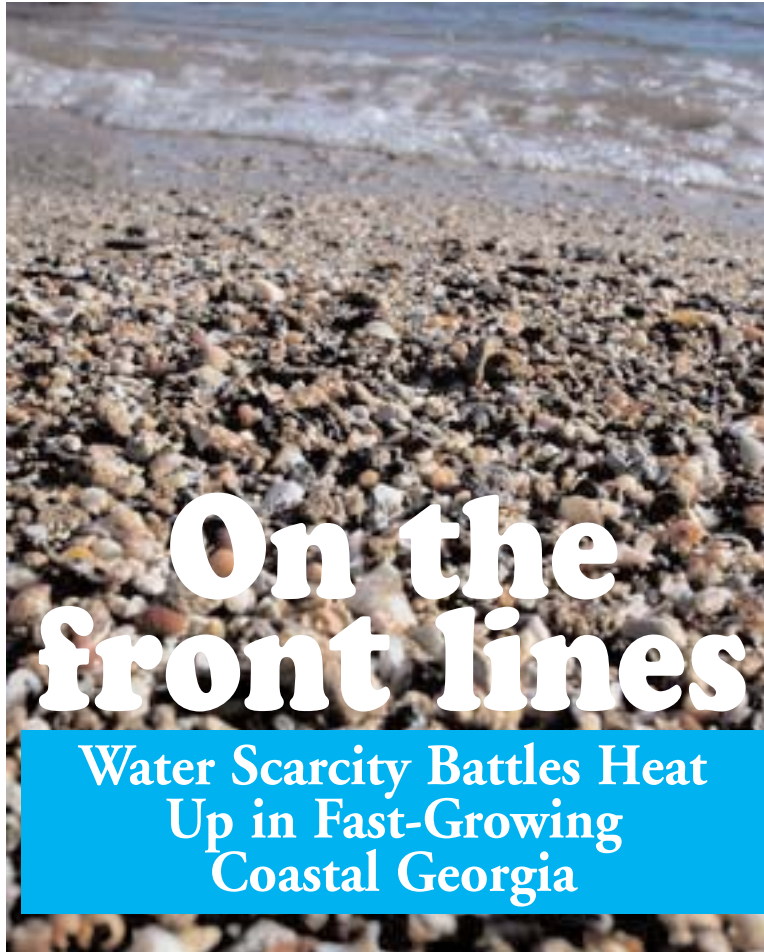


WaterTalk

In two rural Southeast Georgia communities, a confrontation over water rights is playing out that may have a dramatic impact on the future of water allocation in our State.

On April 20, 2004, the Cities of Bloomingdale and Rincon filed a lawsuit against Dr. Carol Couch and the Georgia Environmental Protection Division in an attempt to force the State's hand in the allocation of water for these two cities.

This conflict grew out of EPD's Interim Strategy for Managing Salt Water Intrusion in the Upper Floridan Aquifer of Southeast Coastal Georgia (herein "Interim Strategy"), a response to saltwater intrusion into the Upper Floridan near Hilton Head, South Carolina, and Savannah, as well as into the water supply for Brunswick. The Interim Strategy, promulgated in April 1997, imposed a moratorium on new or expanded groundwater withdrawals from the Upper Floridan Aquifer in Chatham and Glynn counties, as well as southern Effingham and Bryan counties. Also, the Interim Strategy limited increases in Upper Floridan withdrawals in a 24-county Coastal Georgia area to 36 million gallons per day (MGD), or 10% of the 1995 groundwater use for the 24-county area. By September 2001, EPD published a Supplement to the Interim Strategy that announced that the 36 MGD limit had been reached, and expanded the groundwater moratorium to the entire 24-county region. As



part of the Interim Strategy, the City of Savannah agreed to decrease its levels of groundwater use and increase its treatment capacity for surface water use. Savannah's efforts resulted in excess permitted groundwater capacity for the city, as well as excess treated surface water capacity.

The Interim Strategy coincided with unprecedented growth in Coastal Georgia. During the mid-to-late 90's, several communities in the region began to approach their permitted groundwater capacity, while the moratorium disallowed additional groundwater allocation. One alternative for these growing communities

has been treated surface water. However, treatment facilities are capital-intensive projects, and lead to high water costs, particularly relative to using groundwater.

The first coastal community to reach critical limits on groundwater use was Richmond Hill. An impasse between EPD and Richmond Hill, including the repudiation of Savannah's selling of groundwater to Richmond Hill, led to litigation over that community's water rights. Eventually, Richmond Hill received an EPD permit to withdraw groundwater from the Lower Floridan Aquifer.

Bloomingdale, a small community in West Chatham County, has also experienced rapid growth. Its 1981 groundwater withdrawal permit limited the town to 150,000 gallons per day. In 1984, Bloomingdale installed a second well and requested a modification to its permit, in

essence doubling its capacity. A Modified Permit was issued, one that Bloomingdale officials have alleged allowed for 156,000 gallons per day from each well. However, the language of the modified permit is unclear, and EPD has held that the modification did not give Bloomingdale the alleged increase.

On several occasions since 1997, Bloomingdale officials have made efforts to clarify the permit issue, with no resolution as yet. In February 2003, Bloomingdale submitted a request to withdraw water from the Lower Floridan, the approval of which has not been

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Looking to the Trees for Answers

Reconstruction of Flint River Streamflow Using Tree Rings

The article below highlights research initiated by the Georgia Water Planning and Policy Center at Georgia State University in February 2003. The resulting white paper written on this subject, entitled 'Reconstruction of Flint River Streamflow Using Tree Rings,' is a more detailed presentation of the research, including several appendices, graphs, charts, and pictures.

