How the Bayou Meto Water Management District Will Move Water From the River to Rice Fields

An inverted siphon under Scott Bayou.

Edward Swaim giving Governor Asa Hutchinson a tour of the Bayou Meto Water Management Project's Marion Berry Pump Station.

To reduce aquifer depletion, Arkansas has big plans to transition irrigated agriculture from groundwater to river water. One project currently underway is the Bayou Meto Irrigation Project, which will distribute water from the Arkansas River to about 268,000 acres of farmland. Toward that end, the Bayou Meto Water Management District and its federal partners will build 105 miles of canal and improve flow in 116 miles of existing bayous and ditches to convey the water. In this interview, Executive Director Edward Swaim talks with Irrigation Leader *about this ambitious project, which is slated to begin delivering water within the next 3–5 years.*

Irrigation Leader: Please tell us about your background and how you came to be in your current position.

Edward Swaim: I was originally a lawyer for the Arkansas Soil and Water Conservation Commission, now known as the Natural Resources Division of the Arkansas Department of Agriculture. Later, I became chief of the agency's Water Resources Management Division. We worked on general water policy issues and solutions to Arkansas's water challenges. Part of that involved a revision of the Arkansas Water Plan, and one of the major recommendations was that we finish the Bayou Meto and White River Irrigation Projects, two large projects designed to help us supplement crop irrigation with surface water where it is available. Groundwater has been lost in Arkansas for well over 100 years as we've irrigated land in eastern Arkansas from the shallow alluvial aquifer. Now, we have started to see effects on the deeper Sparta aquifer, which supplies drinking water and industrial water needs in eastern and southern Arkansas. To conserve the alluvial aquifer for future use and to protect the Sparta aquifer, our state policy is to make use of the abundant surface water resources of the Arkansas and White Rivers and any other sources that can be drawn on without harming in-stream needs or other uses. We'll put that water to use to reduce our groundwater withdrawals to sustainable levels. In 2019, I left the state to work for the Bayou Meto Water Management District and get this project operating.

Irrigation Leader: Please tell us about the Bayou Meto Water Management District.

Edward Swaim: The concept of using surface water to irrigate crops and reduce our groundwater withdrawals goes back to the 1930s. By then, we knew from studies that our groundwater was not inexhaustible. We knew that we would have to conserve our groundwater, find other sources, and manage the groundwater in conjunction with surface water availability. In 1950, the Bayou Meto Irrigation Project was authorized by Congress, and the U.S. Army Corps of Engineers was selected to build the project. But there was no forward movement on the project for 35 years, so it was deauthorized in 1986. In the intervening time, we experienced several droughts, and in 1980, we had a severe drought that harmed agriculture and directed people's attention toward water issues again.

In the 1980s, our legislature passed several laws to give us better water data and more tools to put our water resources to work. In general, we're an eastern, riparian, reasonable-use state, so until that point, only the owners of land contiguous to a body of water such as a stream or a lake could withdraw from that surface source. Their ownership of the land gave them a right to use the water as long as they didn't unreasonably harm their neighbors. The legislature modified that concept by creating a nonriparian permit program. It allowed nonadjacent water users to apply to use

LEFT: PHOTO BY THE U.S. ARMY CORPS OF ENGINEERS. RIGHT: PHOTO COURTESY OF THE OFFICE OF GOVERNOR ASA HUTCHINSON.

water as long as they didn't harm other water users, wildlife, navigation, or aquifer recharge or violate requirements set by interstate compacts.

That really opened the door for a project like ours to work. In 1991, the Bayou Meto Water Management District was formed as a regional water distribution district to serve a large area that includes parts of four counties. We developed the Bayou Meto Irrigation Project to serve three purposes. The first is to provide surface water to irrigate about 268,000 acres of farmland growing corn, cotton, rice, and soybeans to prevent the overpumping of the aquifer. The second is to provide flood control by improving the flow of natural streams within the project area. This will help drain fields and valuable bottomland hardwood habitat in the spring. The third is to enhance wildlife habitat by making flows in streams more reliable and providing water to flood fields for migrating waterfowl. Maintaining rice cultivation by conserving groundwater will ensure that thousands of acres of habitat will continue to be available for waterfowl that spend the winter in our project area. The Little Bayou Meto Pump Station will remove water from the lower project area, including the 33,000-acre Bayou Meto Wildlife Management Area, a premier winter mallard habitat that attracts thousands of hunters every winter.

