

LCRA Water Management Plan Update Process: Participant comments through June 22, 2018, and LCRA responses

As part of the process to update its Water Management Plan, the Lower Colorado River Authority is accepting and responding to comments from interested entities and individuals. This document includes comments and responses received following the first participant meeting on May 21, 2018, and received by June 22, 2018.

Comments related to the WMP process:

From the City of Austin: In consideration of the short timeline for the proposed 2018 WMP update, the City recommends that LCRA allow substantive stakeholder comment throughout the process. The City of Austin would like to establish that this comment period (ending June 20, 2018) will not be the only time LCRA will accept comments on items that were discussed at the May 21, 2018, participant meeting (e.g. WMP update process, weather-varied demands) and that other comment periods in the future are treated likewise. Due the compressed nature of the 2018 WMP update timeline, it will be important for LCRA to remain open to substantive comments throughout the development period, not just in the designated comment periods. Enforcing a hard comment deadline limits time for stakeholder review, especially as it is the beginning of the update process and stakeholders are still becoming familiar with the overall process. Additionally, it is possible that information provided in future participant meetings will prompt further comment on items whose initial comment period is past, and the City would like to retain the ability to comment on any previous items that may be affected by new information. For these reasons, among others, the City requests that the comment period deadlines outlined in the WMP timeline will not diminish stakeholders' ability to submit substantive comments on any part of the process as the update progresses.

The City recommends LCRA broadcast and archive WMP update meetings on the internet. Considering the timing of this update process taking place in part during the summer months when some participants cannot be available regularly, the City recommends broadcasting and archiving the meetings on the internet.

From the Highland Lakes Firm Water Customer Cooperative: LCRA's communication about and opportunities for public review and comment on proposed "technical issues" are too limited. HLFWCC believes that LCRA needs to provide more comprehensive explanations for proposed "technical" changes to WMP methodology, and that it should not arbitrarily close the period for commenting on any "technical" issue. HLFWCC finds that the proposed changes to "technical" issues cannot be evaluated in the absence of information about how exactly the WMP might be revised using the new approach. At this juncture, for example, it is impossible to offer fully informed comments because any resulting revisions to the WMP caused by the new approach have not been revealed. HLFWCC finds the "technical papers" to be far from thorough in explaining the pros and cons for adopting the alternative approaches presented in the papers. Finally, HLFWCC believes that a thirty-day period to review "technical papers" about which there is incomplete information is arbitrary and truncates evaluation of both the "technical paper" as well as any possible outcomes produced by possible adoption of any proposed new approach.

From the National Wildlife Foundation, Texas Living Waters Project and Texas Parks and Wildlife Department: We are quite concerned that the stakeholder input process, as currently envisioned, will not provide an adequate opportunity for input on and understanding of proposed revisions to the WMP. WMP revisions involve highly technical issues and the implications of many revisions can only be understood based on a review of complex modeling results. In past revision processes, identification of alternative approaches for achieving desired outcomes, while minimizing unnecessary adverse results, has been possible because adequate opportunity was provided for stakeholders to evaluate initial modeling results, propose alternative approaches, and evaluate modeling results based on those alternative approaches. The truncated stakeholder process currently proposed is not adequate to support a comparably deliberative evaluation of options. As a result, the process is much less likely, even with a more constrained set of proposed changes, to result in a recommendation that carries broad stakeholder support.

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We certainly acknowledge that the scope of revisions to the WMP as contemplated in the current round is much narrower than in recent revision processes. However, the addition of the Garwood Amendment and of the Arbuckle Reservoir present significant new complexities to be understood in evaluating modeling results and, particularly for the latter, in understanding the implications of proposed approaches. Also, the proposed introduction of changes to the instream flow compliance approach at the Wharton gage (which, in our initial thinking, raises questions about the potential role of the Arbuckle Reservoir in addressing the impacts of overly large releases to meet instream flow requirements at the Wharton gage), a bay rainfall relief mechanism for freshwater inflow provisions, and the addition of another environmental flow seasonal trigger (which we support in concept), raise issues that require technical evaluation. We do not believe the proposed process provides sufficient time to review initial proposals, with accompanying technical analyses; formulate and evaluate potential variations on those proposals; and present final proposals that the stakeholder committee can understand and discuss.

As we understand the proposed schedule, there are three meetings remaining. The next meeting is only scheduled for three hours. Presumably, we will see initial modeling results at, or slightly prior to, that meeting. It takes time to understand the intricacies of the modeling and to conceptualize potential variations on approaches for consideration, which then must be modeled. That will be particularly true with the addition of the Arbuckle Reservoir to the model. Also, as noted during the last meeting, a number of stakeholders will not be able to attend the next meeting. There is less than a month between the second and third meetings and between the third and final meetings. That will provide very little time for stakeholders to digest information presented at a meeting, formulate potential variations on approaches presented, and provide input to LCRA on the variations so that modeling runs evaluating the variations can be shared in advance of the subsequent meeting.

