October 13, 2026

Via E-mail

Michael Warriner
U.S. Fish and Wildlife Service
Austin Ecological Services Field Office
1505 Ferguson Lane
Austin, Texas 78754
michael_warriner@fws.gov

Re: Pedernales River springs salamander species status assessment (SSA)

Dear Michael Warriner,

I am an interested party in the listing determination for the Pedernales River springs salamander (*Eurycea* species 1, "salamander"). With this letter, I submit information that has become available since the submission of the petition to list the salamander under the Endangered Species Act ("ESA") (Datri et al. 2021, "petition") and a subsequent comment regarding the Service's 12-month review for the species (Datri et al. 2023, "12-month comment") that is relevant to the U.S. Fish and Wildlife Service's species status assessment for the salamander. *See* Endangered and Threatened Wildlife and Plants; 90-Day Findings for Four Species, 87 Fed. Reg. 63468 (Oct. 19, 2022). The Service must base its determination regarding the salamander ESA listing status on the "best scientific . . . data available." 16 U.S.C. § 1533(b)(1)(A), (c)(2). As set forth below, recent information shows that the Pedernales River springs salamander faces unabating and even accelerating threats from urbanization exacerbated by climate change. This evidence demonstrates that the salamander continues to face significant threats to its continued existence and therefore warrants protection under the Endangered Species Act.

Scientific or commercial data that have become available since the petition and 12-month comment:

PRESENT OR THREATENED DESTRUCTION, MODIFICATION, OR CURTAILMENT OF SPECIES' HABITAT OR RANGE (FACTOR A)

Habitat modification, in the form of degraded water quantity and quality and disturbance of spring sites, is the primary threat to the Pedernales River springs salamander. This primary threat has not abated and continues to accelerate.

Water Quantity and Quality Degradation

Urbanization

Growing human populations increase demand for urbanization, which degrades salamander habitat by changing hydrologic regimes and detrimentally impacting the quantity and quality of water resources (USFWS 2013, USFWS 2014). The range of the Pedernales River springs salamander is limited to the Texas counties of Travis, Hays, and Blanco. The city of Austin, Travis County, Texas is the 12th most populous city in the United States (U.S. Census Bureau 2026). Austin ranks among the fastest-growing cities in the country. Population projections from the Texas State Data Center estimate that Travis County will increase in population from 1,290,188 in 2020 to 2,352,816 in 2060. This would be an 82.4 percent increase in the human population size over this 40-year period. The Texas State Data Center also estimates an increase in human population in Hays County from 241,067 in 2020 to 612,040 in 2060. This would represent a 154 percent increase over the 40-year period. For Blanco County, Texas State Data Center projections estimate an increase in population from 11,374 in 2020 to 15,835 in 2060, a 39.2 percent increase over the 40-year period. All human population projections from the Texas State Data Center presented here are under a high migration scenario (Texas Demographic Center 2024).

Drought and Climate Change

"For groundwater-obligate species such as *Eurycea* salamanders, declining water tables and reduced springflow causes habitat loss at the surface and subsurface, resulting in declines in individual abundance and eventually population extinction" (Devitt et al. 2019). "Increased urbanization in the watershed has been cited as one factor, particularly in combination with drought that causes declines in spring flows (COA 2006, pp. 46–47; TPWD 2011, pp. 4–5)" (USFWS 2013, 2014). Climate change can alter hydrologic processes and lead to increases in surface temperature and evaporation, and to changes in precipitation and streamflow (Hostetler and Bartlein 1990, Houghton et al. 2001, Huntington 2006, Khan 2022). These changes exacerbate water insecurity by diminishing water supplies (Konapala et al. 2020, Kundzewicz et al. 2008). The Service considers climate change and drought ongoing and expected-to-increase threats to Eurycea salamanders (USFWS 2013, 2014, 2020). Examples of extreme weather events impacting water resources in the state and the region have occurred and/or continue to occur since the petition and 12-month comment.

A live water crisis unfolded in south Texas this year: Corpus Christi almost certainly experienced a new drought of record, and water supply reservoirs reached the lowest levels on record. Given that Corpus Christi is a wholesale water provider for several communities in the region, the primary outlet for Permian Basin crude, and a major liquefied natural gas export hub, "if Corpus doesn't have enough water, the impacts will be local, regional, state-wide, national, and international" (Mace 2026).

"Weather whiplash of extraordinary proportions affected central Texas in early July 2025. An exceptional and prolonged drought that led to reduced agricultural yields, livestock losses, and low water availability was abruptly followed by a 1 in 1000-year precipitation event. The result was catastrophic flooding, significant loss of life, destroyed infrastructure, and an altered natural landscape….The 20 Texas

counties included in the early July 2025 flood disaster declaration had been experiencing drought since late 2021, the second longest such uninterrupted period of drought in the U.S. Drought Monitor. This included 180 weeks of at least severe drought and 105 weeks with exceptional drought somewhere in these 20 counties…The effects of prolonged drought in central Texas were acute and numerous…Water resources have been severely compromised as reservoir and aquifer storage fell to critical levels…The Edwards Aquifer dropped below the Stage 5 drought threshold, the most extreme threshold, for the first time since the Edwards Aquifer Authority's inception in 1993. Also, Canyon Lake, a reservoir on the Guadalupe River, was at 46% of total capacity and Medina Lake was just above 2% full prior to the extreme precipitation beginning on July 3….Extreme low precipitation and record high temperatures for the 48 months ending on June 30, 2025 were principal drivers of this drought. Precipitation was in the lowest 10-percentile and the 9th-lowest on record compared to 1899-2025 while temperatures were the highest on record, almost 1 degree Fahrenheit greater than the prior record set the year earlier" (Hoell et al. 2025).

In January 2026, the Barton Springs Edwards Aquifer Conservation District ("BSEACD", "District"), which follows a Habitat Conservation Plan (HCP) to protect Austin blind and Barton Springs *Eurycea* salamanders of Travis County, warned its constituents that groundwater conditions within the District were approaching historic levels, writing that "Barton Springs flow is currently less than a quarter of its historical average", and that the District was approaching a Stage 4 Emergency Response Period for the first time in the District's 39-year history. "The region's persistent drought is caused by four years of year-after-year below-average rainfall, record-breaking high temperatures, and rapid increases in demand caused by growth. All these factors contribute to an overdraft on the region's limited groundwater resources" (BSEACD 2026). From the District's April 7, 2026 update: "After delivering the warmest February on record, 2026 has now produced a record-breaking March as well. The month concluded with an average temperature of 70.8°F, which is nearly two degrees higher than the previous record set in 1907 when March averaged 68.9°F. Rainfall was also below average, with the area receiving just over half of its typical March total. Despite the limited precipitation, conditions were sufficient to delay a Stage 4 Emergency declaration, leaving the District in Stage 3 Exceptional drought." The District has been operating under Stage 3 Exceptional Drought since October 2025. As of April 2026, it has remained in continuous drought for 47 consecutive months. "Springflow is currently just 2.3 cfs above the Stage 4 Emergency Response threshold… As of April 7, the 10-day average water level at the Lovelady well is 453.8 feet above mean sea level (ft-msl), which is within the Stage 3 Exceptional Drought range. This is only 0.4 feet (or 5 inches) above the Stage 4 Emergency Response threshold…The District has never entered Stage 4 Emergency Response, but without substantial recharge, flows could approach that threshold later this spring" (Hlavaty 2026). Persistent drought appears to be testing the limit of the BSEACD HCP and water quantity impacts on the *Eurycea* salamanders it covers.

At this writing, 99% of the state of Texas is in abnormally dry to exceptional drought (NDMC et al. 2026). The majority of the state received less than normal rainfall for August (NOAA 2026). Figure 1 shows annual precipitation in the three Pedernales River springs salamander counties, with below average precipitation for all three counties for five of the past seven years (NOAA 2026). Drought conditions have prevailed across the three counties since 2021-2022 (NOAA 2026, Figure 2).

