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Via the Federal eRulemaking Portal

Michael Warriner
U.S. Fish and Wildlife Service
Austin Ecological Services Field Office
1505 Ferguson Lane
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Re: Pedernales River Springs salamander 12-month status review

Dear Mr. Warriner:

On behalf of Save Our Springs Alliance, Crystal Datri, Nico Hauwert, Save Barton Creek Association, and the Wimberly Valley Watershed Association we submit the following comments regarding the U.S. Fish and Wildlife Service's 12-month status review for the Pedernales River Springs salamander (*Eurycea* species 1.) ("salamander"). Endangered and Threatened Wildlife and Plants; 90-Day Findings for Four Species, 87 Fed. Reg. 63,468 (October 19, 2022). "The Service must base its determination regarding the salamander's Endangered Species Act ("ESA") listing status on the "best scientific . . . data available." 16 U.S.C. § 1533(b)(1)(A), (c)(2)." With these comments, we present further substantial scientific or commercial information indicating that the previously petitioned action is warranted and a proposed rule to list the species should be promptly published. As set forth below, recent and forthcoming scientific research corroborates that the Pedernales River springs salamander faces unabating and even accelerating threats from urbanization, habitat loss, and extreme weather due to climate change. The cumulative weight of the evidence demonstrates that the salamander's expected response to the presented threats combined with the lack of existing regulatory mechanisms to adequately ameliorate the impacts of the presented threats leaves the salamander currently in danger of extinction throughout all or a significant portion of its range and therefore should be protected as endangered under the Endangered Species Act.

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

Limited Range

The Pedernales River springs salamander's known range remains extremely limited, comprising the ten locations identified in the petition (Datri et al. 2021) that are distributed in small springs along the Pedernales River as it flows through the central Texas counties of Blanco, Hays, and Travis.

Water Quantity Degradation

Drought combined with explosive development in central Texas has continued to dewater the aquifers that feed the springs these salamanders inhabit.

Climate Change

Climate change can exacerbate water security by diminishing water supplies (Konapala et al. 2020, Kundzewicz et al. 2008). Last summer, in New Braunfels (Hays County, Texas), Comal Springs, whose water comes from the Edwards Aquifer, ceased flowing, as did portions of the Llano and Pedernales Rivers (the Pedernales reached zero flow again this summer), which stopped feeding water into the Highland Lakes that Austinites rely on for drinking water (Holley 2023). The Hays Trinity Groundwater Conservation District says both the Pedernales and Blanco rivers are experiencing record-low flows. This past summer Jacob's Well stopped flowing for only the sixth time in recorded history. "The springs are a window to the aquifer. If you see a dried-up spring, that means every nearby water well is at risk," says Charlie Flatten, manager of the Hays Trinity Groundwater Conservation District (Baddour 2023). The 100th meridian dry line has shifted 140 miles eastward over the past century, and now runs about thirty miles east of Austin, leaving all of the Hill Country on the dry side of the line (Seager et al. 2018a,b). A total rainfall deficit of more than 13 inches, or about 23% lower than normal, was documented over a 2-year period (May 2021 – April 2023) in a hydrogeologic study, whose study-area is at the juncture of Hays and Travis counties where the majority of salamanders are found (Hunt 2023a). The salamander's entire range counties of Travis, Hays, and Blanco are all ranked as having experienced the warmest on record for June through September 2023. For precipitation over these same past four months, Travis and Blanco counties ranked as the 5th driest and Hays County ranked as the 2nd driest on record (NOAA 2023). At this writing, central Texas, including the entire 3-county range of the salamander, remains in Exceptional Drought (Pugh and Artusa 2023). "It's really an ecological disaster, it's an economic disaster," said David Baker, executive director of The Watershed Association (Fawaz 2023). The cessation of spring flows result in a loss of species diversity (Zara 2011, USFWS 1980), and the climate catastrophe and water scarcity are projected to worsen. The director of the Texas Center for Climate Studies and the Texas State Climatologist says "the chances of exceeding the drought of record are probably increasing year by year" (Randall 2020). Texas' future climate will feature drier summers and decreasing water supplies for much of the state for the remainder of the 21st century. Projections indicate drier conditions than even the most arid centuries of the last 1,000 years that included megadroughts. Megadrought, which lasts about two decades, is caused by natural climate cycles and human-induced climate change which will cause higher average temperatures that increase evaporation rates and affect the intensity of rainfall (Nielson-Gammon et al. 2020, Dickens 2022).

Rapid Population Growth

Texas is now one of only two U.S. states with a population of 30 million or more and continues to include some of the fastest-growing metropolitan areas and counties in the United States. Eight Texas counties (including Hays, Williamson, and Comal in central Texas) ranked among the nation's 25 fastest growing counties between 2000 and 2022, when all saw their populations double. Between July 2021 and July 2022, Travis County's population growth was 1.4%, while Hays County was the fastest-growing county in the area, with a population increase of 5.1% (U.S. Census Bureau 2022).

The Aquifers that the Salamander Occupies are Depleting

The Pedernales River experiences gaining and losing reaches that are attributable to the underlying geology. Common gaining and losing reaches were observed in gain/loss studies conducted in 1962 and again in 2016. "One losing area observed in 2016 that was not observed in 1962 is the reach south of the City of Fredericksburg. Losses in this area have been increasing over the last two decades and may be attributable to groundwater withdrawal from the City of Fredericksburg well field. Additional

study is needed in this area" (Wierman et al. 2017). These losses may be impacting the most upstream salamander springs.

The majority of the known range (7 of the 10 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. These locations occur in springs emanating from the Cow Creek unit of the Middle Trinity Aquifer (Texas Water Development Board 2016).

"The Middle Trinity Aquifer is an important groundwater resource for central Texas. However, like much of Texas, broad areas of the aquifers in western Travis County are experiencing groundwater depletion, indicated by declining water levels and springflows over time (Wierman et al. 2010, Smith et al. 2020). Indeed, east of the Bee Creek Fault, the Middle Trinity Aquifer is experiencing groundwater mining, which occurs when more water is withdrawn than is replaced. The aquifer is locally depleted up to 150 ft, or nearly dewatered (Hunt et al. 2020a). This mining or depletion of storage is most likely due to the combined factors of local- and regional-scale pumping from wells, changing climate, geology, and the distant recharge areas located to the west and south in Hays and Blanco Counties" (Hunt 2023a).

While the majority of Hays County primarily utilizes the Middle Trinity Aquifer, the Lower Trinity is the primary aquifer for southwestern Travis County (SWTC) and northern Hays County. "Differences in the geology and hydrogeology in Travis and Hays Counties are reflected in contrasting groundwater availability potential of the Middle and Lower Trinity Aquifers. The groundwater availability of the Middle Trinity Aquifer in SWTC appears to be limited by aquifer properties, boundary conditions such as faults and rivers, and significant reductions in storage caused by pumping. In contrast, in Hays County groundwater availability of the Middle Trinity is limited by negative impacts associated with drought and pumping (Gary et al. 2019). One of these impacts is springflow reduction resulting from capture" (Hunt et al. 2020).

While Hunt et al. (2020) provides a framework and regional baseline for the aquifers in southwest Travis County, a recent and ongoing hydrogeologic study (Hunt 2022a,b; Hunt 2023a,b) focuses on the immediate area where the cluster of 7 salamander locations occurs (Figure 1). "As the [human] population continues to expand and more groundwater is produced, there is a risk of further groundwater depletion and significant impacts to the springs, seeps, and baseflows that sustain the [Travis County] park and preserve resources" (Hunt 2022a). In April 2021, the Travis County Commissioners Court executed a contract with the Bureau of Economic Geology to conduct a source water study on the groundwater resources of Hamilton Pool and Reimers Ranch. This study focuses on the geologic units that make up the Middle Trinity Aquifer: the lower Glen Rose, Hensel Sand, and Cow Creek Limestone geologic formations (Hunt 2022a, Hunt 2023a). The cluster of seven salamander locations, comprising the majority of the known range for the species, occur in springs emanating from the Cow Creek unit of the Middle Trinity Aquifer (Texas Water Development Board 2016). "Source water of the aquifer system feeding the springs is generally thought to be a localized geographic area of the Middle Trinity Aquifer where recharge enters the aquifer and flows to the natural discharge area (springs and seeps). Such an area is often termed a source water area, or 'springshed'. Wells that produce groundwater within this area directly impact spring and seep flows" (Hunt 2022a). Not only does the Hunt (2022a,b) source water study area and study watersheds include the majority of the known salamander range, but three of the ten salamander-occupied springs are directly monitored: Red's Spring, Bunkhouse Springs, and Climbers Canyon Spring (Appendix A). This study is still underway; however, the Phase I report (Hunt 2022a) and hydrologic data from May 2021 to September 2023 are available in the dataverse (Hunt 2022b). "Given the very localized flow systems that sustain the springs in the study area, pumping combined with drought conditions will likely lower water levels and capture spring flow" (Hunt 2022a).

Further, the Phase II report and hydrogeologic data very recently became available (1 Oct 2023, Hunt 2023a,b). We present the following key points from this report highly relevant to the salamander:

"Land use within the study area was historically ranch land, with some minor agriculture, but is now increasingly becoming developed and suburban. Mahler (1991) reported that the Hamilton watershed is susceptible to degradation from urbanization owing to its geomorphology, hydrology, soils, and bedrock."

"Source-water areas are strongly related to the surface watershed for a given spring complex." "The volume of cumulative springflow, as well as median flow rates, directly correlates to watershed areas and estimated rates of recharge, indicating that the springsheds (groundwater) and watershed (surface water) areas are most likely linked."

"The localized aquifer system in the study area has a strong connection between surface water and groundwater such that the aquifer and springs can be considered renewable; however, this connection also means that the springs are vulnerable to drought conditions and pumping. Increased pumping will most likely result in the capture of springflow and, to a lesser extent, water-level declines in the aquifer, which are magnified in drought conditions."

