

AGENDA ITEM MEMO

BOARD MEETING DATE: July 7, 2021

TO: Board Members

THROUGH: Jeff Walker, Executive Administrator
Ashley Harden, General Counsel
Jessica Pena, Deputy Executive Administrator, Water Supply & Infrastructure

FROM: Temple McKinnon, Director, Water Supply Planning

SUBJECT: Adoption of the 2022 State Water Plan

ACTION REQUESTED

Consider adoption of the 2022 State Water Plan.

BACKGROUND

Every five years, the Texas Water Development Board (TWDB) is required by Texas Water Code §16.051(a) to adopt a comprehensive state water plan that incorporates the approved regional water plans. The state water plan is to

- provide for the orderly development, management, and conservation of water resources,
- prepare for and respond to drought conditions, and
- make sufficient water available at a reasonable cost to ensure public health, safety, and welfare and further economic development while protecting the agricultural and natural resources of the entire state.

The 2022 State Water Plan must be adopted no later than January 5, 2022 and will be the fifth state water plan developed through the regional water planning process as mandated by Senate Bill 1 in 1997 and Texas' eleventh state water plan developed since 1957.

At the end of each five-year regional water planning cycle, the Executive Administrator compiles information from the Board-approved regional water plans and other sources to develop the state water plan, which is published for public comment and, after consideration of public comments, adopted by the Board. Once adopted, the state water plan is submitted to the Governor, Lieutenant Governor, Speaker of the Texas House of Representatives, and the appropriate legislative committees.

Our Mission

Leading the state's efforts in ensuring a secure water future for Texas and its citizens

Board Members

Brooke T. Paup, Chairwoman | Kathleen Jackson, Board Member

Jeff Walker, Executive Administrator

In addition to incorporating the approved regional water plans, the state water plan, as formally adopted by the Board, serves as: a guide to state water policy; includes legislative recommendations that the Board believes are needed and desired to facilitate more voluntary water transfers; and, identifies river and stream segments of unique ecological value and sites of unique value for the construction of reservoirs that the Board recommends for protection.

KEY ISSUES

The Board authorized publishing the Draft 2022 State Water Plan document for public comment at its April 8, 2021 meeting. The public comment period extended from April 8 to May 26, 2021. Notice of the public comment period, public hearing, and the Board's intent to adopt the 2022 State Water Plan was published in the *Texas Register* on April 23, 2021.

The TWDB held a public hearing on May 24, 2021, 1:00 pm, through GoToWebinar and at the Stephen F. Austin Building in Austin, Texas to receive comments on the Draft 2022 State Water Plan. A total of 55 people attended the public hearing, with four organizations and four individuals providing oral comments. The TWDB also received written comments from 15 organizations and 76 individuals during the comment period.

On June 18, 2021, the interactive version of the state water plan was made available to the public. The 2022 State Water Plan document, together with a 2022 Interactive State Water Plan (ISWP) website, meet all requirements under TWC §§16.051, 16.053, 16.054, and 16.055 and 31 Texas Administrative Code (TAC) §358.4.

The TWDB expresses appreciation to all the stakeholders who participated in and provided input to, the development of the 16 regional water plans and this state water plan. The TWDB appreciates all the comments that were submitted. Many of the public comments addressed more than one issue. The issues raised were grouped into the following general categories:

- General comments
- Policy recommendations
- Drought and drought response
- Climate Change
- Water demand projections
- Water availability
- Environmental flows
- Groundwater
- Water management strategies and projects
- Conservation
- Unmet needs
- Editorial corrections/additions

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Recommended responses have been prepared for each relevant issue raised by the comments, including a recommended change to the plan, where changes were warranted. A summary of the comments received and TWDB responses are included as Attachment A.

Additionally, minor editorial corrections, including numerical corrections, have been made to the draft document.

The plan, as adopted today, will initially be posted online only as a transitory document that, prior to January 5, 2022, will be replaced by a graphically enhanced version for the purpose of final publication and distribution.

RECOMMENDATION

The Executive Administrator recommends the Board's adoption of the 2022 State Water Plan, including the changes described herein and with the incorporation of the online 2022 ISWP website. The Executive Administrator also recommends authorizing making additional minor technical and non-substantive language edits, as necessary, prior to the final publication of the graphically enhanced version.

Attachment: Summary of comments received on the Draft 2022 State Water Plan and TWDB responses to the comments

**Summary of comments received on the draft 2022 State Water Plan
and
TWDB responses to the comments**

The TWDB appreciates all of the comments that were received

An asterisk "*" indicates a comment that warranted a change to the water plan document

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General comments

Comment: Representative Kyle Beidermann supports the state water plan being updated every 2 years in areas of the state experiencing the highest stress on the groundwater aquifers, and/or in those areas of the state experiencing severe drought conditions.

Response: The five-year planning cycle period is based on statute and will accommodate the variations across the state with regard to preparing for a repeat of the worst recorded drought conditions. Real-time groundwater monitoring data may be hosted by certain groundwater conservation districts across the state and is utilized in the development of the regional water plans as available. No changes were made in response to this comment.

Comment: Central Texas Water Coalition commented that they appreciate that this is a "living document". The increased emphasis on conservation is an important component to this plan and hope this emphasis remains in future plans.

Response: The Texas Water Development Board (TWDB) appreciates this comment. The TWDB supports all conservation efforts and will continue to make an effort to emphasize consideration of conservation in future plans. No changes were made in response to this comment.

Comment: Sierra Club Lone Star Chapter and Hill Country Alliance commented that they have seen a marked improvement in the sophistication, credibility, and value of State Water Plans since the passage of Senate Bill 1 in 1997. They, along with the National Wildlife Federation and Galveston Bay Foundation, applaud the development of the interactive State Water Plan and other data transparency efforts to view historical and projected water data.

Response: The TWDB appreciates this comment.

Comment: Freese and Nichols, Inc. noted that a link to the state interactive website did not work and suggested that the 2022 State Water Plan also include a brief (1-2 page) summary of the regional plans by region. This would allow the reader to understand regional issues and findings without access to a computer or searching 16 individual regional reports.

Response: The 2022 Interactive State Water Plan was under development during public review of the draft state water plan and is now accessible at the website <https://2022.texasstatewaterplan.org>. Regional summaries of each of the 16 regional water plans are being developed and can be accessed on the 2022 State Water Plan webpage at <http://www.twdb.texas.gov/waterplanning/swp/2022/index.asp> later this summer. No changes were made in response to this comment.

Comment: Hill Country Alliance recommended that the TWDB adopt and apply a set of guiding principles that will serve as a blueprint for long-term water sustainability. For example: The economy and land values of Texas depend on meeting its water needs in a way that does no harm to rivers, streams, springs, and aquifers.

Response: Development of the regional and state water plans are already guided by the principles that are set forth in 31 Texas Administrative Code (TAC) §358.3 and that reflect the public interest of the entire state. The TWDB is currently performing its review of the planning guidance principles

pursuant to Texas Water Code §16.051(d) and, if revisions are warranted. No changes were made in response to this comment.

Comment: *Hill Country Alliance commented that the TWDB, like other agencies, should create and enact a conflict of interest policy to avoid the perception or temptation of conflict of interest by regional water planning group technical consultants.*

Response: The process of consultant selection and procurement continues to lie with the regional water planning groups. Any determination of conflict of interest will be made by the regional water planning groups. Further, the procurement of professional services must be in accordance with the Texas Government Code Chapter 2254 and 31 TAC §355.92. No changes were made in response to this comment.

Comment: *The Texas Parks and Wildlife Department commends the TWDB for producing such a detailed and comprehensive Draft Plan and applauds the TWDB's development of a suite of online and interactive tools and dashboards which allow stakeholders and the general public to better access and understand the water planning information that affects them. The Texas Parks and Wildlife Department greatly appreciates being a participant in the water planning process and thanked the TWDB for the opportunity to review the Draft Plan.*

Response: The TWDB appreciates this comment.

Comment: *The Texas Parks and Wildlife Department commented that the Draft Plan states, "The construction of a new reservoir can increase the reliable volume of permitted water available for annual diversion" (Section 5.3, page D-69). The TPWD understands that perspective. It is important to emphasize, however, that the ultimate siting of a new reservoir has important implications for other human and environmental values. As such, it is paramount in the earliest stages of contemplating a new reservoir that resource agencies be adequately consulted and engaged such that due consideration may be given to strategies that maintain and/or limit impacts upon the state's fish, wildlife, and recreational resources.*

Response: The TWDB appreciates this comment. If implemented, projects must adhere to all applicable federal, state, and local permitting requirements. The TWDB encourages TPWD's representatives on the regional water planning groups to coordinate with the planning groups and reservoir sponsors on this topic, as applicable. No changes were made in response to this comment.

Policy recommendations

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that the TWDB has significant expertise and experience on water matters that could generate valuable legislative and policy recommendations, and that they hope to see such recommendations in future iterations of the State Water Plan.*

Response: The TWDB looked at a variety of potential policy recommendations including based on a thorough review of the numerous legislative recommendations in the 2021 regional water plans, those previous state water plan policy recommendations and on the experience of staff. On February 10, 2021, the Executive Administrator brought an item to the Board at a public meeting for consideration with proposed policy recommendations to be included in the Draft 2022 State Water Plan, at which time the public was welcome to offer suggestions and comment. There were no comments received prior to or after that Board meeting. The TWDB focuses on making strong, well-founded, statewide policy recommendations that focus on state water planning and the statutorily required considerations under Texas Water Code Sections 16.051(b) and (e) rather than offering new research ideas or (re)raising policy issues that have already been either long-debated or resolved by the legislature at the state level. No changes were made in response to this comment.

Comment: *Environmental Defense Fund commented that the Draft Plan does not mention that the managed depletion of groundwater resources could reduce surface water availability in certain watersheds. The TWDB has determined that approximately thirty percent of the water flowing in rivers in Texas originates from groundwater, yet the Draft State Water Plan does not consider these connections. This is in large part because surface Water Availability Models (WAMs) “do not account for stream-aquifer interactions over time or variable hydrologic conditions and GAMs do not account for streamflow changes associated with permitted surface-water withdrawals and/or return flows” (HDR, 2007). In other words, the WAMs and the GAMs function in isolation from one another even though in reality, the availability of surface water and groundwater are influenced by each other. The State Water Plan should include a policy recommendation that the State conduct a study to better understand how managed depletion impacts surface water availability and supply.*

***Response:** A study to better understand how managed depletions impact surface water availability in the state would be valuable but difficult to carry out with current models and data. As noted in the comments received, water availability models (WAMs) and groundwater availability models (GAMs) operate on differing spatial and temporal scales. Additionally, neither are capable of accurately modeling short-term fluctuations in surface water-groundwater interactions, thus limiting the ability to model the impact of changes in the management of one resource (surface water or groundwater) on the other (groundwater or surface water). Further, there is limited data available statewide to inform the development, calibration, and validation of models that could be used to characterize surface water-groundwater interactions across a river basin scale. The collection of data and the development of models needed to jointly manage surface water and groundwater statewide will require multiple years to complete, additional, and significant allocation of financial and other resources, and cooperation from multiple entities to carry out. In the meantime, the TWDB and partner agencies are conducting studies to better understand surface water-groundwater interactions in specific areas of the state including the Colorado River in Bastrop County, South Llano River in Edwards and Kimble counties, and the Devils River in Val Verde County. These studies will increase our understanding and ability to provide information about how managed depletion of groundwater affects surface water availability and supply.

Further identification of surface-groundwater interactions as relates to the water availability models has been added to the last paragraph of Section 5.2 as follows: “Other factors not presently accounted for in the methodology for assessing surface water availability, but which may impact it, include stream-aquifer interactions, changes over time to reservoir inflows, and evaporative loss from reservoirs. More than half of the annual statewide surface water availability of 12.7 million acre-feet in 2020 occurs within the Trinity, Neches, and Sabine river basins (Figure 5-4, Appendix B).”

Comment: *The Texas Parks and Wildlife Department encourages the TWDB and regional water planning groups to support studies to investigate the groundwater/surface water interaction within each region and to develop groundwater strategies that are consistent with the protection of springs and groundwater-based habitats as well as desired future conditions.*

Response: The TWDB appreciates this comment. No changes were made in response to this comment.

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that they oppose designations of reservoir sites unique for construction.*

Response: Reservoir site protection is important to meeting the state’s future water supply needs throughout and beyond the current planning horizon. Pursuant to TWC §16.053(e)(6) and 31 TAC §357.43, regional water planning groups are required to identify sites of unique value for construction of reservoirs that the planning group recommends for protection. Texas Water Code §16.051(e) also requires that the state water plan identify sites of unique value for the construction of reservoirs that the TWDB recommends for protection. Designation of a unique reservoir site does not prohibit the ongoing use of, or further development of, the associated land by private interests. None of the three sites of unique value for the construction of reservoirs being recommended in the state water plan were previously designated by the Texas Legislature. No changes were made in response to this comment.

Comment: *Texas Parks and Wildlife Department concurs with the draft plan’s recommendation of five river or stream segments of unique ecological value.*

Comment: *Sierra Club Lone Star Chapter commented that they support the legislative recommendations for designation of stream segments.*

Response: The TWDB appreciates these comments. No changes were made in response to these comments.

Comment: *Hill Country Alliance commented that the preservation of the natural environment via designation of unique stream segments is an important component of the Hill Country’s economy. The Hill Country Alliance recommends that the TWDB encourage planning groups to actively promote the designation of more unique stream segments in future legislation.*

Response: Chapter 2 of the plan includes the regional water planning group recommendations of unique river or stream segments as policy recommendations directed to the Texas Legislature for potential designation. The TWDB encourages the commenter to work directly with their regional water planning group to identify segments considered appropriate to designate and to promote the designation of more unique stream segments in future legislation. No changes were made in response to this comment.

Drought and drought response

Comment: Representative Kyle Beidermann commented that an in-depth discussion on what options are available to Texas citizens when a severe drought occurs, similar to the 2010-2015 drought, should be added to the plan. For example, the narrative should address the meaning of a declaration of an emergency versus a disaster and identify which state agencies and other parties have roles and capabilities in responding to it and that funding mechanisms should be highlighted along with the names and contact information for each Priority Groundwater Management Area and other areas of the state not having GCDs.

***Response:** Section 3.3 of the state water plan outlines drought response roles at the state, regional, and local levels. Whereas the state water plan provides a high-level summary of information and recommendations, the regional water plans have more detailed drought planning, response and recommendations for the entities in their planning area. This information is included in Chapter 7 of each regional water plan and interested parties should refer to the regional water plans for more detailed discussions.

Additionally, Section 3.3.1 of the plan has been modified to include a description of the process used by the Drought Preparedness Council to recommend to the Governor that a drought disaster proclamation be issued for certain counties impacted by drought. The TWDB provides data upon which the Council relies to make their recommendations. Section 3.3.1 is revised as follows: (additional language prior to last paragraph) “Using data from the U.S. Drought Monitor, the chair of the Drought Preparedness Council makes a recommendation to the governor as to which counties should be included in a drought disaster proclamation. Counties for which any portion of the county is identified as drought stage D3 (extreme drought) or D4 (exceptional drought) per the U.S. Drought Monitor, and any county that has at least 50 percent of the county identified as drought stage D2 (severe drought) or higher for five weeks, inform the recommendation. In making the recommendation, the chair of the Drought Preparedness Council consults with the Texas Water Development Board, Texas Commission on Environmental Quality, river authorities, groundwater conservation districts, and when necessary, local officials to gain further information. The chair may then develop a recommendation based upon specific required criteria.”

Comment: Sierra Club Lone Star Chapter, National Wildlife Federation, and Hill Country Alliance commented that the plan does not give due consideration to the use of drought management in reducing future water demands during a drought as severe as the drought of record and, thus, future demands are likely over-estimated. The five planning groups that recommend drought management recommend 158,000 AFY in reduced municipal water use in 2070 and represent ~25 percent of the projected 2070 population. The 11 planning groups that do not recommend drought management should recommend conservative drought management (ex: 5 percent reduction in demands for municipal WUGs with needs) in line with the 5 planning groups that recommended drought management.

Response: In developing dry-year projections and water management strategies to address them, it is important to know how and where drought measures will fit into the calculations. For example, incorporating the lower per capita water use measured under drought restrictions as a baseline dry-year per capita use would then necessitate that drought measure strategies should not then also be recommended as a water management strategy to address needs calculated from such a per capita rate because that per capita rate would already reflect drought management strategy benefits. Planning groups must consider drought management for each identified need and document why drought management was not recommended. To assist with consideration of

drought management strategies during development of the 2021 Regional Water Plans, the TWDB developed a drought management costing tool for the planning groups' use that provided information on economic tradeoffs of drought strategies. The TWDB will provide drought management related comments received on the state water plan as well as data regarding how other planning groups assessed drought management to all 16 of the planning groups in the state for their information and consideration during the development of the 2026 Regional Water Plans. Ultimately, the decision to recommend a particular water management strategy is for each regional water planning group to make. No changes were made in response to this comment.