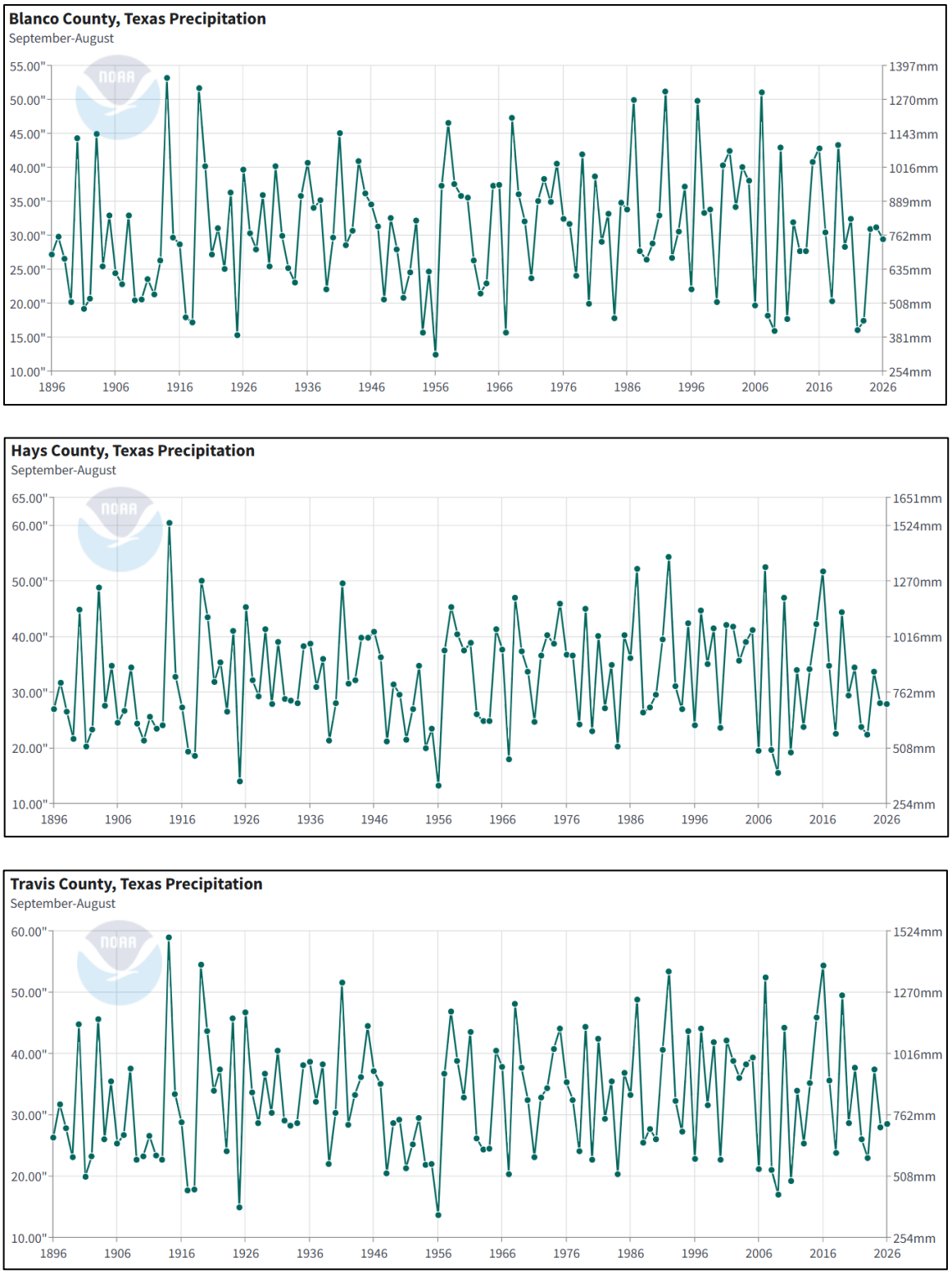


Figure 1. Below average precipitation for 5 of the past 7 years in the three Pedernales River springs salamander counties (NOAA 2026).

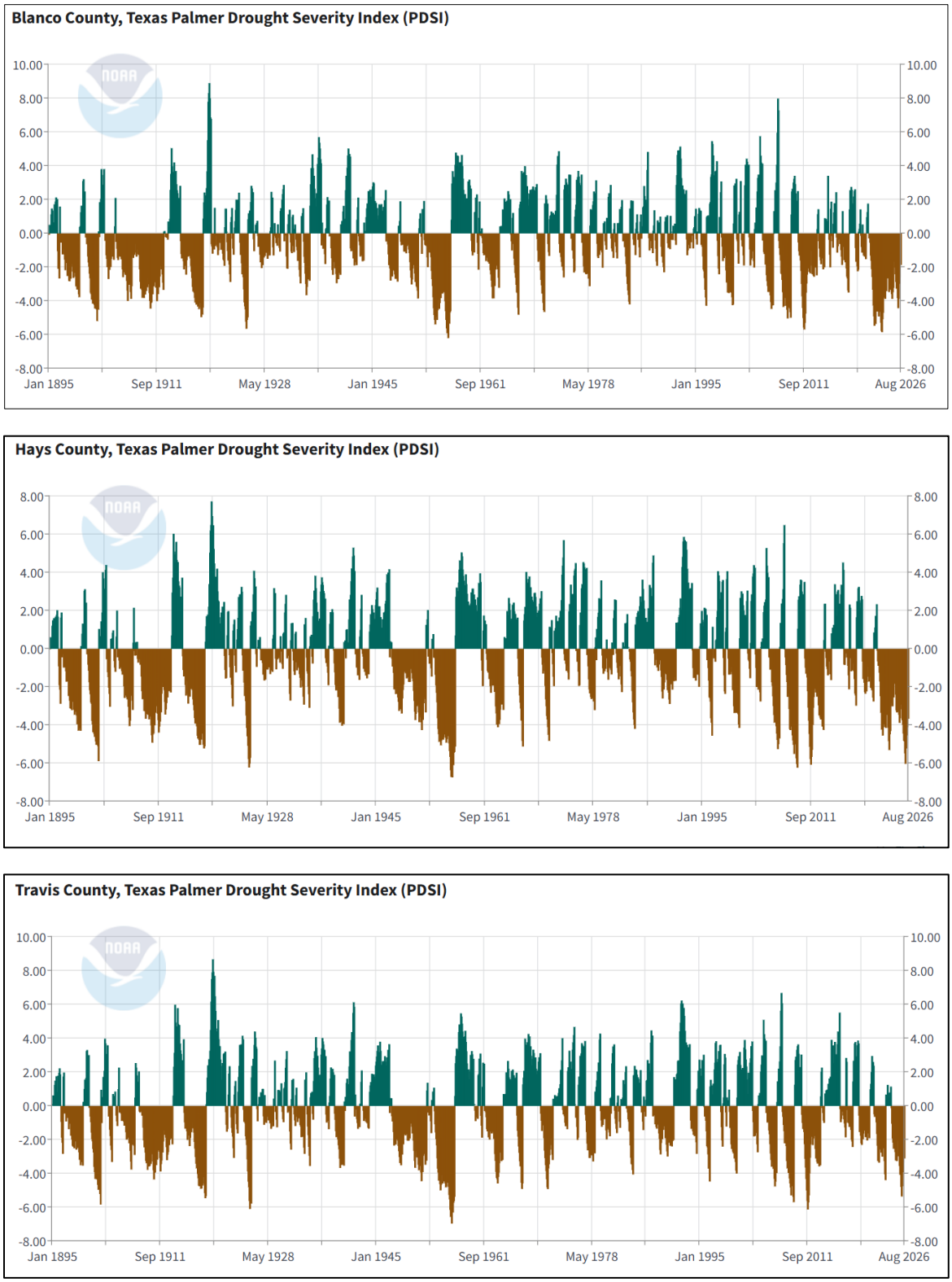


Figure 2. Drought conditions have prevailed for the three Pedernales River springs salamander counties since about 2021-2022 (NOAA 2026).

It is hotter than ever. Since 2022, all years for all three Pedernales River springs salamander counties have been above average temperature. For these three counties, the past 3 years have been among the 5 hottest years on record, with the last 12 months being the hottest on record (Figure 3, NOAA 2026).

