

Solving Montgomery County's Water Shortage (And the Potential Impact on Lake Level)

by
Jace A. Houston, General Manager

Montgomery County's Groundwater Crisis

You may not know it, but our county is in the midst of a crisis. As Montgomery County's population has grown at an astounding rate, we have always met our growing water demand by drilling water wells and pumping water from our underground aquifers. This remains the case today. Now, our rapid growth has created an overwhelming demand that our underground water supply cannot sustain. We are literally draining the Montgomery County well dry.

Fortunately, a solution to this crisis is in the works. The voter-approved Lone Star Groundwater Conservation District has carefully studied this issue to discover what steps need to be taken to avoid a water supply disaster. As a result of their findings, they have recently adopted regulations giving all large volume groundwater users in Montgomery County until January 1, 2016, to reduce their consumption of groundwater by 30%.



This is an enormous challenge, and it calls for a well-reasoned, well-engineered solution. Because of Montgomery County's historic reliance on groundwater, there are no large pipelines in place to deliver surface water to the 200-plus water systems around the county that are required to convert, and the cost to install the miles of pipeline necessary to reach every system would be crippling to our economy. That is why the San Jacinto River Authority (SJRA) has voluntarily committed itself to developing and offering a countywide groundwater reduction plan that creates a regional solution and allows all the water users in Montgomery County to work together to achieve compliance in a more efficient and less costly way.

A Solution for the Entire County

Montgomery County benefits when we all work together. The impending groundwater crisis is no different. SJRA has studied the problem and is proposing a solution that works for all of Montgomery County. The SJRA plan calls for the 200-plus water systems in Montgomery County to work together and split the costs for the construction of the infrastructure necessary to comply with the Lone Star's rules. In fact, the SJRA plan is the only plan that can bring the entire county into compliance cheaply and quickly.



Montgomery County does not need to switch completely off of underground water to comply with the Lone Star rules, and importantly, we don't have to deliver surface water to all 200 systems either. That's really the key to the cost savings. Even though all 200 systems are each required to reduce their groundwater use by 30%, the SJRA plan allows many communities to continue to receive their entire water supply from underground aquifers for many years to come. By participating with other water systems in the SJRA plan, they will be considered to be in compliance with the Lone Star rules because other users in the plan are converting to surface water *on their behalf*.

At the outset, communities such as Conroe and The Woodlands will “over-convert” from underground water supplies to surface water. This “over-conversion” allows all of the participants in the plan to comply with the Lone Star's rules with minimal infrastructure and, therefore, minimal cost.

SJRA has volunteered to be the leader in this effort for countywide compliance because it is basically the only entity in a position to do so. The future growth of all of Montgomery County is essential to every community in our county. If we leave one community in our county behind, we all lose out.

The Importance of Lake Conroe

SJRA's plan calls for the utilization of Montgomery County's own resource, Lake Conroe, for its originally-intended purpose – water supply. SJRA shares the understanding that Lake Conroe is an invaluable asset for our county, and in recognition of the legitimate concerns of local business and property owners, SJRA hired an independent engineering firm to conduct a study of the potential impacts that the surface water program might have on lake levels.

SJRA is committed to an open process with honest communication. As lake level concerns have been raised during the development of our surface water plan, SJRA staff and engineers have willingly fielded any and all questions regarding the lake levels of Lake Conroe using the best data and science we have available. Of course, it is not easy to explain how a reservoir operates or how it is permitted by the State of Texas for a certain amount of annual usage, and the purpose of this independent engineering study is to verify, using actual data and computer models, how the reservoir is predicted to respond at various levels of water usage (and to present that data in a graphical format that is hopefully a little easier for people to visualize).

The actual graphs produced from the independent engineering study are presented in full below. It is very difficult to fully explain the nuances of charts and graphs in a written article, but it is my hope that this information will answer most of the questions that we have received and begin to dispel the rumors and sensational claims that have circulated about this project.

