Evaluating options for improving drought resilience of the upper Flint River

This work was funded by the Regional Water Planning Seed Grant Fund (EPD) and conducted by the UGA River Basin Center and American Rivers, in collaboration with the Upper Flint Regional Water Planning Council and Upper Flint River Working Group.

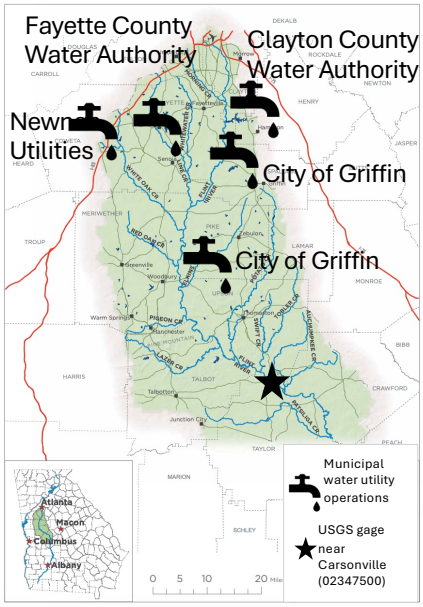
Objectives

Simulate short- and long-term drought management actions on river flows using EPD's Basin Environmental Assessment Model (BEAM)

Evaluate how alternative drought-response management actions could mitigate ecosystem effects.

Predict the ecological consequences of droughts of different severity and duration

Upper Flint Basin



*Modified and reprinted from American Rivers 2013

Simulated Management Actions

Improved infiltration across the basin

Photo credit: watershed management

Low-flow operations and responses

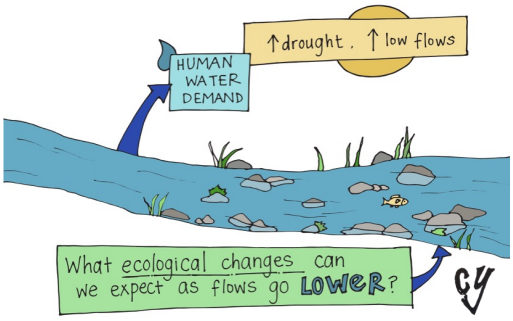


Illustration credit: Carol Yang

Quarry storage to augment river flows

*Not an active project.

Combining management actions showed the greatest opportunity to support streamflow for aquatic ecosystems and water security for public utilities during drought and low flow periods

Overview:

The Upper Flint River system provides drinking water for more than 400,000 residents of south Metro-Atlanta and central Georgia. Due to a lack of impoundments along the river's mainstem, it also supports shoal ecosystems that are important ecologically and enjoyed recreationally. In this project, we assessed the impacts of short- and long-term drought management actions on the river ecosystem and water resources, building on recommendations from the Upper Flint Regional Water Plan (2023) and actions proposed by the Upper Flint River Working Group (American Rivers 2019).

Flint River at Sprewell Bluff State Park. Photo taken on June 10, 2022.

Approach:

We simulated management actions in EPD's Basin Environmental Assessment Model (BEAM). The Flint BEAM simulates daily river flows and provides location-specific data for water withdrawals, discharges, and reservoirs in the basin. Water is routed based on the permit limits for withdrawals and discharges and monthly average demand for municipal utilities, agricultural, and industrial permits.

Photo credit: Alan Cressler
Flint River shoal at Sprewell Bluff State Park when river flows were less than 100 cfs. Photo taken on October 23, 2016.

Evaluation:

We compared each management action individually and then combined to the baseline scenario (permitted withdrawal and discharge limits as of 2018 and the water demand set to 2011 levels) to assess the relative impact.

Ecological impacts were based on relationships developed between low velocity conditions and riverweed, a native aquatic plant that grows extensively in shoals. We compared reservoir storage at or below drought level 2 for municipal water utilities.

Outcomes:

We found that combining management actions reduced the occurrence and duration of days below 100 cfs and 200 cfs near Sprewell Bluff Park. While changing utility operations during summer was the only way to keep more water in the river, augmenting flows from potential quarry storage at the top of the basin reduced the impact on reservoir levels during low flow periods.

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