

Potential Regional Economic Impacts of Water Cutbacks to Irrigated Agriculture

What is the Issue?

Over the last two decades the western US has been in an historic drought. As a result, policymakers have been grappling with how to allocate limited or declining water supplies. Water experts expect agricultural producers to shoulder large reductions in water use because agriculture is typically the largest water user in most regions. Water experts expect agriculture, typically the largest water user, to shoulder large reductions in order to adapt to water shortages. In Arizona, where 96% of harvested cropland is irrigated and agriculture accounts for about 75% of the state's water use, crop producers are particularly vulnerable to water cutbacks.

For communities where agricultural water supply reductions are imminent and/or agriculture plays an important role in the regional economy, the potential economic impacts of water cutbacks to irrigated agriculture are a serious concern not only for agricultural industries, but to the wider community.

This study presents results from two previous case studies (Bickel et al., 2019, 2020) that estimate the potential regional economic impacts of agricultural water supply cuts to two crop producing regions in Arizona: (1) Pinal County and (2) Graham and Greenlee counties. These two regions represent areas of the state with relatively high probabilities of surface water shortages which could trigger cutbacks to agriculture. Assuming that producers would respond to cutbacks by fallowing land, or taking it out of production, the studies estimated reductions in acreage, farm gate sales, farmer income, as well as the resulting economic multiplier effects from farmers purchasing fewer inputs from local businesses and employing fewer farm workers.



Since these case studies, conditions on the Colorado River have worsened and the Drought Contingency Plan (DCP) has hastened and increased the anticipated water supply reductions taking place in Pinal County.

General Findings

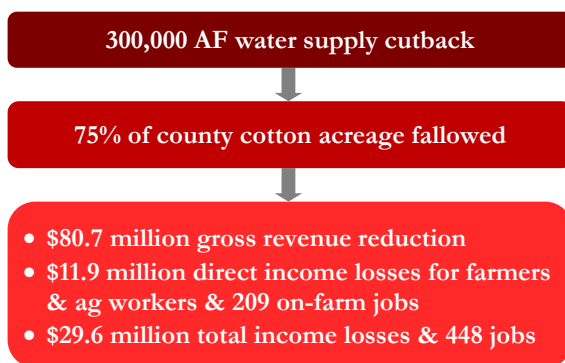
- Fallowing irrigated crop acreage in response to water cutbacks would affect farmers and regional economies in Arizona, albeit in different ways.
- Agricultural producers would face decreased sales as well as decreased production costs because they are no longer purchasing inputs needed for growing and harvesting. Therefore, direct effects to agricultural producers would be lower net revenues, profit, or income for their individual operations.
- Reduced spending on inputs and labor would also affect the broader county economies, resulting in decreased income in non-agricultural sectors. This would happen as a result of agricultural producers purchasing fewer inputs and farmers and agricultural workers earning and spending less income on consumer goods and services in the regional economy.
- In Pinal County, a hypothetical irrigation supply cutback of 300,000 acre-feet would lead farmers to reduce county cotton acreage by 75%, resulting in a \$80.7 million gross revenue reduction for farmers and 448 fewer jobs county-wide.
- In Graham County, a 20% irrigation supply reduction would lead to 23% of county cotton acreage being fallowed, a \$5.3 million gross revenue reduction for farmers, and 23 fewer jobs county-wide. In Greenlee County, a 20% irrigation supply reduction would lead to 18% of county alfalfa acreage being fallowed, a \$323,000 gross revenue reduction for farmers, and 1 fewer job county-wide.

Pinal County Case Study

The first case study focuses on Pinal County in central Arizona. Pinal County is a leading agricultural producer in the state, with important agricultural goods including cotton, milk, cattle, alfalfa, and other livestock feed and forage. With average annual precipitation in Pinal County ranging from only 8 to 10 inches per year, the availability of irrigation water is of utmost importance to crop production. Broadly, water supplies for Pinal County agriculture come from groundwater, surface water from the Colorado River transported by the Central Arizona Project (CAP), surface water supplies from the Gila River, and reclaimed water. CAP water has become an important source of water for irrigated agriculture in parts of Pinal County, but many agricultural users in the county have low priority water entitlements. As such, Pinal County agricultural producers are some of the first and most affected by surface water cutbacks triggered by declining Colorado River supplies.

The study modeled a hypothetical reduction in irrigation water supplies of 300,000 acre-feet (AF). At the time of the study, this was roughly the anticipated cutback under a Colorado River Basin Tier 1 shortage. The Arizona Drought Contingency Plan (DCP), however, hastened and increased the volume of these water cutbacks with Arizona's CAP losing an additional 192,000 AF under a Tier 0 Colorado River Shortage per the Lower Basin Drought Contingency Plan (now occurring if Lake Mead elevation falls below 1,090 feet). The total Tier 1 Colorado River Shortage reduction, declared August 2021, is then 512,000 AF for 2022, prior to any mitigation commitments.

Pinal County

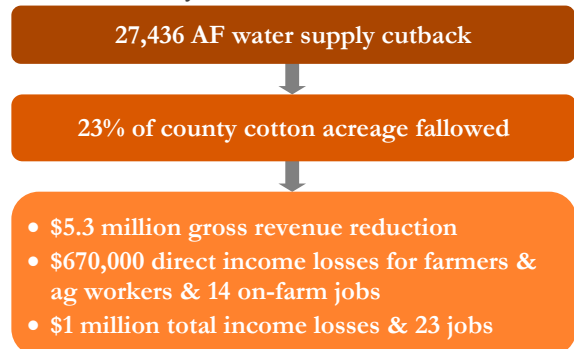


Graham & Greenlee County Case Study

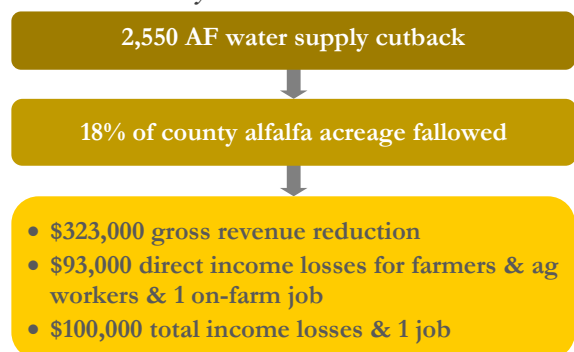
The second set of case studies focuses on Graham and Greenlee Counties in southeastern Arizona. Top agricultural goods produced are cotton (in Graham County) and cattle and calves (in Greenlee County). Irrigated agriculture in both counties relies, in part, on waters from the Gila River fed by the Upper Gila Watershed. The Upper Gila Watershed has experienced chronic drought conditions and is expected to face both higher temperatures and lower precipitation under the effects of climate change, resulting in decreased surface water supplies.

The study modeled a hypothetical reduction in irrigation water supplies of 20% for both counties.

Graham County



Greenlee County



For more detailed information on these case studies, please see the full reports:

Bickel, A. K., D. Duval, and G. Frisvold. (2019). Simple Approaches to Examine Economic Impacts of Water Reallocations from Agriculture. *Journal of Contemporary Water Research & Education*, 168(1), 29-48. <https://doi.org/10.1111/j.1936-704X.2019.03319.x>
 Bickel, A.K., D. Duval, and G. Frisvold. (2020). Agriculture in Graham and Greenlee Counties. Department of Agricultural and Resource Economics, University of Arizona. Accessed from <https://economics.arizona.edu/agriculture-graham-and-greenlee-counties>