***Comment:** Sierra Club Lone Star Chapter and Hill Country Alliance commented that the TWDB should actively encourage and assist municipal water utilities to revamp drought contingency plans to at least partially incorporate triggers based on information from the Palmer Drought Severity Index and the U.S. Drought Monitor and not rely so heavily on triggers based on water sources and that the TWDB should encourage and facilitate efforts of water user groups in common news media markets and/or sharing water sources to collaborate more and seek more consistency in the development and implementation of drought contingency plans.*

Response: The TWDB drought dashboard (<https://waterdatafortexas.org/drought>) provides 1) U.S. Drought Monitor data by county and by HUC08 watershed, including time series data for the county or HUC08 of interest (2002—to present); 2) Monthly Palmer Drought Severity Index data by county; 3) 1-, 3-, 6-, 12-, and 24-month Standardized Precipitation Index by county; 4) Monthly rainfall and temperature anomalies, as well as total rainfall and monthly temperature by county and by HUC08, and includes the ability to download historical rainfall data from 1981-to present for a county or HUC08 of interest. It also provides several other drought indices that can be used to monitor drought onset, persistence, and impact (for example to vegetation) at different timescales.

The information products available on the drought dashboard provide guidance on current and persistent drought conditions. These products can be used to inform decisions on when to implement drought triggers that have been identified for supply sources. The TWDB will consider ways that guidance (in terms of examples) on how to use the information products available through the dashboard could be used by the regional planning groups and those developing DCPs, including through conversations and targeted training webinars organized by the Texas Commission on Environmental Quality or the Texas Department of Emergency Management / Drought Preparedness Council's quarterly meetings where TWDB typically participates. No changes were made in response to this comment.

Climate change

Comment: *Honorable Barbara Canales, Nueces County Judge commented that the plan should include an increased emphasis on the impacts of changing climate conditions on Coastal Texas and the unique challenges and pressures coastal counties and cities are facing including sea level rise and higher frequency of tropical storms and hurricanes and that the plan should include greater recognition of Texas' coastal bays and estuaries, which are only mentioned in the plan once, and their impacts to the Texas tourism economy and commercial fishing. The 2022 State Water Plan should affirm that coastal bays and estuaries are dependent on high quality and sufficient freshwater inflows. "Coastal county sub-regions" should be created so that the 18 coastal counties can work with each other on common coastal water issues in future water plans. Coastal counties are downstream from every Texas watershed and deserve special focus.*

Response: The primary objective of Texas' state water planning process is to ensure adequate water supplies in times of drought. The TWDB recognizes the importance of bays and estuaries and continues to support studies of bay and estuary inflows, including publishing information to support inflow needs assessments. This type of information is available to the regional water planning groups, and they are required to consider impacts of their plans on the environment when developing their plan. The boundaries of regional water planning areas are revisited every five years in a process by which the TWDB accepts comments and considers any requested changes. Regional water planning groups, including along the coast, may also create subcommittees, as they consider appropriate, to address certain issues and may coordinate and work with other planning regions on such issues. No changes were made in response to this comment.

Comment: *Greater Edwards Aquifer Alliance commented that the regional water plans and the state water plan should more explicitly evaluate the likely impacts of climate change on water resources and demands and develop water management strategies that reflect the reality of climate change.*

Comment: *Sierra Club Lone Star Chapter, Hill Country Alliance, and Environmental Defense Fund recommend that the TWDB discuss in this plan, and address in rule updates for next planning cycle, an evaluation of the likely impacts of climate change on the state's groundwater and surface water availability and future demands for water, with specific consideration for which water management strategies will work best in a Texas affected by climate change. They commented that, in places, the plan cites some sources in discussing availability and other topics but needs to bring the reality of climate change into the forefront of regional and state water planning in order to have an effective state water plan to secure a water future for Texas.*

Comment: *National Wildlife Federation, Galveston Bay Foundation, Greater Edwards Aquifer Alliance, and Hill Country Alliance commented that there is significant scientific evidence that Texas will continue to face challenges posed by increasing climate variability through the end of this century and that they recognize that the draft plan acknowledges climate-related uncertainties in future water supply (Section 5.9) and future water needs (Section 6.8). However, they strongly suggest expanding these sections to show a clear and individualized focus on climate-related stressors and that the plan should clearly identify climate drivers such as sea level rise, storm surge, increasing flood risks and temperature and precipitation changes in the future uncertainties. They comment that while including data on all these changes may not be feasible at this stage or may be covered elsewhere (such as regional flood planning), the plan should, at a minimum, provide a qualitative assessment of these changes to provide a comprehensive picture of the future related to the region's water planning and that a clear assessment of these climate threats in the plan will also allow the different planning groups to better understand vulnerabilities and manage their systems against future threats.*

Comment: Texas Parks and Wildlife Department commented that water management strategy evaluations should consider the uncertainty of changing climate and hydrology with regards to future water supply strategies and environmental flows.

Comment: National Wildlife Federation, Galveston Bay Foundation, Greater Edwards Aquifer Alliance, and Hill Country Alliance commented that they recommend ways to include climate-related projections in the plan including by: improving the future understanding of climate impacts by conducting region-specific vulnerability assessments to quantify impacts on water resources; identifying locally-applicable projections that can be utilized by regions in their regional water plans in the future; and by leveraging existing resources and best practices from other state water plans to compile region-specific existing studies on incorporating climate science in future water plans.

Comment: Freese and Nichols, Inc. commented that the water plan could be unintentionally misleading in discussing the uncertainty of future water supplies without mentioning the possible impact of climate change and that there is overwhelming evidence and scientific consensus that the global climate is warming and is likely to continue to warm and, while it is not currently possible to precisely quantify the impact of this warming on Texas' water supply, climate change certainly adds to our overall uncertainty. They recommend that the TWDB consider noting in this section [section 5.9] that the impacts of climate change may not be seen in the near-term (over the 5-year planning cycle), but the effects will likely be realized by the end of the planning horizon.

***Response:** Regional and state water planning address uncertainties related to water supply and demand, including related to past observed climate variability, in an adaptive manner rather than in a speculative manner. Water planning incorporates documented changes into the planning process as they occur. As directed by statute, Texas' water plans are based on drought conditions, including the benchmark drought of record—the period of time when hydrological conditions provided the least amount of water supply—using historical hydrological data. This baseline requirement does not limit regional water planning groups from also considering and attempting to address other types of water supply risks.

There is limited scientific information about the nature of long-term changes to water resources in Texas. The same can be said for how to address potential changes to water resources since it remains to be seen which regions might become wetter and which might become drier. Presently, there are no climate forecasting tools capable of providing meaningful, reliable estimates of changes to future water resources in Texas at the resolution and scale needed for regional water planning. To provide the best available, actionable science, grounded in historical data and patterns, the TWDB continues to collect data and work with regional planning groups to consider potential ways to improve estimates of water supply reliability in the face of drought.

The TWDB is funding a research project to better quantify the risk exposure of Texas' major water supply reservoirs. This research focuses primarily on developing a range of theoretical hydrologic conditions, based on historical data, but including droughts potentially worse than the drought of record. The TWDB has also launched studies to address how observed long-term hydrological change might affect future surface water availability. In addition, the TWDB is investing in improving the accuracy of the reservoir evaporation data it collects and compiles as a key hydrology input to the water availability models. The uncertainties associated with the existing reservoir evaporation dataset that the TWDB compiles precludes its use in trend analyses. With improved data on hand, the TWDB will be able to undertake an assessment of how future reservoir evaporative loss might impact future surface water availability, similar to how reservoir sedimentation is currently considered as a factor affecting future surface water availability. In addition, the TWDB is investing in a statewide weather monitoring system, the TexMesonet, which will aid in monitoring drought conditions and collect data on several different variables including

soil moisture data, which is currently monitored sparsely, to inform assessments of potential changes to watershed runoff and reservoir inflow.

The last paragraph of Section 5.9 has been changed to:

“Regional and state water planning address uncertainties related to water supply and demand, including related to climate variability, in a primarily adaptive manner rather than in a speculative manner. There currently isn’t much agreement among climate models (or scientists) about the nature of long-term changes to water resources in Texas and Although there are currently no forecasting tools capable of providing quantitative certainty about future water resources in Texas at the resolution needed for water planning. However, efforts to improve technical capabilities and address uncertainty are in progress. To provide the best available, actionable science, grounded in observed data and trends, the TWDB continues to collect data, provide technical services, improve water availability models, and support studies for consideration in developing the next state water plan. Further, the TWDB will continue to expand its understanding of the interactive relationship between the rivers and aquifers of Texas to improve planning and to better inform future water management and policy decisions.”

***Comment:** National Wildlife Federation, Galveston Bay Foundation, Greater Edwards Aquifer Alliance, and Hill Country Alliance commented that the increase in sea level rise will lead to saltwater intrusion in groundwater aquifers and that the state plan should include data on relative sea level changes to avoid underestimation of future groundwater availability. They commented that the plan should point to data sources that provide an estimate of sea level rise projections that can be utilized by relevant groundwater conservation districts, groundwater management areas, and regional water planning groups.*

Response: Available data on relative sea level changes may be used, to the extent possible, by groundwater conservation districts and regional water planners to evaluate possible saltwater intrusion in coastal aquifers. It is unlikely that minor sea level changes will substantially affect statewide groundwater availability. However, it is possible that sea level changes could affect groundwater conditions near the coast, particularly in areas already experiencing subsidence and an increased incidence of high tide nuisance (i.e., sunny day) flooding. No changes were made in response to this comment.

***Comment:** National Wildlife Federation, Galveston Bay Foundation, Greater Edwards Aquifer Alliance, and Hill Country Alliance commented that extreme events such as hurricanes and the more recent winter storm Uri can lead to direct consequences and damages to the water supply infrastructure. They comment that water management strategies identified in this plan should take extreme events into consideration and include strategies for creating resilient infrastructure in the future. They provided an example of including projects for dry flood-proofing against hurricanes using measures such as flood shields and water-resistant walls that will lower the risks to facilities and that, for existing water supply facilities and that the plan should anticipate emergency funds and resources for repairs, closures, and cleanup due to damage from unpredictable and extreme weather events.*

Response: Water management strategies and projects that improve the resiliency of a water system by demonstrating an appreciable increase to supply to ensure adequate water supplies during drought at the water user group level, such as through additional emergency interconnections between water providers or the development of new water supply source to diversify a utility's portfolio, are within the scope of regional and state water planning. However, protecting and maintaining existing water supply infrastructure that is already in place is the responsibility of water providers and the associated costs of doing so are specifically not within the

scope of regional and state water planning which is focused on increasing water supplies to water user groups or otherwise managing water demands under drought conditions. Political subdivisions may nevertheless obtain funding to implement projects to improve the resiliency of any of their existing water supply infrastructure through the TWDB's other financing programs. For example, the TWDB through its State Revolving Funds, currently provides emergency and urgent need initiatives at a zero percent interest rate and with some potential principal forgiveness associated with costs of recovering from extreme events, for example, that cause sudden damage of a water provider's facilities and has already provided these funds to multiple entities in response to water and wastewater facilities damaged during disasters. No changes were made in response to this comment.

Water demand projections

Comment: *Blanco City Council - Connie Barron Member commented that they believe the water demand projections for Blanco County are underestimated based upon local growth patterns and that they would appreciate having a City of Blanco or South Blanco County representative on the Region K Regional Water Planning Group.*

Response: Each planning group has the opportunity to provide locally available information to support revision requests to water demand projections as they develop their regional water plans. The TWDB notes that the Region K Regional Water Planning Group currently has one voting member that represents the Blanco County interest (James Sultemeier) and another voting member from Blanco County (Ronald Fieseler). We strongly encourage involvement in the regional water planning process. The public may access Region K contact information through the TWDB website to make contact with these representatives. No changes were made in response to this comment.

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that they support the basic methodology for projecting irrigation demand but feel the decline may be steeper than projected in later decades in the Panhandle regions as groundwater depletion becomes more of a limiting factor and regional economies shift. This rate of decline should be scrutinized every five year planning cycle.*

Response: The TWDB does reassess irrigation water demand for every five year planning cycle. Prior to each planning cycle, the TWDB reviews the most recently available irrigation groundwater pumpage and use data to inform the water demand baseline. And every five years, desired future conditions are established by the Groundwater Management Areas in the state, from which the TWDB develops modeled available groundwater values. Based on our current methodology, these modeled available groundwater values will determine the rate of decline for future decades for the groundwater component of the irrigation demands. No changes were made in response to this comment.

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that it would be helpful to have more information about the county-level livestock inventory estimates used in the calculation of future water use, especially more specific information about the relative proportion of livestock water demand from confined animal feeding operations other than the general statement in the plan.*

Response: Statewide 2017 livestock inventory estimates are available on the planning dashboard (Livestock Water Use) at <http://www.twdb.texas.gov/waterplanning/data/dashboard/index.asp>

Upon request, the TWDB can provide county-level livestock inventory estimates as available. The TWDB estimated 2019 confined animal feeding operation (CAFO) inventory using CAFO capacity data from the Texas Commission on Environmental Quality. The capacity of CAFOs are not typically 100 percent fully utilized, therefore ratios of livestock inventory to CAFO capacity by county were developed based data obtained from the Texas Cattle Feeders Association. Estimated historical livestock water use for CAFOs (cattle, milking cows and hogs) was approximately 35 percent in 2019. This data will be updated for the development of the 2026 regional water plans and released as supporting data for planning group review of draft water demands. No changes were made in response to this comment.

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that they agree with the manufacturing water demand projection methodology, but the next round of planning should consider the extent to which changes in the demand for fossil fuels will affect the type of manufacturing on the Texas Gulf Coast and possible impacts on manufacturing water use.*

Response: The TWDB reassesses manufacturing water demand for every five year planning cycle by reviewing the most recently available industrial water use data to inform the water demand baseline. Additionally, industrial development and production patterns are monitored in general terms, including projected economic output and employee growth trends along the Gulf Coast so that any significant change in actual conditions can be addressed in the next planning cycle. No changes were made in response to this comment.

Comment: *Freese and Nichols, Inc. commented that TWDB's policy decision to assume no growth in manufacturing and steam-electric power [water] demand is not reflective of the actual conditions of ongoing robust industrial growth in some regions and can present an obstacle to successful planning, especially when an individual manufacturing facility or power plant can require thousands or tens of thousands of acre-feet per year in supply. While the Draft 2022 State Water Plan accurately reflects the approved water demands, perhaps the TWDB can explain in greater detail in Section 4.2.6 why this approach was taken and provide brief clarification recognizing the finding of some regions that it may underestimate future water needs in later decades for manufacturing in some parts of the state.*

***Response:** The long-term trend of total manufacturing water use in Texas has been decreasing while manufacturing output has been increasing. The constant water demand projection after 2030 is considered a reasonable approach for projections considering historical trends, but there is no intended implication that future manufacturing conservation savings are already included in the water demand projections. While the historical trend for manufacturing water use appears to be decreasing, projecting water demands at a recent historical level, while updating the projections in each planning cycle, is considered as a reasonable approach to ensure that sufficient water is planned for manufacturing use. The constant projection for steam-electric power generation also reflects the recent industry's increasing trends of using more water efficient technology and the growing share of renewable energy that requires very little water to generate power in combination with increasing energy efficiency of customers. In the event of increases not adequately captured, regional water planning groups may amend their plans with projects to accommodate the demands and request a change to the projection although we recognize that it is preferable to include projections that adequately accommodate economic growth activities. Statements have been added to Sections 4.2.6 and 4.2.8 to characterize the concerns of some regions with manufacturing and steam-electric demand projections.

Additional language is added to the third paragraph of Section 4.2.6 as follows: "Overall, manufacturing accounts for approximately 8 percent of Texas' water demand across the planning horizon. The majority of Texas manufacturing occurs along the Gulf Coast, with Regions H and I accounting for nearly 70 percent of all manufacturing demand in 2070 (Figure 4-9). Regional water plans for Regions C and H noted concern that the assumption of no growth in manufacturing water demand after 2030 does not reflect ongoing manufacturing growth in the regions. The Region C plan stated that several water suppliers have included a management supply factor to help mitigate this concern. The Region H plan stated that it is unlikely that reductions in water use per production unit will offset all growth in manufacturing in the region and acknowledged the need for continuing evaluation of this topic in future planning cycles to consider the potential for mitigating influence from changes in regional industry categories, water use characteristics, and implementation of water-efficient technologies."