"Although long-term data are largely absent for the Middle Trinity in much of the focused study area, the Hegemier Well provides an exception, with monthly data extending back more than 10 yr…. Overall, the long-term trend for the period of record is one of decline, suggesting long-term storage depletion."

"Groundwater levels and springflows have declined steadily over the 2-year period [May 2021-April 2023], although they have episodically responded to rainfall and subsequent recharge. Overall springflow during the study period declined more than 40%."

"Hydrogeologic data in this report and other studies indicate that the Middle Trinity Aquifer in the focused study area is distinct within the region and is informally defined in this report as the Hamilton Pool segment of the Middle Trinity Aquifer."

The report recommends a groundwater-management area for the Travis County portion of the study area.

"Reducing current and future pumping of the Hamilton Pool segment of the Middle Trinity Aquifer in the management zone will be the primary way of achieving the goal of conserving and protecting the aquifer and its springs."

"Data evaluated by this study and fundamental hydrogeologic principles indicate that increased pumping of wells in the area, in conjunction with periods of extreme drought, will result in decreases in springflow. The direct effect of increased pumping will be the capture of springflow and, to a lesser extent, a depletion in storage. This fact is particularly true under drought conditions, when recharge is minimal or nonexistent."

The evidence presented above substantiates that water quantity degradation is an ongoing and accelerating threat to the salamander.

The Mirasol Springs, LLC development creates an additional unabating and accelerating threat to the majority of the known range of the salamander

The Mirasol Springs, LLC development is located at the juncture of southwestern Travis and northern Hays Counties. The development runs along 1500m of the Pedernales River and encompasses substantial percentages of spring fed watersheds that sustain the river (Figure 2). In correspondence obtained by SOS Alliance via Freedom of Information Act request (FOIA) among U.S. Fish & Wildlife Service (USFWS) staff at the Austin Ecological Services Field Office dated 28 October 2022: "Not once did they mention they had springs on site" …. "Apparently they have Pedernales salamanders on this site, which they never mentioned" (Exhibit A). In fact, the half of the known locations for the Pedernales

River springs salamander are found in the immediate vicinity of or directly on the Mirasol Springs, LLC property currently undergoing development (Datri 2020, Datri et al. 2021, mirasolsprings.com, Figure 3). In their application for enrollment in the Balcones Canyonlands Conservation Plan dated 16 June 2022 (Whitenton 2022), Mirasol Springs, LLC describes the project as spanning 1,400 acres, including a 70-room hotel covering ~55 acres, 30 small-lot cottages, 39 homesites of 4 to 8 acres, and, in partnership with the University of Texas at Austin, a field research station with labs, cabins, and research lands. Note that their TLAP application describes it a somewhat differently: "The service area includes a hotel made up of 71 rooms (with a potential for 12 additional rooms), two restaurants, an events venue, a variety of visitor venues, a few retail areas, 69 single-family residences (with a potential for 8 additional residences, and a University of Texas Field Station" (TLAP 2023). The remainder of the 1,400 acres will be used for hiking, biking, fishing, horseback riding, and other outdoor activities; presumably, not for public access, but for the residents and guests of the aforementioned homesites and resort (Whitenton 2022). A conservation easement is said to be in development; however, the BCCP application does not indicate that this easement is dedicated to the protection of habitat, but for the recreational activities listed above; therefore, those habitats are subject to the threats described in the petition (including water quality degradation, physical modification of surface habitat, disease and predation, all exacerbated by water quantity degradation and climate change) and this comment document. USFWS staff indicate that this development impacts salamander habitat in correspondence obtained by SOS Alliance via FOIA among staff at the Austin Ecological Services Field Office dated 28 October 2022: "It appears [spring locations] will definitely be impacted by this proposed development" (Exhibit A).

Given the depletion and degradation to water resources occurring and projected at the regional and local scale area of the development described above, where does Mirasol Springs (no pun intended), LLC propose to get their water supply? "The development has acquired a Lower Colorado River Authority contract that allows for pumping surface water from the nearby Pedernales River—the same one that stopped flowing this summer and last" (Holley 2023, LCRA 2020). "Groundwater will only be used when surface water is unavailable or curtailed" (Holley 2023, mirasolsprings.com 2023).

It is likely that surface water will be unavailable or curtailed at intervals of increasing length and frequency. Climate change can alter hydrologic processes and lead to increases in surface temperature and evaporation, and to changes in precipitation and streamflow (Hostetler & Bartlein 1990, Houghton et al. 2001, Huntington 2006, Khan 2022). These changes exacerbate water security by diminishing water supplies (Konapala et al. 2020, Kundzewicz et al. 2008). The situation is "especially dire" when municipalities rely primarily on surface water resources, as these are "inherently more susceptible to the consequences of climate change" (Shao et al. 2023). Mirasol Springs, LLC proposes pumping water out of the Pedernales River and storing some portion of it in water supply reservoir(s) (mirasolsprings.com 2023, Figure 4). Changes in seasonal precipitation can result in significant variations in reservoir inflows (Konapala et al. 2020) and the Pedernales River has stopped flowing the past two summers (Figure 5, HTGCD 2023). The annual evaporative losses during drought years, such as Texas experienced in 2011, can surpass the annual municipal water use for the given year (Zhu et al. 2021). Storage in reservoirs is expected to be significantly impacted by future alterations in precipitation, temperature, and other climatic variables due to a changing climate. Changes in reservoir evaporation rates and streamflow patterns play an important role in reducing future surface water availability (Shao et al. 2023).

> "There's no easy way to quantify how much water Mirasol [Springs, LLC] will use once the resort opens to the public. Though developers expect to use less, Mirasol's contract with the LCRA allows it to pump around 100,000 gallons of water from the Pedernales each day, except under

certain drought conditions. Based on water availability studies, the developers estimate the contract will provide about 80 percent of the project's water.

But there is little doubt that the Highland Lakes, which store water supply for more than two million Central Texans, are nearing a crisis point as long-term drought and lowered lake levels become a permanent reality of life in Central Texas. Already, some climatologists are predicting that conditions in Texas suggest that the state, like California before it, could be hit by a megadrought lasting for decades by the end of the century. These fears have prompted some experts to begin calling for the LCRA to begin implementing more conservation efforts. Because Central Texas continues to experience severe drought conditions, the LCRA has implemented the first stage of a drought contingency plan that asks customers to voluntarily reduce their water use. The region's two largest lakes —Lake Travis and Lake Buchanan —are already at less than 50 percent capacity. Should the levels drop another 10 percent or so, to 900,000 acre-feet, the LCRA plans to implement "mandatory water use reduction measures" among customers with contracts including Mirasol. "With very little water flowing into the lakes and a 'heat dome' roasting our area since early June, lake levels are decreasing as significant amounts of water evaporate or are used on landscaping in the region," John Hofmann, LCRA executive vice president of Water, said in a July news release urging regional conservation due to declining lake levels." -Holley 2023

According to Mirasol Springs water contract with the LCRA, one of their intake pumps is located in the immediate vicinity of the mouths of Roy Creek and Elder Creek (LCRA 2020, Datri et al. 2021). This area of the river is proposed critical habitat for the proposed endangered Texas fatmucket (*Lampsilis bracteata*) (USFWS 2021), and in the immediate vicinity of where USFWS staff observed the species in a June 2023 survey (USFWS 2023). Listing of the Texas fatmucket and designation of critical habitat could result in a reduction of the volume of water that Mirasol Springs is able to withdraw from the Pedernales River, thus increasing Mirasol Springs' reliance on groundwater.

"It's also unclear whether the nearby stretch of the Pedernales is a reliable source of surface water, said Charlie Flatten, general manager of the Hays Trinity Groundwater Conservation District. "Frankly, nobody's ever withdrawn water on a commercial basis from the Pedernales River, so that's untested. We don't know what happens if they start drawing large quantities" (Elbein 2022).

Mirasol Springs, LLC encompasses substantial portions of the Roy Creek, Hamilton Creek, and Little Elder Watersheds (Figure 2). The small watersheds being urbanized by Mirasol Springs, LLC contain creeks that flow into the Pedernales River, conveying surface runoff and baseflows from springs and seeps (Hunt 2022a). Headwater springs are the source of the surface waters of the Pedernales River during summertime baseflow conditions and "are very important to the health of the river" (Meadows Center 2015, Wierman et al. 2017). "HTGCD uses Pedernales and Blanco River streamflow as District-wide drought indicators because these rivers are recharge features of our aquifers" (HTGCD 2023). "The various springs and fractures within the riverbed allow water to flow freely between the aquifer (groundwater) and the river (surface water)—providing an intricate and irrefutable interaction throughout the river's length" (Meadows Center 2015, Wierman et al. 2017). Mirasol Springs, LLC's surface water permit is threatened by its own urbanization of the watersheds and spring sheds, a loss of inflows, and the compounding and exacerbating effects of climate change. It is likely that their surface water resources will be curtailed, "at which point the development, as a utility district, would be required by state law to provide guests and residents with a consistent and reliable water source"

(Holley 2023). When the river is at its lowest (baseflow conditions) and sustained by groundwater, those are the conditions under which Mirasol Springs, LLC will most likely pump the groundwater. "A clear relationship exists between geologic data and surface/groundwater interactions." "[Pedernales] Flow can be influenced by groundwater pumping activities" (Meadows Center 2018).