Although we understand that LCRA has proposed the process it determined appropriate, we believe that all parties would be better served by a more deliberative process that represents a better chance of achieving broad buy-in prior to presentation to the LCRA Board and submission to TCEQ. Accordingly, we request that the timeline for the stakeholder process be extended at least for an additional month in order to allow for another meeting, with four to five weeks between meetings. Regardless of whether the schedule changes, it will be very important to ensure that modeling results are made available to stakeholders well in advance of the subsequent meeting.

LCRA response to process-related comments:

LCRA will accept comments throughout the WMP update process. Comments received by the comment deadlines will allow staff to consider the comments or suggestions prior to the next participant meeting, but comments received after a deadline will still be accepted and considered.

LCRA will consider having additional participant meetings, but we do not plan to broadcast the meetings. LCRA will continue to post meeting presentations and additional technical information on LCRA.org. LCRA staff also is available for individual meetings with participants or groups of participants.

Comments related to the level of demands:

From the City of Austin: The City recommends LCRA use 10-year projected demands (2030 demands) rather than 2025 projected demands for the 2018 WMP update. By TCEQ Order, the WMP must protect firm demand 100% of the time through the drought of record. The 1988 Adjudication requires the protection of both existing and projected firm demand. In previous versions of the WMP, LCRA has used a ten year projection of firm demands. The City believes it is more appropriate to use 10 -year projected demands, rather than the proposed 5-year projected demands. The 2010 WMP explains the need for 10-year projected demands, stating, “[t]his ten year planning period was chosen because the critical drought period used to determine the Combined Firm Yield of Lakes Buchanan and Travis lasted approximately a decade...If the critical drought were to repeat itself beginning now, the maximum demands during the drought period

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would be those in year 2010 [representing the final year in the 2000 -2010 projection period referenced above]. Thus, a ten-year planning period was used.” The duration of the recent multi-year drought may be shorter or longer than this 10-year period depending on whether the end of the drought is measured by the complete refill of Lakes Travis and Buchanan or based on the results of the combined firm yield (CFY) analysis with new hydrology. Regardless, the WMP update, for the reasons explained by LCRA in the 2010 WMP, needs, in the projection of firm demand, to account for the duration of both of these major multiyear droughts in the POR.

An argument that the WMP will be updated again in 2025, allowing for an opportunity to update demands again, is problematic in multiple respects. First, it is not a certainty that an update will go into effect in 2025. This typically would require starting an update process a few years in advance of 2025, and still does not account for the possibility of a hearing or other circumstances which may extend this timeframe. More importantly, however, planning for demands only through 2025 will not be protective enough in the case of a repeat of the drought of record (DOR) that starts before 2025. Updating demands in the midst of a multiyear drought cannot retroactively impose curtailments that needed to be already in place early in the drought to be sufficiently protective of firm demand expected to occur over the duration of a major multiyear drought. A key means by which the WMP protects firm demand is by limiting the release of interruptible stored water in a timely manner at the onset of a drought, so that there is enough remaining in storage to meet firm demands without shortage for the remainder of a DOR or major multiyear drought. For these reasons the City recommends a minimum firm demand projection of ten years.

The City recommends that LCRA consider adjusting their weather-variable demand volumes for the City of Austin. The City suggests using different volumes for the projected average demands for the City of Austin. Currently, LCRA has proposed using Water Forward, Austin’s Integrated Water Resources Plan (IWRP), projections for average-demand years and Region K projections for hot-dry demand years. The City believes this creates an apples-to-oranges comparison of demands, because the two projections are based on entirely different methodologies. The Region K demands function as conservative planning numbers and are based on the overall per-capita water use in a historically hot-dry year and projected population growth. The Water Forward demands were developed by the utility to represent baseline demands, including passive conservation, implementation of best management practices, such as requiring or incentivizing water efficient fixtures, and relatively new active conservation measures, such as permanent one-day-per-week watering restrictions for automatic irrigation systems. The City believes that demands that include these new, and in some regards exceptional, efforts should either not be treated as Austin’s demands for the purposes of the WMP or only be incorporated with other adjustments to the plan to assure that the plan does not inappropriately shift a significant portion of the benefit of Austin’s efforts to other customers, as further explained in the next section.

The Water Forward demands are calculated differently than Region K projections. They were developed by looking at water use across multiple sectors (e.g. single-family residential, commercial, etc.) and end uses (e.g. irrigation, toilet flushing, etc.). The baseline projections are based on use during 2013, 2014, and 2015, which includes years with drought restrictions in place. Since Water Forward projections include anticipated—but not guaranteed—future water savings, the City believes that it would be more prudent, as well as more consistent, to adjust the Region K projections by an appropriate factor, such as the 85% factor proposed for the other firm customer demands, to obtain a non-hot-dry year projection, rather than using a number developed for a very different planning process.

