STATUS OF THE FLINT RIVER REGIONAL WATER DEVELOPMENT AND CONSERVATION PLAN

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Abstract. The Flint River Regional Water Development and Conservation Plan (the Plan) was initiated by the Georgia Environmental Protection Division (EPD) in October 1999 in response to growing concern over agricultural irrigation in southwest Georgia. Computer models of stream-aquifer relations and surface water flows indicated that, under conditions of extreme drought and greatly increased irrigation the Flint River and some of its tributaries could either stop flowing or become influent. The Plan included a moratorium on the issuance of new farm use permits form the Floridan aquifer in southwest Georgia; however, the Plan also called for extensive scientific study of stream-aquifer relations and agricultural water use, and the creation of an Advisory Committee to assist EPD in crafting the Plan. These efforts are all nearing completion, and will result in a resource management plan strongly founded in cutting-edge science and extensive stakeholder participation.

INTRODUCTION

The purpose of this paper is to provide a brief historical background of the Plan, provide a status report of the Plan, and lay out a process and timeline for its completion by December 2005.

In 1996, a report issued by the US Geological Survey (USGS) indicated drought-year agricultural irrigation from the Floridan aquifer in southwest Georgia could affect streams in hydraulic connection to the aquifer. Specifically, groundwater base flow to the Flint River and several major tributaries could become negative which, coupled with already low surface water flows, could lead to brief periods of actual drying of some stream segments (Torak and McDowell, 1996). This would threaten the endangered species of Unionid mussels native to the lower Flint River Basin. It could also have led to contamination of the Floridan aquifer from tainted surface water leaking into the limestone.

In 1998, the four-year drought that would forever change Georgia's perception of its water resources began. This led to an increase in the number of farmers seeking farm-use withdrawal permits in southwest Georgia. By Spring of 1999 hundreds of permit applications had been received, and then-EPD Director Harold Reheis announced that eventually EPD would no longer issue new Floridan aquifer permits in the lower Flint River Basin. His comment accelerated the rate of permit applications, until he announced on October 23, 1999 that no additional permit applications would be reviewed after November 31, 1999. By December 1, 1999 more than 2500 farm-use permit applications had been received at EPD.

Reheis' announcement of a permit moratorium in October 1999 was only part of the larger roll out of the Flint River Regional Water Development and Conservation Plan. The Plan also includes studies of agricultural water use and the hydrogeology of the lower Flint River Basin. Specifically, the Plan will include: 1) a process for determining the amounts of irrigated acreage; 2) a more accurate estimate of agricultural water use; 3) an improved ground and surface water computer model for the Flint River and the Floridan aquifer; 4) an improved determination of the flow into and out of Lake Seminole; and 5) appointment of an advisory committee that would include representatives from the agricultural community. The scope of the Plan will be expanded by other scientific studies, conducted by EPD and the University of Georgia, that will simulate stream flows under a range of management scenarios and the ecological impacts of those flows on aquatic communities.

AGRICULTURAL WATER USE STUDIES

The realization that irrigation and severe drought could impact stream flows in southwest Georgia led different groups of researchers simultaneously to start investigating the magnitude of irrigation. Beginning in

1998, researchers from the J.W. Jones Ecological Research Center at Ichauway used aerial photographs to begin mapping center-pivot irrigation near ecologically sensitive streams. Also in 1998, researchers at the University of Georgia's National Environmentally Sound Production Agriculture Laboratory (NESPAL) began a landmark study in which a statistical sampling of permitted irrigation systems statewide would be metered. This project was called "Ag. Water Pumping", and consisted of several nested projects: selection of suitable irrigation systems to meter, determination of irrigated acreage, and metering of irrigation systems. The latter two projects ran concurrently.

Selection of permitted irrigation systems to meter required a complete assessment of EPD's agricutural permit database, which was completely inventoried and reformatted before any irrigation systems were metered. This work was completed in 1999. Once usable permitted systems were identified, irrigation metering started in 1999. In southwest Georgia, 4% of permitted irrigation systems were monitored. To gain as much data as possible with limited funds, flow meters were attached temporarily to irrigation systems to obtain a flow rate, and on-off meters were attached to the power systems to monitor usage times. By knowing flow rates in gallons per minute, and the number of minutes a system was operated, detailed water usage numbers were obtained.