Additional language is added to the third paragraph of Section 4.2.8 as follows: "Steam-electric power accounts for roughly 5 percent of Texas' total water demand across the planning horizon. Regions G and K (occupying the Brazos and Lower Colorado basins) account for over 40 percent of statewide steam-electric power water demand. Regional water plans for Regions C and H noted concern that the assumption of no growth in steam-electric water demand after 2020 does not reflect ongoing growth in the electric demands in the regions. The Region C plan stated that several water suppliers have included a management supply factor to help mitigate this concern. The Region H plan acknowledged the need for continuing evaluation of this topic in future planning cycles to consider the potential for mitigating influence from changes in regional power generation water use characteristics, power generation facility types, and implementation of less water-intensive technologies."

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that they agree with the projected mining water demand but believe that the decline may be steeper than projected and begin as early as 2030.*

Response: TWDB is currently conducting a mining water use study with the Bureau of Economic Geology to inform the mining water use estimates and projections for the 2026 Regional Water Plans. TWDB has a dedicated webpage for this ongoing study at <https://www.twdb.texas.gov/waterplanning/data/projections/MiningStudy/index.asp>. The final report and its supporting data in dashboard form will be available on the TWDB's website in June 2022. As with other draft demand projections, the planning groups will be able to review these draft projections and provide locally available data to support revisions to the draft demands as they develop their next regional water plans. No changes were made in response to this comment.

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that they generally support the methodology for projecting municipal water demand. The statement that "dry-year water use usually reflects the highest per capita water use" may be a reflection that municipal water user groups do not have effective, or are not implementing successfully, drought contingency plans.*

Response: The baseline dry year projection for municipal water demand is based upon reported historic use. If drought contingency plans were implemented, the resulting reduced water use should be captured in the reported data to the TWDB. In developing dry-year projections and water management strategies to address them, it is important to know how and where drought measures will fit into the calculations. For example, incorporating the lower per capita water use measured under drought restrictions as a baseline dry-year per capita use would then necessitate that drought measure strategies should not then also be recommended as a water management strategy to address needs calculated from such a per capita rate because that per capita rate would already reflect drought management strategy benefits. The TWDB collects water restriction data reported to the Texas Commission on Environmental Quality annually and evaluates potential impacts of utilities water restrictions on their annual water use volumes and per capita water use. No changes were made in response to this comment.

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that they applaud the steam-electric power water demand projections but believe water demand may decline rather than remain constant. The TWDB should closely monitor developments when setting parameters for groups to consider steam-electric power demand in the next planning cycle.*

Response: The TWDB reassesses steam-electric power water demand for every five-year planning cycle by reviewing the most recently available industrial water use data to inform the water

demand baseline. Additionally, power generation facility development or retirement and production patterns are monitored and incorporated into the draft projections. As part of the demand review and revision process each planning cycle, planning groups may bring locally available data to support revision requests. No changes were made in response to this comment.

Water availability

Comment: *Texas Conservation Alliance commented that economical future water availability should avoid evaporative losses from surface storage, primarily through Aquifer Storage and Recovery (ASR) and that TWDB's recent study of ASR is a worthy first step toward the best available opportunity for future expansion of water availability in Texas.*

Response: Regional water planning groups are required to consider aquifer storage and recovery as a potentially feasible water management strategy and provide a specific assessment of the potential for aquifer storage and recovery projects to meet any identified significant water needs. Planning groups that do not recommend aquifer storage and recovery must document the reasons they did not. Aquifer storage and recovery may not be feasible for all water user groups and planning groups cited reasons such as lack of suitable geology in proximity to needs, cost constraints, or a lack of interested project sponsors for not recommending such strategies. The Statewide Survey of Aquifer Storage and Recovery and Aquifer Recharge will be a resource available to planning groups in their assessment of aquifer storage and recovery strategies during development of the 2026 regional water plans. No changes were made in response to this comment.

Comment: *Central Texas Water Coalition commented that the use of firm yield is concerning as it allows sources to be drawn down to zero and not account for the potential of drought worse than the drought of record. It is their understanding that the Region K plan does not incorporate the requirements of LCRA's water management plan so water availability is overstated. Reliance on firm yield for water planning is a dangerous practice and each region should be required to utilize safe yield or justify why they don't. The TWDB's rules should be amended to require the accounting of all permitted and or required water uses/requirements, including interruptible and environmental flow releases, in the Firm and Safe Yield methodologies. This would help to address the water supply uncertainty regarding the frequency, duration, and severity of future droughts. Studies are also needed that would support the direct incorporation of climatology into forward-looking water planning processes and management.*

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance expressed concerns about the more extensive use of "safe yield" rather than "firm yield". It is not clear in the plan what specific criteria the TWDB used to determine whether a request to use safe yield for certain reservoirs was warranted. They would like to see a more detailed explanation, perhaps by way of one or two examples, of how safe yield is calculated and how it differs from firm yield in demonstrating greater reliability in drought conditions (as opposed to recommending drought management to reduce water use to maintain a reserve in a reservoir.)*

Comment: *Central Texas Water Coalition commented that they are concerned that firm yield modeling assumptions significantly overstate the availability of surface water and cited several studies which indicate that inflows in the Colorado basin are decreased from those in the historical dataset of the water availability models and that the state water plan indicates that changes to inflows are not presently accounted for in modeling. They further indicated that the TWDB should acknowledge these issues and develop tools and adjustments to incorporate declining inflows into models, at least in the lower Colorado basin of Region K.*

***Response:** Current regional water planning rules and guidance provides a set of hydrologic modelling assumptions and methods to provide a common point from which to evaluate surface water availability, including how to estimate the firm yield of surface water supply reservoirs. This default approach is generally based on using a slightly modified (to also reflect sedimentation)

TCEQ, WAM Run 3 which aligns with the requirement that regional water plans be developed in accordance with Texas law and water rights. The state's WAM models are based on historic hydrologic data, including naturalized streamflow and reservoir net evaporation, which were available as of their most recent updates. The WAMs account for historic hydrologic conditions but do not make predictions about future reservoir inflows or other parameters.

The regional water planning groups are given significant flexibility to request variances to the default hydrologic modeling assumptions to allow them to reflect differing conditions, including more recent drought conditions they consider appropriate for addressing risks and for long-term planning in their region. The TWDB encourages regions to consider requesting modifications that will better reflect reasonably expected drought conditions and reviews each request and, if considered reasonable for long-term planning purposes, approves the hydrologic variance request. For example, WAM Run 3 assumes zero return flows, which is a conservative assumption that, if left unmodified, could result in lower basin water suppliers over-investing in new, potentially unnecessary projects which is partly why eight planning groups requested, and the TWDB approved, including some amount of return flows when developing their plans.

Because water 'supply' is a subset of the total water source 'availability' volume and because water 'needs' are secondarily calculated based on existing water supply volumes, needs estimates are potentially impacted anytime an underlying water availability volume changes. Note that when a region modifies a reservoir or reservoir system yield through a variance request, the original unmodified firm yield is still required to be reported in the plan documents.

There are many assumptions that must be considered when developing estimates of availability. Each of which may either increase or decrease the resulting availability estimates. For example, assuming some amount of return flows from upstream will reduce estimates of downstream water 'need' (potential shortages); whereas, the use of one-year safe yields reduces water availability estimates thereby increasing water needs. Both of those options might be employed by the same region even though they have countervailing impacts on availability.

A number of regions chose to incorporate additional protection against drought risks, including the occurrence of a drought worse than the drought of record, by using a one-year safe yield to provide water reserves. The safe yield analysis calculates, through iterative modeling runs, the annual volume of water (that is necessarily smaller than the firm yield volume) that can be diverted while still leaving an equivalent one-year supply in storage throughout the drought of record. The relative decrease in yield between firm and safe yield depends on the specific reservoir and associated historic data.

When making decisions related to determining water availability and the risks of not having sufficient water supplies, planning groups are expected to consider alternatives to developing additional water supply, such as drought restrictions. As described in Section 3.3.2 of the plan, planning groups generally chose to ensure water supply during a drought and did not generally consider it prudent to adopt a plan that would restrict normal economic and domestic activities through drought restrictions. Decisions to use safe yield or to recommend a particular water management strategy lies with the regional water planning groups and not with the TWDB.

Regional water planning groups may also address unquantified risks by recommending more strategies on the future supply side of the planning equation. In other words, instead of taking a conservative supply approach by lessening their existing supply estimates that, in turn will, result in greater calculated water needs, they may choose to simply recommend additional water management strategies and projects that would provide water supply in amounts greater than their identified water needs. The difference between using safe yield versus simply recommending additional supply projects beyond the identified needs, for example, depends on a planning group's

perception of and approach to mitigating water supply risks, including the risk of a new drought of record.

To assist the regional water planning groups in making these types of decisions regarding reservoir reliability in the face of uncertainty, the TWDB has contracted research to better quantify uncertainties and risks associated with surface water reservoirs. The intent is to provide additional tools to assist the planning groups in making better risk-based decisions. The TWDB also intends to work both internally and with the 16 regional water planning groups to develop additional, general guidelines and recommendations regarding the use of various safe yields and other factors that impact estimates of water availability. The TWDB intends to provide the results of the research, along with other potential technical guidance, for stakeholder comment and consideration during the next, 6th cycle of regional water planning.

The description regarding surface water availability has been clarified in the first paragraph of Section 5.2 to acknowledge that past changes to reservoir inflows are, in fact, taken into account in the WAMs even though future trends are not projected in the WAMs as follows :

“Surface water supplies in Texas come from Texas’ 15 major river basins and 8 coastal basins via 187 major reservoirs and numerous river diversions, known as run-of-river supplies (Figure 5-2). Surface water availability is determined using the Texas Commission on Environmental Quality’s surface water availability models (WAMs), which estimate the monthly and annual water volumes that can be diverted each year in drought of record conditions, all of which assume a repeat of the historic hydrologic record. The default model for planning purposes, known as WAM Run 3, conservatively assumes that all existing water rights are fully used without returning any flows to the river, unless a permit requires such returns, and is adjusted to consider the impacts due to sedimentation on reservoir yields. The state’s WAM models are based on historic data, including inflows, that was available as of their last updates. WAMs reflect historic changes to hydrology, including inflows, but do not attempt to make predictions about the future changes to inflows or other parameters. However, planning groups are allowed and encouraged to modify the default model to reflect appropriate conditions not included in WAM Run 3 when evaluating *existing* water supplies for planning purposes.

Justifiable modifications to the water availability models, which are expected to better reflect conditions encountered during a drought, include correcting known model errors; reflecting increased sedimentation or current river system operations; updating reservoir inflows to reflect recent drought conditions, including return flows; or utilizing a reservoir safe yield instead of firm yield. Safe yield is a reduced annual water volume that continues to be available from a reservoir for periods longer than a drought of record, which may provide a buffer against uncertainty for water supply purposes.

All regional water planning groups requested and received approval to modify their surface water availability analysis for the purpose of evaluating existing water supplies. Select modifications utilized in the development of the surface water availability models are summarized in Appendix B and available at <http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/hydroassumptions.asp>. Of note is that House Bill 723, enacted by the 86th Texas Legislature (2019), directed the Texas Commission on Environmental Quality to update the Brazos, Neches, Red, and Rio Grande water availability models by December 1, 2022. These updated models will be available and utilized in the next state water plan.”

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that they agree with the allowance to use a modeled groundwater peak factor to reflect more realistic groundwater use*

scenarios during drought conditions, assuming that long-term "desired future conditions" will be met. The Sierra Club Lone Star Chapter recommends that the TWDB clarify what is meant by use of phrases such as "legally authorized" and "within legal limits" in reference to what water sources are available as those phrases may be interpreted differently.

Response: The phrase "legally authorized" in terms of a water source generally means a water source that has been permitted by the Texas Commission on Environmental Quality or a groundwater conservation district, or a source that may be legally available through contractual rights, whichever is applicable. No changes were made in response to this comment.

Comment: *Freese and Nichols, Inc. commented that page D-79 of the plan notes some of the reasons water availability values change between state water plans. Another factor that is not mentioned is that there were different requirements for reporting groundwater availability between the 2017 State Water Plan and the 2022 State Water Plan. For example, in Region H the use of the groundwater peak factor in the 2022 State Water Plan and improved ability to reflect groundwater availability within Subsidence District counties allowed for a much higher groundwater availability for regional planning purposes, yet the amount of regulated supply has not changed much. The map shown on page D-81 may mislead readers in thinking there have been large changes in groundwater in a county when it is a reporting issue rather than a resource issue. For counties with new groundwater availability models there may be significant changes in resource availabilities. FNI suggests that this distinction be discussed on page D-79 and possibly added as a footnote to the map on page D-81.*

***Response:** The Groundwater paragraph of Section 5.8 has been modified and a footnote has been added to Figure 5-15 as follows:

"Both groundwater availability and supply increased as compared to the 2017 State Water Plan. Statewide, availability increased, though there was considerable variation by county, including relatively more decreases in western and southern counties (Figure 5-15). The greatest relative change in statewide availability occurred for the planning decade 2020, with an approximate 15 percent increase primarily due to policy decisions made as part of the groundwater management area joint planning process, although updated groundwater availability models may have contributed to noted differences. Additionally, groundwater availability reported for regional water planning purposes increased in several counties in Regions G and H where modeled available groundwater peak factors were utilized. Statewide, existing supply increased in all decades as compared to the 2017 State Water Plan."

Footnote to Figure 5-15 - "In the 2022 State Water Plan, modeled available groundwater peak factors were used to determine groundwater availability for certain aquifers in the following counties: Austin, Brazoria, Brazos, Madison, Montgomery, Walker, and Waller. Availability increases shown in these counties reflect changes in groundwater availability reported for regional water planning purposes and do not necessarily reflect increases in resource availability since the 2017 State Water Plan."

Comment: *Freese and Nichols, Inc. commented that it believes the statement: "Quantifying surface water availability for state water planning purposes relies largely on deriving a single firm yield or safe yield value that has been generated under the assumption that future hydrology—the pattern of precipitation, evaporation, and streamflow—will exactly correspond to a repeat of the historical hydrology as used to model water availability." is inaccurate and suggests the wording of this statement be changed to focus on a repeat of the historical drought as a reasonable basis for long-range planning.*

***Response:** The third paragraph of Section 5.9 is revised as follows:

“Quantifying surface water availability for state water planning purposes relies largely on deriving a single firm yield or safe yield value that has been generated under the assumption that future hydrology—the pattern of precipitation, evaporation, and streamflow—will exactly correspond to a repeat of the historical hydrology as used to model water availability.” based on the historical record that includes the drought of record, which serves as the benchmark condition for Texas’ long-term water planning. This approach has provided a reasonable basis for long-term planning.”

***Comment:** Belding Farms and Cockrell Investment Partners commented that surface water and groundwater are linked and that reliable springflows demonstrate sustainable water management for all users. They commented that private property right to water is protected when water is sustainably managed and appreciate the improved coordination efforts in the 2022 plan to address the importance of these interactions.*

Response: The TWDB appreciates this comment. No changes were made in response to this comment.

Environmental Flows

Comment: *The Texas Parks and Wildlife Department suggested the glossary definition for “environmental flows” be revised to remove the reference to “balancing human needs” in order to more accurately describe the environmental flow standards. They proposed the following definition “Environmental Flows – Includes instream flows in rivers and freshwater inflows to bays and estuaries. Environmental flows are the quantity and timing of streamflow of sufficient quality needed to maintain ecologically healthy streams and rivers, as well as the bays and estuaries they feed. Healthy aquatic ecosystems conserve biodiversity, support industries like recreation and commercial fishing, and provide ecosystem services like storm water attenuation and waste assimilation.”*

Response: The definition of environmental flows provided in the glossary is based on the Texas Commission on Environmental Quality’s definition, which aligns with the agency’s environmental flow standards. No changes were made in response to this comment.