The City’s recommendations in this section are limited to this update and we believe that an approach using weather-varied firm demands should be revisited in the next update. The approach that has always been used for modeling firm demands is to use hot-dry demands for all years. The City has concerns about departing from that method which we believe is appropriately conservative.

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From the Central Texas Water Coalition: Several of the projected water demands for LCRA's Firm customers seem to be understated, including: 1) the City of Cedar Park (recently approved contract for 20,500 with optional 2,500 acre-feet; but listed as having a 20,000 acre-feet/year demand in the year 2025); and 2) Domestic Use on Highland Lakes (listed as 5,100 acre-feet/year in 2025, but existing Domestic Use customers (grouped with other small or temporary customers) is already reported as having contracts for 4,574 acre-feet/year (perhaps these other customers are not located on the Highland Lakes?).

It does not seem appropriate to "mix" the City of Austin's average and high-use Demand projections by using the Austin Water Forward numbers AND the Region K numbers, respectively. These two numbers were derived in very different ways, and it does not seem technically correct to choose them for this purpose without converting them into comparable numbers. We recall that the City of Austin representatives on Region K expressed concerns about the inadequacy of Austin's projected demands in view of its continuing economic and population growth, and the City raised concerns about other aspects of the Municipal Demand methodology utilized by Regional Water Planning Groups. The City of Austin's water customers have been conserving water, and we expect that to continue, but Austin should not be singled out and selectively chosen as an entity with lower water demands until Austin's representatives confirm that such a projection is reasonable and justified.

According to the Summary Table of "Preliminary Projected 2025 Demands," it appears that LCRA is proposing to rely on water use numbers since 2010 as the basis for its high-use demands for the non-City of Austin Municipal/Manufacturing customers not individually reported in the Region K planning work. Please explain how this approach will protect the future demands of these Firm customers, since water use was curtailed during many of those years.

Why was the period from 2012 to 2016 chosen for Municipal Demand Projections? During most of that time period, LCRA's Firm customers were operating under restrictions or prohibitions on outdoor watering due to the continuing drought. As a result, Municipal and Manufacturing customers may have reported artificially low demands.

As with the other Demand projections, it would be extremely helpful to have a reference table to compare the numbers derived using LCRA's proposed methods against the Demands presented in the 2015 WMP and in the working draft of the 2021 Region K Plan. We are concerned that the new methodology allows LCRA to lower the projected Demands for Firm customers in ways that could threaten the long-term sustainability of water supply in this river basin.

What is the total volume of water allocated under Firm Domestic Use Contracts on the Highland Lakes? What is the total volume of water held under Firm Domestic Contracts that are not diverting from the Highland Lakes? The observed growth and development around the Highland Lakes suggests that these numbers are trending upward at a noticeable pace, and it would be helpful to confirm that the Draft Demand numbers for these customers is generous enough to account for the apparent increase in Domestic Use Contracts.

From the City of Leander: Leander's 2025 projected demand of 8,500 ac-ft/year appears to be too low in the LCRA's Draft Technical Paper for Development of Projected Firm Demands for Municipal and Other Firm Uses, dated May 2018 (see attached).

2016 TWDB Planning Projections appear to be the basis for the projection; however, 2021 Planning Projections would be more appropriate for the City of Leander, given recent growth since 2016.

Our latest population estimate is 55,682 as of 12/31/2017. The US Census Population Estimate for the City of Leander is 49,234 as of July 2017.

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Please consider using the TWDB's 2021 Planning Projections which should yield considerably higher demands for 2025. (It is anticipated that Leander will surpass a population of 59,821 in 2018.)

From NWF, TLWP and TPWD: ...it appears that the high-year demands for municipal and industrial customers, which are based on extrapolation from Region K demand projections, ignore the savings achieved through water conservation measures other than the plumbing fixture code measures incorporated into the TWDB demand projections. Because water conservation savings, other than plumbing fixture code implementation, are treated in the planning process as a supply source, the demand analysis appears to include the portion of projected demand expected, pursuant to the regional water plan, to be met through water conservation in the amount of demand expected, in the WMP process, to be met from the Highland Lakes, potentially resulting in overstated demands. The over-estimation of demands likely is highest for high-year demands.

On a related issue, we would appreciate receiving an explanation of the rationales for the changes made in the updated 2025 demand projections since the May 21 presentation.

LCRA response to level of demands-related comments:

In response to concerns raised in these comments, LCRA staff reviewed the demand values for firm water customers. Staff confirmed the demand for the City of Cedar Park is consistent with the most recent Texas Water Development Board/Region K projection. LCRA updated the demand for the City of Leander to include data from the most recent Texas Water Development Board/Region K planning projections.

LCRA has included demand assumptions for domestic water use around the Highland Lakes since the 2010 WMP. The demand projection for domestic use of 5,100 a-f per year on the Highland Lakes allows for demands in excess of the 4,574 a-f per year currently contracted. LCRA does not have data for the amount of water under domestic use contracts not being diverted.