In August of 2012, a research team from Texas A&M University completed a peer review of SJRA's lake level study. The peer review was funded by stakeholders from the Lake Conroe area. The Texas A&M report found that the lake level projection model prepared for SJRA is a “reasonable (even conservative) projection” of lake level impacts associated with the future use of Lake Conroe as a water supply. SJRA's model results (presented below) tend to slightly over-predict the amount of drawdown on lake level due to the use of very conservative assumptions in the model.



Lake Level Data

First, it is important to note that in an average year, seven feet of EXCESS water spills out of Lake Conroe because the lake is simply over full. This is seven feet of lake level that leaves Montgomery County without offering any beneficial use to the citizens of our county. That is almost twice the amount of water that is used in all of Montgomery County in a year's time.

[As an aside, a number of people have asked me why we don't just build another lake below Lake Conroe to capture all that excess water before it reaches the gulf. For purposes of this article, I'll have to give the short answer. First, when I use the term "excess" to refer to the water that flows out of Lake Conroe, I only mean excess as it relates to the amount of water that we are physically and legally able to retain in the lake. Any effort to construct a new lake to capture this unused water would impact the legal rights of other water right holders downstream, including the City of Houston. Plus, there is simply no site where we could build a large enough lake to begin to capture that amount of water.]

In addition to being almost twice the amount of water currently used in Montgomery County, seven feet of lake level is also SEVEN TIMES the amount of water that is needed in the first phase of the surface water program from 2016 to 2025. This fact is extremely important in understanding why the impact on lake level is so minimal. Lake Conroe spills on an average, annual basis much more water than we need for the surface water program. That is why you only see an impact on lake level during very severe, long-term (multi-year) droughts, and even then you really don't see much impact until the third or fourth phase of the program starting in 2035 or 2045.

In fact, the MAXIMUM amount of water available for consumption from Lake Conroe each year is only four feet of lake level (1/8th inch per day). The SJRA plan would not reach this level of annual usage until 2045 (or even later if we can improve our conservation efforts)! Even when we reach this maximum amount of usage, the average year would still see three feet of lake level flow out of Lake Conroe and out of Montgomery County as EXCESS water.

To demonstrate graphically how lake levels would likely be affected at different levels of usage, the engineers used our records of daily lake levels since the lake was completed in 1973, and then used a computer model to simulate what the lake level would have been if specified amounts of surface water were being used each year. In other words, we know what the lake level has been every day since 1973, and the computer model predicts what the lake level would have been if we had been using one foot of water each year (1 inch per month), then two feet of water (2 inches per month), then three feet of water (3 inches per month), and finally four feet of water (4 inches per month).

We can compare the modeled results in each case to the historic record of lake level and get a pretty good feel for what impact, if any, the future use of lake water will have on lake level.

Some important facts to remember as you look at each of the graphs. First, the dashed red line on the graph corresponds to 201 feet above mean sea level, which is the normal pool level of Lake Conroe. Any time the lake rises above this level, water begins to spill over the dam and down the river. Also, in each of the following graphs, the engineers have inserted a dashed reference line at 197' MSL – this is four feet below normal pool level, and it represents a level at which recreational lake users experience significant access issues. This line is included simply as a reference for comparing historic lake levels to predicted lake levels.

Also, it is very important to note that these graphs do NOT take into account any additional conservation and drought contingency measures that may be implemented in the future. SJRA intends to pursue both conservation and drought contingency efforts that will help mitigate any periods of significant lake level decline. Also, SJRA is researching technical options for reducing surface water usage during times of severe drought. We are not taking a "wait and see" approach. We intend to take proactive steps to help protect lake levels.