Comment: *National Wildlife Federation, Greater Edwards Aquifer Alliance, and Hill Country Alliance commented that consideration of environmental flow needs in regional planning currently consists of acknowledging that permits for new water supply projects will be subject to environmental flow provisions consistent with any applicable flow standards—as is required under Senate Bill 3. While Senate Bill 3 established, among other things, a process for adopting environmental flow standards to inform affirmative strategies aimed at protecting flow, the Board can play a larger role in recommending strategies for environmental flow protection. Some planning groups have also considered impacts of supply projects on streamflow and changes to bay and estuary inflows, however, as was noted in the Draft 2022 State Water Plan, “these evaluations varied by region based on the type of project under consideration and the relevant resources affected.” Existing statutory provisions require regional water plans to include appropriate provisions for environmental water needs and may be approved if consistent with long-term protection of the state’s natural resources. The continued failure of the Regional and State Water Plans to incorporate environmental flow needs represents a missed opportunity to ensure sustainable use of our water resources and results in plans that jeopardize the health of our streams, rivers, bays and estuaries. They urge the Board to require consideration of environmental flow needs in future Regional and State Water Plans.*

Comment: *Sierra Club Lone Star Chapter, Environmental Defense Fund, and Hill Country Alliance commented that a shortcoming of the plan is the failure to consider environmental water needs and thus the failure to recommend strategies to provide water to meet this critical need. The environment has water “demands” and “needs” like the other categories of use in the plan. Texas Water Code Section 16.053(e)(5)(F) states that regional water plans shall include consideration of “appropriate provision for environmental water needs and for the effect of upstream development on the bays, estuaries, and arms of the Gulf of Mexico...” but the TWDB has not required planning groups to identify environmental water demands and needs, much less develop recommendations on how to meet those needs. Nor has the TWDB attempted to layer on to the regional water plans a process for addressing environmental water needs that might be more watershed based and covering more than one region. And no evaluation is done of the socioeconomic impacts of not providing water for the environment during a time of drought. The Senate Bill 3 process should be a complement to the regional and state water planning process, and not a substitute way of identifying and providing for environmental water needs. We urge the TWDB to reassess the approach that the agency has taken to implementation of the regional and state water planning process and to move to meet the letter and spirit of the law (Senate Bill 1 in 1997) by requiring regional plans to identify environmental water*

needs and recommend strategies to meet those needs. Without addressing environmental water needs, the state water plan will never be the comprehensive document that it was intended to be.

Comment: *Galveston Bay Foundation and Hill Country Alliance commented that they believe that greater protection for our water resources can be achieved through the regional and state water planning process if water needs and management strategies include environmental needs as a planning category. Currently, water planning regions across Texas are tasked with identifying municipal, industrial, agriculture and other water needs and strategies to meet those future demands – culminating in the development of the State Water Plan. The intent of Senate Bill 1, requiring the development of state, regional, and local water management plans, was to “implement a comprehensive drought and water conservation, development, and management plan for Texas.” Further, regional water plans must include appropriate provisions of environmental water needs and may only be approved if consistent with long-term protection of the state’s natural resources. The Texas Water Development Board does not currently identify, and does not require the regions to identify, environmental water (both freshwater inflows and instream flows) needs during the regional and state water planning process. They believe that the State Water Plan will not represent a comprehensive management plan and cannot be consistent with long-term protection of our natural resources until environmental water needs are considered in the plan. The continued failure of the regional and state water plans to incorporate environmental flows needs represents a missed opportunity to ensure sustainable use of our water resources and results in plans that jeopardize the health of our streams, rivers, bays and estuaries. They urge the Board to require consideration of environmental water needs in future regional and state water plans.*

Comment: *Greater Edwards Aquifer Alliance commented that the regional water plans and the State Water Plan should identify environmental water needs and recommend strategies to meet those identified needs so that the State Water Plan meets the statutory goal of being a truly comprehensive water plan for Texas that reflects “One Water” concepts.*

Response: There are six water use categories specified in 31 TAC §357.31 for which TWDB develops water demand projections including municipal, manufacturing, irrigation, steam electric power generation, mining, and livestock, and for which needs are identified and water management strategies recommended. Environmental uses are not considered by the rule as a water user group. Environmental factors and other factors deemed relevant by the regional water planning groups (e.g., recreation) are considered when evaluating plan strategies including under TWC 16.053(e)(5)(F).

The Legislature has voiced its preference for a bottom-up planning process, with decisions regarding water planning occurring at the regional level. Therefore, where statute neither explicitly requires nor prohibits a certain action, it is more appropriate for a regional water planning group to choose whether to take that action than it would be for the TWDB to require or prohibit such action. The TWDB defers to the Legislature on questions of statutory requirements. Where statute does not grant the TWDB authority to impose certain requirements on regional water planning groups, the TWDB believes it is not appropriate to demand those requirements.

The TWDB rules (31 TAC §358.3(22) and (23)) require that regional water planning groups use the environmental flow standards, which were specifically developed through an extensive stakeholder process (Senate Bill 3 (2007)) and were adopted by the Texas Commission on Environmental Quality (2011 – 2014) for the explicit purpose of meeting environmental needs, and to evaluate strategies in the regional water plans, where applicable. In basins where standards are not available or have not been adopted, information from existing site-specific studies or state consensus environmental planning criteria are to be used. Additionally, 31 TAC §358.3(23) requires consideration of environmental water needs including instream flows and freshwater inflows to be

consistent with TCEQ's adopted environmental flow standards where applicable. While the environment is not defined as a water user group with estimated demands and needs, regional water planning groups are required to consider and potentially adjust recommended water management strategies based on environmental needs. This consideration is applied during water management strategy evaluations consistent with requirements in 31 TAC §357.8(22) and §357.34(e). Regional water planning groups may also make other recommendations related to environmental water needs as part of their regulatory, administrative, or legislative recommendations under 31 TAC §357.43(d). At this time, the TWDB and the regional water planning groups do not have the statutory direction or resources to perform new evaluations of environmental flows within the framework of regional water planning. No changes were made in response to these comments.

Comment: *Texas Parks and Wildlife Department commented that regional water planning groups, in their environmental reviews, consider a variety of factors, including: the volume of discharge a strategy would produce; the number of acres of habitat potentially affected; streamflow alteration; and changes to bay and estuary inflow patterns. However, the emphasis of these evaluations varies by region based on the type of project under consideration and the relevant resources affected. TPWD recommends that the regional planning groups and TWDB consider the effects on environmental flows and habitats due to both individual and cumulative strategies.*

Response: Regional water planning groups are required by rule (31 TAC §357.34(e)) to provide a quantitative reporting of the following environmental factors for each water management strategy evaluation: effects on environmental water needs, wildlife habitat, cultural resources, and the effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico. The regional water plans are also required to include a discussion of the plan's impact on other water resources of the state including other water management strategies. Regional water planning groups are not discouraged from conducting a cumulative strategy analysis but are limited by the planning groups' financial and other resources. We encourage the commenter to raise these specific issues at the regional planning level at the point in time in the planning cycle when groups are considering whether or how to perform such evaluations. No changes were made in response to this comment.

Comment: *The Texas Parks and Wildlife Department commented that many water management strategies utilize water under existing water rights or reuse water that is already assumed to be 100 percent water use consumption in WAM modeling. This makes it difficult to determine impact of water strategies on environmental flows using WAM Run 3 versus current conditions and there are likely impacts to environmental flows that are underestimated. Evaluations should also consider the uncertainty of changing climate and hydrology with regard to water management strategies and environmental flows. The Texas Parks and Wildlife Department looks forward to assisting the TWDB and the planning groups in these efforts and determinations.*

Response: The drought of record benchmark and the requirement that regional water plans adhere to all legal requirements, including water rights, often relies on conservative approaches and many assumptions, such as the use of WAM Run 3, that the regional planning groups must determine. The ability of regional water planning groups to consider an alternative or multiple scenarios, for example regarding water consumption, is limited by the planning groups' financial and other resources. We encourage commenter to raise these specific issues at the regional planning level at the point in time in the planning cycle when groups are considering whether or how to perform such evaluations. The TWDB will coordinate with the Texas Parks and Wildlife Department on how to best assist getting information for consideration to planning groups as they develop their 2026 Regional Water Plans. No changes were made in response to this comment.

Groundwater

Comment: Representative Kyle Beidermann commented that the state water plan is critical and must be accurate, adjustable, defensible, and clear in defining the real time and future groundwater conditions across the state and that, as it is currently drafted, it falls short of meeting these key objectives and that the citizens of Texas must have a higher confidence level in the 2022 State Water Plan than the previous plan. He commented that the 2010-2015 drought taught the Hill Country that the state groundwater models were not dependable and the measures available by the state to lessen its severity were not in place.

Response: The primary objective of Texas' state water planning process is to ensure adequate water supplies in times of drought, including from groundwater sources. The plan provides decadal estimates of future water demand and supply conditions under drought of record. The TWDB is currently working to upgrade and improve the Hill Country Trinity Aquifer Groundwater Availability Model that will incorporate the most recent software advances to simulate groundwater-surface water interactions. In addition, the TWDB has sponsored initiatives to better understand groundwater recharge in the Edwards Plateau and Hill Country regions as well as groundwater-surface water interactions. The TWDB is also initiating, in cooperation with the LCRA, a field study of groundwater-surface water relationships along the South Llano River watershed that is anticipated to provide additional insights into aquifer-stream relationships. No changes were made in response to this comment.

Comment: Representative Kyle Beidermann commented that the Hill Country Priority Groundwater Management Areas (PGMAs) are not consistent in their knowledge and expertise in using groundwater models and that the TWDB should implement, as needed, an extensive groundwater modeling training program for all groundwater conservation districts (GCDs) that should include consultants hired by the GCDs and that the TWDB should ensure GCDs/PGMAs have highly skilled and trained groundwater modelers.

Response: The TWDB is working to incorporate better "user-friendly" interfaces to the groundwater availability models to enhance understandability of the models and their results. Groundwater modeling is a highly specialized field, and typically requires several years of training and experience for scientists and engineers to be proficient in the conceptualization, data manipulation, and programming of the models. A number of water resources consultants have competent and experienced staff that can assist groundwater conservation districts in the use and interpretation of model results. The TWDB groundwater modeling staff are also accessible to the public to generally assist in navigating model results. No changes were made in response to this comment.

Comment: Representative Kyle Beidermann commented that the TWDB should establish a priority listing of the GCDs/PGMAs that would provide the TWDB and the public with visibility on which GCDs/PGMAs are experiencing the most significant and negative impacts on their groundwater aquifer and that the criteria could include: Desired Future Conditions, the highest population growth percentages, availability of water from a single source, level of confidence on the groundwater model, etc. This listing could also be used by the TWDB to issue grants and loans for specific studies and other pertinent work.

Response: Developing priority rankings and listings of significant and negative impacts related to groundwater conditions is highly subjective and would be expected to be sensitive to the context of local policies and decisions, population trends, environmental considerations, legal (property rights) issues, and other factors. The groundwater conservation districts, cooperating with each other in joint planning in groundwater management areas over shared aquifers, are the most appropriate organizations for evaluating these complex impacts. No changes were made in response to this comment.

***Comment:** Representative Kyle Beidermann acknowledged that significantly more data is needed for the TWDB models to be substantively improved.*

Response: All groundwater models, including those developed and used by the TWDB, benefit from incorporating the most recent and extensive data sets on geology, groundwater conditions, and hydrology. The TWDB agrees that additional data will improve all modeling efforts and engages with local and regional stakeholders such as groundwater conservation districts to acquire and incorporate available new data. No changes were made in response to this comment.

***Comment:** Representative Kyle Beidermann commented that the TWDB must reach out to the Federal Government, the private sector, and other appropriate parties to find and utilize the most practicable groundwater models for Texas. The case may be where one model is insufficient for use across the various groundwater aquifers in the state. This initiative by the TWDB should be performed periodically to validate and add credibility to the groundwater models being used and to establish a long-term collaboration sharing the state's findings with other parties.*

Response: The TWDB has developed groundwater availability models through a state-wide stakeholder-driven process and has contracted with technical consultants, the federal government (U.S. Geological Survey), and academia throughout the state. Groundwater availability models are generally state-of-the-art when selected and have been developed for 28 of the 31 major and minor aquifers. The remaining three models are in development. Most of the models have been revised and upgraded since their initial development to incorporate recent data and advances in groundwater software. Currently, the TWDB are working with the U.S. Geological Survey as it is upgrading the existing groundwater availability model for the northern Gulf Coast region. We have also used other U.S. Geological Survey models to evaluate groundwater conditions in the Edwards Aquifer in the San Antonio region. No changes were made in response to this comment.

***Comment:** Representative Kyle Beidermann commented that funding sources (local, state, Federal, and private) need to be found and dispensed for specific studies associated with developing a much better understanding of the groundwater aquifers and that the use of the most recent developed groundwater sensors and other groundwater monitoring equipment needs to receive the highest attention for these funds. He commented that the benefit of using the latest 21st Century geo-hydrologic technology will help reduce the existing conflict in probability analysis.*

Response: The TWDB has successfully applied for and received grants from the U.S. Geological Survey to enhance and improve automated groundwater level recording equipment throughout the state. These grants typically focus on areas of greatest need as expressed through the scarcity of data or increased demands for understanding dynamic groundwater conditions. The TWDB will continue to seek cooperators for data sites and funding to improve the level of data reliability in the state. These groundwater level recording wells provide near "real-time" data that are uploaded to the Water Data for Texas (<https://www.waterdatafortexas.org/groundwater>) website and

available for groundwater stakeholders to use in planning and monitoring programs. No changes were made in response to this comment.

Comment: *Environmental Defense Fund commented that an inherent component of the State Water Plan is that the plan “plans” for continued depletion of groundwater in both managed and unmanaged areas of the state (to be) consistent with the desired future conditions adopted by groundwater conservation districts in each groundwater management area and that this continued depletion of existing groundwater supply adds to future decades of unmet needs. To address this flaw, the State Water Plan should calculate how much future water demand would be satisfied if the planned depletion of groundwater was replaced with sustainable management of the resource. This additional information could be used in subsequent planning and management decisions.*

Response: The planned depletion of groundwater is generally an outcome of regional groundwater joint planning policy decision-making and the development of desired future conditions that are adopted through stakeholder-driven evaluations of a number of technical, legal, and socioeconomic factors. The TWDB incorporates the results of these local policy-driven decision through the application of modeled available groundwater values that are then incorporated into the regional and state water planning effort. In the event that districts in a groundwater management area voted to adopt desired future conditions that would reduce or eliminate the rate of managed depletion, it would result in increased needs over that same period due to a lesser modeled available groundwater value. No changes were made in response to this comment.

Comment: *Belding Farms and Cockrell Investment Partners commented that the TWDB should add further narrative to better define depletion of groundwater supply from “managed and unmanaged” aquifers, including permitting decisions and greater specificity as to how increased groundwater production will impact existing users and potentially create new unmet needs and the associated costs and that the plan should include the variability in desired future conditions (DFCs) consideration (or lack thereof) relative to production during high water demand periods and resultant localized impacts – particularly when the DFCs may not have high water use or summer thresholds to ensure that the DFCs can in fact be met while protecting the current users right to water – particularly during critical high water use periods.*

Response: The TWDB compiles and publishes information on adopted desired future conditions (DFCs) and the modeled available groundwater values that are based on the DFCs. This information includes the explanatory reports developed by the districts through the joint groundwater planning process to explain consideration of the required factors in determining DFCs. The DFCs then inform permitting and drought management decisions by districts at a local level. With about 100 groundwater conservation districts in Texas, the TWDB does not have the resources to track and quantify the impacts of individual permitting and drought management decisions. However, the agency does compile available data on groundwater production and use and publishes those data that are used by groundwater conservation districts, groundwater management areas in joint planning, and regional water planning groups to evaluate groundwater availability. Those data often provide insight into groundwater use patterns relative to high water use attributable to drought, population growth, or a combination of various factors. The regional and state water plans reflect projected water availability based on the joint planning process and an expectation that DFCs are to be achieved and therefore, to the extent that groundwater districts fail to manage groundwater in a manner consistent with achieving DFCs, the plan cannot reflect conditions that diverge from the DFCs, including changes to future needs. No changes were made in response to this comment.

Comment: *Hill Country Alliance commented that the TWDB should encourage Groundwater Management Areas to incorporate the impact of land use change and increasing impervious cover on groundwater recharge into their Desired Future Conditions .*

Response: Groundwater management areas are required to consider nine factors identified by statute prior to proposing desired future conditions. Consideration of additional factors, such as land use change, are at the discretion of the groundwater management areas. No changes were made in response to this comment.

Comment: *Environmental Defense Fund commented that the TWDB's analysis for planning groups does not include socioeconomic impacts associated with planned depletion of aquifers, which would be useful to both the regional water planning process and for groundwater conservation districts when adopting desired future conditions and that the TWDB should provide planning groups with a socioeconomic analysis that evaluates impacts related to aquifer depletion or to put in another way, the socioeconomic benefits of managing water resources sustainably and that this type of analysis would provide more balance to the planning process and that while it may not be possible to provide this information for all the regions at this stage of the planning cycle, identifying the need to make these calculations and incorporate them into future plan updates would itself be a positive step.*

Response: Socioeconomic factors are one of the key elements of joint groundwater planning that is conducted on five-year cycles by groundwater conservation districts that share common regional aquifers in a groundwater management area. This is the approach that has been incorporated into the Texas Water Code that governs the groundwater planning process. Socioeconomic analyses performed in the state planning process focuses on the potential impacts of not meeting the anticipated water needs that are identified based on the adopted planning water demand projections and the existing surface and groundwater availability estimates. No changes were made in response to this comment.