As compared to the demand projections presented at the May 21 participant meeting, the City of Austin demands for the normal-use year increased 100 a-f per year due to correction of a typographic error. The Municipal/Manufacturing - Other demands changed based on: the increase for Leander; an increase to the demands for Oxea and Underground Services Markham (two LCRA customers that are not individual water user groups in Region K); and accounting for Pflugerville's groundwater supply that offsets a portion of its demand. The net impact of these changes is that demands in this category increased from 124,000 a-f per year to 130,200 a-f per year in high-use years and from 105,300 a-f per year 109,000 a-f per year in normal-use years. The steam electric demands for high-use years remain the same as what was presented at the May 21 meeting (80,000 a-f per year), while the average-year steam electric demands decreased from 69,600 a-f per year to 66,700 a-f per year.

Using 2025 demand projections is appropriate for this WMP revision, which is expected to be in effect through that year. The 2025 demands allow for a significant amount of demand growth over current demands, as well as the demands that would be in place when this revision becomes effective. Total use of water by LCRA firm customers in 2017 was 306,614 acre-feet, as compared to the 2025 average/normal projection of 343,000 a-f per year and the 2025 high-use-year projection of 426,100 acre-feet. If this revision becomes effective in 2020, there would be at least five years in which actual demands are projected to be below the year 2025 demand levels included in this WMP revision. There is a strong likelihood that projected demands will exceed actual demands at least until 2025, if not beyond. (Note: Projected demands in the 2015 WMP for firm customers for year 2015 were 379,836 a-f per year, which is well above actual demands being experienced.)

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Austin Water Forward demand values reflect the best available information and were developed after a significant amount of work by the City of Austin staff. LCRA staff is relying on Region K Regional Water Planning Group values for the high-use demand year because the demand values for Austin Water Forward are for an average year and, to LCRA staff's knowledge, Austin Water Forward did not develop high-year water demands. The Region K projections are developed under TWDB guidelines for regional and state water supply planning to meet supply needs in high-use years.

LCRA staff relied on Region K projected demands for all customers individually reported in the Region K process. For customers not individually reported in the Region K process, actual recent water use values were used for projected water demands. For many of those customers, the highest water use was in 2011, a year in which any drought response measures were generally not triggered until later in the year. For manufacturing customers in Matagorda County, staff relied on customer-provided water use projections that reflect planned expansions.

LCRA staff reviewed demand information from 2012 through 2017 as part of the development of municipal demands for the average-use year. (The draft technical paper also considered 2017, and is being revised to reflect this.) These demands were compared to 2011 to develop a factor for the normal/average-use year. These years reflect the most recent water use data available, and include a combination of drought and non-drought years.

A table comparing projected 2025 water demands to the demands in the 2015 WMP is posted on the [Water Management Plan update](#) webpage on LCRA.org.

Comments on agricultural demands:

From CTWC: It is unclear how LCRA's Draft Downstream Agricultural Demands compare to the Region K 2020 Demands, since the Region K Irrigation Demand Projections appearing in Table 1 of this Draft Paper appear to be presented somewhat differently from the tables that were discussed by the Region K Population and Water Demand Committee. If LCRA can provide a reference chart to facilitate the comparison and understanding of its latest Demand proposals, or, if LCRA can point us to the identical "Table 1" within the Region K documents, that would be very helpful.

Please provide information on the estimation of and accounting for the conveyance losses that occur between the point where stored water is released from an upstream reservoir to the point that the water is diverted from the river. In other words, what is the magnitude of the conveyance losses for releases of stored water from the Highland Lakes? How is LCRA compensated for the value of the water that is lost along the way?

In its development of Table 2 of the Draft Paper, LCRA briefly describes the components of its demand methodology for Downstream Agricultural Operations, but it is not clear that such calculations could be validated or repeated without more information. Most importantly, the Total Demands presented in Table 2 are huge numbers (indicating a maximum total annual demand of 422,001 acre-feet/year), likely exceeding the Combined Firm Yield of Lakes Buchanan and Travis, and possibly calculated without assurance that such water will be used beneficially and without waste. It is unclear whether such water would be supplied from the storage reservoirs or from LCRA's run-of-river water rights. Although LCRA proposes to respect the maximum year demands that Region K is using for this Water User Group as an upper limit on its own demand projections, CTWC remains concerned that Region K's Agricultural Demand numbers are far too high to be used as guidance in this process.

How do you account for orders placed by Agricultural Interruptible customers that are not diverted when it passes by the irrigation division's diversion point on the river, leaving those volumes of water available to be "re-ordered"?

How does LCRA utilize water pricing as a method to encourage conservation and reduce demands?

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LCRA response to agricultural demands-related comments:

The agricultural demands for downstream irrigation operations for this WMP revision are based on values approved by the Region K Population and Demand Committee which were included in the county totals approved by Region K and TWDB. Documentation of the work by Region K, as well as the review submission to TWDB and the TWDB response are posted on the [Water Management Plan update](#) webpage on LCRA.org.