Construction finally began in 2009, when after the 2008 financial crisis, our project got a substantial amount of federal stimulus money. We built a large pumping plant, the Marion Berry Pumping Plant, on the Arkansas River, and we built another, the Little Bayou Meto Pumping Plant, 50 miles away to pump water back into the river to help with flood control.

Irrigation Leader: What progress have you made to date?

Edward Swaim: We have built the two pumping plants and several miles of canal, and the Army Corps is constructing about 3 miles of canal. Next year, it will secure a contractor to build 3 additional miles of canal to reach Indian Bayou. That stretch of canal should be finished by the end of 2025. In addition, our district is responsible for building bridges that cross the canal. In 2020, our district built the first of many bridges near the main pump station. We borrowed money from the state to finance two highway bridges that the Arkansas Department of Transportation is now building, and we'll start construction next year on a county road bridge. The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) is providing assistance for the secondary distribution system through its Watershed and Flood Prevention Operations Program. We will clear obstructions from bayous and drainage districts with money from this program. We will also work with the NRCS and use its financial assistance for the pumps and pipelines needed to move water to fields some distance away from the canal and the bayous. We are soliciting bids for these small pump stations and the associated pipelines that will go in the ground over the next 2–3 years. The Army Corps will also work to clear Wabbaseka Bayou so that it can carry water back to the Arkansas River.

The construction of regulating reservoir gates.

PHOTO COURTESY OF BAYOU METO WATER MANAGEMENT DISTRICT.

The Dry Bayou siphon, under construction.

Irrigation Leader: Do you have a sense of how much water you'll be delivering and how that will affect the aquifer levels that you're concerned with?

Edward Swaim: The pump station will move about 1,750 cubic feet per second through the pumps. It will be many years, though, before we meet the goal capacity of the pump station, because we're building it in phases. In the first phase, we'll be covering almost a third of our project area, so we think that will show a benefit almost immediately.

Our goal is to reach a point at which reduced withdrawals from the alluvial aquifer allow it to stabilize so that it doesn't have a net loss every year. When we have short wet periods, we see a little bit of recovery. I think that tells us that if we can reduce the demand, we will see a positive effect. Surface water delivery will meet part of our need, but conservation has a big role in the overall plan to conserve groundwater. NRCS on-farm work is essential to our success. Several NRCS initiatives have been carried out in our project area with our district as the sponsor or a partner. As farms adopt more practices recommended by state and federal agencies and build tailwater recovery systems and on-farm storage, we will see positive results.

Irrigation Leader: What remains to be done to get this project completed?

Edward Swaim: The two pumping plants are not yet operational, because we have to build the transmission system. We'll clean out the channels and bayous and then build a network of pumps and pipelines to push the water out of the bayous to reach farms. A large part of that work will be done in cooperation with the NRCS's Watershed and Flood Prevention Operations Program. The Army Corps and NRCS are putting tens of millions of dollars into the project. The State of Arkansas is generating our match through its bond program, which was set up to help with water projects. Those loans are not accruing any interest, and we don't have to repay them until the 2050s. The Arkansas Game and Fish Commission is also a major partner and has made a substantial investment in the project.

We hope to bring these components together, finish the first phase of the project toward the end of 2025, and be able to move water to farms by 2026. I'm optimistic that by then, we will be irrigating a significant amount of farmland in our district. That will prove the concept and reenergize the project partners and farmers who have been waiting on the water. They'll finally see that water flow. IL

Edward Swaim is the executive director of the Bayou Meto Water Management District. He can be contacted at edwardswaim@bayou-meto.org or (501) 676-7420.

TOP: PHOTO COURTESY OF BAYOU METO WATER MANAGEMENT DISTRICT. BOTTOM: PHOTO COURTESY OF THE OFFICE OF GOVERNOR ASA HUTCHINSON.

