

“Well...we have water!”



City of Ocala, Florida

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The answer to Ocala's water sustainability problem was right under its feet; 1291 feet, to be exact. The solution to finding an alternative water supply for the north central Florida city of 55,000 lay at the bottom of a well drilled 1291 feet into the Lower Floridan Aquifer. Ocala's response to the charge from the St. John's River Water Management District, to find an alternative water supply, was by no means the path of least resistance. Options such as desalination or pulling surface water out of a nearby river, while more conventional and predictable, presented numerous economic and environmental challenges. Drilling an exploratory well was risky and provided no assurance of success. Time, however, was not on Ocala's side. The importance and urgency of the situation demanded a different approach.

Ocala is part of the St. John's River Water Management District, one of six regionalized districts having jurisdiction over water in the state of Florida. The Upper Floridan Aquifer, part of the Floridan Aquifer system, provides water for approximately 90 percent of Florida, including Ocala. It also serves parts of Alabama, Georgia and South Carolina. In Florida, to pull water from the ground or from a surface body of water, a Consumptive Use Permit (CUP) must be issued by the relevant water management district. In 2005, Ocala's CUP was up for renewal. Ocala, like many other Florida cities at the time, was experiencing a staggering growth rate. Projections indicated Ocala would reach larger than sustainable water withdrawal rates in 2013 if growth continued at its current rate.

In reaction to the high withdrawal rates across the state and in anticipation of a potential water shortage, the water management districts began to advise the state was approaching rates that would soon be unsustainable. When Ocala's CUP was renewed in 2007, the St. John's River Water Management District placed limits on the amount of water Ocala would be allowed to pump from the Upper Floridan: 12 to 17 million gallons per day. Any needs above that could only come from an alternative water supply.

Ultimately, the alternative water supply had to be approved by the water management district. The options most likely to receive approval were desalinization and pulling surface water out of the nearby Ocklawaha River.

Desalinization would involve partnering with other communities to build a desalinization plant on the coast and piping the water a minimum of seventy miles to Ocala. In addition to logistic issues, there were concerns associated with maintaining and keeping secure the seventy miles of pipe. After months of consulting, estimates for desalinization were in the \$300 million to \$500 million range. With this option, user rates would increase from \$1 per thousand gallons of water to \$10 per thousand gallons of water. For elected officials, city staff and customers this would be hard to swallow.

An alternative was pulling water out of the Ocklawaha River, one of the principal tributaries of the St. John's River. Ocala wasn't the only municipal utility researching this route, however. Estimates indicated up to thirty others were investigating the Ocklawaha as an alternate water source. Yet unknown was the amount of water Ocala would be permitted to pull from the river, should it be approved as an alternative. The upside was that this option would be much less expensive than desalinization, approximately \$100 million for the city with user rates at \$3.50 per thousand gallons. However, the environmental concerns were great and the anticipated resistance from river conservationists would be difficult to overcome. Elected officials and city staff recognized there were too many uncertainties to justify the expense.

Water and Sewer Director, Jeff Halcomb, Water and Sewer Utility Manager, Darryl Muse and Water and Sewer Engineer, Ed Earnest were relegated back to the drawing board. Together, the three began to research. Their subject: the Lower Floridan Aquifer, a deep region of the Floridan Aquifer that was by and large untapped and thought too mineral laden to consider as a source for drinking water. Their investigations lead them to a failed real estate endeavor located just outside of Ocala. Ten years prior there were plans for a 14,000 house community. In an effort to find a viable water source for the community, the developer tested parts of the Lower Floridan. The plans for the community were eventually abandoned when the land was purchased by the state for conservation purposes. What remained however, were the results of the tests conducted on this part of the Lower Floridan.

The team scoured the developer's log books which were on file with the St. John's River Water Management District. The findings of the decade old water analysis were encouraging. The water from this part of the Lower Floridan would not require much treatment to be considered a viable source of water. More recent tests on the Lower Floridan in the nearby Villages showed water suitable for irrigation, but not for drinking. Conversely, testing done in the neighboring Southwest Florida Water Management District indicated the potential for drinkable water. Two of three areas within a twenty mile radius of Ocala showed that promise lay in the Lower Floridan. This was enough to prompt city staff to pursue an exploratory well into the Ocala portion of the Lower Floridan.

