THE JONES CENTER AT ICHAUWAY

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Irrigation Efficiency and Streamflow

Water security is becoming a concern even in areas that have abundant precipitation like the southeastern U.S. Warming temperatures and increasing human demand have created periods of water scarcity. One of the greatest global water uses is agriculture. The lower Flint River basin in southwestern Georgia is a concentrated area of commodity production and important to the regional economy. Periods of water scarcity have been observed since the 1980s. In response, Georgia farmers are leading the nation in implementing sophisticated management practices to reduce water consumption. A variety of tools have been developed to help farmers implement a number of improvements to increase irrigation efficiency, including conservation tillage, low-pressure drop-nozzles, smart irrigation scheduling, and variable rate irrigation. These practices have been adopted to varying degrees by producers in southwestern Georgia. But just how does irrigation savings translate to streamflow?

A variable-rate irrigation system being tested at Stripling Irrigation Park, Camilla, GA

We used USGS streamflow records and the Soil and Water Assessment Tool, a river basin model that simulates streamflow, to evaluate how varying degrees of irrigation reduction might affect streamflow under a range of climate conditions, from very wet to extreme drought. We simulated a full range of irrigation scenarios, from traditional irrigation consumption to no irrigation. Traditional irrigation provided the 100% baseline in the model, and was similar to previously published values of water application. We used the Ichawaynochaway Creek basin, a major tributary of the lower Flint River, as the basis for our model. It has a long record of streamflow and climate data along with extensive agricultural land cover typical of the region.

Irrigation reduction proved to be an effective way to increase streamflow, especially during drought when aquatic habitat is most vulnerable. For the driest months, a 20-30% reduction in irrigation increased streamflow about 10%. This additional flow may prove vitally important in maintaining adequate in-stream habitat for imperiled aquatic organisms during extremely low flows. Practices which reduce water consumption are already in place on many farms, and further increases are reasonable by continuing to implement irrigation technology improvements.

MORE INFORMATION

Qi, J., S.T. Brantley, and S.W. Golladay. 2020. Simulated irrigation reduction improves low flow in streams—A case study in the Lower Flint River Basin. *Journal of Hydrology: Regional Studies* 28, 100665.

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KEY POINTS

Simulated irrigation reduction had a consistently positive effect on streamflow.

Proportional changes in streamflow were much greater during low flow periods.

Increasing streamflow is achievable by broadly implementing existing water conservation technologies.