

Regional Water Planning in Texas and the Drought of Record

What is the drought of record?

Statute directs that the state water plan be developed to respond to drought conditions. As such, Texas' water plans are based on future conditions that would exist in the event of a recurrence of the drought of record. *Drought of record* is defined as the period of time when natural hydrological conditions—based on observed records—provided the least amount of water supply. Generally, this also corresponds with high water usage rates.

The statewide drought that occurred in the 1950s is the most significant statewide drought recorded in Texas' history (dating back to 1895) and is recognized as the drought of record benchmark for much of the state. Since the 1950s, more severe regional and local drought events have affected some water sources. Water planning for these water sources is based on that more severe recorded benchmark drought condition.

How does source water drought of record planning differ from planning for a utility's treatment and distribution system capacity and operation?

Retail utility treatment and distribution systems are commonly sized based on peak (e.g., daily; hourly) system demands of customers, which the utility is authorized to meet from existing supply sources, in addition to supplying water to meet the average annual or monthly system demands. The drought of record is relevant to a utility's overall system operation from the perspective of how much yield (volume) will be available from the system's water source during drought of record conditions and what the reliability of that water source will be during those conditions.

How can regional water planning groups identify new droughts of record? And how is a new drought of record confirmed?

For planning purposes, droughts of record for surface water sources are generally determined by the Texas Commission on Environmental Quality's water availability models (WAMs), which are based

on historical flow data that is used to determine surface water availability within each river basin in the state.

For instances where a WAM has not been updated to include flow records from a recent drought event, regional water planning groups may consider a variety of drought-related data to assess whether a potential new drought of record may have occurred, including Palmer Drought Severity Index, stream flow, and precipitation data. As WAMs are updated to reflect recent hydrological conditions, either as official updates by the Texas Commission on Environmental Quality or via other approved means, potential new droughts of record may be confirmed.

Some planning groups evaluated potential new droughts of record for groundwater resources based on assessments of annual precipitation and Palmer Drought Severity Index data. New droughts of record are not easily confirmed for groundwater sources. Most aquifers in Texas do not immediately show the impacts of decreased recharge from precipitation, and distinguishing whether the effects on groundwater resources are from decreased recharge or from increased pumping during periods of drought is a challenge. However, some aquifers in Texas, like the Edwards (Balcones Fault Zone) Aquifer, respond rapidly to changes in precipitation, making the effects of drought conditions more directly impactful.

How do groundwater management areas consider drought during the joint groundwater planning process?

Groundwater management areas are required to consider hydrological conditions, such as recharge from precipitation, during the joint planning process. While they are not required to specifically consider the drought of record in the joint planning process, several groundwater management areas have considered and incorporated periods of drought when developing desired future conditions.

Why is the drought of record considered a reasonable planning benchmark rather than using a drought worse than the drought of record?

The drought of record is considered a reasonable benchmark for planning because it reflects quite severe, extended drought conditions (the worst experienced ever on record) and utilizes the best available, actionable science, grounded in historical data and patterns.

The dynamic and cyclical nature of the regional and state water supply planning processes accommodates ongoing efforts to monitor and adjust plans based on measurable changes that impact water resources, for example in the event of new droughts of record. In addition, regional planning groups and local entities may plan for conditions worse than the benchmark drought of record if they choose to do so.

What drought conditions could be used to represent a drought worse than the drought of record?

It is challenging to try to predict the likelihood or conditions of new hydrological droughts that are worse than the drought of record, especially at the scale of local water supply sources. There are currently no 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.

The TWDB is working with Texas' state climatologist to explore ways of preparing for a drought worse than the drought of record. For example, there are some less uncertain climate-related parameters that could potentially be projected and incorporated into future water availability scenarios. At some point, estimates of future changes to reservoir evaporation may be considered certain enough to incorporate into yield modeling and estimated in a manner similar to how

water planners currently project changes to reservoir yields due to future sedimentation.

To address potential drought conditions worse than the drought of record, the TWDB continues to monitor climate science, consult with subject experts, and solicit research with the aim of improving the regional water planning process.

How can planning groups address uncertainties and plan for a drought worse than the drought of record?

The existing regional water planning framework already allows planning groups to address planning uncertainties,¹ such as uncertainty about droughts worse than the drought of record, in a variety of ways, including by

- using conservative water source yields,
- utilizing a management supply factor,
- recommending additional water management strategies to protect against a drought worse than the drought of record,
- incorporating information from local and/or regional water providers that have developed long-range plans to assess their system's capacity under conditions worse than the drought of record, and
- quantifying the demand reductions achieved through implementation of drought contingency plans and presenting the information in the plan as specific measures to implement in the occurrence of a drought worse than the drought of record.

Additional Resources

For additional information on the regional water planning process and current activities, please call 512-936-2387 or visit

www.twdb.texas.gov/waterplanning/rwp/index.asp.

¹ There are a variety of uncertainties and risks associated with long-term water planning including, for example, related to future population and water demands.