The groundwater production for Mirasol Springs, LLC will come entirely from the Middle Trinity, as all wells are screened in the Cow Creek Limestone, the very geologic formation occupied by the majority of the known population of the salamander. A recent study (INTERA 2023) has been conducted specifically to evaluate the expected impacts of the proposed groundwater production by Mirasol Springs, LLC on local water levels and springs. The INTERA study area not only encompasses the majority of the known salamander range, but includes one of the salamander springs (Red's Spring in Roy Creek) in their model. INTERA (2023) projects that local springflow will decrease due to the proposed pumping, with additional drawdown under drought conditions. As the baseline flows for these springs/seeps are lower during drought conditions, the proportion of flow reduced by the Mirasol pumping is larger during drought conditions. "Baseline flow at Hamilton Springs is eliminated in the 0 and 20% recharge scenarios. Baseline flow at Roy Creek Springs is significantly reduced in the no-recharge scenario so that the proposed [Mirasol Springs, LLC] pumping eliminates the remainder" (INTERA 2023). As stated above, Travis, Hays, and Blanco counties have experienced their 5th, 2nd, and 5th respective driest summers on record, and these reductions in rainfall available for recharge are projected to worsen. This is in addition to Mirasol Springs, LLC proposing to pump water from a recharge feature for the aquifer, the Pedernales River.

> "'In times of heavy drought, however, when regulating agencies cut off surface water users, Mirasol might lean more heavily on groundwater than expected,' said Doug Wierman, a hydrologist who has worked with the conservation-focused Wimberley Valley Watershed Association: 'Once they have a groundwater permit in hand, they can use their maximum permit. Maybe they got it thinking, 'We're only gonna use this if we have to,' but they still have the legal right to pump that full amount.'
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> And if that full amount were used, Wierman said, it could throttle the flow of water into Roy Creek. The results would be catastrophic for the canyon: As the springs dried, the clear creek and pools would stagnate, perhaps sinking into a toxic algal sludge that would kill the animals living in it and choke out the plants that need wetter conditions. This isn't a theoretical concern. In Comanche Springs, out near Fort Stockton, excessive groundwater pumping for agriculture has essentially dried up the titular pools, with disastrous effects on endangered pupfish living within them. Closer to Austin, Wierman said, a drawdown in the water table caused by overpumping resulted in the spring at Jacob's Well stopping its flow in 2002." -Elbein 2022

Due to climate change, population growth, and urbanization of the watersheds and springsheds, and their own groundwater pumping, it is likely that Mirasol Springs, LLC's surface water supplies will be increasingly curtailed. The development is most likely to rely on the use of groundwater when its supply is most threatened, when the Pedernales River Springs salamander and other groundwater fauna are most threatened by water quantity degradation. And, in doing so, in a cycle of degradation, Mirasol Springs, LLC will reduce flows to the river, further decimating the surface waters, and their own proposed water supply.

Mirasol Springs, LLC demonstrates either a complete lack of understanding of decades and quite recent literature directly relevant to the water supply in the immediate vicinity of their development or a

complete disregard. Recent examples demonstrate that existing regulatory mechanisms are not likely adequate to prevent Mirasol Springs, LLC from completely dewatering salamander habitat (see section on Factor D).

We present substantial information further corroborating that the petitioned action is warranted due to water quantity degradation across the Pedernales River springs salamander's range.

Impacts to Individual Locations

Those impacts to individual locations detailed in the petition remain. We present further information acquired or updated since the petition below.

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 (Figure 6). Flows at Martin Spring in September 2023 were observed to be considerably lower than those documented in the petition (Figure 7).

Reimers Ranch Spring #1 and Climbers Canyon Spring are located on Travis County's Milton Reimers Ranch Park. "The upper Cow Creek unit is where most recreational rock climbing occurs at Reimers Ranch" (Hunt 2023a). There remains no protection from the effects of human visitation at these two springs.

Reimers Ranch Spring #1 has three impoundments (Figure 8). The stream channel pour off is used as an access point into the river canyon and is subject to foot traffic, trash, human waste, modification of habitat, and apparent vegetation removal by patrons (Figure 9). Low flow conditions, algae, and drought-stressed riparian vegetation are documented in Figures 10 and 11.

Climbers Canyon Spring is located in Climbers Canyon, a heavily visited access point to hikers and rock climbers. Dogs, both on and off leash, are common. The foot trail enters adjacent to the primary spring, crossing the outflow multiple times, and becoming the stream channel itself in some stretches (Figure 12). Hunt 2023a suggested tampering from the public with their measurements at the pool there. Low flow conditions are documented in Figure 13.

Water quality parameters observed at Climber's Canyon, Reimers Ranch Spring #1, and Martin Spring are in Appendix B.

The petition detailed the site degradation at Red's Spring. The habitat destruction of this salamander site, including artificial deepening of the orifice, substrate removal, and keeping the orifice covered with a tarp is on-going. Most concerningly, the entire surface flow is continuously diverted for use as the sole water supply for a vacation home (Figures 14 and 15). The spring orifice continues to be regularly "cleaned-out" to remove habitat substrates from the diversion pipe.

The individual impacts to the three locations (Hammett's Crossing Spring #2, Little Elder Spring, and Bunkhouse Springs) that are located directly on the Mirasol Springs, LLC property that were detailed in the petition remain. Hammett's Springs #2 remains accessible to trespassing (Figure 16) and the other roadside effects documented in the petition. Little Elder Spring and Bunkhouse Springs are located in the Elder Creek watershed (Figure 2). Mirasol Springs, LLC has modified their site plans since the petition, but in the small Elder Creek watershed alone, where one-fifth of the known sites for the species live, Mirasol Springs, LLC's current plans include roads, an artificial pond and stream, a commercial farm and poultry farm, multiple buildings including approximately 23 "cottages", and a spa (Figure 2, Figure 17). Perhaps most threatening to the Elder Creek watershed and salamander springshed is the water

treatment plant and the associated wastewater irrigation fields located 170 meters upstream of the two salamander locations.

The Mirasol Springs, LLC development has filed a Texas Land Application Permit (TLAP) to treat their effluent on site and discharge a daily average flow of 39,000 gallons per day of treated effluent wastewater by land (TLAP 2023). The waste sludge from a clarifier will be stored in a 10,000-gallon sludge storage basin, dewatered using a mechanical dewatering device, and stored in a dumpster for disposal by a third party. The effluent will be disinfected with free chlorine, directed to a channel, and discharged into a 218,000 gallon in-ground basin. Effluent irrigation pumps will withdraw from the storage basin and pump effluent to a 16.2-acre subsurface area drip dispersal system in the springsheds (Figure 2, Figure 18) and the Roy Creek and Elder Creek watersheds (Figure 19). Vegetation in the irrigation area consists of native grasses, cedar (presumably they mean ashe-juniper trees), and scattered oak trees. All vegetation will be removed and replaced with a with a mix of native and non-native grasses including pearl millet.

While Mirasol Springs, LLC claims, "Treating the wastewater on site and disposing of the effluent produced via land application will best protect the environment and surrounding ecosystem" (TLAP 2023), we present evidence corroborating that their wastewater system represents a substantial threat to the salamander. "In the context of the thin soils, numerous springs, and delicately sensitive Texas Hill Country streams, rivers, and aquifers, any wastewater effluent system represents the threat of permanent and significant degradation" (Ross 2011). Wastewater effluent permits do not require treatment to remove metals, pharmaceutical chemicals, or the wide range of chemicals found in body care products, soaps, detergents, pesticides, or other cleaning products. The multiple treatment stages and storage containers, some in-ground, present a potential for leaks into the surface and groundwater. Subsurface irrigation systems represent a greater risk of degradation compared to surface irrigation (Ross 2011). A direct connection has been shown between upland areas where effluent irrigation occurs and underlying aquifers, and aquifer recharge through soils regularly irrigated with effluent will be significantly higher than through soils saturated only by rainfall (Ross 2011, Hauwert 2009). According to the Mirasol Springs, LLC TLAP application, the injection zone is not vertically isolated geologically and there is no impervious strata between the injection zone and the nearest underground source of drinking water. At other developments in Hays County, higher nitrate concentrations have been found at sites immediately below TLAP irrigation fields compared with springs above irrigation fields (Turner 2010). From Hunt (2023a)'s source water study: "The aquifer units are exposed at the surface west of the Bee Creek Fault Zone, allowing recharge to occur in some of these areas." … "Source-water areas are strongly related to the surface watershed for a given spring complex." … "Perennial springflow is thought to be derived primarily from within the surface watershed in which a given spring is located." The Mirasol Springs, LLC proposed TLAP irrigation fields occur in the recharge zones of the Elder and Roy Creek springsheds and their creek's respective watersheds (Figures 2, 18, and 19). It is likely water quality will be degraded, degrading salamander habitat. Further, Mirasol Springs, LLC proposes to irrigate common areas and other landscape plantings, so the effluent will be distributed even further, to unknown areas outside of the 16.2-acre fields.

Urbanization will cause harmful contaminants to enter water bodies upon which the salamander depends. We present substantial information further corroborating that the petitioned action is warranted due to water quality degradation and physical modification of surface habitat across the Pedernales River springs salamander's range.

THE INADEQUACY OF EXISTING REGULATORY MECHANISMS (FACTOR D)

"The reduction of spring flow is a state-wide phenomenon and one that is unlikely to reverse trend". Given the positive correlation between salamander detections and spring flow, the anticipated response to spring flow reduction lends support for minimum spring flow protections for groundwater fauna (RECON 2012, Krejca et al. 2017).

Existing and projected groundwater availability issues in the Trinity Aquifers of the Hill Country prompted the designation of the Hill Country Priority Groundwater Management Area (PGMA) in 1990 (Cross and Bluntzer 1990). As substantiated in the section on Factor A, this 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.