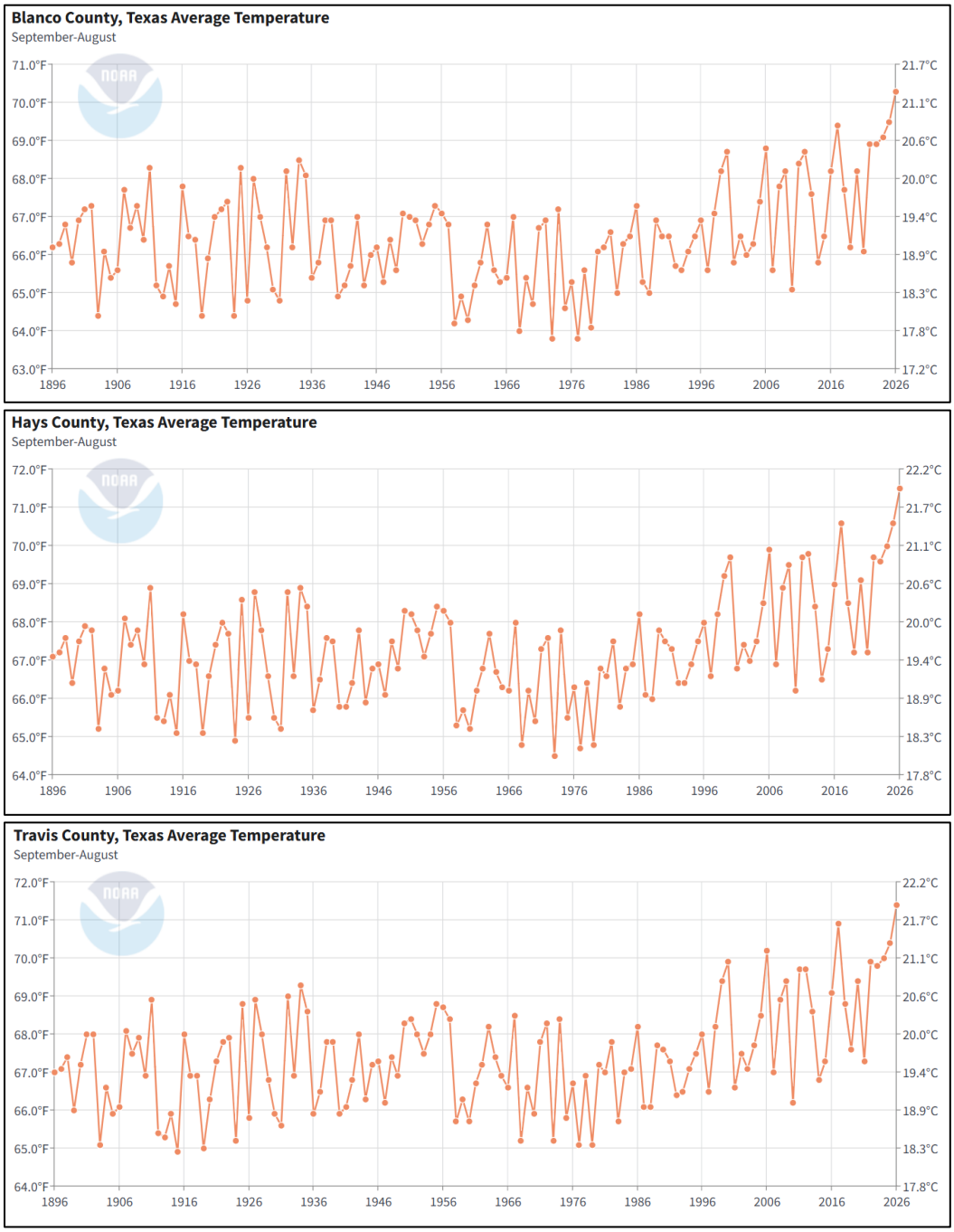


Figure 3. All years since 2022 have been above average temperature for the three Pedernales River springs salamander counties. The past 12 months have been the hottest on record (NOAA 2026).

The climate catastrophe and water scarcity continue to be projected to worsen. "'There's some question about whether we should actually refer to what's coming as a drought,' says Nielsen-Gammon. 'Because a drought is something that happens temporarily and goes away. And we're talking about something that is effectively going to be permanent – at least in terms of human lifespan'" (Buchele 2020). "Soil will dry up and not be able to support the same amount of agriculture and plant and animal life. Nielsen-Gammon says it will make the climate of East Texas more like that of West Texas, and the climate of West Texas more like that of New Mexico. There will be less water in the reservoirs, and without new ways of storing water, Texas will no longer be able to support human activity" (Buchele 2020).

Springs are drying across the state. Gunnar Brune assessed the status of springs across Texas, assembling these data in a 1975 report and in his seminal work Springs of Texas (Brune 1975, 1981). Mace and Galaviz (2024) reexamined the status of springs across the state: "In fact, groundwater users have produced an additional 500 million acre-feet of groundwater from Texas' aquifers since Brune's study in 1975, twice as much as was produced when Brune did his study," leading Mace and Galaviz (2024) to hypothesize that more springs have gone dry since Brune's 1975 report and to update the status of those springs. "After correcting the flow status of springs in the 1975 report with those in Brune's 1981 book, we found that 14 percent of springs had gone dry by 1981, with 23 percent of those springs dry today, an increase in failed springs of 64 percent. Because Brune's book did not include the entire state and we found the book's spring status more reliable, we refined our analysis only to include those springs shared between the report and the book. This refined analysis showed that 11 percent of springs had gone dry by 1981 compared to 30 percent today, an increase of 173 percent, or 2.7 times more" (Mace and Galaviz 2024).

The Blanco-Pedernales Groundwater Conservation District is in Drought Stage 2 (Moderate, 20% curtailment) (BPGCD 2026), the Southwestern Travis County Groundwater Conservation District is in Drought Stage D-1 (SWTCGCD 2026), and the Hays Trinity Groundwater Conservation District is in Emergency Stage, 40% curtailment of groundwater pumping district-wide (HTGCD 2026).

The 12-month comment referenced the INTERA model projecting impacts on springflow and water levels from the Mirasol Springs development's proposed groundwater production under average rainfall conditions and drought conditions. Five salamander locations are within the INTERA model study area. The INTERA model projects that spring flow will decrease due to Mirasol's proposed pumping, with additional water level drawdown under drought conditions (Oliver 2023). These conclusions have since been further substantiated. "The Groundwater Availability Certification provided by Applicant [Mirasol] as required by HTGCD Rule 11, Sec. 11.8.3 indicates that the Applicant's proposed groundwater pumping during prolonged drought could lower Middle Trinity Aquifer levels at the development site and joining property by as much as 5.5 feet after 10 years and by as much as 6.1 feet after 30 years. Proposed groundwater pumping will decrease local aquifer storage and prolong springflow recovery" (HTGCD 2023).

The Bureau of Economic Geology (BEG) conducted a multi-year source water study to delineate the springsheds for the Hamilton Pool area, focusing on six key perennial spring complexes that discharge from the Cow Creek Limestone within the Hamilton Pool segment of the Middle Trinity Aquifer. These include springs in the Lick, Pogue, Reimers/Grotto, Hamilton Pool, Elder, and Roy Creek watersheds as well as other smaller, unnamed drainage areas (Hunt et al. 2025). It was noted in the

petition that the most significant populations for the Pedernales River springs salamander may occur in this area in the Cow Creek. The majority of the known range (7 of the 9 locations) of the Pedernales River springs salamander is clustered within a 0.5 square mile area (1.3 km^2) at the juncture of southwestern Travis and northern Hays Counties, Texas. After developing a conceptual model and hydrologic data for this area, the BEG developed a three-dimensional groundwater flow model to assess the impacts of pumping and reduced recharge scenarios on groundwater resources (Graf and Hunt 2024). The BEG model domain includes the 7 salamander sites referenced above. The BEG source water study comprehensively characterizes the geology, recharge, hydrology, and water budget for the overwhelming majority of the salamander's known populations. It is highly relevant to the SSA. Key points from Graf and Hunt (2024) and Hunt et al. (2025) are listed below:

- "Groundwater depletion is a significant issue in this region, as evidenced by over 30 years of continuous water level declines (up to -3.0 ft/yr; Hunt and others, 2020) and the prolonged cessation of once-perennial springs. Groundwater pumping in western Travis County has substantially increased (~280% since 1975; Hunt and others, 2020), with the Middle Trinity Aquifer being the primary target in the study area. Groundwater depletion is a consequence of both prolonged drought and excessive groundwater pumping. Basic hydrogeologic principles explain how water extracted from wells comes from reduced groundwater storage (with associated lowering of groundwater levels) and by capturing natural discharge, such as spring flow (Theis, 1940; Konikow and Leake, 2014). Unfortunately, both impacts are present in the region, evidenced by groundwater mining centered around the City of Bee Cave, and the reduced flow at Jacob's Well Spring in Hays County (Gary and others, 2019; Hunt and others, 2020). Declining spring flows and nearby declining groundwater levels, along with increased groundwater pumping volume, raise significant concerns about the long-term sustainability of water resources and their effects on Travis County's treasured natural landmark, Hamilton Pool" (Hunt et al. 2025).
- "….in the study area, generally south of Highway 71 and between Bee Creek and the Pedernales River, the Middle Trinity Aquifer is the primary target for water supply (Hunt and others, 2020)" (Hunt et al. 2025).
- "Over the two years of field study (May 2021 through April 2023), groundwater levels and spring flows steadily declined (Figure 7 [Figure 4 of this comment]), with temporary increases after isolated rainfall (and recharge) events. Overall, spring flow decreased by about 40%, and water levels declined by about 10 ft, as shown in the Reimers Ranch Public Water Supply (PWS) well (Figure 7). During this period, median flows were about 0.05 cubic feet per second (cfs), equivalent to 22 gallons per minute (gpm) for larger complexes like Hamilton Pool and about 0.01 cfs (4.5 gpm) for smaller complexes. The median springflow rates generally correlate with watershed areas and estimated recharge rates, indicating a strong connection between springsheds (groundwater) and watersheds (surface water) (Marshall and Hunt, 2023; Graf and Hunt, 2024). Thus, the strong surface water-groundwater connection in this localized aquifer system makes the springs renewable but also vulnerable to drought and, as this study highlights, pumping during drought" (Hunt et al. 2025).