Despite staff's enthusiasm for the prospect, in 2008 the water management district discouraged the city from pursuing the well. They felt the result would not be worth the investment. There was a requirement dictating any water found in the Lower Floridan must prove to be a separate water source from that in the Upper Floridan. The technical term is "confinement." Regulations stated that an alternate water supply must be separate from the primary. In some parts of the state, the Upper and Lower Floridan are separated by thick layers of limestone. In others, the separation consists of only thin sheets and the two sources can eventually comeingle. Water testing would be required to determine if water found in the Lower was indeed separate from that in the Upper. The water management district again asserted expending resources on a 1,500 foot exploratory well to find it tapped the same water source found at 250 feet would be unwise and not worthy of a permit. City staff acknowledged the district's directive to actively pursue other options but continued to keep the exploratory well in the front of their minds.

Staff began planting the seeds it hoped would eventually grow into full support of this unconventional approach. Informal educational sessions were held with city executive staff and city council members. The posture of the water management district was tested, to see if there had been a change. Little by little, the pieces started to fall into place; support from executive staff and council was obtained. In 2010, the water management district had a change in leadership and in philosophy and finally granted Ocala a permit to drill a test well. The last step was

obtaining formal approval from city council to appropriate \$200,000 to fund the experimental well. All waited to see if the risk would pay off.

In mid-2010 Ocala's journey to the Lower Floridan began at a sited well plot that had not yet been developed. Estimates were that it would take 1500 feet to hit the Lower. It took 1291. In June of 2011 results of water tests to determine confinement began to come in. Early indicators showed mineral levels from the test well into the Lower Floridan were different from those of surrounding wells pulling from the Upper Floridan. On July 6, 2011 it was official: confinement had been established. To quote the St. John's River Water Management District letter to the city, "After a review of the water quality results from the Upper Floridan and Lower Floridan aquifers...the District acknowledges that the Lower Floridan aquifer well meets our criteria as an alternative water source." The waiting was over. The risk had paid off.

<http://www.youtube.com/watch?v=K2JRCEp0nn0&list=UU7NRkiqpb7AEmQ6l01sSGVg&index=12&feature=plcp> (See our journey)

Ocala is allowed to pull 17 million gallons per day from the Upper Floridan. It is currently averaging 10 to 14 million per day. Halcomb, Muse and Earnest hope the city never has to move forward in tapping their Lower Floridan well. They will continue to push Ocala toward a conservation mindset, knowing it may only delay the need for an alternate water source. But should that need arise, Ocala will be ready thanks to the persistence of staff, the trust of elected officials and 1291 feet of fortune.

The New York Times

September 22, 2011

Determined Fla. City Digs Deep to Expand Water Supplies

By ELLEN M. GILMER of

OCALA, Fla. -- Persistence won out this summer for Jeff Halcomb.

After more than three years of greasing wheels, facing resistance and pitching plans, Halcomb, Ocala's water and sewer director, found what he has been looking for: a backup source of water for his central Florida city.

Ocala has drilled into the mostly untapped Lower Floridan Aquifer in hopes that it will help the city sidestep future water shortages. That underground water supply is generally considered to be too mineral-heavy to be worth accessing, but city officials think they are onto something. Early well tests have shown high water quality, a finding that could save the city hundreds of thousands of dollars in the future.

The test well isn't much to look at: a black casing tube jutting about 3 feet out of the dirt, 12 inches in diameter. But through that wellhead is a 1,291-foot hole that leads to a yet-unmeasured store of water.

"Look what we're coming into. Look how huge this is," Halcomb exclaimed, while watching watery video from a remote camera used to scope out the well. "This is right under the city of Ocala."

The Floridan aquifer system is one of the most productive in the world, according to the U.S. Geological Survey. The aquifer provides water for many cities and towns over 100,000 square miles in Florida and parts of Alabama, Georgia and South Carolina. Most users draw from the aquifer's shallower portion, the Upper Floridan, leaving the deep Lower Floridan relatively unstudied and unused.

To say Ocala stumbled upon the usable water would be unfair; certainly, it was a researched endeavor. But in the city of 55,000, put on the map by its championship-caliber horse industry, Halcomb will be the first to acknowledge that luck was on his side.

It started with a push for Florida communities to develop alternative water supplies. As population snowballed in Florida for decades, the five state water management districts felt the impending strain.