Consider the plight of Jacob's Well, a karst spring in Hays County, Texas once renowned for consistent outflow from the Middle Trinity aquifer. Jacob's Well is inhabited by spring and aquifer-adapted fauna, including the state-threatened *Eurycea pterophila*. The salamanders at this site provide genetic information unique to the species (Krejca et al. 2017). Jacob's Well is within Groundwater Management Area 9, a region set with Desired Future Conditions to include 30-ft average declines in water levels through 2060 (State of Texas, 2010). "If this condition is realized, Jacob's Well would stop flowing and the 'spring' habitat, the wetted area exposed to sunlight, would no longer be wetted or accessible to salamanders. This could potentially impact the salamander abundance on the surface and possibly change the patterns of nutrient flow through the cave" (Krejca et al. 2017). While Jacob's Well flowed continuously through the drought of record (1956), it was first recorded to stop in 2000 (Krejca et al. 2017), and the cessations, including the one this summer, have become more frequent and longer, spanning weeks and months (Wilder 2023). Jacob's Well falls under the jurisdiction of one of the same groundwater conservation districts as the Pedernales River springs salamander, the Hays-Trinity Groundwater Conservation District (HTGCD). While the HTGCD has, for the first time in history, issued and is currently under a temporary moratorium on issuing new groundwater pumping permits for those wells that require a permit (HTGCD 2023), a private company called Aqua Texas continues to pump millions more gallons than its HTGCD-issued permit allows. The Jacob's Well outflow can be readily observed to cease when Aqua Texas turns on their pumps, which taps into the same part of the Trinity aquifer as Jacob's Well and accounts for 85 percent of pumping in the Jacob's Well Springshed (Wilder 2023, HTGCD 2023).

Aqua Texas is permitted by the HTGCD to pump around 100 million gallons a year. Last year, the company pumped out 191 million gallons. This year, the company had already pumped 178 million gallons by June. That's nearly twice its allotment and enough water to keep Jacob's Well running for at least two hundred days during low conditions (Wilder 2023). The HTGCD sent Aqua Texas a $450,000 fine but the company refuses to pay, while settlement negotiations and its excessive pumping continue. "This situation highlights a critical weakness of aquifer management in Texas, according to Vanessa Puig-Williams, Texas water program director for the Environmental Defense Fund. Because groundwater is private property in Texas, most of the conservation districts that manage it have insufficient tools available to enforce conservation, she said" (Baddour 2023, Houston and Texas Central Railroad Co. v. East 1904, Wells 2014, Texas Special District and Local Laws Code Chapter 8843, Texas Special District and Local Laws Code Chapter 8871). "We are asking our local groundwater conservation districts to do the impossible," [Puig-Williams] said. "I think we've set ourselves up for a disaster and I think we're starting to see it in Central Texas". "Jacob's Well is the canary in the coal mine for the aquifer. The canary is gasping for breath right now," -David Baker, executive director for the Watershed Association (Baddour 2023).

Further, “when the Legislature authorized the [Hays-Trinity] groundwater district in 2001, lawmakers prohibited it from regulating residential and agricultural wells. Landowners can legally pump a nearly unlimited amount of water to fill ponds and swimming pools and to irrigate lawns. Some 95 percent of wells in the groundwater district are exempt from oversight, representing an estimated 60 percent of all pumping. In 2022 alone, 145 new unregulated wells came online.” … “Regional groundwater managers, including the Hays Trinity district, are planning to allow significant aquifer mining. They’re planning for the Trinity to be pumped down another thirty feet by the year 2060. And yet even this lenient allowance may be exceeded decades ahead of schedule—at the current rate, the annual groundwater budget for western Hays County will be eaten up by 2032” (Wilder 2023).

“Excluding the Ogallala Aquifer, groundwater conservation districts have made almost twice as much groundwater available for use in 2070 than can be produced sustainably in these aquifers. 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 Texas state water plan indicates a potential shortage in existing supplies by 2030 for Blanco, Travis, and Hays, with Hays having the largest shortfall; however, the current 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 Nielson-Gammon, director of the Texas Center for Climate Studies and the Texas State Climatologist (Randall 2020).

The inadequacy of regulatory mechanisms isn’t limited to water quantity. “Monitoring to determine whether TLAPs have damaged streams, creeks, springs, and wells is not required by Texas environmental regulations; nor is it a requirement of most permits” (Ross 2011). Ross (2011)’s “report examines available evidence that current TLAP standards have failed to protect springs, creeks, rivers, and groundwater. It identifies significant permit inconsistencies; and short-comings of the current regulations governing TLAP permits terms. It recommends necessary regulatory changes to protect the character and quality of pristine Texas Hill Country streams and springs against an onslaught of expanding development and larger wastewater effluent volumes that come with increased human habitation.” … “Only by soundly based and strictly enforced regulations can we balance provision of wastewater infrastructure to suburban residences with protection of the natural streams and springs that draw people to these areas”.

We provide 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.

THE POTENTIAL FOR BIAS

Despite the plight of the salamander across its range and the numerous public concerns over the potential environmental impacts by Mirasol Springs, LLC (Holley 2023, therealdeal.com 2023a, therealdeal2023b, Mejia-Hilario 2023, Elbein 2022, KXAN 2022, SOS Alliance 2021, Fisher 2021), the University of Texas at Austin (UT) "is thrilled to partner with the Winn Family" on the Hill Country Field Station (Holley 2023). The prestigious *Eurycea* expert, and one of the "discoverers" of the very species in question (Chippindale et al. 1994, Chippindale et al. 2000, Devitt et al. 2019), Dr. David Hillis, highlights the positive benefits of the project (Mejia-Hilario 2023, therealdeal 2023b, Figure 20).

While in the media, there are claims that "Winn's resort and the research site are separate endeavors" (therealdeal.com 2023b), their development site plans, TLAP, and BCCP applications indicate that they are, indeed, the same project (TLAP 2023, Whitenton 2022). In the September 2023 issue, Texas Monthly detailed the potential for the Hill Country Field Station to represent greenwashing of the Mirasol Springs, LLC development. "A budget proposal created by UT in 2020 and later acquired by *Texas Monthly* shows that the university sought more than $64 million in gifts from the Winn family that ranged from a $7 million field station to tens of millions of dollars for a variety of endowments connected to the College of Natural Sciences" (Holley 2023). Further, a former official from the College of Natural Sciences is said to have been forced by the school to sign a non-disclosure agreement about the university's partnership with Mirasol Springs, LLC. Shortly after the Texas Monthly September 2023 article, UT and the Winn family announced that the Winns would endow $50 million to the university (therealdeal.com 2023b, UT News 2023). In these circumstances, there is an obvious potential for the perception, if not indeed the reality, to develop that researchers at UT-Austin might be influenced by the university's lucrative partnership with the Winn family.

Available information indicates that the Service does regularly correspond with UT herpetologists. Given the expertise and involvement of herpetologists at UT in previous actions regarding *Eurycea*, it is possible that the Service may place a high degree of reliance on these researchers' opinions; however, at least some Service staff at the local field office seem aware of the potential for issues: "They also indicated that the UT lab is likely being named after or dedicated to Dr. Hillis. A bit of a conflict of interest as he gives his opinion on this site and the species" (exhibit A).

"This research by our faculty and students relates directly to conservation and protecting land and water resources in the Hill Country." -a UT spokesperson quote from Holley 2023

"…but the site they chose is just so fragile that it makes things really challenging and not just for Roy Creek," she said. "The conservation community in this area is deploying every strategy we can think of to benefit water recharge and the flow in the Pedernales, and pulling water out of the river that makes up 25 percent of the flow into Lake Travis just doesn't seem logical." Christy Muse, co-founder of the Hill Country Alliance, quoted in Holley 2023

The proposed field research center, incorporated into the Winn development proposal, would – if pending pumping permit applications are approved – draw water directly away from and contribute effluent to key salamander springs to support research center functions.

Any decision regarding the salamander's ESA listing status must be based on the "best scientific . . . data available," 16 U.S.C. § 1533(b)(1)(A), (c)(2),. Given Dr. Hillis' direct involvement in negotiations with the Winn family (Welch M. pers. comm.), and the information discussed above, the Service must take affirmative steps to ensure both the appearance and reality of objectivity in decisions regarding the salamander.

By submitting this letter, we have provided substantial scientific or commercial information further substantiating the petition's claims such that a reasonable person conducting an impartial scientific review would conclude that the petitioned action is warranted (50 CFR § 424.14(h)(1)(i)).

Sincerely,

/s/ Bill Bunch
Bill Bunch
Executive Director
Save Our Springs Alliance

/s/ Crystal Datri
Crystal Datri

/s/ Nico Hauwert
Nico Hauwert

/s/ Brian Zabcik
Brian Zabcik
Advocacy Director
Save Barton Creek Association

/s/ David Baker
David Baker
Executive Director
Wimberly Valley Watershed Association