The maximum agricultural demand values proposed for this WMP revision were developed by Region K and are based on 2011 actual water use, with adjustments to reflect lower demands that would be expected in a repeat of 2011 conditions as a result of the surcharge levels that have been implemented since 2011. The demand in any year would be supplied first by LCRA's downstream water rights (Garwood, Lakeside, Gulf Coast and Pierce Ranch) and then from the Highland Lakes. The amount of demand met from the Highland Lakes will be a model output.

LCRA includes a factor added to the modeled releases of water from the Highland Lakes to account for interruptible water that is ordered but not diverted. This factor is documented with the modeling assumptions. LCRA's water rate for interruptible agricultural customers uses the water delivered to the customers' fields for determining the number of billing units. This approach to rate design results in a higher unit rate (in dollars per acre-foot) than if the additional release amounts for ordered-but-not-diverted water and canal losses were added into the billing units; however, the overall revenue sought to be collected is the same.

LCRA has a pricing structure for interruptible water that includes surcharges for higher amounts of water use, similar to the tiered pricing structures that many municipal water providers use for their retail water customers. This structure is specifically designed to encourage increased water conservation. LCRA has implemented substantial rate increases among its interruptible water customers over the few years, with the goal of reaching a full cost of service rate over about seven years. Agricultural water demand by LCRA's interruptible customers is affected by a number of factors, including weather, fuel and fertilizer costs, and global rice markets, so it is difficult to determine whether these rate increases affected water demand.

Comment related to demands for power plants:

From CTWC: It is unclear why the volumes of water used by the various power plants exclude the demand in 2011 at some power plants and include the year 2011 at others. The Decker and Fayette Power Plants diverted very high volumes of water in 2011, yet the year 2011 is not used in LCRA's calculation of a minimum annual demand level. Please explain the basis for that decision, which apparently lowers the demand projections for these power plants. We are not aware of weather related circumstances that would justify omission of 2011 data. If the power plants diverted unusually high volumes of water in 2011 because such water was being released from storage for LCRA's downstream agricultural irrigation customers, this interrelationship should be explained.

LCRA response to the power plants demands-related comment:

The demands for power plants were based on year 2011 unless the highest-use year was a different year. For the Fayette Power Project and Decker Power Plant, the highest-use year was 2011; for the South Texas Project, it was 2007; for Bastrop Energy Partners, it was 2014; and for the Thomas C. Ferguson Power Plant, it was 2017.

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Comments related to the weather-varied demand approach:

From the City of Austin: The City recommends LCRA consider using a different methodology to select average vs. hot-dry demand years for firm customers (excluding power plants). The draft technical paper published to the WMP website at the end of May described the categorization methodology used by LCRA to determine years that firm customers (excluding power plants) would have “average” and “hot-dry” demand. This methodology incorrectly categorizes important drought years as years that would have average demands. The City, working with their hydrology consultant, is proposing an alternative method which the City believes results in a more appropriate representation of the conditions that lead to hot-dry or average demands. This alternative methodology, described in more detail in Attachment 2, uses precipitation departure and evaporation as the two categorization variables rather than precipitation and temperature as in the proposed methodology.

From the HLFWCC: The proposed new demand projection methodology may put firm customers’ municipal water supplies at risk. HLFWCC members have questions and concerns about using the new, proposed methodology to calculate projected demand because it may reduce reliability of and increases risk to public water supply. In the May 2018 draft technical paper entitled, “Development of Projected Firm Demands for Municipal and Other Firm Uses,” LCRA explains that it is adjusting the Region K municipal water demands to account for reduced demand in years that are not “hot and dry high-use demand years” based on a new approach. In the interest of time, the new proposed Austin-only approach is not discussed in these comments; however, for non-Austin users, HLFWCC offers the following initial comments on the proposed new methodology. As we understand it, for non-Austin users, LCRA proposes to base water demand projections in the WMP on lower (“non-high”) demand discovered by averaging water use from 2011 through 2016, comparing that period to water use in 2011, and applying the ratio of those calculations to Region K’s projected water demands. The technical paper states that this new “weather-varied” demand projection methodology results in a 15% reduction to previously forecasted non-Austin water demand, and a finding that less than half of the historical period would be considered a “high-use” year over the selected historical period (i.e., 35% of the years between 1940 and 2016). HLFWCC would like an opportunity to review these calculations and input data and discuss our questions and concerns with LCRA staff.

It is unclear from the technical paper why this new “weather-varied” yet limited averaging approach to demand forecasting is relevant or necessary, but HLFWCC submits that consideration of demand in years that are “hot and dry high-use demand years” is an important purpose of the WMP and should be one of the underlying conditions assumed for all long-term planning purposes. HLFWCC is concerned that the averaging methodology described in the technical paper may result in a risk to future firm water supplies. HLFWCC believes that it may be more appropriate to continue using a more conservative approach, one that is the most protective of public water supplies and consistent with the Certificates of Adjudication entrusted to LCRA.

