THE JONES CENTER AT ICHAUWAY

Publication Brief

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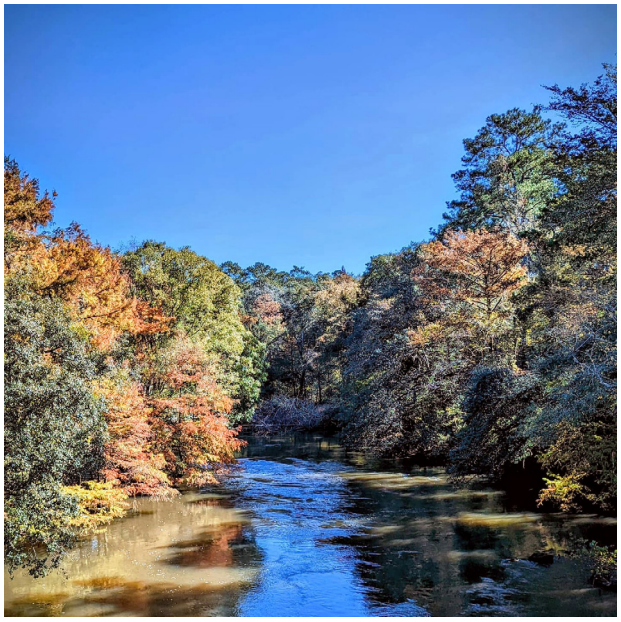
Longleaf restoration improves streamflow during drought

Water scarcity is an issue of growing concern across the U.S. Increasingly, historically perennial aquatic systems are becoming intermittent, ceasing to flow or drying completely for extended periods during the year. This issue is particularly relevant in Southwest Georgia, where the landscape and the economy are dominated by irrigated agriculture, a major water user. A wide range of stakeholders are interested in ways to mediate water scarcity in the future. One solution may come from restoration of native longleaf pine forests. Well-managed mature longleaf pine forests with low to moderate basal area and grass-dominated understories use little water compared to other forest types. What would be the effect of replacing those thirstier forests with longleaf pine at a watershed scale?



We used USGS streamflow records and the Soil and Water Assessment Tool, a river basin model, to project how large-scale restoration of longleaf pine might affect streamflow under a range of climate conditions, from very wet to extreme drought. We used the Ichawaynochaway Creek basin for this study. Currently, the watershed is about 50% forested, but only 4% is in longleaf pine. We modeled a scenario where longleaf covered about 35% of the watershed, replacing unmanaged mixed hardwood/pine, and then compared the streamflow in this scenario to streamflow conditions over the past 20 years.

Longleaf restoration was an effective way to increase streamflow and was comparable to models that reduced agricultural irrigation (see earlier study below). Furthermore, longleaf restoration was most effective at increasing streamflow during drought when aquatic habitat is most vulnerable to drying. During drought, the restoration scenario increased flows in October by ~ 45%. This can help maintain in-stream habitat for imperiled aquatic organisms during periods of water scarcity. Perhaps most importantly, these changes can be made without impacting the agricultural productivity that supports the region's economy.

MORE INFORMATION

Qi, J., S.T. Brantley, and S.W. Golladay. 2021. Simulated longleaf pine (*Pinus palustris* Mill.) restoration increased streamflow—A case study in the Lower Flint River Basin. *Ecohydrology* e2365.

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

Many watersheds in agricultural regions maintain a substantial portion of land in forests, with many of these forests unmanaged.

Simulated longleaf pine restoration on existing forest land had a substantial positive effect on streamflow.

Changes in streamflow from longleaf restoration were greatest during the driest months of the year.