Water management strategies and projects

Comment: *Sierra Club Lone Star Chapter, National Wildlife Federation, Environmental Defense Fund, and Hill Country Alliance recommend that the TWDB discuss in this plan and address in rule updates for the next planning cycle an evaluation of how well existing water supply systems serve the needs of socially vulnerable populations, how they will be affected by future water needs, and what strategies will provide clean, safe, and affordable drinking water to assure there is equity in how our regional and state water plans serve our communities and our people. A helpful background source in developing an equity focus for water planning is the U.S. Water Alliance's *An Equitable Water Future: A National Briefing Paper*, published in 2017.*

Response: The scope of regional and state water planning requires ensuring sufficient water supply to all water user groups and the entire Texas population. The regional and state plans do not include evaluations of the quality or level of retail service of water supply to specific sub-populations within a retail water providers service area. The regional and state water plans evaluate the need for additional water supply that is needed to support annual retail system demands and do not discern between socioeconomic profiles of the water user groups. Concerns over retail water service quality to customers may be addressed through the Texas Commission on Environmental Quality as they oversee the implementation and enforcement of the Safe Drinking Water Act. No changes were made in response to this comment.

Comment: *Environmental Defense Fund, Sierra Club Lone Star Chapter, National Wildlife Federation, Hill Country Alliance recommend that the TWDB discuss in this plan and address in rule updates for next planning cycle incorporation, where possible, of One Water concepts. This is a more integrated approach to policies and actions to provide water supply, protect water quality, reduce flooding risks, maintain environmental flows, preserve the natural environment, and assure water equity. Greater attention in the water planning process to evaluating surface water and groundwater connections, identifying environmental water needs and recommending strategies to meet those needs, coordinating this planning process as closely as possible with the new regional and state flood planning process and exploring more opportunities for wastewater reuse as a water supply are just some of the ways in which this water planning process might start incorporating One Water concepts.*

Response: The primary objective of Texas' state water planning process is to ensure adequate water supplies in times of drought. Consideration of all available sources of supply, including reuse, is currently part of the plan development process and utilizing the results of local planning efforts in each regional water planning area is an essential part of the process. The TWDB is constantly looking to improve our data support to the regional water planning groups and will continue to do so for surface water/groundwater interactions and conservation and reuse data. There is already a statutory mandate that the regional *flood* planning process inform the *water* planning process where water supply development is a potential and each of these program areas are working closely with one another as guidance for flood planning is developed. Likewise, water planning guidance is evaluated and updated at the beginning of each planning cycle and will be open for stakeholder review late in 2021 or early 2022. The TWDB will review how the regional water planning guidance can be modified, if appropriate, to accommodate integrated approaches like One Water. We encourage stakeholder input on this guidance document when made available. No changes were made in response to this comment.

Comment: *One individual commented on the Region B yield methodology, a 20 percent reserve supply only used in the Wichita Falls system, not being a standard metric so it is falsely stating a water supply need.*

Comment: *Texas Conservation Alliance, Sierra Club Lone Star Chapter, and Hill Country Alliance commented that they are concerned with the 20 percent reserve yield assumption for the Wichita Falls system, noting this is an uncommon methodology and the plan doesn't explain assumptions to justify its use. They comment that the yield for the proposed Lake Ringgold is not calculated with this reserve so the estimated need for, and yield from the project is overstated.*

Response: Current regional water planning rules and guidance provides a set of hydrologic modelling assumptions and methods to provide a common point from which to evaluate surface water availability, including how to estimate the firm yield of surface water supply reservoirs. This default approach is generally based on using a slightly modified (to also reflect sedimentation) TCEQ, WAM Run 3 which aligns with the requirement that regional water plans be developed in accordance with Texas law and water rights. The state's WAM models are based on historic hydrologic data, including naturalized streamflow and reservoir net evaporation, which were available as of their most recent updates. The WAMs account for historic hydrologic conditions but do not make predictions about future reservoir inflows or other parameters.

The regional water planning groups are given significant flexibility to request variances to the default hydrologic modeling assumptions to allow them to reflect differing conditions, including more recent drought conditions they consider appropriate for addressing risks and for long-term planning in their region. The TWDB encourages regions to consider requesting modifications that will better reflect reasonably expected drought conditions and reviews each request and, if considered reasonable for long-term planning purposes, approves the hydrologic variance request.

The Region B planning group submitted hydrologic variance requests to TWDB to use a 20 percent reserve yield for both existing Wichita Falls system reservoirs and proposed Lake Ringgold. Both requests were reviewed and approved by the TWDB. This methodology was not used for all reservoirs in the region since these reservoirs were not as severely impacted by drought, have safe yields greater than authorized water supply, provide limited supply, or are no longer in use. Note that when a region modifies the reservoir or reservoir system yield through a variance request, the original unmodified firm yield is still required to be reported in the plan documents.

A new drought of record prior to this most recent planning cycle was determined for the Wichita Falls reservoir system; from this experience it was established that a 20 percent reserve is necessary to maintain operation of the City's reservoirs and treatability and accessibility of supply. For example, when Lake Kemp capacity is below 40 percent, the water that is left in the reservoir is not treatable to permit limits due to increased salinity and the treatment limits of the reverse osmosis system. A one-year safe yield would not provide the required level of protection which is directly related to the storage volume itself. Whereas the operation of Lake Ringgold may be treated similarly to require the same 20 percent reserve if implemented, the firm yield of Lake Ringgold was reported in the Region B plan for consistency with the water right permitting application. No changes were made in response to these comments.

Comment: *One individual suggested an increased focus on incentives for reuse, wastewater plant loans, and purple pipe infrastructure.*

Comment: *One individual commented that the TWDB should prioritize wastewater reuse in the 2022 State Water Plan, incentivize reuse inclusion in wastewater plant loans and purple pipe infrastructure to bridge gaps between stakeholder wastewater treatment partners and willing developers. The*

TWDB should incentivize the installation of environmentally friendly technologies, such as Clearas, which lowers phosphorus levels.

Comment: *One individual commented that the TWDB should create a funding toolbox program that focuses on wastewater discharge reduction, water reuse, and purple pipe infrastructure in order to protect rivers like the South San Gabriel. They commented that all of the water in our system should be used before building new reservoirs and that progressive reuse clauses should be added to all wastewater contracts. Progressive reuse technologies, such as Clearas, should be used to achieve low phosphorus levels.*

Response: The TWDB financial assistance programs currently provide opportunities for funding wastewater and reuse projects. The Clean Water State Revolving Fund provides funding opportunities for a variety of wastewater and reuse projects, including purple pipe distribution systems. The State Water Implementation Fund for Texas (SWIFT) provides funding opportunities for reuse projects that are recommended water management strategies in the state water plan.

The recommendation of water management strategies and water management strategy projects are made by regional water planning groups, which are required to consider a variety of types of water management strategies, including reuse. Reuse strategies recommended in the regional water plans must directly provide new or increase existing reuse water supplies to a water user group. Retail distribution infrastructure, including for purple pipe, is not an eligible component of the regional and state plans. The TWDB encourages the commenter to work directly with their regional water planning group to identify strategies appropriate for the region. No changes were made in response to these comments.

Comment: *Five individuals commented that they oppose the development of Lake Ringgold.*

Comment: *An attorney in Clay County commented in opposition to the development of Lake Ringgold, noting concerns about project funding, need, and potential impacts.*

Comment: *One individual commented in opposition of Lake Ringgold noting concerns about alternative yield methodologies and project funding.*

Comment: *One individual commented in opposition to the development of Lake Ringgold, noting concerns about flooding and risk of failure with the proposed dam site location.*

Comment: *One individual commented in opposition to the development of Lake Ringgold, noting that loss of habitat has not been adequately studied and carbon sequestration potential should be considered. The TWDB should also require a broader range of studies of impacts of new reservoirs in a holistic and whole-community context.*

Comment: *Texas Conservation Alliance commented that the TWDB should remove Lake Ringgold from the State Water Plan as a recommended water management strategy because: 1) the firm yield of Wichita Falls' current water supply lakes, even in a repeat of the worst drought of record, plus its established indirect reuse program, meet the City's projected demands for 2070 with a significant safety margin; 2) the City has additional water rights from Lake Kemp that could be developed; and 3) Wichita Falls was the only one of Texas' top 25 cities (by population) to lose population in the last decade and its water use is projected in the Plan to increase by just over 3% in the next fifty years.*

Comment: *Texas Conservation Alliance commented that Lake Ringgold is not a needed project since Wichita Falls instituted its reuse project. The reuse project guarantees enough water to meet all essential uses, irrespective of any future climate conditions because the reuse project means that all non-consumptive water uses are insured against any future drought. They commented that Wichita Falls' long-range plan does not include more economical alternatives such as surface water*

desalination or aquifer storage and recovery. They comment that the proposed cost of Lake Ringgold, after interest and maintenance, will approach \$1 billion dollars for a service area population of 150,000 and creates a debt that is detrimental to public welfare.

Comment: *Texas Conservation Alliance commented that Lake Ringgold would have enormous environmental impacts, with inundation of 16,000 acres including more than 1,000 acres of native tallgrass prairie (one of the most endangered ecosystems in the country) and a substantial percentage of the trees in Clay County. They commented that more than half the inflows to Lake Ringgold will be lost to evaporation. These evaporative losses will reduce stream flows downstream in the Little Wichita and Red Rivers.*

Response: The recommendation of water management strategies and water management strategy projects are made by regional water planning groups, which are required to consider a variety of types of water management strategies and evaluate each potentially feasible strategy under specific criteria including cost, quantity, reliability, and impacts on environmental, agricultural, and other water resources, pursuant to 31 TAC §357.34. The planning groups are given significant flexibility to consider and address water supply risks for long-term planning in their region.

The state water plan projects population growth through 2070 for the City of Wichita Falls which recently experienced a new drought of record. Neither direct nor indirect reuse projects alone can guarantee protection against drought or otherwise ensure that essential water uses are provided for. This is due to the relatively rapid decay rate to the overall volume of available water supplies that results from a portion being continuously lost due to consumptive use as well as expected water losses. The decision whether to recommend a particular water management strategy or water management strategy project lies with the regional water planning groups and not with the TWDB. Additionally, the inclusion of a recommended water management strategy or project in a 50-year plan does not offer any guarantee that the strategy or project will be implemented. If implemented, projects must adhere to all applicable federal, state, and local permitting requirements, including related to dam design requirements. By its approval of each of the regional water plans, the TWDB has included all water management strategies and water management strategy projects recommended by the planning groups in the 2022 State Water Plan. The TWDB encourages commenters to direct their concerns on water management strategies to regional water planning groups. No changes were made in response to these comments.

Comment: *Sixty-two individuals commented that they oppose building the Marvin Nichols Reservoir and that there are other options Texas can use to meet future water supplies. Several comments specifically mention that Marvin Nichols Reservoir should not be included in the 2022 State Water Plan.*

Response: The recommendation of water management strategies and water management strategy projects are made by regional water planning groups, which are required to consider a variety of types of water management strategies and evaluate each potentially feasible strategy under specific criteria including cost, quantity, reliability, and impacts on environmental, agricultural, and other water resources, pursuant to 31 TAC §357.34. The decision whether to recommend a particular water management strategy or water management strategy project lies with the regional water planning groups and not with the TWDB. Additionally, the inclusion of a recommended water management strategy or project in a 50-year plan does not offer any guarantee that the strategy or project will be implemented. By its approval of each of the regional water plans, the TWDB has included all water management strategies and water management strategy projects recommended by the planning groups in the 2022 State Water Plan. The TWDB encourages commenters to direct

their concerns on water management strategies to regional water planning groups. No changes were made in response to the comments.

Comment: *Hill Country Alliance commented that rainwater harvesting should be widely encouraged to meet rural and urban domestic water demands, as well as use for limited irrigation under drip irrigation. Livestock and wildlife can also be provided supplemental water by rainwater harvesting.*

Comment: *One individual commented that the state water plan should include a feasibility study for incentivizing demand reduction strategies and test the conclusion that new groundwater wells are the only economic solution in some areas of the state. An alternative for rural municipal water users is rainwater harvesting, and the state should consider incentive-based approaches to manage demand, including improved water allocation policies.*

Response: By its approval of each of the regional water plans, the TWDB has included in the 2022 State Water Plan all water management strategies and water management strategy projects recommended by the planning groups. Based on the water management strategies recommended by the planning groups, the volume of water from recommended rainwater harvesting strategies, about 5,000 acre-feet per year, provides approximately 0.1 percent of the total volume of recommend strategies. At least one factor impacting rainwater collection recommendations is that rainwater systems that are sized adequately to collect, store, and treat sufficient water supply to meet water needs *throughout a drought of record* may not be cost effective in many cases. The state water plan does not attempt to emphasize any one technology over another, but generally reports strategy information in proportion to its relative significance in the plan. Similar to other types of strategies, rainwater harvesting is briefly mentioned in the water management strategy descriptions. The TWDB will continue to promote rainwater harvesting, for example, through the annual Texas Rain Catcher Awards. No changes were made in response to these comments.

Comment: *Trinity River Authority commented that the Region C Water Planning Group (RCWPG) engaged in extensive coordination with the Region D Water Planning Group during the fifth-round of planning with regards to the Marvin Nichols strategy. Those efforts were supported by the Authority as the sponsoring political subdivision of the RCWPG and significantly facilitated by the TWDB, and the Authority appreciates the TWDB's willingness to deploy its staff in support of those discussions. While no agreement was reached, there was an unprecedented opportunity for interregional engagement and public participation in the water planning process. They commented that planning should be guided by the principle that surface water is the property of the state and the plan should be adopted in its present form.*

Response: The TWDB appreciates this comment and notes that the Marvin Nichols Reservoir remains a recommended water management strategy in the adopted version of the 2022 State Water Plan. The TWDB intends to continue to support engagement and dialogue between planning regions in the future. Additionally, a current guidance principle for the development of the regional and state water plans is that all surface waters are held in trust by the state in 31 TAC §358.3(13). No changes were made in response to this comment.

Comment: *One individual commented that water and flood infrastructure improvements and alternative strategies are needed for San Angelo and West Texas, including seawater desalination. They noted the importance of the Region 9 flood planning effort and the Flood Infrastructure Fund.*

Response: The recommendation of water management strategies and water management strategy projects are made by regional water planning groups, which are required to consider a variety of types of water management strategies, including seawater desalination, and factors including costs.

The TWDB encourages the commenter to work directly with both their regional *water* planning group and regional *flood* planning group to identify strategies appropriate for the region. No changes were made in response to this comment.

Comment: *Belding Farms and Cockrell Investment Partners commented that the TWDB should add unambiguous language to recognize that inclusion of a strategy in the plan, either as recommended or as an alternate, does not impart on the project a sense that it is fundable, dependable and sustainable. They recommended that language be added that allows existing users to recognize that inclusion in the plan does not permit actual construction of a project, does not in itself authorize funding for a project and does not guarantee a specific volume of water from a future project.*

***Response:** Section 7.10 of the plan addresses the uncertainty of future water management strategies, including acknowledging the uncertainty of permitting, political and financial processes, and project sizes. The first sentence of Section 7.10 is revised as follows: "Implementation of any given recommended water management strategy or project is not a certainty, and project sponsors are ultimately responsible for implementing water management strategies."

Comment: *Belding Farms and Cockrell Investment Partners commented that TWDB should actively ensure that funding of future projects from the State Water Plan does not result in new unmet needs due to "managed and unmanaged" or poorly managed groundwater activities and that the inclusion in the plan of a recommended or alternate water management strategy may lead many to believe that the TWDB has fully vetted all impacts; that the projects themselves are viable, feasible and sustainable; and that the projects will not in fact result in the creation of new unmet needs. They understand this not to be the case and the TWDB already recognizes that some projects will never materialize due in part to some of these reasons.*

Response: Groundwater is managed on the local level in Texas. However, as proposed projects are considered for funding by the TWDB, the staff review the technical assumptions and data used to justify the parameters of proposed projects to ensure that the projections of water availability are viable, feasible, and sustainable for the life of the project and consistent with adopted desired future conditions from the joint planning process. No changes were made in response to this comment.

