow

	Baseline acres	Scenario 1 acres	Change in acres	Proportional Change
Irrigated Corn	462,846	74,030	-388,816	-0.840
Hay	78,192	46,415	-31,777	-0.406
Other grain	60,063	4,843	-55,220	-0.919
Other non-grain	62,772	12,154	-50,618	-0.806
Dryland Corn	665,185	665,185	0	0.000
Fallow	1,125,246	1,651,677	526,431	0.468
Hay	45,666	45,666	0	0.000
Other grain	1,269,414	1,269,414	0	0.000
Other non-grain	354,857	354,857	0	0.000
Grazing	4,613,419	4,613,419	0	0.000
Total	8,737,660	8,737,660	0	

- “Other grain” includes sorghum and winter wheat
- “Other non-grain” includes dry beans, soybeans, and “other crops”
- Total agricultural acreage varies slightly year-to-year, leading to a difference in the total row.

Comparison across scenarios

	Baseline acres	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Irrigated Corn	462,846	-388,816	-388,816	-388,816	-388,816
Hay	78,192	-31,777	-31,777	-31,777	-31,777
Other grain	60,063	-55,220	-55,220	-55,220	-55,220
Other non-grain	62,772	-50,618	-50,618	-50,618	-50,618
Dryland Corn	665,185	0	0	145,247	193,143
Fallow	1,125,246	526,431	0	96,126	496
Hay	45,666	0	0	8,797	11,698
Other grain	1,269,414	0	0	157,094	208,897
Other non-grain	354,857	0	0	31,548	41,951
Grazing	4,613,419	0	526,431	87,619	70,246
Total	8,737,660	0	0	0	0

- “Other grain” includes sorghum and winter wheat
- “Other non-grain” includes dry beans, soybeans, and “other crops”
- Total agricultural acreage varies slightly year-to-year, leading to a difference in the total row.

Progress and next steps

- Finalize calibration of IMPLAN model with appropriate sectors and relationships across industries.
 - Link CO Republican River region to 2 other model regions
- Complete economic impact analysis and finish draft of the report by the end of the calendar year.

Feedback request

- Are there results for specific economic sectors that we should highlight for the report (e.g., ag sectors, manufacturing, services, government, household income)?
- Any additional scenarios we should evaluate?
 - We currently assume no local linkage between dryland and irrigated agricultural sectors (excluding animal processing).
- Industries that use local irrigated production as inputs are not directly impacted in the simulation.
 - The assumption is that these inputs are sourced from outside the study region at no additional cost.
- Contact: Jordan.suter@colostate.edu; dtmanning@utk.edu;



Thanks!

Scenario 2: All irrigated acreage converts to grazing

	Baseline acres	Scenario 1 acres	Change in acres	Proportional Change
Irrigated Corn	462,846	74,030	-388,816	-0.840
Hay	78,192	46,415	-31,777	-0.406
Other grain	60,063	4,843	-55,220	-0.919
Other non-grain	62,772	12,154	-50,618	-0.806
Dryland Corn	665,185	665,185	0	0.000
Fallow	1,125,246	1,125,246	0	0.000
Hay	45,666	45,666	0	0.000
Other grain	1,269,414	1,269,414	0	0.000
Other non-grain	354,857	354,857	0	0.000
Grazing	4,613,419	5,139,850	526,431	0.114
Total	8,737,660	8,737,660	0	

- “Other grain” includes sorghum and winter wheat
- “Other non-grain” includes dry beans, soybeans, and “other crops”
- Total agricultural acreage varies slightly year-to-year, leading to a difference in the total row.

Scenario 3: Irrigated acreage converts based on distribution of land use on EQIP land

	Baseline acres	Scenario 3 acres	Change in acres	Proportional Change
Irrigated Corn	462,846	74,030	-388,816	-0.840
Hay	78,192	46,415	-31,777	-0.406
Other grain	60,063	4,843	-55,220	-0.919
Other non-grain	62,772	12,154	-50,618	-0.806
Dryland Corn	665,185	810,432	145,247	0.218
Fallow	1,125,246	1,221,372	96,126	0.085
Hay	45,666	54,463	8,797	0.193
Other grain	1,269,414	1,426,508	157,094	0.124
Other non-grain	354,857	386,405	31,548	0.089
Grazing	4,613,419	4,701,038	87,619	0.019
Total	8,737,660	8,737,660	0	

- “Other grain” includes sorghum and winter wheat
- “Other non-grain” includes dry beans, soybeans, and “other crops”
- Total agricultural acreage varies slightly year-to-year, leading to a difference in the total row.

Scenario 4: Irrigated acreage converts based on distribution of land use from statistical model

	Baseline acres	Scenario 4 acres	Change in acres	Proportional Change
Irrigated Corn	462,846	74,030	-388,816	-0.840
Hay	78,192	46,415	-31,777	-0.406
Other grain	60,063	4,843	-55,220	-0.919
Other non-grain	62,772	12,154	-50,618	-0.806
Dryland Corn	665,185	858,328	193,143	0.290
Fallow	1,125,246	1,125,742	496	0.000
Hay	45,666	57,364	11,698	0.256
Other grain	1,269,414	1,478,311	208,897	0.165
Other non-grain	354,857	396,808	41,951	0.118
Grazing	4,613,419	4,683,665	70,246	0.015
Total	8,737,660	8,737,660	0	

- “Other grain” includes sorghum and winter wheat
- “Other non-grain” includes dry beans, soybeans, and “other crops”
- Total agricultural acreage varies slightly year-to-year, leading to a difference in the total row.