Because irrigation metering was not made mandatory until 2002, determination of irrigation depths (e.g. inches per acre of water) required knowing how much acreage was under irrigation. This led to another major part of the Ag Water Pumping study: accurate mapping, with the farmers' assistance, of permitted irrigation wells, surface water pumps, and their associated acreage. The result was the mapping of more than 90% of permitted wells and pumps, and the land irrigated by these, in the Flint River Basin. This work was completed in 2003 by NESPAL and EPD, and completed another major goal of the Plan, which was to determine the number of irrigated acres in the basin.

Ag. Water Pumping had two phases: AWP I, which measured monthly water use, and AWP II, which installed a number of real-time flow meters on irrigation systems. In addition to monitoring water usage, the Ag Water Pumping researchers obtained detailed information about acreage, cropping patterns, and water source (i.e. groundwater or surface water), thus creating a useful tool with which to compare water usage to crop type in different parts of Georgia (Hook et al, 2005). The final report for Ag. Water Pumping was completed in February 2005.

HYDROGEOLOGIC STUDIES

Much of the impetus behind the Plan, especially the moratorium, was the USGS model (Torak and McDowell, 1996) of stream aquifer flux that predicted influent stream in the lower Flint River Basin. However, pumpage rates used as model input were widely considered to be too high. Furthermore, geologic properties of the Floridan aquifer were not known in any detail. To improve these shortcomings, USGS was charged with re-evaluating the original stream-aquifer model using detailed pumping data obtained from Ag Water Pumping. Additional aquifer data would be obtained from a series of test wells drilled in the Dougherty Plain. At present, the stream-aquifer computer model is in its final stages of calibration and simulation. It will be submitted to EPD on June 1.

A significant USGS study of the hydrogeology of southwest Georgia involved evaluating the effect of Lake Seminole on regional groundwater levels and the direction of groundwater flow. The question had been raised in the past as to whether Lake Seminole was providing "supplemental" groundwater to Florida that would otherwise have discharged to the Flint River had the Lake not been built. Observation wells were drilled around the lake; detailed chemical tracing studies of water in the lake were performed; and springs and sinks were discovered that directly linked the lake to the Apalachicola River through the Floridan aquifer limestone. The Lake Seminole study concluded that the lake has a strong stabilizing effect on groundwater levels in the area, and in some areas has raised aquifer heads by as much as 25 feet. Furthermore, the presence of the lake resulted in groundwater flow actually being deflected away from Florida and into the lake, where it would eventually discharge into the Apalachicola as stream flow. Thus, Lake Seminole does not appear to provide a groundwater "windfall" to Florida, but does have a pronounced effect on groundwater resources in Georgia (Jones and Torak, 2003). This study was completed in 2003, and satisfies the fourth goal of the Plan: to assess the impact of Lake Seminole.

OTHER TECHNICAL STUDIES

In addition to the studies described already, two biological modeling studies of stream flows and their impacts on aquatic communities are progressing at University of Georgia. One study is modeling impacts of groundwater input and stream velocity on dissolved oxygen (DO) concentrations. Dissolved oxygen is a

critical water quality parameter that affects the health and viability of aquatic communities Groundwater input may affect DO concentrations by keeping streams cooler in summer and warmer in winter. Stream velocity also plays a role in DO concentrations, as faster moving streams are naturally more agitated and thus more oxygenated (Rhett Jackson, personal communication, 1995). The other biological model underway at UGA relates stream flows to the probability that a stream can support a particular fish population (James Peterson, personal communication, 2005). Both these biological models will rely in part on flow regimes projected to occur in the next 50 years under a variety of management scenarios. For example, if all backlogged farm use permits applications were issued and a drought occurred, or none of them were issued and a drought occurred, models would be able to predict the impacts of these management scenarios on aquatic communities.