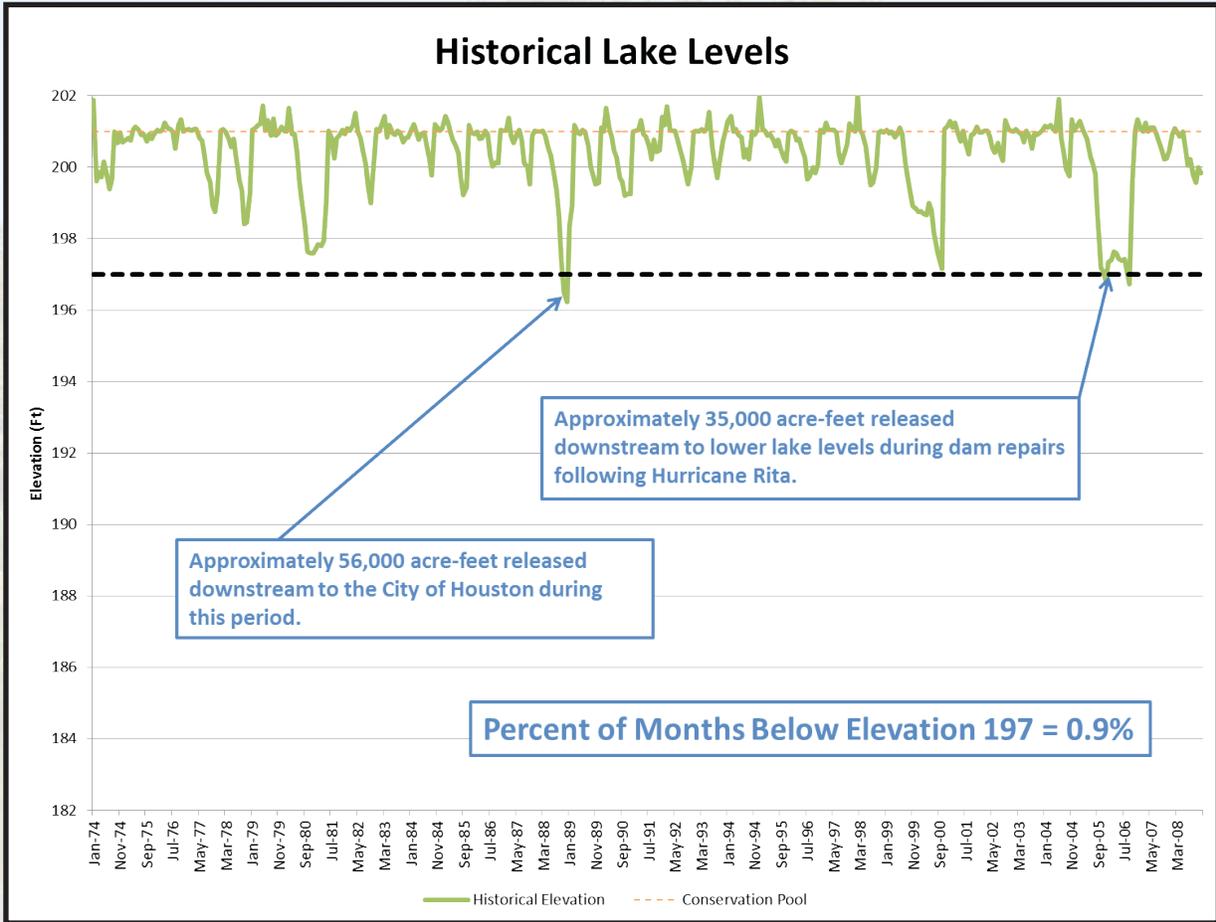


Figure 1. This graph shows the historic lake levels of Lake Conroe since it was completed in 1973. The key points to notice are the three occasions when the lake dipped to the 197' level. One event in the late-1980s corresponded to a large release called for by the City of Houston. The event beginning in 2005 followed an intentional release when the lake had to be lowered due to damage from Hurricane Rita. The third event was in the late 1990s and occurred over a three-year drought period. Overall, the lake was below 197' less than one percent of the months of record.