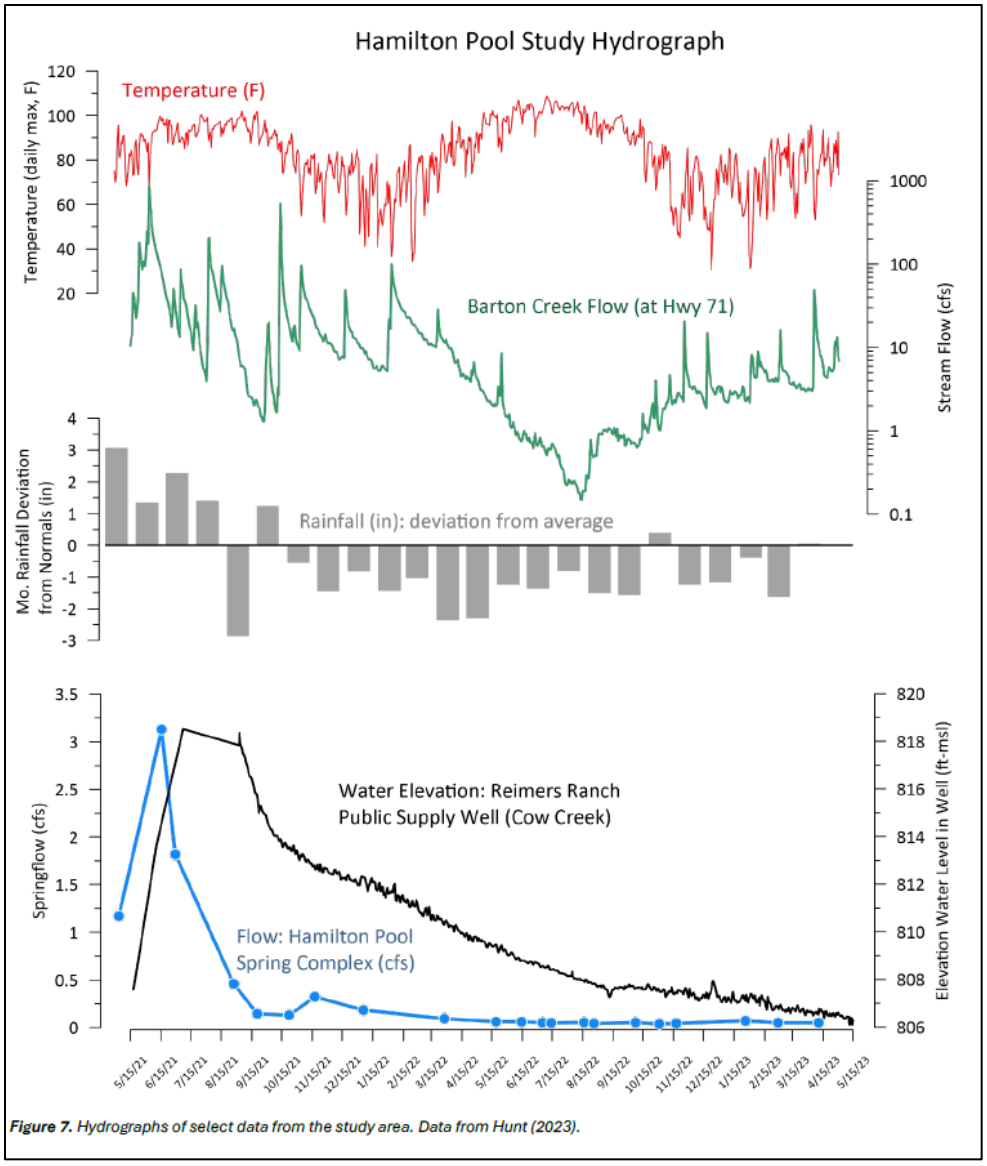


Figure 4. While there have been temporary increases after isolated rainfall events, there have been significant declines in groundwater levels and spring flows in the area where the majority of the Pedernales River springs salamander is found. From Hunt et al. (2025).

- The BEG model accurately replicated observed groundwater levels and spring flows. “The conceptual and numerical models show that water pumped by wells within the springsheds primarily comes from reduced spring flow (termed capture) and, to a lesser extent, changes in aquifer storage (decreased groundwater levels)” (Hunt et al. 2025).
- “If pumping exceeds the natural spring discharge during droughts, then the risk of significant reductions or even drying of the spring is likely” (Hunt et al. 2025).
- “[Figure 5] illustrates a simple comparison of pumping and springflow in the study area, showing that during extended droughts, pumping can be up to three times the amount of springflow, thereby creating conditions for significant capture and reduction of springflow” (Hunt et al. 2025).

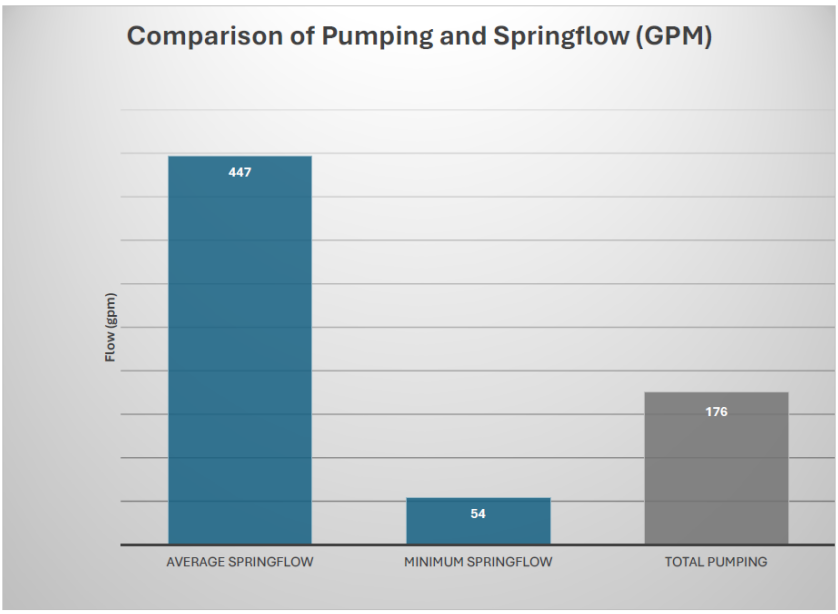


Figure 10. *Comparison of pumping (Table 2) and springflow statistics (Table 1) in gallons per minute. Note that the average values of springflow were collected during a period dominated by drought conditions.*

Figure 5. During extended droughts, pumping can be up to three times the amount of springflow, creating conditions for significant capture of springflow. From Hunt et al. (2025).

- The study identified several permitted wells that could significantly influence springflow where the majority of the salamander locations are found, including current and proposed pumping by West Cypress Hills (194.95 ac-ft/yr), Mirasol (85 ac-ft/yr), Bentree RV (4.42 ac-ft/yr), and Reimers Ranch Park (0.37 ac-ft/yr) (Graf and Hunt 2024).
- Modeling indicated significant impacts due to pumping from the West Cypress Hills development, including changes to the groundwater divide.
    - "MODFLOW will automatically reduce the extraction rate for wells when the defined aquifer characteristics cannot satisfy the assigned rate. This reduction was performed for three of the high-capacity West Cypress Hills public supply wells, highlighting the aquifer's potential limitations in sustaining the assigned pumping rates under steady-state conditions under current demands and does not include the proposed Mirasol pumping or other potential future demand" (Graf and Hunt 2024).
    - "Under the no-pumping scenario, springflows across the model domain exhibit significant increases, highlighting the direct influence of existing groundwater pumping on springflow. Lick Creek experiences the largest relative increase, with simulated springflow increasing 64%, followed by Hamilton Pool at 43%, Pogue Springs at 38%, and Elder Creek at 22%". Water levels near West Cypress Hills rose by up to 57 feet in the no-pumping scenario (Graf and Hunt 2024).

- “Notably, ceasing existing pumping during moderate drought conditions could raise groundwater levels by 6.1 feet and increase spring flow by 12%. The model also projected negative impacts from proposed future pumping on spring flow, particularly during increasingly severe drought conditions” (Hunt et al. 2025).
- “…the simulations indicate that existing pumping potentially significantly contributes to (current) reduced springflow in Lick Creek and Hamilton Pool spring complexes. The proposed Mirasol Springs development is projected to diminish springflows further, particularly under drought conditions. Moreover, prolonged drought periods can significantly reduce water levels and well yields, highlighting potential regional water availability limitations.”
- Proposed Mirasol pumping represents a 15% increase in groundwater demand in the model domain.
- “The additional proposed pumping from the Mirasol Springs development resulted in a further decrease in spring flow, with Elder Springs experiencing the most significant reduction (-21%) under baseline conditions, followed by Roy Creek (-10%) and Hamilton Pool (-6%), with impacts amplified by simulating increasingly severe drought conditions” (Hunt et al. 2025).
- Under low recharge scenarios, for the proposed Mirasol wells, the model could not meet the proposed pumping demands on the aquifer system. "These results may reveal the limited groundwater availability of this small, unconfined aquifer and its ability to support pumping under sustained drought conditions" (Graf and Hunt 2024).
- “These modeling results estimate that the majority (~76%) of the proposed pumping by Mirasol would be from the capture of springflow…”. Elder creek flows were reduced by 90% under the 40% recharge scenario combined with Mirasol pumping (Graf and Hunt 2024).
- “While springflow constitutes most of the source water for Mirasol pumping across all scenarios, with increasing drought, there is a greater reliance on regional groundwater flow as springflow declines” (Graf and Hunt 2024).
- “Results demonstrate that the proposed Mirasol pumping during prolonged droughts would jeopardize the springs” (Graf and Hunt 2024).

I note that the Mirasol pumping referenced above is what has been proposed in the Mirasol Springs development groundwater conservation district permit applications to HTGCD and SWTCGCD (Clancy 2021a, 2021b). In addition to the permitted pumping that is proposed, Mirasol is currently pumping from exempt wells. Further information regarding these additional wells is detailed below in “Impacts to Individual Locations”.