Comment: *Coastal Alliance to Protect Our Environment (CAPE) commented that they are concerned about the process by which water management strategies are designated as recommended. Based on interactions with Region N, CAPE fears that water management strategies are recommended without a clear, objective selection process. CAPE recommends the 2022 State Water Plan be amended to include objective criteria for each of the four strategy considerations (quantity of supply, reliability of supply under drought of record conditions, cost of supply, and impacts of the strategy on water quality and on water, agricultural, and natural resources) to distinguish between strategies that are recommended and not recommended and remove the subjectivity of the current recommendation process. Greater emphasis should be placed in the State Water Plan on the responsibility of State and Regional Planning Groups in considering whether or not to recommend water management strategies.*

Response: Regional water planning groups are required to discuss and receive public input on their process for identifying potentially feasible water management strategies at a publicly noticed meeting and this information is included in each of the regional water plans. As long as the potentially feasible water management strategies are evaluated in compliance with the specific criteria listed in 31 TAC §357.34, including cost, quantity, reliability, and impacts on environmental, agricultural, and other water resources; the decision whether to recommend a particular water

management strategy or water management strategy project lies with the regional water planning groups. The impacts of all evaluated water management strategies are presented in each of the regional water plans. No changes were made in response to this comment.

Comment: *Freese and Nichols, Inc. commented that Table 7-2 attempts to show the distribution of capital costs over the planning horizon, and it generally reflects most of the projects accurately. However, it does not accurately reflect projects that the capital costs are assumed to occur over multiple decades, such as conservation, but where the project may have a single online date. For example, the total capital cost and project count for Region H are correct, but the decadal distribution of capital cost does not match the regional water plan. For the Region H example, it appears that this is due to the region showing municipal conservation projects as having continuing capital costs in multiple decades, but the project is online in 2020. This is likely a limitation of DB22, which is not able to reflect this atypical situation. A similar skewing of the decadal distribution of capital cost is likely for other regions that have analogous projects with multi-decade capital costs. It is suggested this could be addressed through a footnote to the table.*

***Response:** The State Water Planning Database (DB22) is limited to reporting project capital costs by online decade. A footnote has been added to Table 7-2 as follows:

***Capital costs represent approximations based on anticipated online dates. Projects with capital costs that would occur over multiple decades are reported as a single, total capital cost in the project's online decade and may therefore differ from those presented in the regional water plans.**

Comment: *Texas Conservation Alliance commented that Marvin Nichols it not needed due to projected future supplies from the Region C plan and potential for gallons per capita per day reductions. They commented that reuse potential is not maximized and Marvin Nichols is obviated by Dallas Water Utility's balancing reservoir potential to capture reuse and the yield of the balancing reservoir is underestimated.*

Response: Regional water planning groups are required to consider water quality, quantity, reliability, and costs, among many other factors, in their evaluations of potentially feasible water management strategies. The decision whether and where to recommend a particular water management strategy or water management strategy project lies with the regional water planning groups. No changes were made in response to this comment.

Comment: *Texas Conservation Alliance commented that Cedar Ridge Reservoir should be removed from the plan since Abilene and other cities promoting the reservoir have actively secured sufficient supplies from lower-impact sources such as reuse projects and constructing pipelines to existing reservoirs.*

Response: The recommendation of water management strategies and water management strategy projects are made by regional water planning groups, which are required to consider a variety of types of water management strategies and evaluate each potentially feasible strategy under specific criteria including cost, quantity, reliability, and impacts on environmental, agricultural, and other water resources, pursuant to 31 TAC §357.34. The decision whether to recommend a particular water management strategy or water management strategy project lies with the regional water planning groups and not with the TWDB. By its approval of each of the regional water plans, the TWDB has included all water management strategies and water management strategy projects recommended by the planning groups in the 2022 State Water Plan. The TWDB encourages commenters to direct their concerns on water management strategies to regional water planning groups. No changes were made in response to this comment.

Comment: *Hill Country Alliance commented that additional definition is needed for Water Management Strategies (WMS) to avoid the regional and state water plans being criticized as less a planning document and more a 'wish list' beset with duplicative and expensive over-planning. In 2013, the Texas Legislature provided for requirements that WMS be prioritized in order to better manage the growing list of strategies. A better definition of WMS categories and vigorous prioritization will help control the redundant and exceedingly lengthy lists.*

Response: The recommendation of water management strategies and water management strategy projects are made by regional water planning groups. As long as the potentially feasible water management strategies are evaluated in compliance with the specific criteria listed in 31 TAC §357.34, including cost, quantity, reliability, and impacts on environmental, agricultural, and other water resources; the decision whether to recommend a particular water management strategy or water management strategy project lies with the regional water planning groups. Neither the TWDB rules nor statute prohibit recommended water management strategies that, if implemented, may provide water volumes in excess of projected needs. Additionally, the inclusion of a recommended water management strategy or project in a 50-year plan does not offer any guarantee that the strategy or project will be implemented. The “management supply factor” that is now required to be calculated and reported for each water user group, as required under 31 TAC §357.35(g), provides information regarding how much water supply each water user group has been assigned. This newer type of information may support dialogue regarding how best to balance recommendations for additional supplies with various risks and uncertainties, for example, including that some recommended projects may not be permitted or implemented. The TWDB performed a detailed, statewide accounting of water assigned in all the regional water plans and determined that the recommended water management strategies in the regional water plans and state water plan do not over allocate any water sources.

The 87th Texas Legislature, through the passage of House Bill 1905 has removed the requirement for projects to be prioritized by the regional water planning groups.

The TWDB encourages commenter to direct their concerns regarding specific water management strategies to regional water planning groups. No changes were made in response to this comment.

Comment: *Hill Country Alliance commented that the TWDB should encourage prioritizing strategies that protect the inherent interconnectivity of surface water and groundwater. One way this could be accomplished, particularly for Hill Country Groundwater Conservation District is through considering management rules based on spring-flow.*

Response: Groundwater is managed on the local level in Texas. The TWDB encourages commenters to direct their concerns regarding groundwater conservation district rules to the Hill Country Groundwater Conservation District. No changes were made in response to this comment.

Comment: *Hill Country Alliance commented that the TWDB should de-prioritize water management strategies that dewater one region to meet the speculated need of another in the form of inter-basin transfers or otherwise.*

Response: By its approval of each of the regional water plans, the TWDB has included in the 2022 State Water Plan all water management strategies and water management strategy projects recommended by the planning groups. Surface water transfers between river basins in Texas are subject to Texas Commission on Environmental Quality permitting and are one of the surface water strategies used, statewide, by water providers. A current guidance principle for the development of the regional and state water plans is that all surface waters are held in trust by the state in 31 TAC §358.3(13). The state water plan does not attempt to emphasize any one strategy type over

another, but generally reports strategy information in proportion to its relative significance in the plan. The TWDB encourages commenters to direct their concerns on water management strategies to regional water planning groups. No changes were made in response to this comment.

Comment: *Greater Edwards Aquifer Alliance recommends increased use and priority status of nature-based solutions in the State's Water Plan. They commented that current research supports including the use of nature-based solutions in planning documents as they are proving to be an effective tool - not only address environmental/climate concerns - but also to address future demands for water supplies. Basically the soil has the capacity to act like a reservoir and/or a stormwater detention facility, thus meeting stated objectives as outlined in the TWDB's water supply plan and the upcoming flood plan while improving water quality, air quality and biodiversity.*

Response: Although water planning and flood planning are separate programs, there will be data sharing and opportunities for collaboration, such as when flood mitigation projects can provide water supply. Current flood planning rules and guidance require consideration of nature-based flood risk mitigation and, as the results of the flood planning program become available, this information will be available for water planners to consider. No changes were made in response to this comment.

Comment: *Greater Edwards Aquifer Alliance commented that the regional water plans and the state water plan should put more focus on certain water management strategies such as wastewater reuse (including potable reuse), more extensive and aggressive water conservation and drought management measures, water loss reduction, rainwater harvesting, and appropriate aquifer storage and recovery projects, among other options – avoiding surface water reservoir construction and major transports of groundwater or surface water.*

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that alternative strategies (including drought management and more aggressive conservation) should be the focus of strategy recommendations rather than surface water reservoirs with high evaporative losses and negative environmental impacts. They recommend prioritizing wastewater reuse (including for potable supply), community rainwater harvesting projects, appropriate ASR, brackish groundwater where energy and environmental factors are properly addressed, and other innovative approaches.*

Response: The recommendation of water management strategies and water management strategy projects are made by regional water planning groups. As long as the potentially feasible water management strategies are evaluated in compliance with the specific criteria listed in 31 TAC §357.34, including cost, quantity, reliability, and impacts on environmental, agricultural, and other water resources; the decision whether to recommend a particular water management strategy or water management strategy project lies with the regional water planning groups. By its approval of each of the regional water plans, the TWDB has included in the 2022 State Water Plan all water management strategies and water management strategy projects recommended by the planning groups. The state water plan does not attempt to emphasize any one technology over another, but generally reports strategy information in proportion to its relative significance in the plan. The TWDB encourages commenters to direct their concerns on water management strategies to regional water planning groups. No changes were made in response to these comments.

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance encourages the TWDB - with assistance from the Water Conservation Advisory Council - to gather or prepare information about the potential water savings from adoption of the latest building codes to require resilient building design*

to promote water and energy efficiency. This information should be provided to planning groups for their consideration as part of their suite of municipal water conservation strategies.

Response: The TWDB will work with the Water Conservation Advisory Council on gathering data on potential savings from local building codes to assist with TWDB's effort to estimate potential savings for commercial and institutional facilities resulting from water use efficiency standards. Any data collected will be compiled and provided to the planning groups as they consider conservation strategies in the development of the 2026 Regional Water Plans. No changes were made in response to this comment.

Comment: *Freese and Nichols, Inc. commented that the following statement in Section 6.1 is misleading and should be revised to be less definitive: "In these situations, water needs might be met by implementing water management strategies such as the transfer or simple reallocation of surplus water supplies from one water provider to another." They noted that reallocation of supplies from one user to another is typically not simple. Entities that have gone to the expense and trouble of developing water supplies are seldom eager or even willing to transfer supplies to others. In addition, the reallocation of supplies requires the existence or development of appropriate physical facilities, and the economic viability of transferring water needs to be considered.*

***Response:** The first paragraph of Section 6.1 has been modified as follows: "For the purposes of this state planning perspective, the TWDB aggregates data provided by the planning groups and identifies water needs for each water use category and water user group for each decade over the next 50 years. In some instances, these aggregated existing water supplies over a combined geographic area may appear sufficient to meet all the water needs within that area, but in fact are not distributed user by user in a manner that would meet all needs. Therefore, for many geographic areas that as a whole may appear to have sufficient supplies, individual entities may experience shortages and others may have surpluses. In these situations, water needs might be met by implementing water management strategies such as the transfer or ~~simple~~ reallocation of surplus water supplies from one water provider to another. Delivery and treatment of additional water supplies from these strategies may or may not require new or expanded water infrastructure."

Comment: *Hill Country Alliance commented that the TWDB should encourage planning groups to prioritize decentralized systems and new technologies that capture, use, and reuse water in place. Where not practicable, priority should be given to a water neutral growth policy that requires offsetting the projected water demand of new development with water efficiency measures to create a "Net Zero" or neutral impact on overall service area demands.*

Response: The state water plan does not attempt to emphasize or prioritize any one technology or approach, for example decentralization or regionalization, over another, but generally reports strategy information in proportion to its relative significance in the plan. Each regional water planning group develops its own plan within the state framework and may choose decentralized or regionalized approaches to providing water. The TWDB encourages the commenter to direct their concerns regarding water management strategies to regional water planning groups. No changes were made in response to this comment.

Comment: *National Wildlife Federation, Galveston Bay Foundation, Greater Edwards Aquifer Alliance, and Hill Country Alliance commented that they are concerned that recommendation of water management strategy supplies far exceed water needs identified in the State Water Plan. This is not a universal issue with regard to the 16 planning regions, but it is a situation in several regions that needs to be addressed. Regions with a larger surplus of water management strategies include A, H, K,*

L, and M. The most concerning example of this is Region H. The 2022 State Water Plan projects annual water needs for Region H for 2070 to be approximately 833,000 acre-feet of water per year, but the plan includes Region H's recommended water management strategies totaling 1,942,000. This is 2.3 times the identified needs. This situation undermines the state and regional water planning process because it turns the State Water Plan into a wish list of water projects rather than a plan in which strategies have been purposefully selected to address specific water needs. Planning groups have a mechanism to include additional strategies in the plan by designating them as alternative strategies. We recommend that planning groups use this strategy and identify recommended water management strategies that are truly reflective of the region's identified needs.

Comment: Sierra Club Lone Star Chapter and Hill Country Alliance commented that the water plan includes recommended water management strategy volumes up to 3 million acre-feet in excess of needs, which would be costly and negatively impact landowners, agricultural resources, and natural resources and that the largest discrepancy is in Region H and the volume of water over and above projected needs which begs closer scrutiny, including the strategy to transfer surface water from East Texas to the Houston metropolitan area.

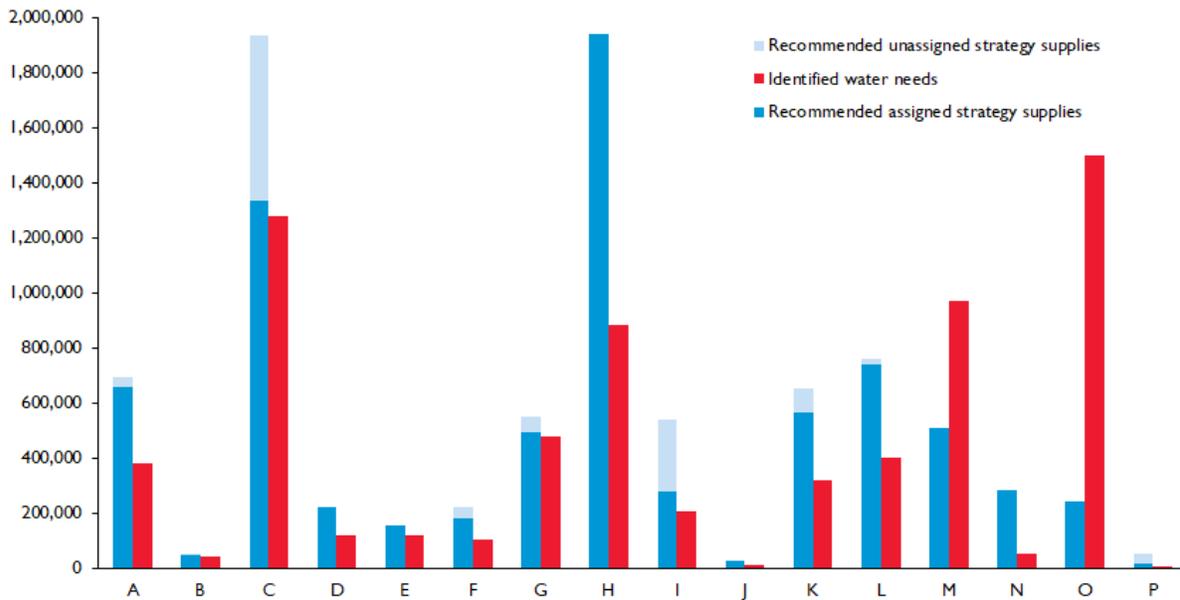
Response: The recommendation of water management strategies and water management strategy projects are made by regional water planning groups. As long as the potentially feasible water management strategies are evaluated in compliance with the specific criteria listed in 31 TAC §357.34, including cost, quantity, reliability, and impacts on environmental, agricultural, and other water resources; the decision whether to recommend a particular water management strategy or water management strategy project lies with the regional water planning groups. Neither the TWDB rules nor statute prohibit recommended water management strategies that, if implemented, may provide water volumes in excess of projected needs. Additionally, the inclusion of a recommended water management strategy or project in a 50-year plan does not offer any guarantee that the strategy or project will be implemented. The "management supply factor" that is now required to be calculated and reported for each water user group, as required under 31 TAC §357.35(g), provides information regarding how much water supply each water user group has been assigned. This newer type of information may support dialogue regarding how best to balance recommendations for additional supplies with various risks and uncertainties, for example, including that some recommended projects may not be permitted or implemented. The TWDB performed a detailed, statewide accounting of water assigned in all the regional water plans and determined that the recommended water management strategies in the regional water plans and state water plan do not over allocate any water sources.

Surface water transfers between river basins in Texas are subject to Texas Commission on Environmental Quality permitting and are one of the surface water strategies used, statewide, by water providers. No changes were made in response to these comments.