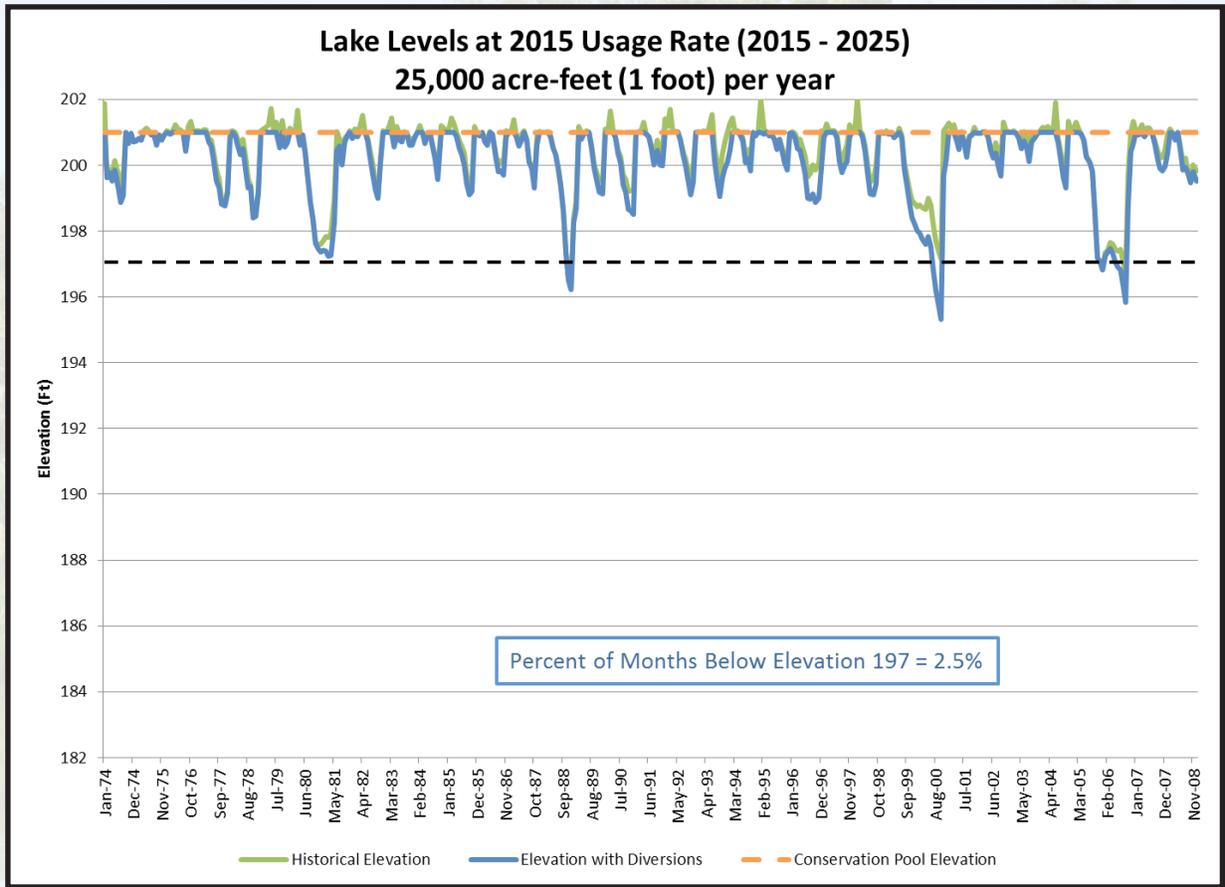


Figure 2. This graph shows the historic lake level (green line) compared to the lake level that would have occurred if we had been using surface water from Lake Conroe at the Phase 1 rate of 25,000 acre feet per year (1 inch per month). As you can see, the difference between the historic lake levels and the predicted levels is almost imperceptible. This usage rate of 25,000 acre-feet per year is the amount proposed to be used through the year 2025.