Current groundwater extraction is having direct, negative impacts on the Pedernales River springs salamander. The depletion in storage and reduction in spring flow is degradation of salamander subsurface and surface habitat across a majority of its known range. Proposed groundwater extraction will significantly accelerate these impacts.

Impacts to Individual Locations

Those impacts to salamander locations detailed in the petition and the 12-month comment remain. Further information acquired or updated is presented below.

The petition and 12-month comment detailed site degradation at Red's Spring. This salamander site on the eastern side of Roy Creek canyon is dry and has been continuously since at least December 13, 2024 according to landowner records (Figure 6). Landowners report that this spring has never before run dry to their family's observations dating to the 1940s (M. Smith pers. comm. 2026). These springs are renewable (Hunt et al. 2025); however, landowner Lew Adams reported 5.25 inches at the Roy Creek property rain gauge and yet no spring flow 6 July 2025 (Figure 7). Further, landowners on both sides of the Roy Creek canyon (M. Smith, J. Askins pers. comm. 2026) report that during drought, Hershel's Spring (on the western side of Roy Creek) historically loses flow before springflows on the eastern side of the canyon noticeably decrease. As of 29 September 2026, Red's Spring and Big Spring, both on the eastern side of Roy Creek canyon remain dry (Figure 8); however, Hershel's Spring and additional springs located on the western side of Roy Creek canyon continue to flow (Figure 9).



Figure 6. Red's Spring is reported to have run dry for the first time. Adams, 13 December 2024

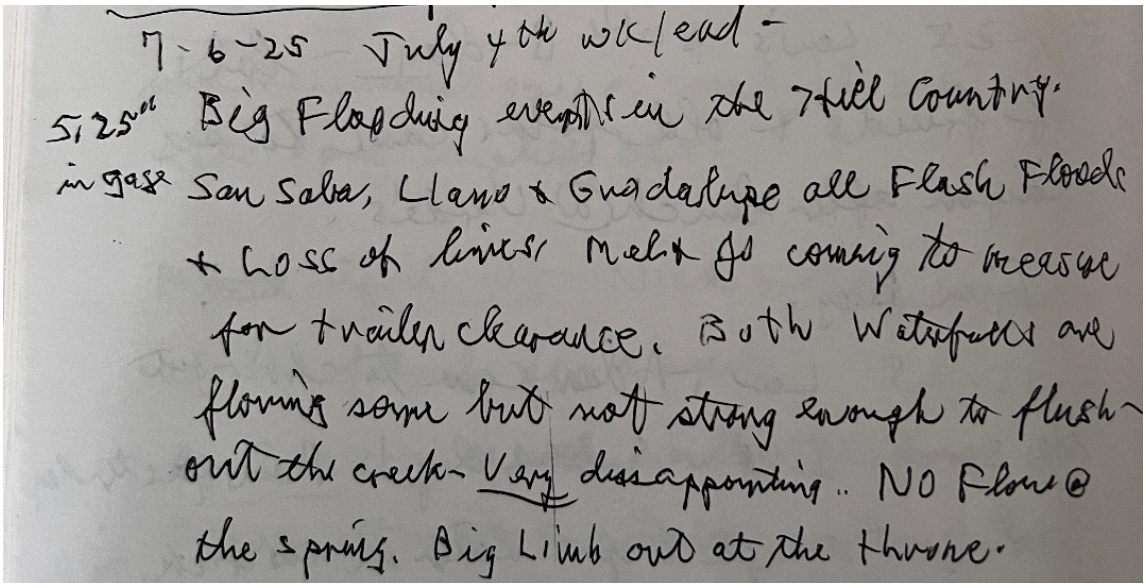


Figure 7. Red's Spring remains dry through significant recharge events in its small, localized springshed. Smith, 30 September 2026



Figure 8. Cypress trees grow at the now dry Big Spring (top photos). Red's Spring (bottom photo) is reported to have never run dry until December 2024. Big Spring and Red's Spring are located on the eastern side of Roy Creek canyon. Datri, 29 September 2026



Figure 9. Hershel's Spring (top photos) and an unnamed spring (lower photos) are located on the western side of Roy Creek canyon and continue to flow. Datri, 29 September 2026

"[The Hunt et al. (2025)] study characterizes a shallow aquifer system that is renewable but exhibits significant vulnerability to both drought and groundwater pumping. As predicted by established hydrogeologic principles of capture (Theis, 1940; Konikow and Leake, 2014), increased pumping in the springshed will inevitably lead to the reduction of spring flow and a decline in aquifer water levels. BEG numerical modeling corroborates this, demonstrating a linear relationship between the rate of pumping and the reduction in spring discharge, with springs located closer to pumping wells experiencing more pronounced impacts." Figure 10 depicts salamander locations and Mirasol Springs exempt wells superimposed on the Hunt et al. (2025) map of watersheds, groundwater flow, and springs.

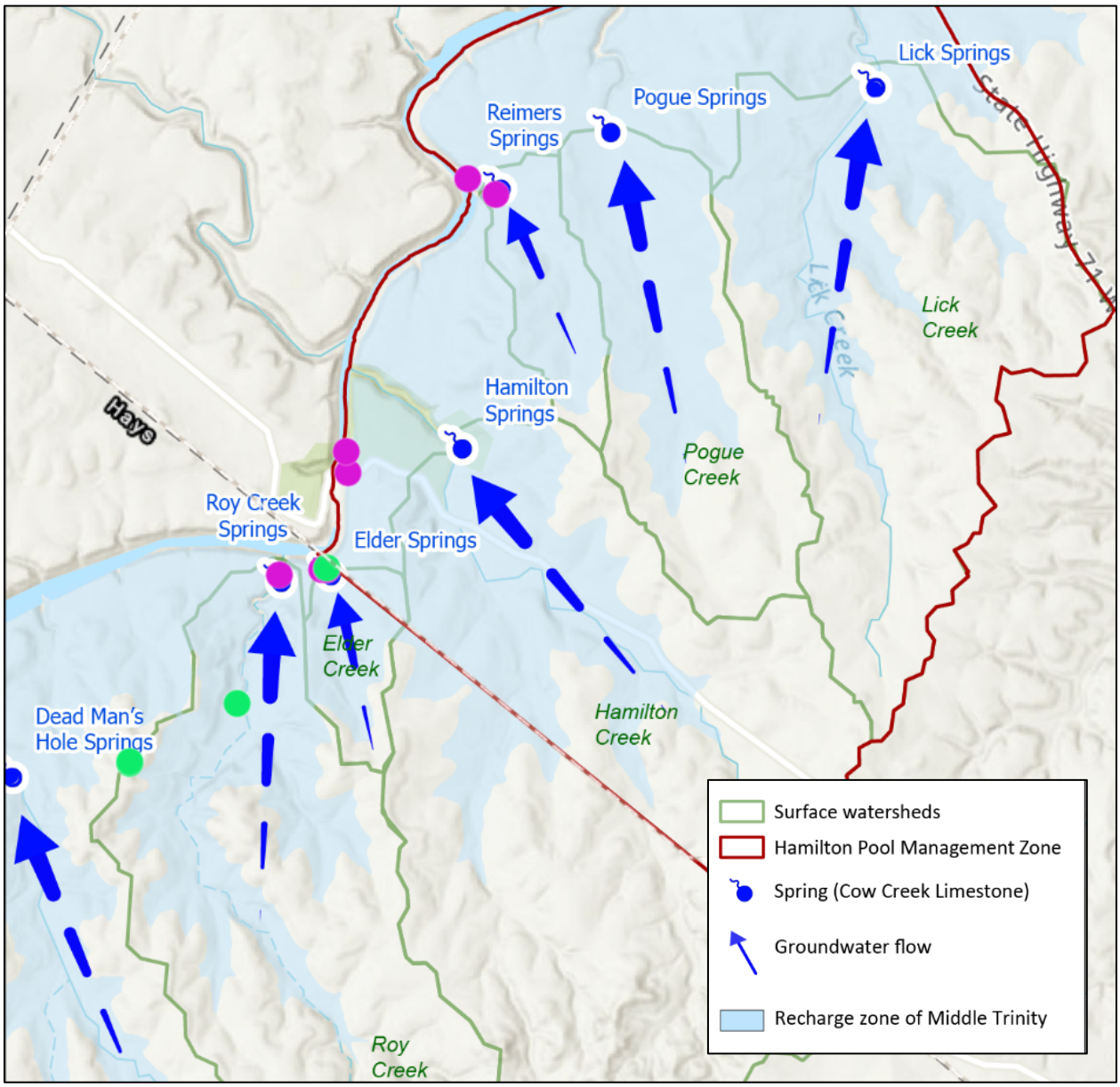


Figure 10. Salamander locations (pink circles) and Mirasol Springs exempt wells (green circles) are superimposed on the Hunt et al. (2025) map of watersheds, groundwater flow, and springs.