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FIGURES

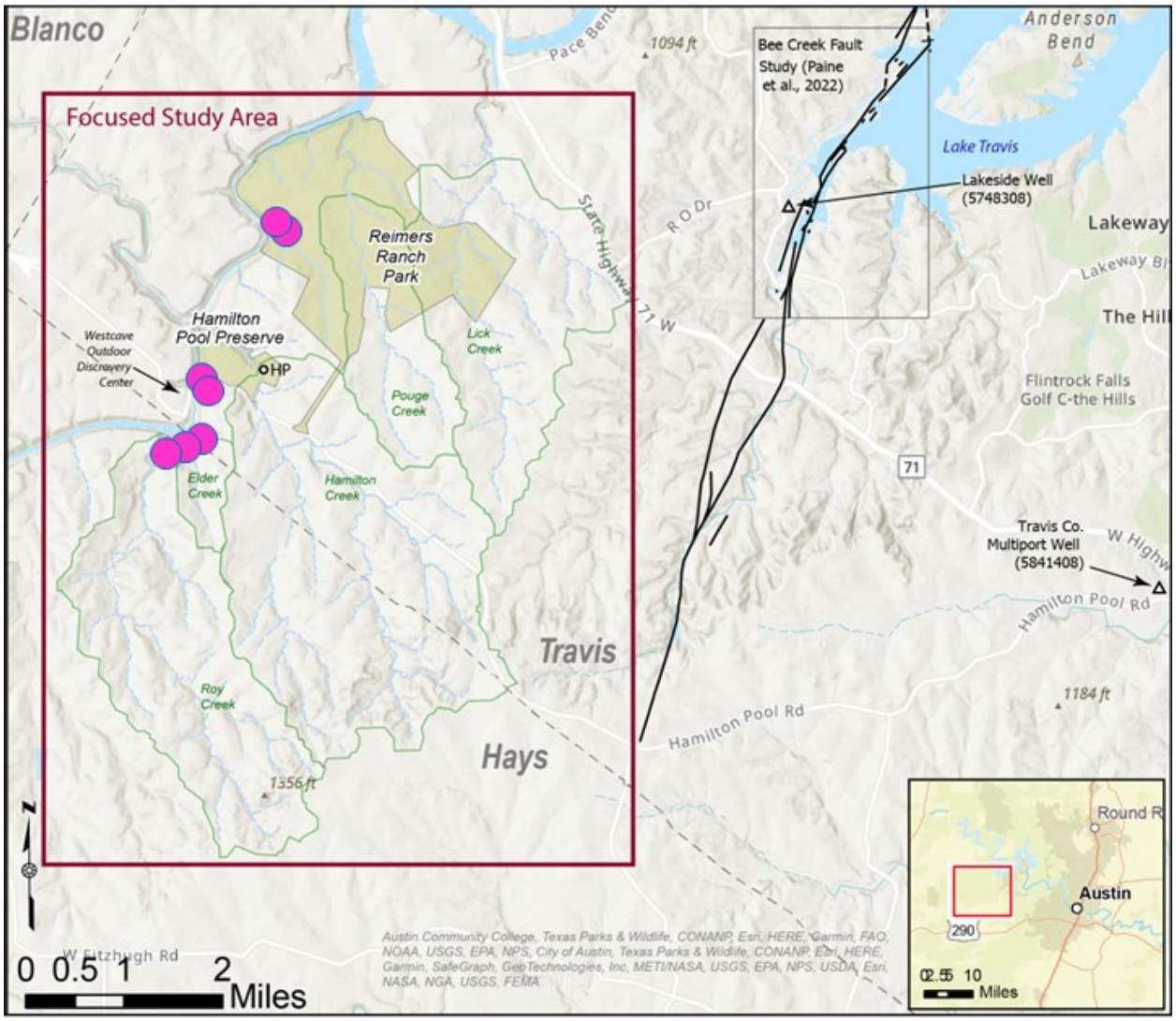


Figure 1. The regional study area map of a source water protection study (Hunt 2023a) with salamander locations superimposed in pink. This hydrogeologic study focuses on the immediate area where the cluster of 7 of the 10 known Pedernales River springs salamander locations occur.

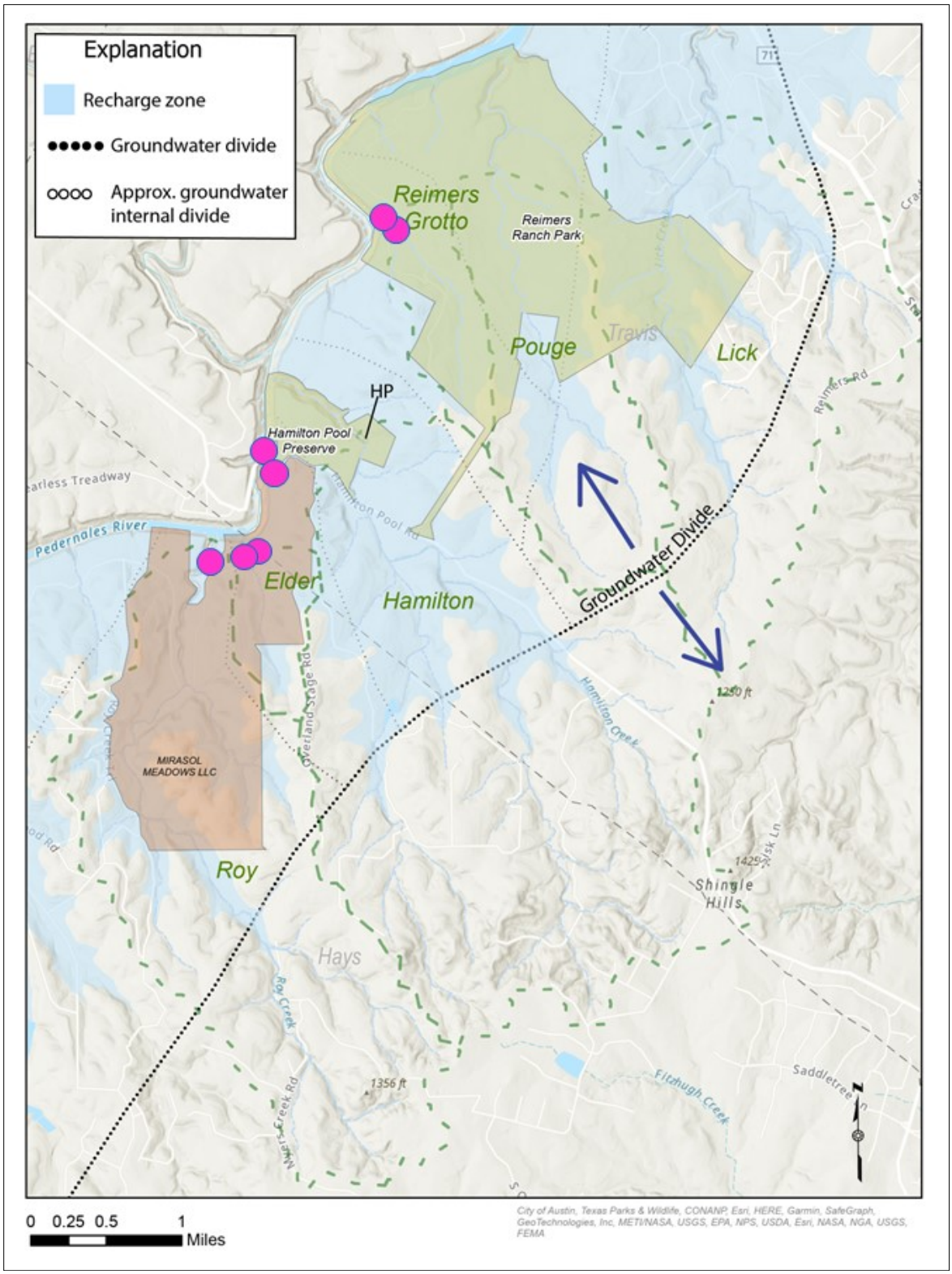


Figure 2. Area groundwater divides, watersheds, and key property boundaries with 7 of the known 10 locations for the Pedernales River springs salamander superimposed in pink (adapted from Hunt 2023). The Mirasol Springs, LLC development (Mirasol Meadow LLC property) encompasses substantial portions of spring-fed watersheds that sustain the Pedernales River.