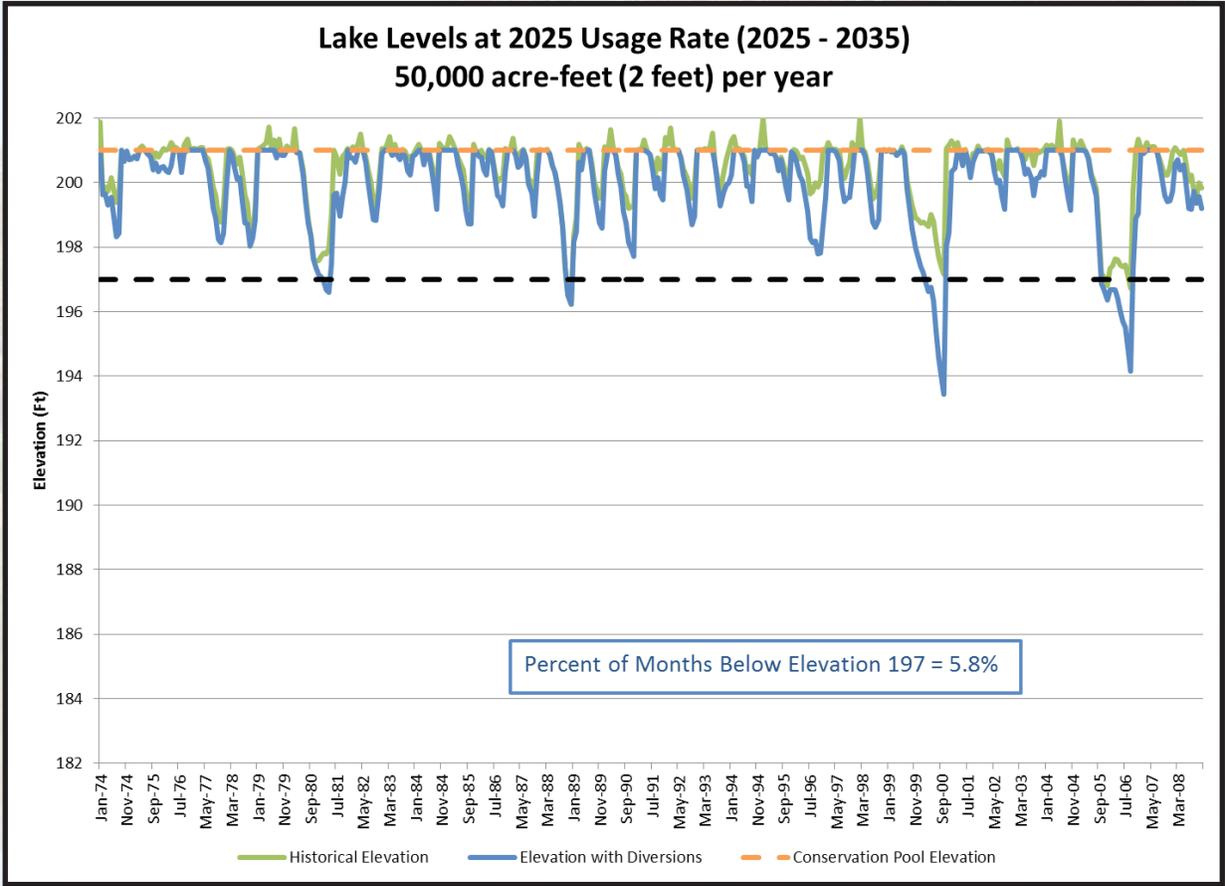


Figure 3. Phase 2 of the proposed groundwater reduction plan would begin in 2025 and raise the surface water consumption from Lake Conroe to 50,000 acre feet per year (2 inches per month). This graph shows that the difference between the historic levels and the predicted levels is still minimal. This level of usage would carry the program through approximately 2035.