One must use caution in interpreting the results presented in the research, especially regarding specific numbers. This is to say that there is a range of error associated with specific estimates for flow in any given year. One can, however, have greater confidence in the relative magnitudes of estimated historical flows. The model performs reasonably well in showing very wet periods and drought periods, and this is the information that state water planners should find particularly interesting.

INTRODUCTION

Water resources management is becoming an increasingly complex task in the United States with ever-growing demands on water from expanding populations, increasing irrigation in agriculture, and other various uses. Even the more humid eastern half of the country is not immune to water supply pressures. For example, the recent drought of 1999-2002 in the southeastern United States resulted



Troy Knight and Heather Williams extract core samples from an old-growth longleaf pine

in widespread and prolonged water restrictions. Thus, the amount of water available for all uses in any given basin is of utmost importance to those who plan for its distribution. Often, the available stream gage data from which water availability is measured is too brief (less than 100 years) to accurately reflect not only long term fluctuations in water volume, but also the lowest potential flows which may occur in any given basin. Dependence upon relatively brief streamflow records can lead to misappropriation of vital water resources most glaringly typified by the Colorado River Compact of 1923, where flows averaged over a seven year period, 1914-23, determined future dispersal of water to several states in the Colorado Basin. These years, in light of current data, proved to have had unusually high flows resulting in perennial deficits in supply as measured by the Compact.

Annual growth rings of trees in various geographic regions have been shown in numerous studies over the past century to correlate with regional and local climatic variables measured by modern instruments, and provide one possible solution to the relative short-term nature of currently available streamflow data. Correlations between the annual growth rings of trees and river discharge, while not resulting from a direct causal relationship, occur because trees incorporate the same climatic variables into their annual growth rings as does streamflow, including precipitation, evapotranspiration, and soil infiltration. Cook and Kairiukstis, in their book entitled 'Methods of Dendrochronology,' explain the factors influencing radial growth in trees in a linear aggregate model where variation in tree-ring-width depends upon (i) age-size trend of tree, (ii) climate signal, (iii) local endogenous disturbances, (iv) stand wide exogenous disturbances, and (v) unexplained variability. The strength of the climate signal embedded in tree-rings varies from species to species and from site to

site making the collection of numerous samples from a variety of locations necessary when using tree rings as a climatic proxy.

THE RESEARCH

In this study, streamflow for the Flint River in west central and southwest Georgia is reconstructed for periods prior to the instrumental record using the growth rings of trees within the region. The Flint River, its tributaries, and associated aquifers supply water for the expanding population of southern Metro Atlanta in the upper basin and an intensively irrigated agricultural belt straddling the lower basin. Severe droughts in the late 20th century tested the hydrologic system's ability to support increasing water demands. Streamflow is reconstructed for Albany, GA, a location on the river receiving the cumulative flow from almost two thirds of the basin.

Streamflow data for the years 1902-1920 and 1930-1938 are monthly mean flow readings provided by the USGS, while the data from 1939-2001 consists of virgin ("unimpaired") flow estimates prepared by Georgia's EPD, the Corps of Engineers, and others. Tree-ring data consists of publicly available bald cypress (*Taxodium distichum*) chronologies scattered throughout the southeastern coastal plain, and four chronologies, one chestnut oak (*Quercus prinus*), one sand post oak (*Quercus margaretta*) and two longleaf pine (*Pinus palustris*), located within or near the Flint basin, created specifically for this study during the summer and fall of 2003.

Correlation analysis is performed between the tree-ring chronologies and streamflow data in order to determine which months or season(s) yield the most accurate reconstruction. The growing season months and annual low flow period of May-October shows the strongest relationship between tree growth and streamflow. Selected tree-ring chronologies are cali-

determined by EPD. Without an increase in permitted groundwater capacity, the town's only recourse for new water may be to purchase it from the City of Savannah.

Rincon, a rapidly growing community in Effingham County, northwest of Savannah/Chatham County, began exceeding its permitted capacity in late 2001. Due to the groundwater moratorium, the city could not receive a modification of its Upper Floridan permit, and ultimately entered into a Consent Order to purchase treated surface water from Savannah. This alternative would be much more costly than using groundwater, due to both infrastructure and treatment costs.

Rincon submitted a Lower Floridan permit application, but was denied that permit in December 2003. EPD referred to the Consent Order in denying the application.

In the meantime, several development projects in Rincon /

Effingham County have been put on hold due to the city's water problems. In fact, Rincon has been sued by a number of developers over the lack of access to water.

As part of their legal arguments, the communities are also alleging, among other things, that EPD's Interim Strategy and other policies are arbitrary; that their recent Clarification to the Interim Strategies on the Lower Floridan is poorly justified; and that increased pumping of the aquifer west of Savannah (i.e., in Bloomingdale and Rincon) would not exacerbate salt-water encroachment. Officials in these cities also allege that EPD is promoting Savannah as the region's "water merchant," and have concerns about Savannah's treated surface water coming from the Savannah River. The conflict between Georgia EPD and growing Coastal communities may set a precedent for how the State manages water scarcity issues in the future. The Georgia Water Planning and Policy

Center is monitoring this litigation closely, and will present a Case Study and Analysis of these conflicts as part of the Working Paper Series. □

Water Talk is a publication produced by the Georgia Water Planning and Policy Center, a consortium of Albany State, Georgia State and Georgia Southern Universities, with research and academic programs focused on water planning and policy issues in Georgia. Water Talk is published periodically in response to questions arising from ongoing debates related to the future shape of water policy in the state. Its primary purpose is to address questions in a manner that contributes to the clarification of issues that are of interest to stakeholders in the state.

All research papers are available upon request by calling the Georgia Water Planning & Policy Center or following the "Research" link on our website. You will find all contact information listed in the section below.



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Or any collaborating center:

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