From CTWC: What is the objective of LCRA’s development and application of a “weather-varied” methodology to calculate Demands for various types of water uses? To assist our understanding of the impacts of these proposed numbers and methods, would you please provide a reference chart that compares the Demands proposed under these Draft Technical Papers against: 1) the Demand assumptions used in the 2015 WMP; and 2) to the extent they are comparable, to the Projected Demands approved by the Texas Water Development Board (TWDB) for use by Region K?

How does LCRA’s “weather-varied” methodology account for the trend toward warmer temperatures that this region is experiencing? How does the methodology recognize and adjust for the extremely low inflows to the Highland Lakes that are now the “new normal”?

From NWF, TLWP and TPWD: In general, we believe the concept of incorporating average year demands rather than assuming extreme dry year demands each year is an improvement in the process. The technical paper is quite helpful

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in explaining how the demand estimates were derived and how the determination is made about which category an individual year falls into.

LCRA response to weather-varied approach related comments:

While there is more than one approach to developing weather-varied demands, LCRA staff chose to use the proposed approach because it relies on information for which data is readily available for the entire period of record. For municipal and manufacturing demands, this approach categorizes 35 years as meeting the criteria for high-use year demands. However, the demand level for high-use years is based on water use expected under a repeat of 2011 conditions (the most severe conditions of any year in the period of record), while factoring in population growth. Including this demand level in 35 of the 77 years in the period of record provides a level of conservatism. The approach proposed by Austin would add one additional year to the high-use category.

The objective in applying a weather-varied methodology is to develop a model that is accurate and conservative. The weather-varied methodology recognizes that a customer's maximum annual demand will not repeat itself every year over a 77-year period of record. The extension of the hydrologic record for this WMP revision through year 2016 includes the recent low-inflow years and allows the operational approach for this WMP revision to be evaluated against a repeat of that hydrology.

LCRA is posting a comparison of the 2025 projected demands, Region K demands and demands used in the 2015 WMP on the [Updating the 2015 Water Management Plan](#) webpage on [lcra.org](#).

Comments related to a conservative planning approach:

From the City of Austin: The Basin's recent drought experience calls for a conservative approach to planning. In the recent multiyear drought, the basin experienced a drought that has established a new critical period. Worsening multiyear droughts call for a reexamination of the practice of planning based only on the period of record hydrology, because by experience we have learned that drought hydrology can be worse than what has been planned for. Based on this, the City urges that at the very least the most conservative approaches should be taken in every regard when using period of record hydrology.

From Horseshoe Bay Resort: It seems as demand increases, so should the minimum combined storage to insure sufficient reserves over a similar period of time during extreme droughts. I am not sure this has been taken into consideration or discussed.

LCRA response to conservative planning approach-related comments:

The proposed approach is a reasonable, conservative approach. The schedule for this WMP revision process will allow LCRA to seek a WMP amendment that has been evaluated against the recent severe drought period through 2016. This WMP revision will test 2025 demands against a period of record from 1940 to 2016, while maintaining a minimum combined storage of lakes Buchanan and Travis of at least 600,000 acre-feet. An increase to the minimum combined storage of 600,000 acre-feet is not being considered at this time.

Comments related to recent low inflows

From the City of Austin: Since we are currently in a period of historically low inflows, there is further need for LCRA to plan conservatively. The last 12-month period, from June 1, 2017-May 31, 2018, was the third-lowest period of historic inflow to the Highland Lakes for that June-May timeframe in the POR. Additionally, calendar year 2017 was the eighth-lowest year in the POR for historic inflows and the inflow hydrology has continued to worsen through 2018. This is

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important for LCRA to consider as we go through the WMP update process. The historically low inflow may suggest changing hydrology and greater uncertainty in the future, which further reinforces the need to plan conservatively.

From CTWC: How is LCRA using the findings and conclusions of the August 2017 “Evaluation of Rainfall/Runoff Patterns in the Upper Colorado River Basin,” prepared for the TWDB by the Kennedy Resource Company, to adjust for the alarming declines in inflows to the Highland Lakes?

Will LCRA be using reduced inflows in its Water Availability Modeling to reflect the harsh reality of the present situation in the watersheds that feed the Highland Lakes? In the last few days, the LCRA River Operations Reports have indicated that gauged flows upstream of Lake Buchanan are ranging from 0 to 19 cubic feet per second. Such horribly low numbers should have significant consequences in the development of this WMP.

LCRA response to recent low inflow-related comments:

The period of record for this WMP revision, 1940-2016, includes several recent low-inflow years. Although 2017 (the eighth lowest year for inflows into the Highland Lakes) is not included, the hydrology for this WMP revision does include a four-year period with the first, second, third and seventh lowest inflow years to the Highland Lakes. While recent inflows in 2018 have been very low, flow levels below 20 cubic feet per second are not unprecedented. The gauged flows upstream of Lake Buchanan were also below 20 cubic feet per second in several of the recent years that are included in the hydrology for this WMP revision, including 2011, 2012, 2013 and 2014.