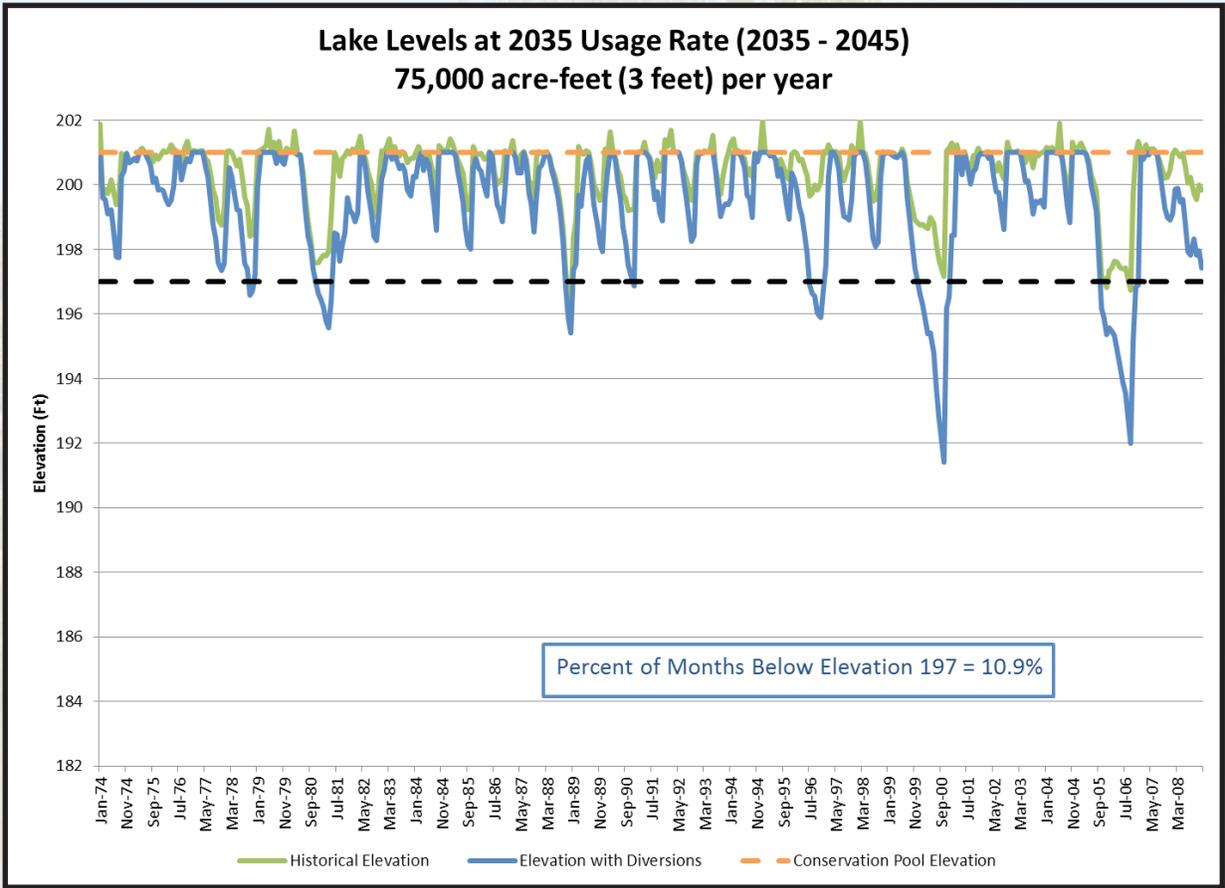


Figure 4. Phase 3 of the SJRA plan is proposed to begin in 2035 at a usage rate of 75,000 acre-feet per year (3 inches per month). At this level of usage, you begin to see a fairly significant impact on lake level during extended droughts such as the three-year drought in the late 1990s and the two-year drought following Hurricane Rita. Apart from these multi-year droughts, the difference in lake level is still fairly minimal.