Runoff and stream flow routing models are being done by EPD, using results of the USGS stream-aquifer model, precipitation records, and pumpage amounts determined by Ag Water Pumping. These models will be able to predict what stream flows will be at gauged locations in the Flint River Basin, as well as at locations upstream from the gauges. As with the biological models, stream flow simulations will be run under a range of different management scenarios.

STAKEHOLDER INPUT

An important feature of the Plan has been the high level of stakeholder involvement since before the Plan was announced in October 1999. Southwest Georgia farmers, RDC's, Legislators, and others have been actively engaged in local and regional discussions of water issues. With the assistance of the Cooperative Extension Service, Chambers of Commerce, NESPAL, and the J.W. Jones Ecological Research Center, EPD has been more engaged with stakeholders in the Flint River Basin than perhaps anywhere else in Georgia. EPD and stakeholders have had many opportunities to interact at Water Summits, permit mapping and sign up days in county Extension offices, public meetings (both informal and formal), and facilitated tours.

Such extensive stakeholder involvement would be laudable for purely policy reasons; however, stakeholders in southwest Georgia have also been the source of the scientific data upon which the Plan will be based. They have allowed their irrigation systems to be metered and mapped; they have allowed observation wells to be drilled on their farms; they have essentially developed an ownership of the science that will be used to develop the Plan.

In September 2004, a Stakeholder Advisory Committee (SAC) was formed to assist EPD in development of the Plan. The goal of this Committee is to provide EPD with a series of very specific recommendations regarding water management strategies in the lower Flint River Basin. SAC meetings occur monthly. The first meeting was in October 2004.

The first three SAC meetings were designed to get Stakeholders up to speed on the many complex scientific and regulatory issues involved in the lower Flint River Basin. In February 2005 the SAC approved a proposed outline of the complete Plan. This outline is divided into two sections: the first section consists of a compilation and summary of the science, and the second section consists of proposed recommendations that SAC will make to EPD for regulatory action. The SAC has already started work on those recommendations, and as the scientific studies are completed they will continue to make further recommendations based on the scientific results. SAC meetings are held throughout the lower part of the Flint River Basin, at publicly owned or "neutral" facilities such as State Parks, colleges and technical schools, etc. Locations such as Extension Offices, farms, or EPD facilities are avoided in order to avoid the perception of impropriety.

SAC meetings are facilitated by associates from the Carl Vinson Institute of Government at the University of Georgia, under terms of a contract with EPD. The facilitators act as dispute mediators, meeting organizers, and discussion leaders, and they provide general logistical support.

The SAC is supported and assisted by a Technical Advisory Committee (TAC), comprised of scientists who are experts in their field as it relates to southwest Georgia. TAC members include biologists, geologists, economists, agricultural specialists, and a representative of the SAC. TAC meetings generally occur monthly also, but in between SAC meetings. The general pattern of interaction between the two committees involves SAC posing a series of scientific questions or issues to the TAC, and the TAC addressing them at the next SAC meeting. The TAC also functions as the scientific "steering committee" that monitors progress of, and provides input to, the various studies. Several TAC members are also principal investigators in some of the sound science studies described above.

Progress of the Flint Plan can be viewed at www.gadnr.org/frbp/. This web site provides documents related to the Plan, names of TAC and SAC members, meeting minutes and presentations, and off-site links to relevant documents.

GENERAL TIMELINE

Completion of the Plan will depend on the timely completion of the sound science studies such that the SAC can apply them to policy recommendations. June 2005 will be the month in which the USGS stream-aquifer model is completed, along with the surface water flow models and one of the biological models. After that, the pace of SAC activities will greatly accelerate. Draft texts of Plan sections will be submitted to the SAC for approval on a rolling basis, starting in April 2005. A complete and semi-final version of the Plan approved by the Stakeholder Advisory Committee will be released for public review and comment on October 14, 2005. After 60 days of public comment, the Plan will be edited to reflect those comments, and the final Plan will be submitted to the EPD Director on December 16, 2005.

REFERENCES

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