

Ag WATER PUMPING

Fact Sheet 4 – Southwest Georgia

Groundwater Withdrawals for Irrigation

What is a groundwater withdrawal?

Each time an irrigator turns on a pump in a drilled well, a groundwater withdrawal is made. The source of the withdrawal will depend upon the depth and construction of the well. Water is contained in many buried sediments and rocks. It flows through these materials and in cracks, fissures, and caverns within the rocks in response to gravity and pumping. Because these groundwater-flows move under the property of many land owners and often discharge into surface stream, withdrawals are regulated by Georgia law. The Georgia Environmental Protection Division (EPD) was given responsibility to protect groundwater levels and flows Ground-water Use Act of 1972. Since 1988, modifications to that act have required irrigators to obtain a groundwater permit for withdrawals from wells used for irrigation and other large uses.

How much groundwater is withdrawn from the aquifers that underlie the Flint River Basin?

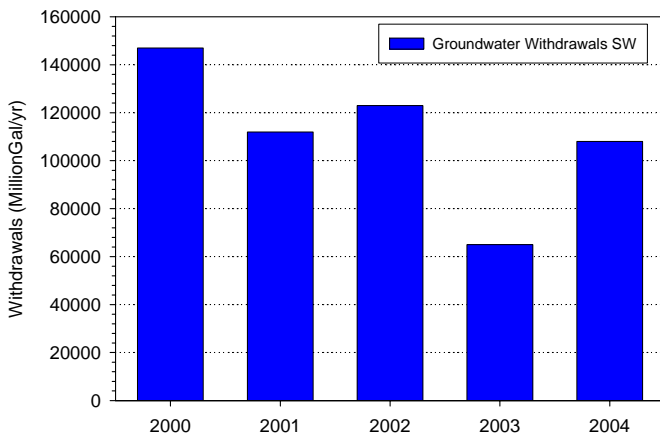


Figure 1. Total annual groundwater withdrawals for irrigation in the 26-county Southwest Georgia Region.

Mean annual withdrawals were computed by multiplying the monthly, area-weighted irrigation depths by the total irrigated area for groundwater-supplied systems and summing that over the year. The surface irrigated area was derived from the 2000 Cooperative Extension Service Irrigation Survey.

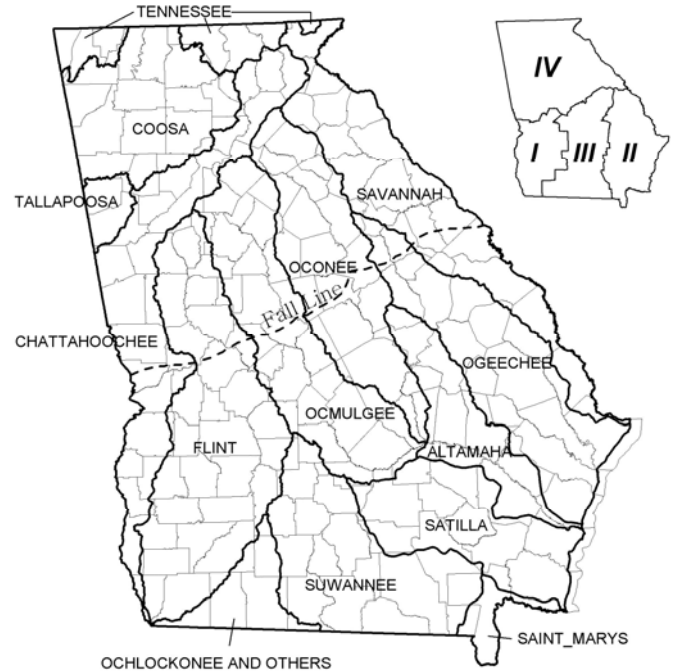


Figure 2. Southwest Georgia reporting area (I) of Ag Water Pumping includes the full county areas encompassing the Flint and Chattahoochee Basins south of the Fall Line.

How do groundwater withdrawals vary over the year?

Because withdrawals are derived from area-weighted average monthly application depths, the pattern of withdrawals is directly related to the magnitude and pattern of irrigation (Fig. 3).

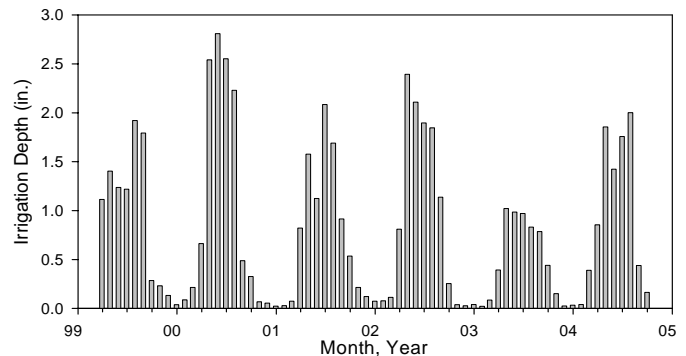


Figure 3. Mean monthly irrigation application depths for irrigation systems supplied directly from wells in Southwest Georgia.



Figure 1. Because wells can be drilled almost anywhere in the high-yielding Floridan Aquifer of Southwest Georgia, the wells are commonly placed at the pivot points.

How are streams and groundwater flows related?

The connection between groundwater and streams can most readily be seen in mountainous or hilly areas of the state. There the pathway between groundwater and streams is short. Rainfall enters the soil and is stored in soil and underlying sediment and rocks to create a groundwater aquifer. Within a few hundred to few thousand feet, the groundwater drains into a creek through seepage or springs, and the discharge maintains the base flow of the stream. Base flow is the flow that remains in a stream after direct runoff from storms has passed. It keeps flow going between storms.

The same process occurs with some of the aquifer and river systems in Southwest Georgia. However, the separation between the location where infiltrating rain leaks down into an aquifer and the point where it drains back out into a river downstream may be dozens of miles. The process is the same, however. The seeps may be in broad wetland areas that are sustained by upwelling groundwater and the springs may be massive “blue holes” that greatly increase flow directly into the river itself. They can also be fissures that supply water in a cypress pond and springs that appear at the edge of fields and forests.

Groundwater flows naturally from recharge areas to these discharge areas. Groundwater elevations decline annually during the summer and fall when natural discharge exceeds leakage from excess rainfall. The process typically reverses in winter and

spring and groundwater elevations rise. These elevations are called water tables or hydrologic heads, depending upon whether or not the aquifer is confined by tight rocks and sediments that limit water flow through them. As water tables or heads decline, groundwater flow to wetlands, ponds, springs, and blue holes decreases, and base flow in receiving streams decreases.

When groundwater withdrawals are made by pumping wells, water tables or heads decline nearby. The resulting lower heads from many withdrawals can decrease discharges to streams and base flow in streams.

The Agricultural Water Pumping Program (AWP) was a research and extension effort of the University of Georgia and the Georgia Cooperative Extension Service conducted with the cooperation of Georgia farmers and other irrigators. The program was supported by grants from the Georgia Environmental Protection Division (“Statewide Irrigation Monitoring”, EPD project # 764-890147 and “Automated Monitoring for Transient Flow” EPD Project # 701-090094) and state appropriations for the Agricultural Experiment Station and Cooperative Extension Service. The objective of the AWP program was accurate measurement of the amount water used for irrigation in Georgia during a 6-year study period, 1999 to 2004.

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