"Over 90 percent of the water used in Florida is from the [Upper Floridan] aquifer," said Hank Largin, spokesman for the St. Johns River Water Management District, which regulates use in the central state region that includes Ocala. "We're reaching the sustainable limit that we can take out of the aquifer."

Traditional water sources are "just not going to be able to meet the water needs of our state," he added.

If the Upper Floridan is pumped beyond that limit, the effects are seen in low water levels in lakes and streams, and take a toll on those ecosystems, said Wendy Graham, director of the Water Institute at the University of Florida.

With the economic downturn, though, water demand is reduced, and shortages "may not actually come into fruition" in 2013 as projected, she said.

Largin has watched the lower demand play out.

"We're seeing right now with the way the economy is and with the way growth has slowed, we've seen utilities and local governments -- they've pulled back from alternative water sources," he said.

Graham stressed that the problem is only postponed, not solved.

"It's prudent to begin to explore all sorts of alternative supplies," she said.

Sticker shock

Ocala, like so many others, currently pumps its water from the Upper Floridan. The water district divvies up the aquifer's resource among municipalities. Ocala's consumptive use permit, issued in 2007, allows it to draw 17 million gallons of water per day. If the city needs more than that, it must find an alternative supply of water.

To Halcomb, the options on the table were hard to swallow, but he would give them due consideration.

One proposal, desalination, would be wildly expensive, he said. The plan would have Ocala piping in water from a desal plant in Crystal River, an hour away on the Gulf Coast.

"Can you imagine piping it all that way and paying for 70 miles of right of way?" Halcomb said. He estimates that desalination would cost Ocala \$300 million to \$500 million, and increase user rates to \$10 per thousand gallons of water. Ocala residents currently pay a tenth of that: about \$1 per thousand gallons.

Next possibility: sticking a straw in the Ocklawaha River. This approach wasn't quite so pricey, about \$100 million for the city, with user rates of \$3.50 per thousand gallons. But backlash from river conservationists was strong, especially with more than 30 utilities eyeing the flow. And Ocala officials were wary of the amount of water that could be drawn from the river, as regulatory limits had not yet been established.

"Is it going to be worth the effort? Is there enough water? Would we be able to get it when we wanted to?" said Halcomb, listing his apprehensions about siphoning river water.

"We were all going to spend a lot of money, and at the end of the day we probably wouldn't be able to withdraw a lot of water."

Exploratory wells

So Halcomb began connecting some dots.

"We try to put the pieces together so that at the end of the day, we can make a balanced decision," he said.

He heard rumors that real estate developer Avatar Properties Inc. had a decade earlier tested part of the Lower Floridan Aquifer just outside of Ocala. A planned 14,000-house community on the Avatar tract was scrapped when, in late 2006, the land was bought by the state for natural resource conservation.

Halcomb and city engineer Ed Earnest combed through the developer's logbooks filed with the St. Johns River Water Management District and found favorable water analyses.

"They had actually shown that drinking water was pretty good, and they wouldn't have to treat it much," Halcomb said. "Why didn't somebody else pick up on that? Nobody picked up on that. I had put that in the back of my mind."

Largin, of the water district, confirms.

"We haven't had anybody else express an interest in this approach," he said. He suspects it is because cities don't currently have the capital to take on big projects.

Other nearby Lower Floridan tests, these in The Villages, 23 miles south of Ocala, showed brackish water, decent for irrigation but not as a drinking source. Exploratory wells in the Southwest Florida Water Management District were also promising.

For Ocala's slice of the Lower Floridan, it could go either way. City officials wondered what the lower aquifer would hold for them.

Opening the door

In 2008, the water district discouraged the city from pursuing the Lower Floridan. The water was likely not worth the investment, the district had said.

Plus, district regulators pointed out, there is a critical issue of proving that a particular supply of water in the Lower Floridan is isolated from the upper portion. In other words, layers of rock must fully close off the water from the Upper Floridan in order for it to be considered an alternative water supply. An alternative supply must be separate from the primary source.

The distinction can be tricky because Upper-Lower confinement varies throughout the region. In many locations, the two are separated by layers of limestone and other rock. In some parts, though, this confining unit thins out or drops off and the portions of the aquifer run together.