The developer's website states, "Mirasol Springs has agreed to not use groundwater or surface water from the Pedernales as a water source" (mirasolsprings.com 2026); however, Clancy Utility Holdings, LLC ("Clancy") could pump as much water as it could for agricultural purposes without a permit (Texas Water Code § 36.117, Special Districts Local Laws Code § 8843.104, and HTGCD District Rule 3.11.1) until summer 2025 with the execution of settlement agreements between Travis County and other protestants (Exhibits A and B). Even under the settlement agreements, while pursuing an extension of a West Travis County Public Utility Agency pipeline for water service to the Mirasol Springs and Mirasol Lodge developments, Clancy "will limit pumping for farm irrigation to 1000 GPD (based on an annual average) with a 3,000 GPD daily maximum". The developer's website states that construction is expected to begin Spring 2027 (mirasosprings.com 2026); however, "Mirasol is conducting agricultural activities on the Effective Date with groundwater from an existing exempt well" ("Farm Well", State Well no. 5747607, Exhibit B). The developer's website describes the farm as 14 acres (mirasosprings.com 2026), and significant expansion of what is apparently an industrial-scale operation has occurred since 2019 (Figures 11, 12). The BEG model indicates increasing impacts to springs with decreasing distance from wells (Hunt et al. 2025). The Farm Well is 500 m from Red's Spring, 108 m Little Elder Spring (also known as "Elder Spring"), and 70 m from Bunkhouse Springs, all salamander sites (Figure 13).



Figure 11. 2018 (above) and 2026 (below) imagery of Mirasol Springs industrial-scale farm irrigated with groundwater. Salamander locations are shown in pink.



Figure 12. Mirasol Springs industrial-scale farm irrigated with groundwater. Datri, 4 October 2026.



Figure 13. The farm well is 500 m from Red's Spring, 108 m Little Elder Spring, and 70 m from Bunkhouse Springs, all salamander sites. Modeling by the Bureau of Economic Geology indicates increasing impacts to springs with decreasing distance from wells (Hunt et al. 2025).

In addition to the farm well, Clancy has 4 other exempt wells. While Clancy agrees to monitor and manage drawdown trends "to the extent feasible", there is no appreciable limit on groundwater extraction for other exempt uses not covered in the settlement agreement of their existing exempt wells (Exhibits A, B). For example, the Hill Top Wells "are used for non-potable livestock, agricultural, and domestic purposes to service the equestrian center and the existing [5 to 6] homes that are referred to as the Winn Family Compound" (Exhibit B). The Winn Family Compound additionally pumps from the Potable Well. And, apparently Mirasol is, in-fact, using Pedernales River water for their "small" (1.85 acre) pond for "domestic and livestock, and recreational purposes" (Exhibit B, Figure 14). The intricate relationship between Pedernales River water and the groundwater is detailed in the 12-month comment.



Figure 14. While “Mirasol Springs has agreed to not use groundwater or surface water from the Pedernales as a water source”, they are using the river’s water for their “small” (1.85 acre) pond for “domestic and livestock, and recreational purposes”.

In summary, Red’s Spring has never been observed to have gone dry before December 2024. It has been clearly demonstrated, via multiple studies, that groundwater pumping in these springsheds will directly capture spring flow and that effect is amplified during drought and in proximity to springs. Pumping has increased. Hays County has been experiencing continuous severe-to-emergency drought conditions since 2021-2022. At least one salamander spring has been dry for at least 22 months. I do not have recent observations on whether the two salamander sites closer to the farm well (Elder and Bunkhouse) are also impacted, but the literature supports that presumption. Further, as previously substantiated, urbanization, climate change, and drought are projected to worsen.

The accelerating threats imposed by the on-going Mirasol Springs development to the majority of the known range of the salamander are not limited to water quantity. The Mirasol Springs TLAP and its projected impacts were detailed in the 12-month comment. Clancy Utility Holdings LLC TLAP Permit No. WQ0016335001 became effective on August 12, 2025 (Exhibit C). Figure 15 depicts the Mirasol development’s most recently posted site plans with salamander locations superimposed. While site plans have been modified, threats from water quality degradation, disease, and predation detailed in the petition and 12-month comment remain (e.g. there are still fishing ponds; however, they have been

moved upstream of a different known spring), with some already transpiring (e.g. the farm). The most recent groundwater studies indicate effects will travel beyond property boundaries (Hunt et al. 2025).



Figure 15. Five of the nine known locations for the Pedernales River springs salamander are located in the immediate vicinity or directly on the Mirasol Springs development. Adapted from Mirasol Springs site plans (mirasolsprings.com 2026).

The threats to those sites on Travis County property previously detailed in the petition and 12-month comment remain. In addition, there are roads, parking lots, trails, and a public bathroom (possibly on septic) in the immediate vicinity of Reimers Ranch Spring #1 and Climbers Canyon Spring. Hunt et al. (2025) noted potential impacts to springs from wells at Reimers Ranch Park. Likely the largest threat to springs on Travis County lands is water quantity degradation from existing and projected pumping. The previously discussed BEG model indicates that "existing pumping potentially significantly contributes to (current) reduced springflow in Lick Creek and Hamilton Pool spring complexes. The proposed Mirasol Springs development is projected to diminish springflows further, particularly under prolonged drought periods" (Graf and Hunt 2024). As substantiated in the petition, the 12-month

comment, and further with this comment, sites on preserve lands are not immune to habitat modification in the form of water quantity and quality degradation exacerbated by climate change.

The petition and 12-month comment detailed impacts to Martin Spring, located on Travis County property 12 m from road pavement. Those impacts remain. The spring has since become more visible from RR 3238 and thus vulnerable to visitation due to the addition of a recent, unauthorized concrete monument structure and trail. It seems possible, if not likely, that the immediately adjacent spring water was used to mix the concrete; thus, it is possible dead salamanders are encased in the monument (Figure 16).



Figure 16. The trail leading from Hamilton Pool Road to Martin Spring and the unauthorized monument with signs of regular visitation. Datri, 5 March 2025 (above) and 7 July 2026 (below)

The petition and 12-month comment noted that two sites (Martin Spring and Hammett's Crossing Spring #2) are within the immediate vicinity of RR 3238 (located 12 m and 34 m from the road pavement, respectively) and remain subject to impervious cover, road runoff, pollution, trash, and trespassing. These threats are projected to exacerbate with increasing urbanization.

Information that has become available since the petition and 12-month comment continues to corroborate that urbanization exacerbated by climate change is an unabating and accelerating threat to the majority of the known range of the Pedernales River springs salamander.

OTHER NATURAL OR MANMADE FACTORS AFFECTING THE SPECIES' CONTINUED EXISTENCE (FACTOR E)

Small Populations Within a Limited Range

The petition identified ten known locations within a 32 square mile (83 km^2) area for the Pedernales River springs salamander. Corbin (2020) genetically grouped Hope Springs (30.307167, -98.518917) with the species; however, in correspondence regarding the petition between Mirasol Springs and a research scientist at the University of Texas at Austin rumored to have been in the process of describing this salamander for some years now, Hope Springs is said not to be a locality for the species (Exhibit D). Further, in a letter from the Service dated September 14, 2026 regarding the initiation of the species status assessment this comment is in reference to, Hope Springs is not identified as a site. This is a dramatic reduction in what was already an extremely limited known range, to 10 square miles (26 km^2). Further, within this range, small springsheds corresponding to small watersheds (as small as 0.5 mi^2) occur in a small aquifer segment (Hunt et al. 2025). This may explain field observations of 0-3 individuals at known sites (Datri pers. comm 2026). "The risk of extinction for any species is known to be highly indirectly correlated with population size" (USFWS 2014). Given their highly limited distributions and small populations, these salamanders are especially sensitive to demographic and environmental stochasticity (Sabo et al. 2003).

Pedernales River spring salamander sites are isolated from other springs, streams, and other populations by distances of unsuitable habitat types. In areas where springs are fewer and less reliable, closely related *Eurycea* populations are less common (Sweet 1982). During dry times, populations withdraw into the subterranean waters supplying the springs (Sweet 1977). If the subterranean refuge is inadequate, populations may become extinct, with recolonization uncertain (Sweet 1982). Groundwater is increasingly subjected to drying due to pumping and climate change (*see* Water Quantity and Quality section above) or in some ways, becoming more reliable due to urban leakage and pollution (Bendik et al. 2016). While these smaller, more fragmented, less connected sites may be more fragile, they may be important for supporting the larger metapopulation (Stokes et al. 2021). The cumulative effect of all of this habitat fragmentation and destruction is not selection for forced residence in subterranean refugia (Sweet 1982) but likely functional extinction.

THE INADEQUACY OF EXISTING REGULATORY MECHANISMS (FACTOR D)

As substantiated under Factor A in this comment and previously in the petition and 12-month comment, significant, impactful water quantity and water quality degradation are occurring throughout the range of the Pedernales River springs salamander (*Eurycea* species 1) under the existing regulatory mechanisms.

In 2020, the Waters of the United States rule eliminated protections for intermittent and ephemeral streams, wetlands, and other small bodies of water that feed larger ones under the Clean Water Act. Protections have been further eroded by the 2023 Supreme Court Decision Sackett v. EPA (Congressional Research Service 2025) and are now facing even further weakening under a newly proposed 2025 rule (EPA 2025).