Comment: National Wildlife Federation, Galveston Bay Foundation, Greater Edwards Aquifer Alliance, and Hill Country Alliance commented that there is a mismatch in how some of the data is presented that could lead to confusion, specifically that water management strategy supplies in 2070 are greater than the 2070 water needs identified in Chapter 6 by nearly 800,000 acre-feet. Despite the excess of 800,000 acre-feet, Section 7.8 of the plan notes that 14 of the planning groups were unable to identify sufficient feasible strategies to meet the needs for all their water user groups. This may require breaking down water needs as compared to water management strategies in a more detailed manner to demonstrate the true water supply picture. More information and explanation is required to increase transparency and literacy around this important topic.

Suggested revisions included amending Figures 7-6 and 7-7 to include unassigned water management strategy volumes as well as assigned water management strategy volumes to reflect the total proposed water management strategies for each region as compared to the projected needs. The explanation of “Assignment of strategy and project supply volumes” in Section 7.4 of the draft plan is helpful context for understanding how proposed water management strategies are presented in the draft plan and could be included along with Figure 7-6.

***Response:** Planning groups may recommend strategy volumes in excess of identified needs and often do in order to optimize sizing and costs of projects to develop water supply, or to recognize the uncertainty of project implementation or of demand projections. However, the TWDB appreciates the suggestions on how to improve the clarity of the document regarding how recommended water management strategy volumes are assigned to users to address identified water needs and presented in the plan. A new Figure 7-6 has been added to Section 7.4 that presents recommended water management strategy volumes, both assigned to water user groups and any unassigned water volumes, as related to the identified needs by region.



Conservation

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that given the significant percentage of municipal water use that is attributed to outdoor landscape watering in Texas, the plan should highlight steps that are being taken to reduce outdoor landscaping water use. The TWDB should encourage more widespread adoption of reasonable outdoor landscape watering limitations.*

Comment: *National Wildlife Federation, Galveston Bay Foundation, Greater Edwards Aquifer Alliance, and Hill Country Alliance commented that given the significant percentage of municipal water use that is attributed to outdoor landscape watering in Texas, the plan should highlight steps that are being taken to reduce outdoor landscaping water use. The TWDB should encourage more widespread adoption of reasonable outdoor landscape watering limitations. National Wildlife Federation also recommends that reasonable limitations on outdoor landscape watering should be incorporated into conservation management strategies recommended for all 16 water planning regions, which potentially could reduce projected municipal water demands by a range of 100,000 to 230,000 acre-feet per year as of 2070.*

***Response:** Twelve planning regions specifically included outdoor landscape watering best practices as part of recommended municipal conservation water management strategies in the 2021 regional water plans. Planning rules (31 TAC §357.34(i)) require that regional water planning groups consider water conservation practices, including best management practices, for each identified water need. If water conservation strategies are not recommended to meet an identified need, the planning group had to document the reason why. As long as regional water planning groups meet the planning requirements, the decision to recommend conservation strategies, including specific best management practices, lies with each planning group. The TWDB supports all conservation efforts and will continue to make an effort to disseminate relevant conservation data and reports to planning groups for their consideration.

Additional discussion on steps being taken to reduce outdoor landscaping water use has been added to the third paragraph of Section 8.4.1 as follows: “Municipal conservation strategies include a variety of activities, such as incentivized installation of water-efficient plumbing fixtures (for example, through rebates, and are included by 9 regions); stronger water conservation pricing structures that discourage waste (included by 11 regions); education programs (included by 13 regions); and year-round landscape irrigation restrictions that continue to allow for maintenance of healthy landscapes (included by 11 regions). Best practices for outdoor landscape watering were included in the municipal conservation strategies in 13 of the 16 regional water plans.”

Comment: *One individual recommended that passive conservation be highlighted and discussed in Chapters 4 and 7 of the plan so that its important impact may be better realized. It should be noted that passive conservation has a zero cost to water utilities.*

***Response:** Information on anticipated future water savings from plumbing codes, or ‘passive conservation’, is already presented in the plan in Section 4.2.5 as well as a more detailed discussion in Section 8.2. While Table 8-1 provides a comparison of the volume of passive savings to recommended conservation strategy water volumes for perspective, passive savings are not included in Chapter 7 of the plan because they are not accomplished through recommended conservation strategies. The Executive Summary has been revised as follows:

“How much water will we require?”

While population is projected to increase 73 percent over the next 50 years, total water demand for all sectors in Texas is projected to increase by only 9 percent, from about 17.7 million acre-feet per year in 2020 to about 19.2 million in 2070 (Figure ES-3). Municipal demand is projected to increase in greater proportion and total volume over the next 50 years than any other water use category, from 5.2 million acre-feet per year in 2020 to 8.5 million in 2070. This projected demand includes passive conservation savings from plumbing codes that are similar in magnitude to the volume of recommended municipal conservation strategies in this plan as detailed in Chapter 8. Agricultural irrigation demand is projected to decrease, from 9.4 million acre-feet per year in 2020 to about 7.6 million in 2070, due to more efficient irrigation systems, reduced groundwater availability, and the transfer of surface water rights from agricultural to municipal users. Manufacturing and livestock demands are projected to increase, while mining demand is projected to decline. Water demand for steam-electric power generation is projected to remain constant over the next 50 years primarily due to increasingly efficient water use.”

Comment: *Freese and Nichols, Inc. commented that Table 8.2 should show the total conservation savings in 2020 and 2070 by region.*

***Response:** Table 8-2 has been revised to include total conservation savings in 2020 and 2070 by region.

Comment: *Greater Edwards Aquifer Alliance commented that the TWDB should encourage regional water planning groups to recommend water loss control as part of their water conservation strategies for all municipal water user groups with water loss in excess of 5 percent and should emphasize to all of those water user groups the availability of state financial assistance to implement those projects.*

Response: As required by 31 TAC §357.22(a), regional water planning groups shall consider existing local, regional, and state water planning efforts, including water plans, information and relevant local, regional, state and federal programs and goals when developing the regional water plans. The planning groups are also expected to consider information compiled by the TWDB from water loss audits performed by Retail Public Utilities pursuant to 31 TAC §358.6 of this title. Water loss data from the required reporting utilities is provided by the TWDB to all the regional water planning groups for their consideration and use. Percentage alone is not considered to be a water loss performance indicator by the industry. As developing information on water loss metrics becomes available and through working with the Water Conservation Advisory Council, the TWDB will provide this information to the planning groups to support the development of their 2026 Regional Water Plans. No changes were made in response to this comment.

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that more information should be provided in Chapter 8 about which groups established water loss reduction targets for voluntary actions and which groups recommended water loss strategies even though they had not established thresholds or targets for water loss control. The Sierra Club urges TWDB to require planning groups to recommend water loss reduction strategies for municipal WUGs with identified need and water loss threshold of 5 percent or more in most recent water audit.*

***Response:** Often water loss is bundled with other conservation activities as a water management strategy in the regional water plans but many planning groups have distinguished water loss strategies and associated infrastructure projects separate from other conservation best management practices in this plan. Although conservation strategy volumes from water loss projects are summarized in the plan, percentage is not considered a water loss performance indicator by the industry, and TWDB’s own water loss thresholds are only applicable to retail public

water suppliers that are applying for financial assistance for a water supply project. As developing information on water loss metrics becomes available and through working with the Water Conservation Advisory Council, TWDB will provide this information to the regional water planning groups to support the development of their 2026 Regional Water Plans.

In response to this comment, Table 8-3 has been added to Chapter 8 to show regional water loss thresholds and the fourth paragraph of Section 8.4.1 has been revised as follows: “Municipal conservation strategies also include activities to detect, measure, and reduce water loss. Planning groups are required to present water loss audit data in Chapter 1 of their plans and to consider this data when developing their plans. Upon considering the information, ~~five~~ eight planning groups (Regions A, C, E, F, H, ~~and I, J, and N~~) determined thresholds for recommending water loss audits and leak repair strategies in their plans for entities with significant water loss, and ~~four~~ three planning groups established targets for voluntary action (Table 8-3). Regions with thresholds for water loss audit and leak repair strategies primarily considered total water loss in their evaluations. Total water loss is the sum of real and apparent water loss²⁰. Region H specifically considered real water loss in its evaluation. Region N differentiated thresholds for both real and apparent water loss, recommending pipeline replacement for entities above the real water loss threshold and meter replacement for entities above the apparent water loss threshold. However, ~~the~~ Planning groups that did not establish such thresholds or targets still recommended water loss reduction strategies. Examples of projects specifically recommended to address water loss that involve capital expenditures include replacing leaking lines and installing advanced metering infrastructure. About 74,000 acre-feet per year in savings associated specifically with water loss projects is recommended in 2020, and 320,000 acre-feet per year in savings is recommended in 2070. The total capital cost associated with these projects is \$3.8 billion.”

²⁰ More information on TWDB’s water loss programs can be found at <http://www.twdb.texas.gov/conservation/municipal/index.asp>”

Table 8-3. Planning group determined thresholds for water loss audit and leak repair strategies and targets for voluntary action

<u>Region</u>	<u>Threshold for water management strategy</u>	<u>Target for voluntary action</u>
<u>A</u>	<u>Cities: ≥15% total loss</u> <u>WSCs: ≥25% total loss</u>	<u>na</u>
<u>C</u>	<u>Urban/suburban systems: >12% total loss</u> <u>Rural systems: >18% total loss</u>	<u>na</u>
<u>D</u>	<u>na</u>	<u>>15% loss</u>
<u>E</u>	<u>>10% loss</u>	<u>>200 gpcd</u>
<u>F</u>	<u>Cities: ≥15% total loss</u> <u>WSCs: ≥25% total loss</u>	<u>na</u>
<u>H</u>	<u>>10% real loss</u>	<u>na</u>
<u>I</u>	<u>Less than 32 connections per mile: >18% total loss</u> <u>More than 32 connections per mile: >12% total loss</u>	<u>na</u>
<u>I</u>	<u>>10% loss</u>	<u>>200 gpcd</u>
<u>N</u>	<u>>15% real loss (pipeline replacement)</u> <u>>5% apparent loss (meter replacement)</u>	<u>na</u>

Note: Whereas the thresholds used to develop water management strategies by the planning groups include the use of GPCD as well as the use of water loss expressed as a percentage, the water industry does not recognize percentage as a metric or performance indicator for water loss, and the TWDB does not use percentage of water loss in its review and analysis of water loss audits. Type of water loss is specified where known.

> = greater than

≥ = greater than or equal to

% = percent

gpcd = gallons per capita per day

na = not applicable

WSC = water supply corporation

Comment: National Wildlife Federation, Galveston Bay Foundation, Greater Edwards Aquifer Alliance, and Hill Country Alliance recommend that information from House Bill 3605 from the 83rd (R) legislative session should be included in Section 8.1 of the plan because it requires all retail public water utilities to use a portion of the financial assistance they receive from the Board to address water loss if the amount of water lost, as reported on a water loss audit, is above a utility-specific threshold and encourages the TWDB to report on implementation of House Bill 3605 in the state water plans, including the number of financial assistance requests that have been impacted since this legislation was enacted and how much funds have been borrowed to address water loss. They also suggest that the TWDB keep regional water planning groups updated on: any changes in the thresholds that trigger application of House Bill 3605; which utilities are above that threshold and are receiving

financial assistance for water loss control; and what financial assistance for water loss reduction is available from the TWDB for municipal water user groups in the respective regions.

***Response:** The TWDB conservation staff are currently working on a way to track utilities receiving financial assistance for water loss control. Water loss data provided in the future to the planning groups could include this information. Additionally, Section 8.1 has been revised to add a new third paragraph as follows: “House Bill 3605 of the 83rd Legislative Session was implemented during this planning cycle. It requires all retail public utilities to use a portion of the financial assistance they receive from the TWDB to address water loss if it is above a utility-specific threshold. Data collected will be provided to planning groups for consideration in the development of their 2026 Regional Water Plans.”

Comment: *Freese and Nichols, Inc. commented that the plan should mention that the 140 gpcd municipal use goal that the Water Conservation Task Force established in 2004 excluded industrial use and included a credit (gpcd reduction) for indirect reuse. This is often forgotten or unknown by the public.*

***Response:** In its 2004 report, the Water Conservation Implementation Task Force defined gallons per capita per day (gpcd) as the total amount of water diverted and/or pumped for potable use, including industrial use, divided by total population. Additionally, indirect reuse diversion volumes were to be credited against total diversion volumes for the purpose of calculating gpcd for targets and goals.

The second paragraph of Section 8.3 is revised as follows: “Approximately half of the planning groups set a per capita water use goal of 140 gallons per capita per day for municipal water users, a goal largely informed by a similar goal for average conditions that was in the state’s Water Conservation Implementation Task Force report to the legislature (WCITF, 2004). The Task Force defined gallons per capita per day as the total amount of water diverted and/or pumped for potable use, including industrial use, divided by total population. Additionally, indirect reuse diversion volumes were to be credited against total diversion volumes for the purpose of calculating gallons per capita per day for targets and goals. There are various methodologies for calculating gallons per capita per day as discussed below. These pPlanning group goals were generally established considering dry-year projected demands and potential future savings from recommended conservation strategies. Other regions determined individual goals for municipal water users based on calculating the expected per capita use after incorporating anticipated efficiency savings and recommended conservation strategy savings. One region used a combination of both methods for setting their municipal water use goals.”

Comment: *Greater Edwards Aquifer Alliance commented that the per capita water use goal should be lowered to at least no more than 125 gallons per day in order to reflect reasonable municipal water use rates that many utilities in the state have been able to achieve.*

Comment: *National Wildlife Federation, Galveston Bay Foundation, Greater Edwards Aquifer Alliance, and Hill Country Alliance commented that this is the first plan in which planning groups were required to set a per capita water use goal in this round of water planning. The plan states that: “Approximately half of the planning groups set a per capita water use goal of 140 gallons per capita per day for municipal water users, a goal largely informed by a similar goal for average conditions that was in the state’s Water Conservation Implementation Task Force report to the legislature.” The Board should include a table listing the planning groups and the per capita water use goals they selected. We contend that 140 gallons per capita per day (gpcd) is not a particularly progressive per capita water conservation goal. Many communities have already reduced their water use below 140*

gpcd and have goals to reduce their water use further. Working with the Texas Water Conservation Advisory Council, the Board should consider providing guidance or context on per capita water use around the state and on the potential of water conservation for planning groups to make data informed decisions in the next round of regional water planning. Planning groups need to know what is possible and probable. Up-to-date information on what neighboring communities have achieved will be helpful.

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that as required by House Bill 807, each regional water planning group set one or more specific goals for municipal water use gpcd and the plan reports that approximately half of the planning groups set a goal of 140 gpcd, a general target recommend by the state's Water Conservation Implementation Task Force in 2004. That figure is outdated as a goal given water use numbers that many retail utilities in Texas have demonstrated are achievable and as illustrated by the Texas Water Conservation Scorecard by the Texas Living Waters Project in 2020. The TWDB - with the assistance of the state's Water Conservation Advisory Council - should update the suggested per capita municipal water use target and encourage planning groups to adopt that target as their goal.*

Response: The TWDB appreciates these comments and will work with the Water Conservation Advisory Council to identify improvements to data support for the planning groups as they develop conservation goals for the development of the 2026 Regional Water Plans. The TWDB agrees that, collectively, this information can inform planning groups as they set future goals. A table summarizing the per capita goals of each region will be developed as an ancillary document to the plan and included on the state water plan website when available, but no changes were made to the plan document in response to these comments.

Comment: *Central Texas Water Coalition requested that per capita goals be included for every water user group in the plan. Establishing water conservation metrics and goals for groups such as agricultural water users is a logical and reasonable next step toward achieving water savings through conservation, especially in view of the fact that agricultural water users continue to demand the largest quantities of water in the state.*

Response: Regional water planning groups are only required by statute to recommend gallons per capita daily goals for municipal water user groups. Neither the TWDB rules nor statute prohibit the planning groups from recommending such goals for other water user groups. The decision whether to recommend gallons per capita daily goals for other water user groups is at the discretion of each planning groups. No changes were made in response to this comment.

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that there is no implementation information for over 40 percent of the projects and water management strategies in the 2017 State Water Plan and that the TWDB and regional water planning groups need to make a more pro-active effort to gather implementation information, which seems to call for more than just relying primarily on attempted surveys of water user groups. The Water Conservation Advisory Council finds it difficult to meet its statutory charge to "monitor the implementation of water conservation strategies by water users included in RWPs" because of the variability of the planning groups' ability to get this information. Also, conservation is approximately one-third of the recommended strategies in 2070 and more attention needs to be given to monitoring implementation. Since planning groups set gpcd targets, these targets may provide an opportunity to evaluate conservation implementation and, if progress isn't being made, closer scrutiny could be warranted for those strategies.*

Response: Data regarding best management practices implemented by utilities as reported in their annual conservation report was provided to the planning groups for their consideration during plan development. Although legislation has increased the implementation reporting requirements during the 2021 planning cycle, the TWDB has tried to streamline the data collection process. The TWDB and the regional water planning groups have limited resources with which to collect implementation information. However the process by which implementation data is gathered will be evaluated for potential improvements prior to collecting the information for the 2026 Regional Water Plans. No changes were made in response to this comment.