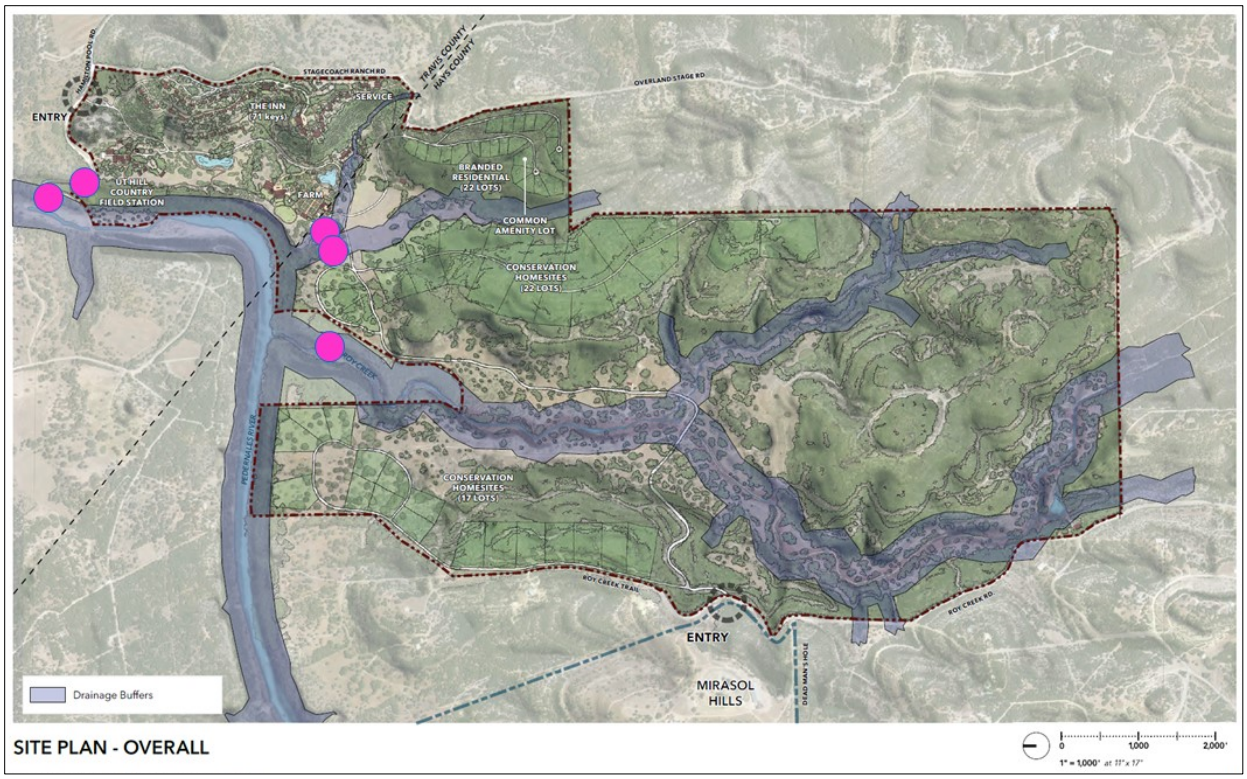
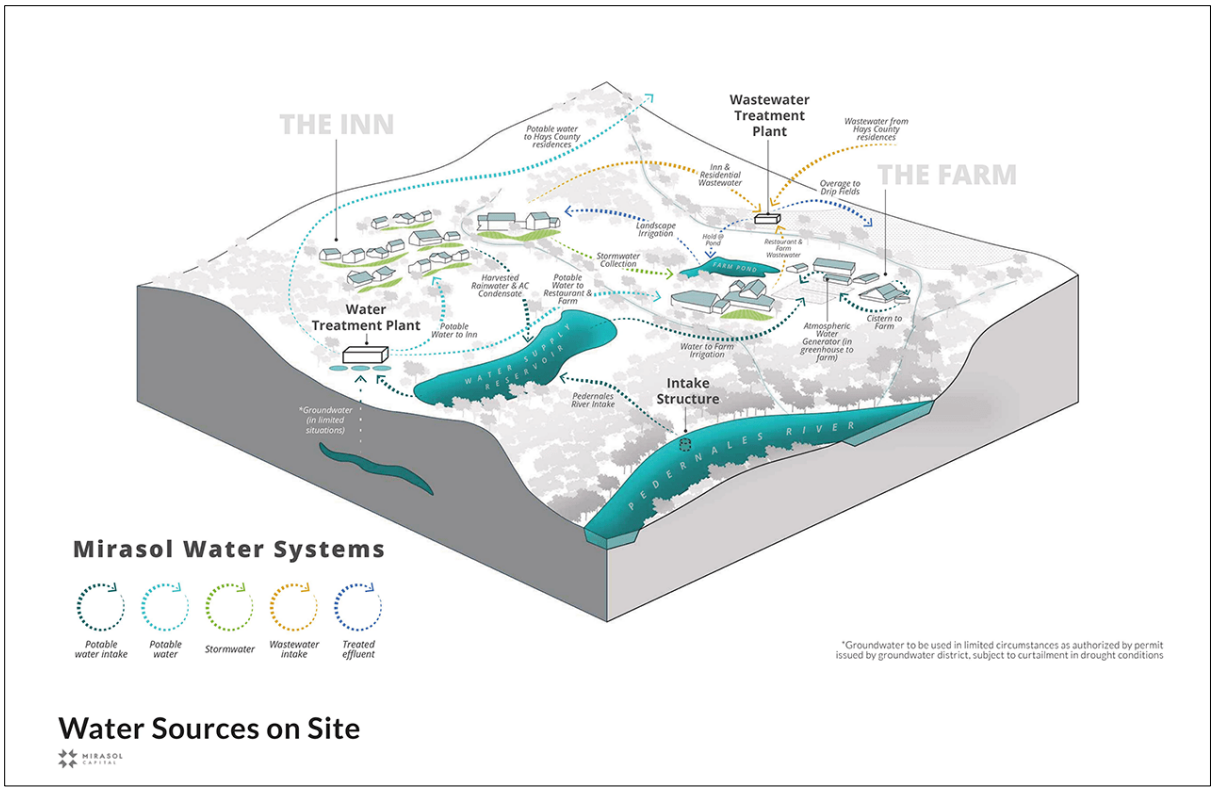


Figure 3. Five of the ten known locations for the Pedernales River springs salamander are located in the immediate vicinity or directly on the Mirasol Springs, LLC development. Adapted from Mirasol Springs, LLC application for inclusion in the Balcones Canyonlands Conservation Plan.



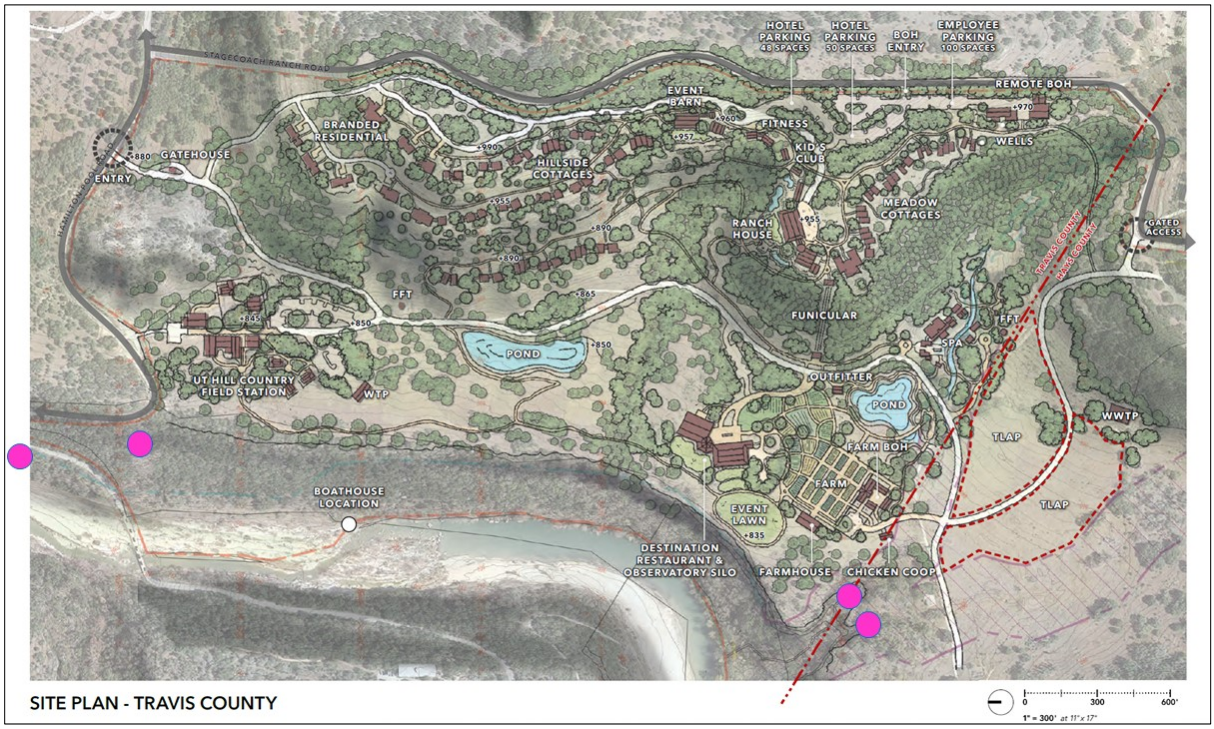


Figure 4. Mirasol Springs, LLC proposes pumping water of the Pedernales River and storing some portion of it in a water supply reservoir(s). Top: from mirasolsprings.com accessed 13 October 2023. Bottom: site plan from Mirasol Springs, LLC's application for enrollment in the Balcones Canyonlands Conservation Plan with four of the ten known locations for the Pedernales River springs salamander superimposed (pink circles).

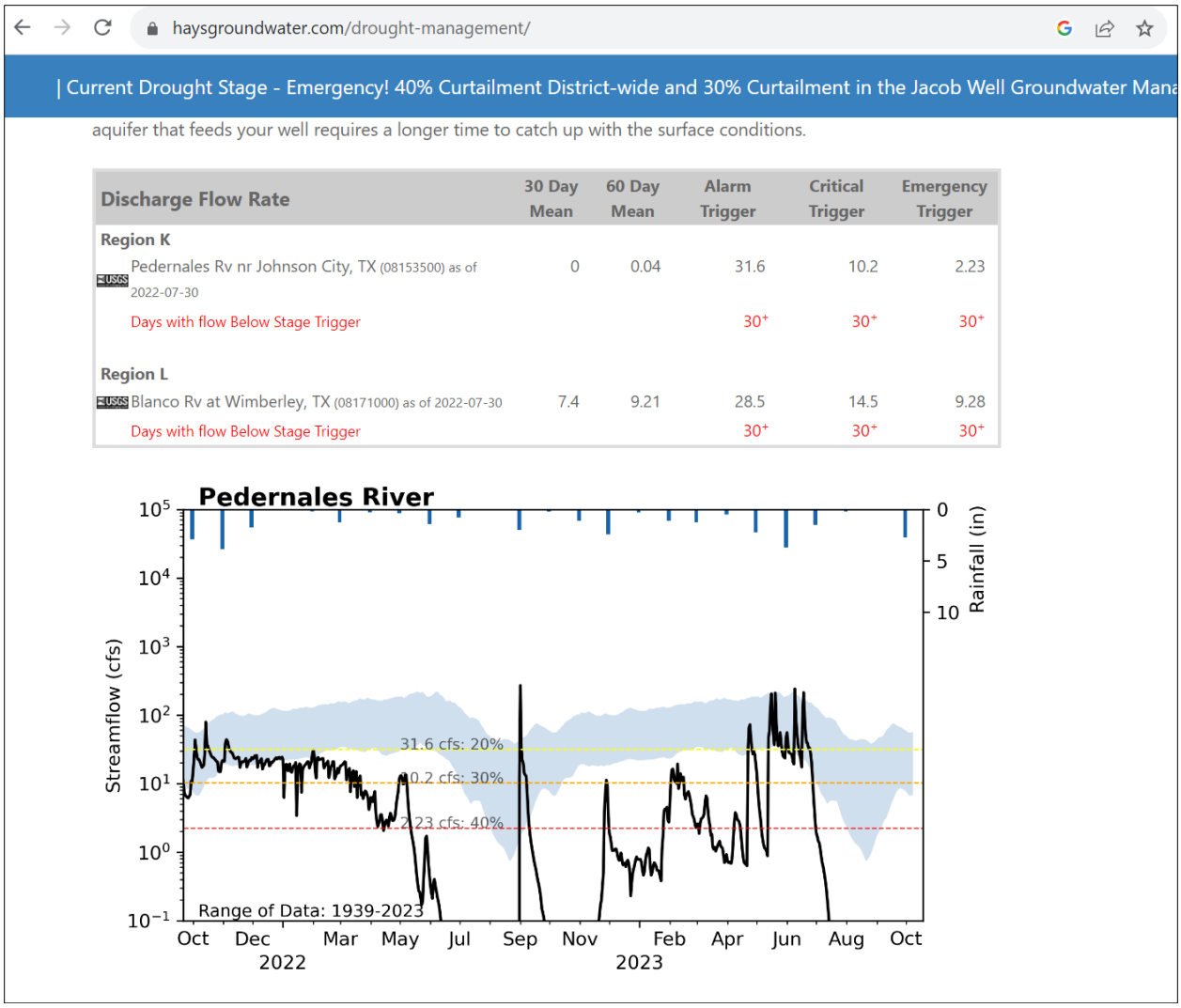


Figure 5. "HTGCD uses Pedernales and Blanco River streamflow as District-wide drought indicators because these rivers are recharge features of our aquifers. Aquifer recharge occurs relatively slowly, and streamflow indicates the current and future health of the Trinity Aquifer in the District" (HTGCD 2023).