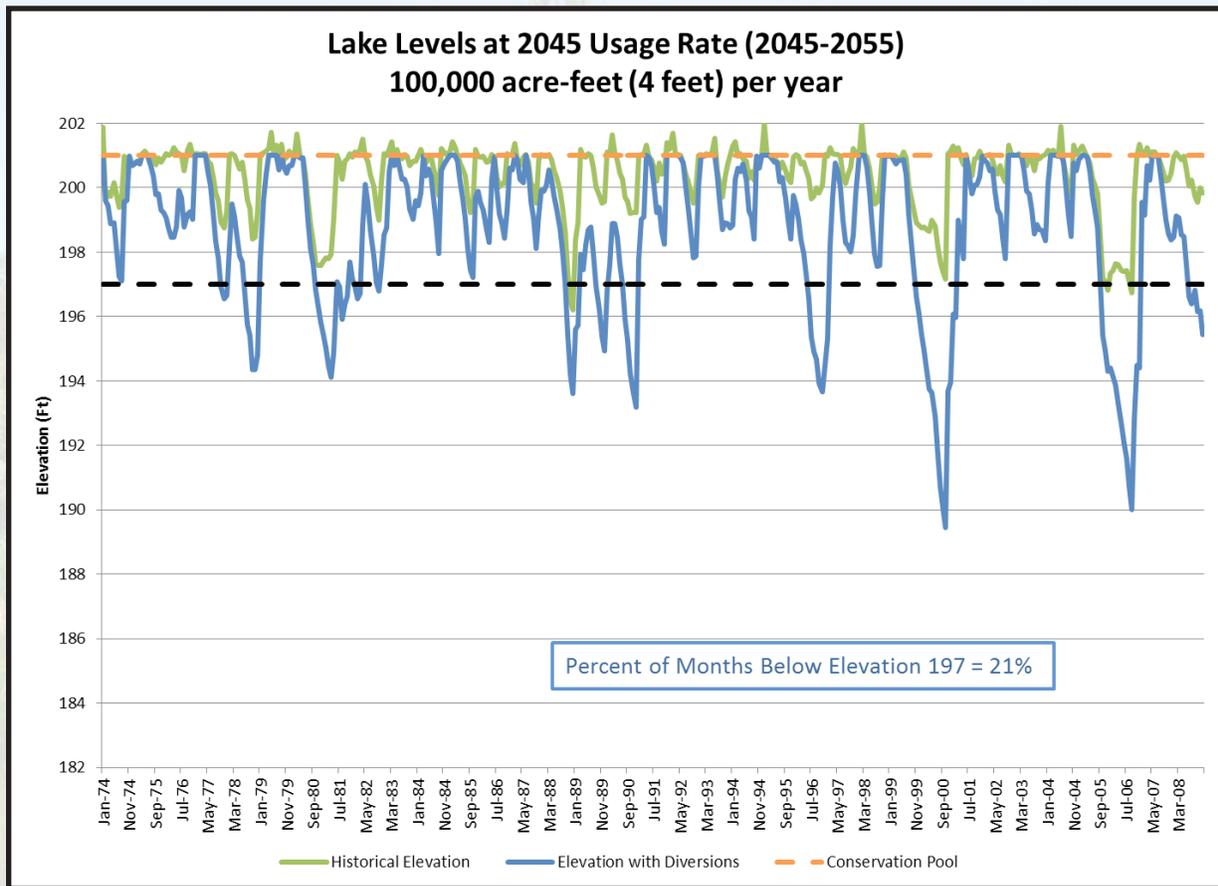


Figure 5. The maximum amount of water allowed by state permit to be withdrawn from Lake Conroe on an annual basis is 100,000 acre-feet per year (4 inches per month). The proposed SJRA plan would not reach this level of withdrawal until after 2045. Figure 5 confirms that the greatest impact on lake level is during severe, multi-year droughts, although you do begin to see more frequent periods where the lake falls below 197’.

What We Have Learned

This independent engineering study shows us that it is indeed weather, not human consumption, that is the main determinant of lake levels for Lake Conroe. Again, in an average year, we are currently releasing seven feet of lake level from Lake Conroe as excess water. This excess water is not being used at all in Montgomery County.

Even so, SJRA is committed to seeking responsible solutions to mitigate any effects on lake levels. For example, SJRA is encouraging a countywide effort to introduce conservation measures and ordinances to cut wasteful consumption of our water supply. There are other mitigation measures being studied as well, such as a comprehensive drought management plan. We will keep you updated as these plans are further developed.

Addressing Montgomery County’s groundwater shortage is imperative, and the countywide solution makes the most sense from many different perspectives, including economic. We realize that the residents of Montgomery County have many concerns and questions, and we share those same concerns for the continued growth and economic vitality of our county.