While Corpus Christi appears to currently be in danger of running out of water in a new drought of record, the current Texas state water plan for Corpus Christi does not show any water shortages (TWDB 2026). “So why is Corpus having all these water problems when the plan says they have enough water today to meet their needs?” (Mace 2026). In addition to the clear lack of groundwater resource protection under the Texas regulatory framework, the Texas state water plans are based on historical hydrological data and do not take into consideration climate change. “Long-range water planning (i.e., 50 years into the future) in Texas currently uses the drought of record (e.g., the 1950s drought) as the benchmark drought event when estimating water supply shortages over the next five decades. However, the current planning methodology does not consider climate change, nor its impacts” (Texas Water Development Board 2022, Shao et al. 2023). “Tying future water supply to criteria established by the drought of record is a defensible choice, but policymakers should be aware that the chances of exceeding the drought of record are probably increasing year by year” says professor John Nielsen-Gammon, director of the Texas Center for Climate Studies and the Texas State Climatologist (Randall 2020). “There are two things to take away from the Corpus experience: The first is that approaching the drought of record is damned frightening…The second takeaway is that it is possible to have a drought worse than the drought of record” (Mace 2026).

The state of Texas still treats surface water and groundwater as separate resources with groundwater considered private property. Under rule of capture law, there remains no enforceable legal mandate at the state or local level to maintain minimum aquifer levels necessary for listed species (Houston & Texas Central Railroad Co. v. East 1904, Wells 2014). “Without joint management of surface and subsurface waters as a single common-pool resource, the aquifers, springs, and streams of the Edwards-Trinity and the regional ecosystems they sustain will become increasingly threatened” (Devitt et al. 2019).

“Groundwater conservation districts are the principle mechanism of groundwater authority and management in Texas” (Hunt et al. 2025). “A patchwork of local groundwater districts are tasked with figuring out how to manage aquifers… Groundwater districts are often underfunded, understaffed, and subject to competing demands. Their jurisdictions correspond to political boundaries—county lines, mostly—rather than to the irregular shapes of aquifers…And even if there is the will to sustainably manage an aquifer, districts often struggle to impose limits on groundwater extraction in a state that prizes limitless growth…By and large, they’re planning to deplete their groundwater over time rather than manage it sustainably. ‘We’re reaching the limit of sustainable groundwater pumping, which means

we're fixing to cross the threshold of mining these aquifers,' said Robert Mace, a former top administrator at the Texas Water Development Board and now the executive director of the Meadows Center for Water and the Environment at Texas State University" (Wilder 2023). "Despite the hopes and desires of scientists, engineers, and planners, the projected future of groundwater production in Texas is unsustainable. About 95 percent of locally-expressed desired future conditions ["DFCs"] are based on water-level declines, groundwater is currently being produced at 1.8 times the maximum sustainable amount, and groundwater is expected to be produced 2.4 times the maximum sustainable amount…In other words, Texas plans to unsustainably produce groundwater from more aquifers in the future, reducing the number of aquifer systems being produced sustainably from 13 to 5 (resulting in sustainable production from only 2 of the 8 major aquifer systems and only 3 of the 13 minor aquifers)" (Mace 2021). The state water plan shows demand exceeding existing supplies (TWDB 2022).

"…the current DFC for GMA 9, which covers nine counties including the [Hamilton Pool source water] study area, is: "Allow for an increase in average drawdown of approximately 30 feet through 2060 (throughout GMA 9) consistent with "Scenario 6" in TWDB GAM Task 10-005" (GMA9, 2021). This DFC expression is essentially a managed depletion goal and is, therefore, inherently incompatible with most definitions of the sustainable yield of an aquifer. Even so, the water level data within the SWTCGCD indicate declining trends of more than three feet per year (Hunt and others, 2020), suggesting an inability to achieve the current DFC and managed depletion goals" (Hunt et al. 2025). The DFC can be expressed for an individual aquifer or segment if there is sufficient hydrogeologic evidence to support distinct DFCs, and one of the primary findings of the Hamilton Pool source water study was the delineation of the Hamilton Pool segment of the Middle Trinity Aquifer. "The GCD and its stakeholders (including the County) could consider defining a DFC for springflow in the Hamilton Pool Management Zone…A relevant and successful example of a DFC that protects spring flows is the Barton Springs Edwards/Aquifer Conservation District (Hunt and others, 2019)" (Hunt et al. 2025). While these are worthy goals, at least one known salamander site has been dry for at least 22 months, with other sites experiencing at least a reduction in flow. The Hamilton Pool Management Zone designation has not prevented the dewatering of the aquifer. There remains no existing regulatory mechanism to adequately prevent the further depletion of already threatened water resources integral to the salamander's survival. "The data speaks volumes about the growing demands on our groundwater resources and some of the consequences of meeting those demands," [Robert] Mace said. "As groundwater use in the state continues to rise, the resulting decrease in springflow jeopardizes not only our groundwater and surface-water supplies but also the ecosystems that rely on these springs" (Blaschke 2024).

I provide updated, substantial evidence corroborating that the petitioned action is warranted due to the inadequacy of existing regulatory mechanisms to ameliorate the threats and the expected response and the effects of the threats to the Pedernales River springs salamander (*Eurycea* species 1) substantiated under Factors A, C, and E.

Conclusion

The Pedernales River springs salamander remains distributed within a highly limited range that continues and is expected to continue in the future to be severely threatened by water quality and quantity degradation across a majority of its range where existing regulatory mechanisms are inadequate. In sum, the data made available to the Service support a finding that the Pedernales River spring salamander warrants listing under the Endangered Species Act.

Sincerely,

/s/ Crystal Datri
Conservation Biologist
Tel.: (512) 470-5527
crystal@wrendaytree.com

/s/ Annalisa Peace
Greater Edwards Aquifer Alliance
Tel.: 210-320-6294
annalisa@aquiferallinace.org

/s/ Katherine Peake
Pedernales River Alliance, Founder
Tel.: 830-998-1778
kbfpeake@gmail.com

/s/ Bill Bunch
Save Our Springs Alliance, Executive Director
Tel.: 512-477-2320
bill@sosalliance.org

/s/ Brian Zabcik
Save Texas Streams, Advocacy Director
Tel.: 512-480-0055
brian@savetexasstreams.org

/s/ Tom Smith
Save the Pedernales, Founder
citizen.smitty@gmail.com

/s/ David Baker
The Watershed Association, Executive Director
Tel.: 512-722-3390
davidbaker@watershedassociation.org

Enclosures:
References
Exhibit A. Mirasol Settlement Agreement
Exhibit B. Mirasol Settlement Agreement Travis County
Exhibit C. Mirasol TLAP
Exhibit D. UT Mirasol correspondence

References

Askins J. 2026. Personal communication.

Barton Springs/Edwards Aquifer Conservation District (BSEACD). 2026. District nears first ever 'Stage 4 Emergency Response Period' declaration. https://bseacd.org/2026/01/district-nears-stage-4-emergency-response-period/

Bendik NF, McEntire KD, Sissel BN. 2016. Movement, demographics, and occupancy dynamics of a federally threatened salamander: Evaluating the adequacy of critical habitat. PeerJ. 4:e1817. doi:10.7717/peerj.1817.

Blaschke J. 2024. Texas springs in crisis: New study highlights overwhelming increase in dry springs. Texas State Newsroom. https://news.txst.edu/research-and-innovation/2024/research-shows-increase-in-texas-dry-springs.html

BPGCD. 2026. https://bpgcd.specialdistrict.org/drought

Brune GM. 1975. Major and historical springs of Texas (Texas Water Development Board Report 189). Texas Water Development Board. https://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R189/R189.pdf

Brune GM. 1981. Springs of Texas, Volume 1. Branch-Smith, Inc.

Buchele M. 2020. Texas needs to prepare for a 'megadrought,' state climatologist warns. KUT 90.5. https://www.kut.org/energy-environment/2020-07-10/texas-needs-to-prepare-for-a-megadrought-state-climatologist-warns

Clancy. 2021a. Operating permit to produce groundwater in Southwestern Travis County Groundwater Conservation District. https://swtcgcd.com/pending-permits

Clancy. 2021b. Proposed Operating Permit to Produce Groundwater. https://haysgroundwater.com/pendingpermit-overview/

Congressional Research Service. 2025. Waters of the United States (WOTUS): Frequently asked questions about the scope of the Clean Water Act (CRS Report No. R47408). https://www.congress.gov/crs-product/R47408

Corbin AB. 2020. Population genomics and conservation of Texas cave and spring salamanders (Plethodontidae: Eurycea) [thesis]. The University of Texas Arlington, Arlington, Texas.

Datri C. 2026. Personal communication.

Datri C, Barlow R, Gillespie JH, Gabor C, Colucci L, Sanders M, Hauwert N, Fushille P, Ahrns-Gosselin A, Baker D, Bunch B. 2021. Petition to the U.S. Fish and Wildlife Service to list the Pedernales River springs salamander as a threatened or endangered species under the endangered species act. September 20, 2021.

Datri C, Hauwert N, Bunch B, Zabcik B, Baker D (Save Our Springs Alliance, Save Barton Creek Association, Wimberley Valley Watershed Association). 2023. Comments regarding the U.S. Fish and Wildlife Service's

12-month status review for the Pedernales River springs salamander (Eurycea species 1). October 18, 2023. Submitted via the Federal eRulemaking Portal.