Figure 6. Martin Spring is 12m from RR 3238 and subject to trash and runoff. 8 Sept 2023

Figure 7. Low flow and deep sediment conditions at Martin Spring. 8 Sept 2023

Figure 8. There are three impoundments at Reimers Ranch Spring #1. Both photos are “looking” upstream. Photo left: the most upstream impoundment. Photo right: the pencil is on the third impoundment. The pool is below the second impoundment. 8 Sept 2023

Figure 9. Reimers Ranch Spring #1 is subject to foot traffic, trash, human waste, modification of habitat, and apparent vegetation removal by patrons. 8 Sept 2023

Figure 10. Low flow conditions, algae, and drought-stressed riparian vegetation at Reimers Ranch Spring #1. 8 Sept 2023

Figure 11. Low flow conditions, algae, and drought-stressed riparian vegetation at Reimers Ranch Spring #1. 8 Sept 2023

Figure 12. At Climbers Canyon Spring, the trail descends into the canyon, crossing the stream channel several times, and even becoming the stream channel at certain points. 8 Sept 2023

Figure 13. Dry flowstone and drought stressed riparian vegetation at Climbers Canyon Spring. 8 Sept 2023

Tap water from the springs, at the Adams' family residence.
Photograph by Nick Simonite

Figure 14. The entire surface flow at Red's Spring in Roy Creek is continuously diverted for use as the sole water supply for a vacation home. From Holly 2023

Figure 15. Habitat degradation at Red's Spring in Roy Creek continues due to diversion for a vacation home. The orifice is artificially deepened and kept covered by a tarp. Periodically, the orifice is "cleaned out" to remove habitat substrate from the diversion pipe. 19 Jul 2023

Figure 16. Entrance to Hammett's Spring #2 from RR 3238. There are no public access points to the Pedernales River at Hammett's Crossing and trespassing is frequent. 8 Sept 2023

Figure 17. Watershed boundaries (red solid lines) adapted from Hunt 2023b and two Pedernales River springs salamander sites (pink circles) superimposed on site plans from mirasolsprings.com. These two salamander sites, representing one-fifth of all known sites for the species, are in the small Elder Creek watershed along with an artificial pond and stream, commercial farm and chicken coop, spa, multiple buildings, approximately 23 cottages, and a wastewater treatment plant and associated drainage fields.

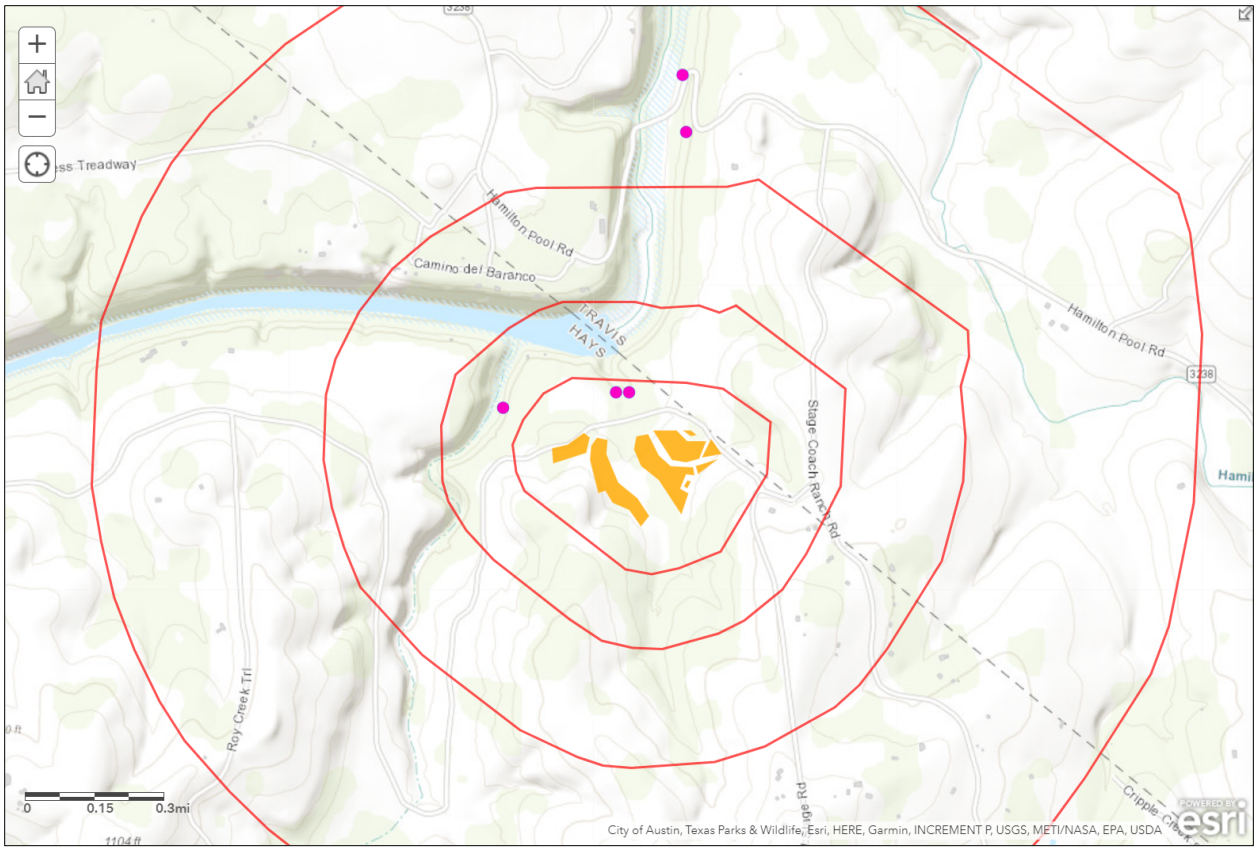


Figure 18. Mirasol Springs, LLC has submitted a TLAP application to treat their effluent on site and discharge a daily average flow of 39,000 gallons per day of treated effluent by land into mostly the small Elder Creek watershed. Subsurface drip irrigation fields are superimposed in orange and buffer zones are superimposed red lines with the outermost line representing a 1-mile radius around the drip fields. Half of the known locations for the Pedernales River Springs salamander are depicted on this map (pink circles).