Drilling a well more than 1,000 feet deep to access water that ends up being part of the same flow that can be drawn at 250 feet would not be a useful investment. The district recommended that Ocala focus on other water options. The city did that, but kept the Lower Floridan prospect in the mix.

"They were just using the information they had," Halcomb said. "They weren't going to give us a permit, but we were still planning."

Halcomb used that time to float the idea with other Ocala officials. He had informal conversations about the lower aquifer portion with the city manager, assistant city manager and council members.

"If you look at how people get stuff," he said, "they knock at it a little bit at a time, and pretty soon they get the door open enough that they can go in."

Permitting

Sure enough, Halcomb got other city decisionmakers on board, and by that time, the water district had had a change of the guard and, he says, a change of philosophy.

"We didn't really know what to expect from it," said water district hydrologist Jay Lawrence. But with district approval, "anyone that wants to drill down there can."

In mid-2010, Ocala was granted a permit to drill a test well into the Lower Floridan Aquifer. The city used an already-sited well plot that had never been developed and began the 1,300-foot endeavor, more than five times deeper than conventional wells into the Upper Floridan.

By June 2011, early well analyses began rolling in. Lab tests showed mineral levels in the test well were different enough from in-use wells to confirm confinement. A yet-unscheduled pump test will determine how much water is available, but high pressure already indicates that it is plentiful.

On July 6, it was official.

"After a review of the water quality results from the Upper Floridan and Lower Floridan aquifers ... the District acknowledges that the Lower Floridan aquifer well meets our criteria as an alternative water source," said Lawrence in a letter to the city.

Finally, Halcomb had assurance that the \$200,000 experimental well investment would pay off.

"We've been aware of the need to [find an alternative water source] for quite some time," said Ocala spokeswoman Jeannine Robbins. "When it happened, everybody was very excited. ... It's nice to have a Plan B, it's nice to know you're not just stuck with one solution. We're way ahead of the curve."

If other communities are prompted to drill test wells, they will face the same crapshoot.

"What you get at this well field might be different from what you get from that well field," Lawrence said.

To bring the Ocala well into service, the city will have to modify its consumptive use permit with the water district, make the well production-ready and build a treatment facility and storage site.

Halcomb estimates the permit adjustment would cost \$100,000, and the well and facility work would run \$24 million to \$48 million, depending on whether the city aims for a design capacity of 10 million gallons of water a day or 20 million.

Waiting for economic rebound

For now, though, the city is holding off on all of that. The Lower Floridan is a backup measure and will only be developed when the city inches closer to its water use limit as set by the district. Ocala is allowed 17 million gallons per day and has lately been averaging 10 million to 14 million gallons.

"Even though we have this alternative water supply source, it would be great if we never had to develop it," Halcomb said. "If we can minimize at the end of the day having to build more infrastructure for a treatment plant, we do save all the way around."

Just a half-decade ago, the population in Florida was swelling, and planners were antsy about impending water shortages. Conservation and the search for alternative sources were critical. The district thought the Upper Floridan would be operating at capacity by 2013. The economic downturn, though, reined in growth and clenched local budgets.

"That number is pushed back," said Largin of the water district. "We're still going to get to it, but there's maybe not the rush to find alternative sources right now."

Instead, cities like Ocala focus on water conservation. For now, those measures are enough to keep them from maxing out on water needs.

Of course, city officials are paving the way -- and crossing their fingers -- for an economic upswing.

"What's really going to be the issue is industry," Halcomb said. "At some point in time, there's going to be enough industry -- and I believe that -- here that might drive expansion."

Situated at the crossroads of several state highways, interstates and rail lines, Ocala is well-positioned for a bump in shipping and receiving, especially if a proposed port in nearby Crystal River gets under way.

"We're all about jobs, and part of that is making sure we can support them with our utilities and our infrastructure," said Robbins, the city spokeswoman. "It's important that if that boom happens, we're all ready to go."

Halcomb guesses Ocala will move forward with developing the well around 2017, when the city's consumptive use permit is due for a 10-year modification.

The well will be used in the meantime by the city and the water district to collect data on the aquifer.

Truth is, business in Ocala might not rebound in that time, and water demand might not see an uptick. But this is about long-term planning, said Halcomb, and the heavy lifting is already finished.

"We're done," he said. "We have a water source that we can develop. You bring your business here, if we get to the need for the water, we're done."

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