LCRA is not modifying the hydrologic approach for this WMP revision based on the study Evaluation of Rainfall/Runoff Patterns in the Upper Colorado River Basin. The WMP is a near-term operating plan and the hydrology includes the recent low-inflow years as discussed above.

Comments related to conservation and allocation of conserved water:

From the HLFWCC: LCRA should consider water conservation by firm water customers. For quite some time HLFWCC members and others have taken significant steps to reduce water use. HLFWCC members are concerned that their water conservation efforts by public water suppliers might result in the conserving water supplier’s demand projections being unrealistically lowered for WMP purposes. Water conservation comes at great monetary cost to the conserving entities; therefore, greater clarity regarding how conservation efforts affect the conserving water supplier and WMP calculations is needed.

From the City of Austin: The City requests that LCRA seek an ordering provision that would require in the next WMP update that the WMP equitably address reductions in demand due to significant customer conservation and water supply strategies. Austin Water is currently in the process of finalizing Water Forward, an Integrated Water Resources Plan for the City of Austin. This plan includes new demand management and supply strategies intended to increase Austin’s water resiliency, often through conservation, which also helps reduce demand on the Highland Lakes, including during times of drought. Other agencies such as LCRA and TWDB are also proponents of conservation, so the City believes it is appropriate for LCRA to consider a mechanism whereby allocations made by the WMP support conservation efforts and other demand offsets, and do not discourage these efforts by allocating a significant portion of the benefits to other customers. The City recommends that LCRA include a mechanism in the next WMP update for accounting for firm customer demand reduction and determining the equitable allocation of the benefits generated by that reduction.

[Repeated from Comments on Level of Demands] From NWF, TLWP and TPWD: ...it appears that the high-year demands for municipal and industrial customers, which are based on extrapolation from Region K demand projections, ignore the savings achieved through water conservation measures other than the plumbing fixture code measures incorporated into the TWDB demand projections. Because water conservation savings, other than plumbing fixture code implementation, are treated in the planning process as a supply source, the demand analysis appears to include the

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portion of projected demand expected, pursuant to the regional water plan, to be met through water conservation in the amount of demand expected, in the WMP process, to be met from the Highland Lakes, potentially resulting in overstated demands. The over-estimation of demands likely is highest for high-year demands.

LCRA response to conservation-related comments:

Region K projected demands for 2025 are based on water use in 2011, projected to 2025 population. These values include some, but not all, of the expected conservation measures that would be in place at that time. The demands do not reflect drought response measures that may be taken as combined storage levels fall during a drought. Such additional water savings would result in lower levels of firm demands than assumed. The use of Region K values for the high-use years is a conservative approach. The WMP makes interruptible water available to agricultural customers while protecting supply to meet firm demands through the repeat of the period of record, including the drought of record. Allocating conserved water in a way that does not allow that water to be considered when determining the available supply for interruptible water would be counter to the intent of the WMP.

Comments related to WMP model output:

From the City of Austin: The City requests that LCRA report all the same output parameters used from the modeling that LCRA did for the 2015 WMP. Specifically, we request that LCRA produce both a “Results Summary” document and a “Consolidated Monthly Run” summary to share with the stakeholders. Examples of both summary products are included as Attachments 3 and 4 in this document.

From NWF, TLWP and TPWD: We believe the model outputs provided in the most recent round of the revision process, which includes the types of outputs produced for the initial stakeholder process and those produced for the additional, truncated stakeholder process provided at the Board’s direction, provided useful information for understanding and discussing the implications of various approaches. Accordingly, we request that comparable modeling outputs be provided for the current process. The development of summary pages, with additional pages of detailed outputs, helps inform a more complete understanding of the modeling results.

In addition, we request that separate outputs be provided for assumed operations of the Arbuckle Reservoir. Basically, we would like to see a water-balance type of approach to help us understand the amount of water diverted into the reservoir and released from the reservoir for various purposes. That information would help inform understanding of the potential of the reservoir to “fine-tune” river operations. Understanding what bay inflows are coming directly from the river versus from the reservoir, also would be helpful. Although water quality data for reservoir releases currently are lacking, we are interested in understanding the potential for water chemistry to be affected by reservoir operations.

Pulse Flow Analysis: Consistent with the commitment stated on page 4-15 of the current water management plan, we would like to see an analysis of pulse flows in the river below Austin during the period with the new WMP in effect.