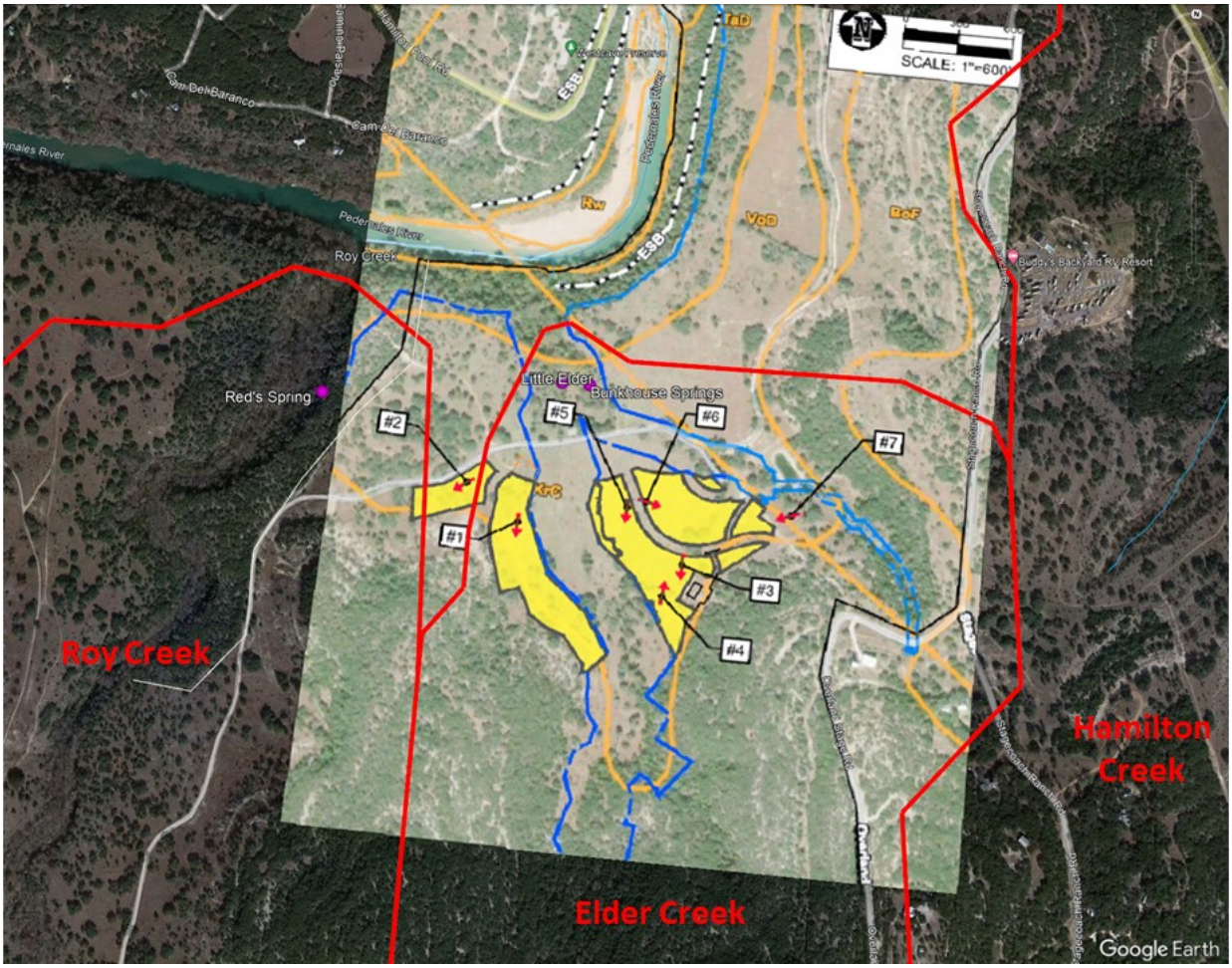


Figure 19. Watershed boundaries (red lines) adapted from Hunt 2023b superimposed on wastewater effluent drip irrigation fields (yellow polygons, TLAP 2023) and three salamander locations (pink circles). A small portion of the irrigation fields occur in the Roy Creek watershed, with the majority occurring in the Elder Creek watershed. "Perennial springflow is thought to be derived primarily from within the surface watershed in which a given spring is located" (Hunt 2023a). It is likely water quality will be degraded by wastewater effluent, degrading salamander habitat.

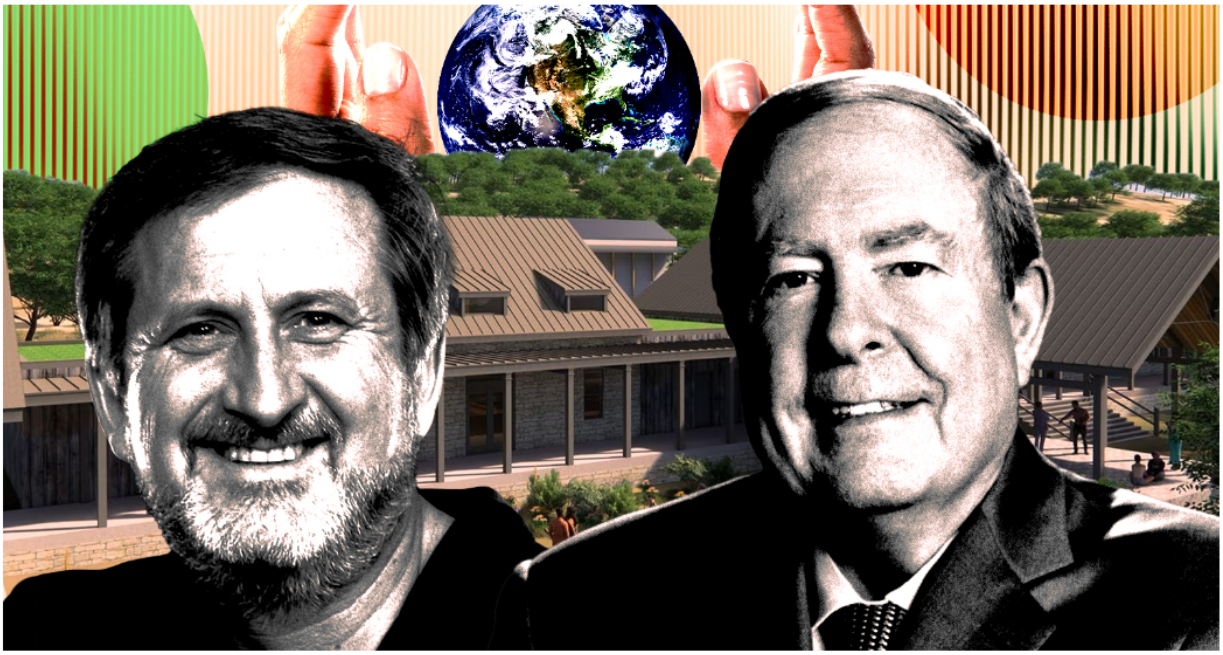
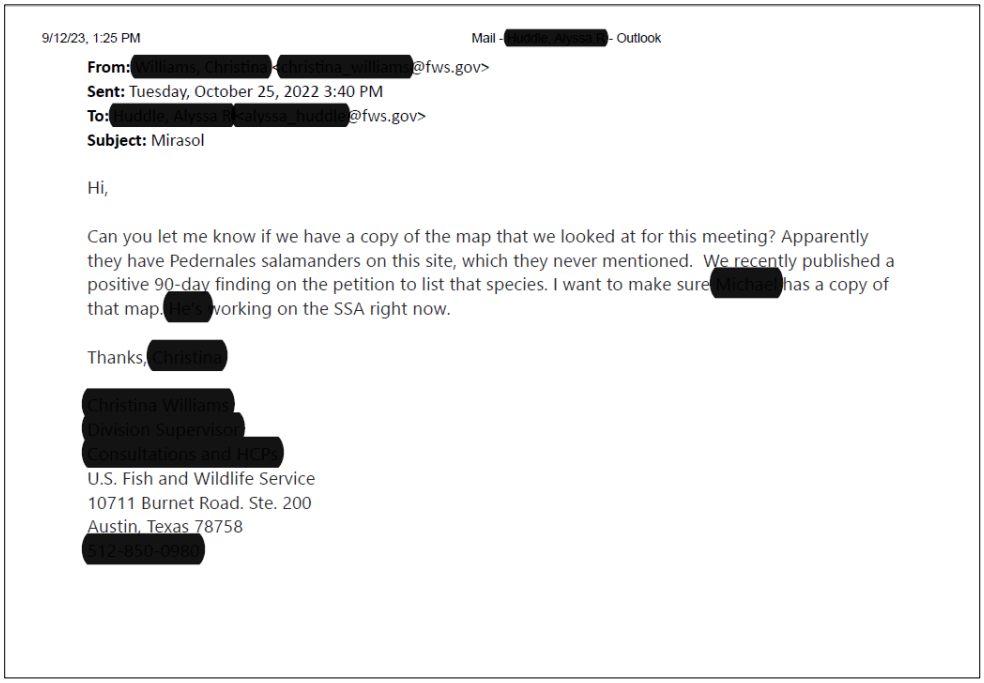


Figure 20. The University of Texas at Austin (UT) “is thrilled to partner with the Winn Family” on the Hill Country Field Station. The prestigious *Eurycea* expert, and one of the “discoverers” of the Pedernales River springs salamander, Dr. David Hillis, highlights the positive benefits of the project. Photo from therealdeal.com

EXHIBITS



9/12/23, 1:25 PM Mail - [redacted] - Outlook

From: [redacted]@fws.gov>
Sent: Tuesday, October 25, 2022 3:40 PM
To: [redacted]@fws.gov>
Subject: Mirasol

Hi,

Can you let me know if we have a copy of the map that we looked at for this meeting? Apparently they have Pedernales salamanders on this site, which they never mentioned. We recently published a positive 90-day finding on the petition to list that species. I want to make sure [redacted] has a copy of that map. [redacted] working on the SSA right now.

Thanks, [redacted]

[redacted]
U.S. Fish and Wildlife Service
10711 Burnet Road. Ste. 200
Austin, Texas 78758
[redacted]

9/12/23, 1:25 PM Mail - [redacted] - Outlook

Fwd: Mirasol

[redacted]@fws.gov>
Fri 10/28/2022 1:11 PM
To: [redacted]@fws.gov>
Cc: [redacted]@fws.gov>

1 attachments (6 MB)
BCCP_1147_Appication Package.pdf;

[redacted]

I was approached by a consultant at the HCP coalition meeting that told me that the Mirasol tract has Pedernales sallies on it. [redacted] and I met with the consultant who provided us the attached BCP application to participate for the warbler. They were also inquiring about banking the warbler habitat on the Hays side. Not once did they mention they had springs on site.

The concerned consultant showed me a map of the spring locations and it appears they will definitely be impacted by this proposed development. They also indicated that the UT lab is likely being named after or dedicated to Dr. Hillis. A bit of a conflict of interest as he gives his opinion on this site and the species.

I wanted to make sure you were aware of this. Let me know if you would like us to gather any more info on the proposed project.

[redacted]

[redacted]
U.S. Fish and Wildlife Service
10711 Burnet Road. Ste. 200
Austin, Texas 78758
[redacted]

Exhibit A. USFWS correspondence obtained via FOIA request, USFWS tracking# DOI-FWS-2023-005741.

APPENDICES

Appendix A. Salamander Location Name Equivalents. There is no single, centralized database of springs in Texas; therefore, spring names often vary in the literature. The following three salamander locations listed in Datri et al. 2021 are monitored in Hunt 2022 and Hunt 2023. Coordinates are equivalent and are available in both documents.

Monitoring Site in Hunt 2022, 2023	Salamander Location in Datri et al. 2021
Red Spring	Red's Spring
Elder Spring	Bunkhouse Springs
Reimers (grotto) spring	Climbers Canyon Spring

Appendix B. Water quality parameters measured with a Hanna HI98194 meter at 3 Pedernales River springs salamander locations on 8 September 2023.

	Martin Spring	Reimers Ranch Spring #1	Climbers Canyon Spring
dissolved oxygen concentration (ppm)	4.49	1.11	3.01
pH	6.94	7.43	7.26
water temperature (°C)	23.95	24.89	26.99
conductivity (µS cm)	762	974	623
total dissolved solids (ppm)	381	480	311
salinity (PSU)	0.37	0.47	0.30