Arkansas's Grand Prairie Irrigation Project

A segment of the White River Canal and cropland area services.

The Grand Prairie Irrigation Project is designed to supply surface water from the White River to irrigated farmers southeast of Little Rock, Arkansas, eliminating their dependence on the threatened Sparta aquifer, which is a critical source of municipal groundwater supplies. The White River Irrigation District (WRID) is helping carry out this important work by building a pump station to lift water 100 feet from the river and a canal and pipeline system to distribute the water. In this interview, WRID Director and Chief Engineer Dennis Carman tells Irrigation Leader *about the importance of the project and the timeline for the beginning of its operations and its completion.*

Irrigation Leader: Please tell us about your background and how you came to be in your current position.

Dennis Carman: I'm a professional agricultural engineer by trade. I've worked in the soil and water profession for more than 50 years in 4 states. I first got involved with the Grand Prairie Irrigation Project, which is what we'll be talking about today, in 1987, when I was the state conservation engineer with the Natural Resources Conservation Service (NRCS), then known as the Soil Conservation Service. In 2000, I moved on to NRCS's National Water Management Center. In 2007, I retired from NRCS and became the director and chief engineer for the WRID.

Irrigation Leader: Please introduce the WRID.

Dennis Carman: The WRID covers 300,000 acres about 50 miles east-southeast of Little Rock, Arkansas. Of those 300,000 acres, 250,000 are irrigated. The area has highly intensive row crop agriculture. The Grand Prairie sits about 80 feet above the White River and Arkansas River floodplains, and farmers here produce a high percentage of the nation's rice and soybeans and are seeing more corn diversification.

Currently, groundwater supplies about 75 percent of our irrigation water, and the remaining 25 percent comes from the 500 farmer-owned irrigation storage reservoirs as well as ditches and bayous. The alluvial aquifer, which runs from about 40 to about 150 feet below the surface, is almost completely depleted. We can still get a little water from that source, but recharge is minimal. Below that aquifer is the Sparta aquifer. That is the aquifer we are most concerned about, because it is the source of our drinking water and municipal and industrial water supply. We are implementing a solution that delivers surface water to agriculture to avoid depleting the critical groundwater resource further.

Irrigation Leader: When was the WRID founded?

Dennis Carman: We were founded in 1984. We are a local government entity governed by a board representing the farmers

PHOTOS COURTESY OF THE WRID.

Preparations for the installation of water control gates at a landowner offtake.

A county road crossing under construction.

in the district. We have a total of 15 elected board members, with at least 2 board members representing each county.

Irrigation Leader: Was the district founded to help carry out the Grand Prairie Irrigation Project? Do you already deliver water to existing customers?

Dennis Carman: The district was formed to provide a solution to the groundwater-decline issue**.** At this point, we are not delivering water. The WRID's mission is to provide affordable water to our irrigated agriculture community. Eventually, we will sell water and use the revenue to support the district's operations and maintenance costs and repay our construction debt.

Irrigation Leader: Would you tell us about the development of the Grand Prairie Irrigation Project over the years?

Dennis Carman: The state of Arkansas is experiencing critical groundwater decline in roughly a third of its irrigated cropland. That problem was identified as early as 1930 but surfaced in a big way in the drought of 1980. The Eastern Arkansas Regional Water Conservation Project was started in 1982 to study and quantify the problem and its potential solutions. This study was completed in 1988. The study identified five of the most critical groundwater-decline areas in the state. The Grand Prairie region was identified as the most critical groundwater-decline area in 1990.

To address the problem, Congress authorized the Grand Prairie Irrigation Project in the early 1990s. The project was in the planning and design stage for 8 years, and in August 2000, we received our first construction authorization and funding. At that point, farmers began constructing about 200 on-farm storage reservoirs as well as pipelines and other infrastructure needed to capture surface water and improve irrigation efficiency on the farms. In 2003, we started the below-ground portion of the pump station. From 2010 to 2016, various contracts were issued to finish the pump station superstructure and install the pipelines that would raise the water from the pump station at the river up about 100 feet to the 70-acre regulating reservoir. That required 7,500 feet of twin 10-foot-diameter pipelines. From that point, the water will flow by gravity through a canal system to serve the district's farms.