Additional Environmental Flow Trigger: Generally, we are supportive of the concept of adding another environmental flow trigger to better reflect seasonal changes in storage. To better understand the role of such seasonal triggers, we recommend undertaking an analysis of how reservoir volumes in March compare to those in July and to those for the proposed new trigger, which we understand might be November. During the last revision process, the July trigger for environmental flow requirements was added fairly late in the process without any consideration, to our knowledge, of whether the reservoir elevations for July triggers should differ from reservoir elevations for March triggers in order to maintain comparable levels of environmental flow attainment. For example, from a cursory review of historical data, it appears that a trigger level of 1.9 MAF in March would be met more often than a trigger level of 1.9 MAF in July. Our initial thinking is that the specific reservoir elevations associated with the various seasonal triggers should be adjusted to maintain the target attainment. That adjustment should apply for the July trigger and for the new trigger, if it is added.

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Wharton Gage Instream Flow Compliance: To help inform discussion of a potential new approach for determining compliance with instream flow requirements at the Wharton gage, we would appreciate receiving an analysis illustrating the problem to be addressed. Ideally, such an analysis would be designed to provide an understanding of the extent of the problem, including of whether it applies equally for subsistence and baseflow conditions. In addition, we would appreciate an analysis of the extent to which the Arbuckle Reservoir could be operated to capture instream flow releases from the Highland Lakes that exceed requirements at the Wharton gage. As noted above, we are concerned that the truncated stakeholder process currently proposed will not provide an adequate opportunity to discuss and refine an approach and, as a result, may fail to avoid unnecessary controversy during the Board and/or TCEQ decision process.

Bay Rainfall Inflow Relief Mechanism: If LCRA has a specific approach in mind, we would appreciate seeing a description of that approach and an illustration of how it would have worked with recent hydrology. Once we have a better understanding of the potential approach, we will be able to formulate a response. We also request consideration of a method for carrying forward some level of credit for reservoir inflows retained in storage through implementation of such an approach. The net effect of the approach, as we understand it, would be to reduce bay inflows during months that the rainfall-inflow-relief mechanism is triggered, which would allow more reservoir inflows to be stored for other purposes. We would like to explore a mechanism that would allow a portion of the stored inflows to be available to meet bay needs in subsequent months. As noted above, we are concerned that the truncated stakeholder process currently proposed will not provide an adequate opportunity to discuss and refine an approach and, as a result, may fail to avoid unnecessary controversy during the Board and/or TCEQ decision process.

LCRA response to model output-related comments:

LCRA will provide model output similar to the output provided in the last WMP revision process. LCRA staff also will work with the participants to develop output data that is responsive to additional specific requests.

Other comments and questions

From the City of Austin: The City recommends LCRA consider adjusting their methodology for the look-ahead test. The City recommends LCRA consider using a WAM-based look-ahead model for the WMP look-ahead test rather than LCRA's existing Excel model. A WAM-based model is more consistent with other planning processes which already use WAM models for their planning purposes, such as TCEQ and regional planning. A WAM-based look-ahead model would be easier for stakeholders to use, and would make the process more transparent and accessible. The City's hydrology consultant has developed a WAM-based look-ahead model that could be shared with LCRA and can accommodate the stochastic elements of LCRA's look-ahead model.

LCRA response: LCRA will consider this recommendation.

From CTWC: Where is the discussion on Environmental Flow Demands? Where are these demands acknowledged as Firm commitments, possibly released from lake storage if needed?

LCRA response: For this WMP revision, environmental flows will continue to be based the same framework in place in the 2015 plan - Subsistence, Base-Dry and Base-Average instream flow levels and Threshold plus four operational levels for Matagorda Bay inflows. The amount of demand for environmental flows is a function of the hydrology, water demands from LCRA customers and other water rights holders, and water management approaches. The model will report the amount of LCRA water supplied to help meet environmental flow needs.

From CTWC: Please provide a copy of the Technical Paper regarding the City of Corpus Christi water right that is referenced in this document.

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LCRA response: The City of Corpus Christi water right is included at its full authorized amount (35,000 a-f/year) for this WMP revision. The same assumption was included for the 2015 WMP.

From CTWC: Where do you account for potential Emergency Hydroelectric Releases?

LCRA response: Emergency hydroelectric releases are factored into the model as part of a simulated demand that represents conveyance adjustments and other releases amounting to an average of about 30 cubic feet per second on a daily basis. Releases made for emergency hydroelectric generation are reported in LCRA's annual water use summaries. Over the past five years, releases have averaged 164 acre-feet per year. The maximum release in one year was 490 acre-feet in 2014.

From CTWC: How is the 50,000 acre-feet/year LCRA Board "Reserve" accounted for in the Demand numbers described in these Technical Papers? What is the purpose of the Board Reserve number?

LCRA response: The firm demands used for the WMP revision are demands expected to be in place in 2025 and are significantly less than LCRA's contractual commitments. These demands are not affected by the LCRA Board of Directors' 50,000 acre-foot reservation, which relates to the amount of water available for entering into contracts. The LCRA Board made the reservation out of concern for the future needs of LCRA's 35-county water service area, including areas using groundwater supplies that are becoming depleted or are of poor water quality.

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