Devitt TJ, Wright AM, Cannatella DC, Hillis DM. 2019. Species delimitation in endangered groundwater salamanders: Implications for aquifer management and biodiversity conservation. Proc Natl Acad Sci USA. 116(7):2624–2633. doi:10.1073/pnas.1815014116.

Gary MO, Hunt BB, Smith BA, Watson JA, Wierman DA. 2019. Evaluation for the Development of a Jacob's Well Groundwater Management Zone Hays County, Texas: Meadows Center for Water and the Environment: San Marcos, TX, Texas State University, Report 2019-05, 58 p. https://bseacd.org/uploads/JW-Mgmt-Zone-Report_7.30.19.pdf

Graf DJ, Hunt BB. 2024. Development of a steady-state numerical model, Hamilton Pool Segment of the Middle Trinity Aquifer, Western Travis County, Texas (Report UTA21-000073). Bureau of Economic Geology, The University of Texas at Austin.

Hlavaty S. 2026. Drought update: March 2026. Barton Springs/Edwards Aquifer Conservation District. Retrieved April 23, 2026, from https://bseacd.org/2026/04/drought-update-march-2026/

Hoell A, Mahoney K, Abel M, Bytheway J, Currier WR, Thompson A, Towler E, Gerlich J, Lisonbee J. 2025. Weather whiplash in Texas: Drought to flood. NOAA Physical Sciences Laboratory. https://psl.noaa.gov/news/2025/texasfloods.html

Hostetler SW, Bartlein PJ. 1990. Simulation of lake evaporation with application to modeling lake level variations of Harney-Malheur Lake, Oregon. Water Resources Research. 26(10):2603–2612. doi:10.1029/WR026i010p02603.

Houghton JT, Ding Y, Griggs DJ, Noguer M, van der Linden PJ, Dai X, et al. (Eds.). 2001. Climate change 2001: The scientific basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.

Houston & Texas Central Railroad Co. v. East (1904) 98 Tex. 146, 81 S.W. 279.

HTGCD. 2023. HTGCD Staff Recommendations on Mirasol Springs LLC / Clancy Utilities Application for an Operating Permit. https://haysgroundwater.com/pendingpermit-overview/. Retrieved September 12, 2024, from https://haysgroundwater.com/wp-content/uploads/2024/05/44Q4263-GM-recommendations-Dec.-20-2023.pdf

HTGCD. 2026. https://haysgroundwater.com/drought-management/

Hunt BB, Cockrell LP, Gary RH, Vay JM, Kennedy V, Smith BA, Camp JP. 2020. Hydrogeologic Atlas of Southwest Travis County, Central Texas: Barton Springs–Edwards Aquifer Conservation District, Report of Investigations 2020-0429, 80 p. + digital datasets. https://repositories.lib.utexas.edu/handle/2152/81562

Hunt B, Kennedy V, Gary M, Scanlon B. 2025. Source Water Study for the Hamilton Pool area, Western Travis County, Texas: The University of Texas at Austin, Bureau of Economic Geology, contract report prepared for Travis County under contract no. UTA21-000073. 29 p.

Huntington TG. 2006. Evidence for intensification of the global water cycle: Review and synthesis. Journal of Hydrology. 319(1–4):83–95. doi:10.1016/j.jhydrol.2005.07.003.

Khan F. 2022. Water availability and response of Tarbela Reservoir under the changing climate in the Upper Indus Basin, Pakistan. Scientific Reports. 12:15865. doi:10.1038/s41598-022-20159-x.

Konapala G, Mishra AK, Wada Y, Mann ME. 2020. Climate change will affect global water availability through compounding changes in seasonal precipitation and evaporation. Nature Communications. 11(1):1–10. doi:10.1038/s41467-020-16757-w.

Kundzewicz ZW, Mata LJ, Arnell NW, Doll P, Jimenez B, Miller K, et al. 2008. The implications of projected climate change for freshwater resources and their management. Hydrological Sciences Journal-Journal Des Sciences Hydrologiques. 53(1):3–10. doi:10.1623/hysj.53.1.3.

Mace RE. 2021. Five gallons in a ten gallon hat: groundwater sustainability in Texas, Report 2021-08. The Meadows Center for Water and the Environment, Texas State University, Nov 2021. https://gato-docs.its.txstate.edu/jcr:0abd33a2-0fcf-4af7-8b6b-e888b54508af

Mace RE. 2026. outlook+water: 89% of Texas is in drought, a hot and dry March, and Corpus Christi (somewhat...) explained. Texas Water Resources Institute, Texas State University. https://texaspluswater.wp.txstate.edu/2026/04/07/outlookwater-89-of-texas-is-in-drought-a-hot-and-dry-march-and-corpus-christi-somewhat-explained/

Mace RE, Galaviz N. 2024. Revisiting Gunnar Brune's "Major and Historical Springs of Texas" with an analysis on the fractal character of springflow. The Meadows Center for Water and the Environment, Texas State University. https://docs.gato.txst.edu/676904/24-001%20Revisiting%20Gunnar%20Brune%20Major%20Historical%20Springs%20of%20Texas.pdf

Mirasolsprings.com. 2026. Retrieved October 1, 2026, from https://mirasolsprings.com/

NDMC (National Drought Mitigation Center), U.S. Department of Agriculture (USDA), National Oceanic and Atmospheric Administration (NOAA). 2026. U.S. Drought Monitor. Retrieved October 1, 2026, from https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?TX

NOAA. 2026. NOAA National Centers for Environmental Information, Climate at a Glance: County Time Series, published September 2026. Retrieved October 1, 2026, from https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series

Oliver W. 2023. Evaluation of Mirasol Springs proposed well application [Technical Report]. Southwestern Travis County Groundwater Conservation District by Intera Incorporated, Sugarland, Texas.

Randall. 2020. Texas A&M Study: Texas will face driest conditions of the last 1,000 years. Texas A&M University College of Geosciences News. July 10, 2020. https://geonews.tamu.edu/news/2020/07/john-nielsen-gammon-unprecedented-drought-challenges-report.php

Sabo J. 2003. Morris, W. F., and D. F. Doak. 2003. Quantitative Conservation Biology: Theory and Practice of Population Viability Analysis. Sinauer Associates, Sunderland, Massachusetts, USA. CE. 7(2):art2. doi:10.5751/ES-00512-070202.

Shao M, Fernando N, Zhu J, Zhao G, Kao S-C, Zhao B, et al. 2023. Estimating future surface water availability through an integrated climate-hydrology-management modeling framework at a basin scale under CMIP6 scenarios. Water Resources Research. 59:e2022WR034099. doi:10.1029/2022WR034099.

Smith M. 2026. Personal communication.

Stokes DL, Messerman AF, Cook DG, Stemle LR, Meisler JA, Searcy CA. 2021. Saving all the pieces: An inadequate conservation strategy for an endangered amphibian in an urbanizing area. Biological Conservation. 262:109320. doi:10.1016/j.biocon.2021.109320.

Sweet SS. 1977. Natural metamorphosis in Eurycea neotenes, and the generic allocation of the Texas Eurycea (Amphibia: Plethodontidae). Herpetologica. 33:364–375.

Sweet SS. 1982. A distributional analysis of epigean populations of Eurycea neotenes in central Texas, with comments on the origin of troglobitic populations. Herpetologica. 38(3):430–444.

SWTCGCD. 2026. https://swtcgcd.com/

Texas Demographic Center. 2024. Projections of the total population of Texas and counties in Texas, 2020–2060 [High migration scenario]. Retrieved May 13, 2026, from https://demographics.texas.gov/Projections/

Texas Water Development Board. 2022. 2022 State water plan: Water for Texas. https://www.twdb.texas.gov/waterplanning/swp/2022/docs/SWP22-Water-For-Texas.pdf

Texas Water Development Board. 2026. 2027 interactive state water plan: Entity 34. Retrieved May 10, 2026, from https://2027.texasstatewaterplan.org/entity/34

U.S. Census Bureau. 2026. U.S. and world population clock. https://www.census.gov/popclock/

U.S. Environmental Protection Agency. 2025. EPA & Army Corps unveil clear, durable WOTUS proposal. https://www.epa.gov/newsreleases/epa-army-corps-unveil-clear-durable-wotus-proposal

U.S. Fish and Wildlife Service. 2013. Endangered and threatened wildlife and plants; Determination of endangered species status for the Austin Blind Salamander and threatened species status for the Jollyville Plateau Salamander throughout their ranges; Final rule. Federal Register. 78(161):51278–51326.

U.S. Fish and Wildlife Service. 2014. Endangered and threatened wildlife and plants; Determination of threatened species status for the Georgetown Salamander and Salado Salamander throughout their ranges; Final rule. Federal Register. 79:10236–10293.

U.S. Fish and Wildlife Service. 2020. Endangered and threatened wildlife and plants; Designation of critical habitat for the Georgetown and Salado salamanders. Federal Register. 85:57578–57613.

Wells S. 2014. The "take" trifecta: Balancing the challenges of endangered species, private property interests, and state management authority in Texas water planning. Rev Litigat. 33:429–468.

Wilder F. 2023. Who's killing Jacob's Well. Texas Monthly. August 28, 2023. https://www.texasmonthly.com/news-politics/jacobs-well-drought-water/