Comment: *National Wildlife Federation, Greater Edwards Aquifer Alliance, and Hill Country Alliance commented that more can be done at the state level to support water user groups to put forth strong water conservation plans and to subsequently ensure those plans and their water conservation goals are reflected accurately in the Regional and State Water Plan. They commented that Implementation of the water conservation strategies contained in the plans is an important part of meeting our future water needs and that these local efforts should be supported as robustly as possible by the professional staff at TWDB, the Texas Water Conservation Advisory Council, and the Texas Legislature.*

Response: The TWDB agrees that the development of strong water conservation plans is a critical activity and supports utilities in the development and review of those plans with tools and resources that can be found on our website

<http://www.twdb.texas.gov/conservation/municipal/plans/index.asp>. A utility is also required to submit a copy of its water conservation plan to the appropriate regional water planning group as a condition of being found complete by the TWDB. As required by 31 TAC §357.22, planning groups are to consider existing water conservation plans when developing the regional water plan. Additionally, the TWDB provides reported conservation plan information to planning groups for consideration in the development of their regional water plans. The TWDB will work with the Water Conservation Advisory Council to identify reporting formats that could better assist the planning groups in the development of their plans. No changes were made in response to this comment.

Comment: *National Wildlife Federation, Greater Edwards Aquifer Alliance, and Hill Country Alliance commented that the plan should include information on the water conservation strategies that have been recommended and what has been implemented. They commented that this data should be available in the Water Conservation Plan Annual Reports that utilities submit to the Board each year and that it would also be useful to report on water conservation projects that have been funded through the Board, including water loss projects.*

Response: Data regarding best management practices implemented by utilities as reported in their annual conservation report is provided to Regional Water Planning Groups during the planning cycle for consideration during the development of their plans. The TWDB will work to identify how conservation data can be better compiled to assist planning groups as they develop their 2026 Regional Water Plans, including related to financing of conservation projects by the TWDB. No changes were made in response to this comment.

Comment: *Central Texas Water Coalition commented that water pricing should be a required water management strategy for planning groups to address and should be specifically reviewed and discussed in each plan. They commented that planning groups should collect data that allows an accounting of the results of the conservation strategies implemented by water user groups and that collecting data and verifying the savings associated with a conservation method or practice would assist the regions in making better decisions in future plans.*

Response: Data regarding best management practices implemented by utilities as reported in their annual conservation report is provided to regional water planning groups during the planning cycle for consideration during the development of their plans. The recommendation of water management strategies, including those associated with conservation pricing measures, are made by regional water planning groups. By its approval of each of the regional water plans, the TWDB has included all water management strategies and water management strategy projects recommended by the planning groups in the 2022 State Water Plan. The TWDB encourages the commenter to direct their recommendations regarding water pricing to regional water planning groups. No changes were made in response to this comment.

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that they would appreciate a discussion in Chapter 9 of how the TWDB might provide state financial assistance through SWIFT and SWIFRT to implement water conservation strategies recommended in the plan. They commented that the plan should report on the extent to which the agency has been able to meet the statutorily set goal of 20 percent of SWIFT/SWIFRT funding going to water conservation, and discuss any obstacles to meeting that goal, and recommend any changes needed or planned to try to meet that goal.*

They would like more information in this chapter about recommended projects for water loss control (which are stated in Chapter 8 to have a capital cost of approximately \$3.8 billion) and the pro-active steps that the TWDB is taking to encourage municipal water user groups to apply for state financial assistance for such projects.

Response: The TWDB is required to prepare and delivers a biennial report every two years to the Texas Legislature to provide an update on how the TWDB is using the SWIFT program funds to support development of new water supplies by implementing projects in the state water plan, including how the funding program is supporting rural and agricultural projects, water conservation, and reuse of wastewater. To date, borrowers have closed on SWIFT funds specifically for conservation projects in every program year since the inception of SWIFT program in 2015 for a total of approximately \$218 million which represents approximately 3.5 percent of all closed funds under SWIFT as of fall of 2020. The TWDB has not denied SWIFT funding to any applicant seeking funding for a conservation project that was recommended in the state water plan. The TWDB has undertaken significant stakeholder outreach to meet these goals to encourage participation. In addition to the SWIFT program, the TWDB has other state and federal financial assistance programs that fund conservation projects that are not considered under the specific SWIFT program measures.

The TWDB will continue to work with rural and agricultural entities and conservation project sponsors through workshops, presentations, one-on-one meetings, and other outreach. More information can be found in Chapter 3 of the latest biennial report which discusses goals and progress toward those goals.

[https://www.twdb.texas.gov/publications/reports/special legislative reports/doc/2020 SWIFT.pdf?d=8550.239999996847](https://www.twdb.texas.gov/publications/reports/special_legislative_reports/doc/2020_SWIFT.pdf?d=8550.239999996847)

In addition to the biennial report, the TWDB posts information on the agency's website regarding progress made in developing needed water supplies, along with a description and status of each project funded through the program. Additional information on all conservation projects with capital costs may be found on the website at <http://www.twdb.texas.gov/waterplanning/swp/2022/index.asp> and through the interactive state water plan at <https://2022.texasstatewaterplan.org>.

No changes were made in response to this comment.

Unmet needs

Comment: *Sierra Club Lone Star Chapter and Hill Country Alliance commented that the plan should be more upfront and explicit in showing how unmet irrigation needs affect the projected water needs of the state. It should be clear what portion of unmet needs statewide are the irrigation "needs" that reflect aquifer depletion and lack of economically feasible options rather than just drought conditions. At the least, Table 6-1 should also show the impact of subtracting the 2.336 million acre feet of unmet irrigation needs from the 6.858 million acre feet of total need to show realistic number that the state water plan must aim to provide by 2070. The TWDB should explain why they disagree with this approach if it isn't correct.*

***Response:** Identified water needs are the result of demands (the volume of water required to carry out anticipated economic activities during drought conditions) being in excess of supplies (the amount of water that is physically and legally available from existing sources for immediate use under a repeat of drought of record conditions.) Therefore, the identified irrigation needs are representative of drought conditions based upon the best available data to project demands and estimate supplies. A significant share of the projected irrigation demands of the state are associated with groundwater sources that are currently being relied on and that are projected to decline over the next 50 years as determined by aquifer management decisions from the joint planning process. To meet the statutory requirement that the state water plan be consistent with adopted desired future conditions, the resulting modeled available groundwater determines the supplies available to water users and is utilized as a constraint on the projected irrigation demands. The inability to address these needs that occur under drought is a result of the lack of economically feasible strategies regardless of the existing water supply meeting demands. The regional and state water plans do not partition water needs or unmet needs into subcategories based on contributing factors. Figure 7-7 clearly displays the information of irrigation needs not met even after strategies have been implemented. An additional footnote has been added to Table 6.1 to indicate the amount of unmet irrigation needs, and its percent of the total unmet needs, for clarification purposes, as follows: "**In 2070, 77 percent of statewide irrigation water needs remain unmet by the plan. Non-irrigation unmet needs represent 6 percent of statewide unmet needs."

Comment: *Freese and Nichols, Inc. commented that the plan indicates that there are unmet municipal needs in regions C, D, F, G, I and J; however, Table 6-5 on page D-94 shows unmet municipal needs of 0 in all decades for Regions C and I. Freese and Nichols noted that the rounding to the nearest thousand acre-feet in Table 6-5 under/overestimates of unmet needs that are of similar magnitude and suggested the table be revised to show any unmet needs less than 1,000 acre feet as "< 1,000" or rounded to nearest hundred.*

***Response:** Table 6-5 has been revised to present unmet needs that are less than 500 acre-feet as "<500."

Comment: *Freese and Nichols, Inc. commented that the Figure 7-7 (Page D-119) shows millions of acre-feet of unmet irrigation needs statewide. The explanation for unmet needs on Page D-118 states that the "inability to meet a water user group's need in the plan is usually due to the lack of an economically feasible water management strategy." However, in the last paragraph of the 'Quick Facts' on page D-84, it states that "significant irrigation water needs that would remain unmet...are due to managed depletion of aquifers and a lack of economically feasible alternatives." It is recommended to make the language between these consistent to explain why there is this large unmet irrigation need.*

***Response:** The second paragraph of Section 7.8 is revised to: “Statewide, most water needs associated with municipal, manufacturing, livestock, and mining water user groups are met by the plan in 2070 (Figure 7-7). However, at least some unmet water supply needs occur for all categories of water user groups, with irrigation water user groups accounting for the majority of unmet water needs. The inability to meet a water user group’s need in the plan is usually due to the lack of an economically feasible water management strategy, ~~but this does not prevent an entity from pursuing the development of additional water supplies at any time.~~ The significant unmet irrigation water needs are largely due to managed depletion of aquifers and a lack of economically feasible alternatives to meet agricultural needs. An unmet need does not prevent an associated entity from pursuing development of additional water supply.”

Editorial corrections/additions

Comment: Freese and Nichols, Inc. commented that the Acknowledgments section was missing three Region H voting members: W.R. Baker, Carl Burch, and Brandon Wade.

***Response:** The TWDB has revised the list of regional water planning group voting members to include these Region H members.

Comment: Freese and Nichols, Inc. commented that the summary of the loss of supply over time provided in the third quick fact of the Executive Summary should be revised to reflect the fact that most of the loss is in groundwater, as shown on Table 5-1 and Figure 5-13. Perhaps it could read “Texas’ existing water supplies— those that can already be relied on in the event of drought—are projected to decline by approximately 18 percent between 2020 and 2070, from 16.8 million to 13.8 million acre-feet per year primarily due to depletion of aquifers, with small losses in reservoir yield due to sedimentation.”

***Response:** The third quick fact in the Executive Summary is revised as follows: “Texas’ existing water supplies—those that can already be relied on in the event of drought—are projected to decline by approximately 18 percent between 2020 and 2070, from 16.8 million to 13.8 million acre-feet per year primarily due to ~~reservoir sedimentation and~~ depletion of aquifers, with relatively small losses in reservoir yield due to sedimentation.”

Comment: Freese and Nichols, Inc. commented that the report should mention that the \$80 billion cost to implement recommended water management strategies is in 2018 dollars, without accounting for future inflation.

***Response:** Statements have been added to the Executive Summary, Chapter 7, and Chapter 9 to clarify that the \$80 billion cost to implement recommended water management strategies is in 2018 dollars and does not account for future inflation.

The seventh quick fact in the Executive Summary is revised as follows: “The estimated capital cost to design, construct, and implement the more than 2,400 recommended water management strategy projects by 2070 is \$80 billion in 2018 dollars, without accounting for future inflation.”

The first sentence of the “How much will it cost?” portion of the Executive Summary is revised as follows: “The estimated total capital cost of the 2022 State Water Plan, which represents the capital costs of all recommended water management strategies and projects in the 2021 regional water plans, is \$80 billion in 2018 dollars, without accounting for future inflation.”

The second quick fact in Chapter 7 is revised as follows: “The cost of implementing the more than 2,400 recommended water management strategy projects by 2070 is \$80 billion in 2018 dollars, without accounting for future inflation.”

The third paragraph of Section 7.5 is revised as follows “The total capital cost required to implement all recommended water management strategy projects is \$80 billion in 2018 dollars, without accounting for future inflation.”

The first sentence of Section 9.1 is revised as follows: “The estimated total capital costs of the water management strategy projects recommended by the 16 regional water planning groups in this plan is \$80 billion in 2018 dollars, without accounting for future inflation.”

Comment: Freese and Nichols, Inc. commented that the summary of economic losses in the 9th quick fact of the Executive Summary should be clarified. Perhaps it could read: "If no action is taken to increase current water supplies, a severe drought could cause \$110 billion dollars a year of damages in 2020, increasing to \$153 billion a year by 2070."

***Response:** The 9th quick fact in the Executive Summary has been revised as follows: "If Texas does not implement the water supply strategies and projects in the state water plan, a severe drought could cause \$110 billion of economic damages in 2020, increasing to \$153 billion per year by 2070. ~~estimated annual economic losses resulting from water shortages range from approximately \$110 billion in 2020 to \$153 billion in 2070.~~"

Comment: Freese and Nichols, Inc. commented that the last sentence on page D-5 states that steam electric power water use remains constant due to more efficient water use. In accordance with the demand methodology, there are multiple reasons for not increasing steam electric power water demands. Perhaps this sentence could be modified to read: "...due to a projected increase in wind and solar power generation and increased water efficiencies at existing facilities."

***Response:** The last sentence of the Executive Summary section regarding how much water we will require is modified as follows: "Water demand for steam-electric power generation is projected to remain constant over the next 50 years primarily due to a combination of anticipated factors including a projected increase in wind and solar power generation and increased water efficiencies at existing facilities. ~~increasingly efficient water use.~~"

Comment: Freese and Nichols, Inc. commented that the second paragraph under the "Variations in drought response" section states that "Six planning groups (Regions B, C, G, H, I, and M) identified that confusion among the public occurs as a result of variation in water supply sources within the same region, requiring different drought responses and timing." This statement is not totally accurate. For example, Region H did a detailed examination to assess if there was confusion among the public but did not find clear evidence such confusion was occurring. The same may be true for other regions as well. TWDB may want to revisit this statement.

***Response:** The TWDB has reviewed the regional water plans and revised the discussion of variations in drought response strategies that may impede drought response efforts in Chapter 3 to remove Region H from the list of regions that identified that confusion among the public may occur as a result of variations in water supply sources within the same region. The second paragraph in the "Variations in drought response strategies that may impede drought response efforts" portion of Section 3.3.2 has been modified as follows: "~~Si~~ Five planning groups (Regions B, C, G, ~~H~~, I, and M) identified that confusion among the public occurs as a result of variation in water supply sources within the same region, requiring different drought responses and timing."

Comment: Freese and Nichols, Inc. suggested that a Groundwater Conservation District map with planning area boundaries be included in Appendix A.

***Response:** Figure A-3, a new map of groundwater conservation districts and regional water planning area boundaries, has been added to Appendix A.

Comment: Freese and Nichols, Inc. suggested including the total needs in Texas by category in Appendix C.

***Response:** Appendix C has been revised to include total needs in Texas by water use category.

Comment: *Freese and Nichols, Inc. suggested including the total economic impacts for Texas in Appendix D, if appropriate. If impacts for the state are not additive, an explanation as to why these numbers are not shown was requested.*

***Response:** As noted in Chapter 6 and Appendix D, the regional impact results presented in Appendix D and the statewide impact results presented in Chapter 6 vary due to the difference in the quantity of water needs used to estimate the impacts. The regional impact results were from an analysis conducted in September 2019 to allow for public comment in the draft regional water plans. Final regional water plans included updated water needs estimates, and the TWDB performed the statewide impact estimates presented in Chapter 6 based upon the final needs data in November 2020. Statewide impact results varied between the September 2019 and November 2020 analysis. Statewide impacts from the September 2019 analysis were not considered appropriate to include in Appendix D since they were inconsistent with data presented in Chapter 6. Explanations provided in the Table 6-3 footnote and Appendix D have been revised to better clarify these inconsistencies.

It should also be noted that summation of the impact results from the individual regional impact assessments will result in an underestimation of the impacts to the state, as the individual regional level impact assessments were developed using regional level impact multipliers and did not take into account the spillover impacts to other regions in the state.

The Table 6-3 footnote is revised as follows: “These statewide impacts vary from the impact results presented in the regional water plans (Appendix D) and online dashboards. This is primarily due to a difference in the quantity of water needs used to estimate the impacts. The results included in the regional water plans and online dashboards were from an analysis conducted in September 2019 to allow for public comment in the draft regional plans. Final regional water plans included updated water needs estimates, and the TWDB performed the statewide impact estimates in this chapter based upon the final needs data in November 2020.”

The second paragraph of Appendix D is revised as follows: “The regional water plan impact estimates presented in this table and the online dashboards vary from the statewide results included in Chapter 6. This is primarily due to a difference in the quantity of water needs used to estimate the impacts. The results presented here and included in the regional water plans and online dashboards were from the analysis conducted in September 2019 to allow for public comment on the draft regional plans. Final regional water plans included updated water need estimates, and the statewide impact estimates included in ~~this appendix~~ Chapter 6 were performed based upon the final needs data in November 2020.”

Comment: *One individual provided a correction to a misspelling in the Acknowledgments.*

***Response:** The TWDB has revised the plan, where applicable.