We have completed 350 new on-farm irrigation storage reservoirs, pipelines, tailwater recovery systems, and conservation practices. We have the primary distribution system essentially complete. We need to build a substation to power the pump station and construct the canal with pipelines to connect the regulating reservoir outlet to the on-farm features. Right now, we are constructing the first 12 miles of canal and the pipelines to distribute the water to the individual farms.

Irrigation Leader: Pumps are big electricity users. Is that a concern?

Dennis Carman: Yes. There's no doubt that the power required to pump the water from the river and move the water to the farms across the district is going to account for a large portion of our operational costs. The higher the power requirement cost, the more expensive our water is going to be. We've got that built into our cost-of-water sales, and we are continuously looking for ways to control costs. We are looking at adding solar power to the project. It certainly is an attractive alternative. One other unique thing that we're considering is the generation of biogas, an environmentally friendly, renewable energy source. We produce a large amount of rice straw, the stubble from rice production, which can be used to generate biogas that can then be converted to compressed natural gas and used for power. That's also looking attractive. Ideally, we will have a substation that will supply power to drive the pumps, and we will offset that with solar production. My dream is that we take our rice stubble, convert it into biogas, and combine it with solar power to offset our carbon footprint and pay for

Steel pipe for landowner water offtakes and siphons (background) and concrete box culverts for road crossings (foreground) in storage.

The installation of a pipe.

the energy required to pump our water. I don't know where that is going to end up, but the science and the technology are there. It's just a matter of whether we at the WRID can pull it all together. It sure is good to dream.

Irrigation Leader: When the project is complete, what's the total amount of water you anticipate diverting from the river?

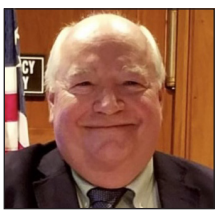
Dennis Carman: We have 250,000 irrigated acres, and we have a water withdrawal permit for 2 acre-feet per irrigated acre in the district. That means we could potentially withdraw roughly 500,000 acre-feet of water per year, but I estimate that over the next decade, we will be using about half that—250,000 acre-feet per year, or about 1 acre-foot per acre. Then we will grow. We have the system sized to pump 1,600 cubic feet per second (cfs), but our routine pumping will be somewhere in the vicinity of 1,200 cfs. When phase 1 is completed, we will divert about 40,000 acre-feet, with a maximum pumping rate of about 200 cfs.

Irrigation Leader: In the West, we hear a lot about competition over water rights and the challenge of balancing consumptive use with the environmental flows required by various laws and regulations. Do those issues apply to the White River?

Dennis Carman: The issues are real in Arkansas also, but the statutory requirements are different. Farmers have riparian rights to water, including groundwater, but actual defined rights to a water allocation like farmers in the western states have do not exist here. The State of Arkansas controls allocations and has permitted the WRID the use of about 500,000 acre-feet of surface water annually to manage or sell within its boundaries. Is there currently or will there be competition for water? Yes. The largest competitors are environmental flows, flows to maintain navigation levels in the river, and municipal demand on water from the Sparta aquifer. The environmental and navigation issue is addressed by maintaining minimum stream flows with a pump cutoff level at the river. The Sparta aquifer competition issue is being addressed by this project. When this project is completed, it will eliminate the need to pump Sparta water for agriculture.

Irrigation Leader: When will the project be completed, and when do you expect to start delivering water?

Dennis Carman: We are targeting meaningful water delivery through phase 1 in 2025. That's the projected date power will be available at the pump station. The remainder of the distribution system for phase 1 will be completed sooner. I project the total 250,000-acre project to be complete in 10–12 years. Phase 1, which includes building the substation to power the pump station and constructing 12 miles of canal and about 100 miles of pipeline, is fully funded. We are working on securing the funding for phase 2. Each phase will require 2–3 years for construction. If funds are available, 10–12 years from now, we should have water across the whole of the Grand Prairie Irrigation Project. I'm getting old; I sure hope to see that happen in person. IL



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PHOTOS COURTESY OF THE WRID.