Balcones Canyonlands Preserve
Spring Monitoring
FY 2018 Annual Report

by Colin Strickland & Crystal Datri



Water flowing from Fallen Giant Spring
Park West tract
Photo by Colin Strickland

City of Austin BCP – Austin Water Utility (AWU)

Background

Protection of the unique species assemblages associated with subterranean features and spring-fed drainages of the Balcones Canyonlands is a priority in the BCP Land Management Plan. Management objectives include mapping and monitoring springs and major seeps (City of Austin BCP, 2007); however, due to limited resources and personnel, no organized effort to meet these objectives was made until recently. Stygobytic invertebrates are often found at springheads during periods of high flow. Species of concern covered by the BCCP that are likely to be found at springs include the flatworm (*Sphalloplana mohri*), ostracod (*Candona* sp. nr. *stagnalis*), and the isopod (*Caecidotea reddelli*). Additionally, the federally threatened Jollyville Plateau salamander (*Eurycea tonkawae)* is found on the BCP in springs, streams, and in subterranean stream passages such as in Testudo Tube. For more detailed information about monitoring of known JPS sites please refer to the Travis County Jollyville Plateau Salamander Monitoring Report.

Spring Documentation & JPS Habitat searching

The City of Austin began to systematically document all springs on COA owned tracts of the Balcones Canyonlands Preserve in fall 2017 (Figure 1). The primary objective is to map spring locations and gather baseline conditions such as flow and species present. Next, is to monitor changes to springs on the preserve system in response to surrounding rapid urbanization and human influenced climate change. Last, is to identify, characterize, and assess the potential for Jollyville Plateau salamander habitat, develop a protocol for further characterization, and prioritize for potential future monitoring. A better understanding of JPS range and habitat preference can further inform critical habitat designations and ultimately contribute to the recovery of the species.

Data presented at this time are preliminary as personnel refine survey protocols and await equipment purchasing.

Personnel

- Names of all persons involved in the spring surveys and their duties:
    - Crystal Datri: Independent biologist contracted by the City of Austin (hereafter COA), section 10(a)(1)(A) scientific permit #: TE89697B-0, cdatri4@gmail.com
        - Identifying and searching potential salamander habitat
        - Searching for and characterizing springs
        - Developing protocol
    - Colin Strickland: Biologist, Balcones Canyonlands Preserve, COA, colin.strickland@austintexas.gov
        - Searching for and characterizing springs
        - GIS mapping, data management
        - Developing protocol
    - Mark Sanders: Biologist, Balcones Canyonlands Preserve, COA, mark.sanders@austintexas.gov
        - Field supervision and project advisor
    - Nico Hauwert, Program Manager, Balcones Canyonlands Preserve, COA, nico.hauwert@austintexas.gov
        - Project supervisor

Location

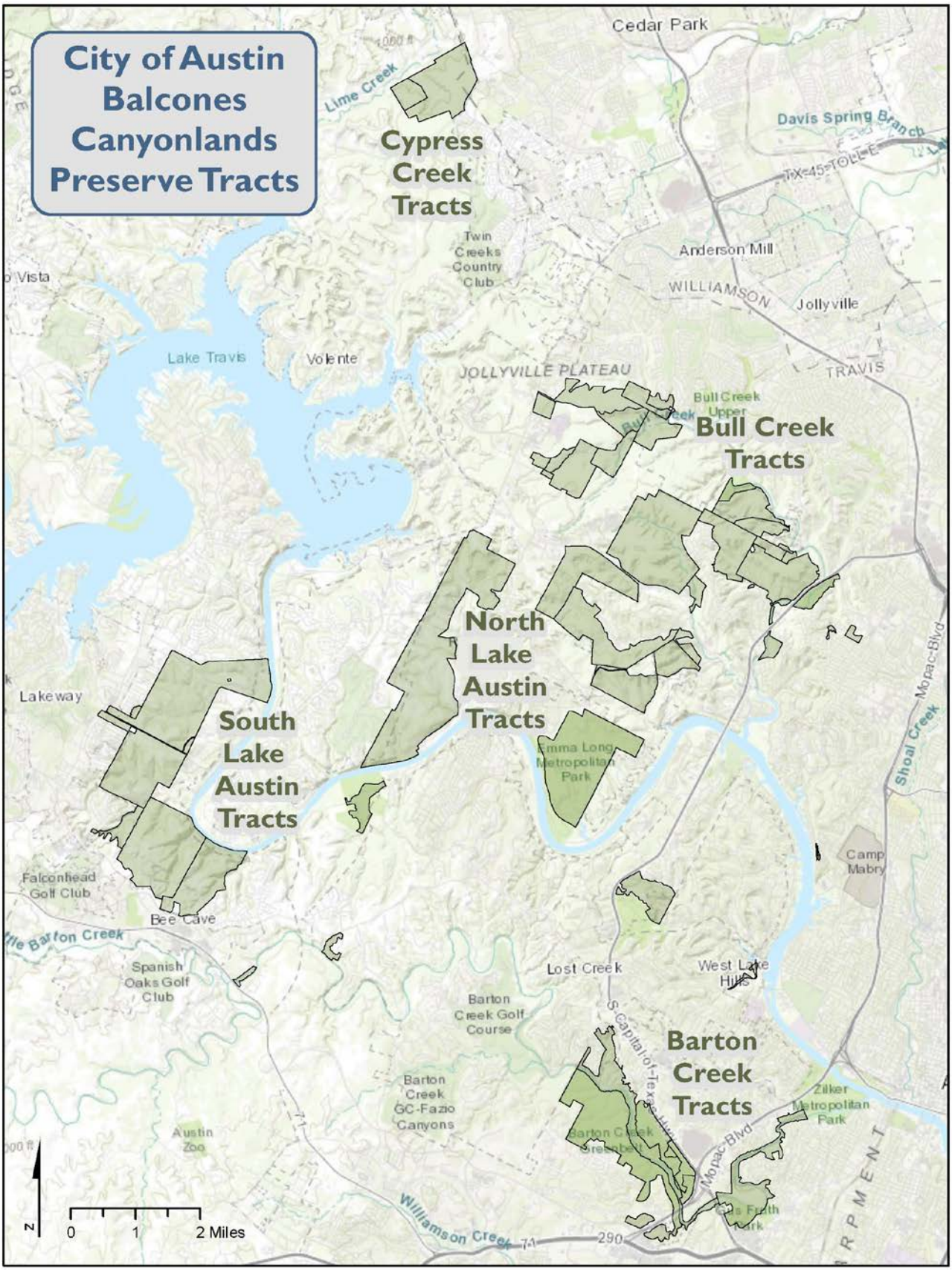

Figure 1. City of Austin Balcones Canyonland Preserve tracts

The focus of our current spring mapping is on tracts north of the Colorado River (Figure 2).

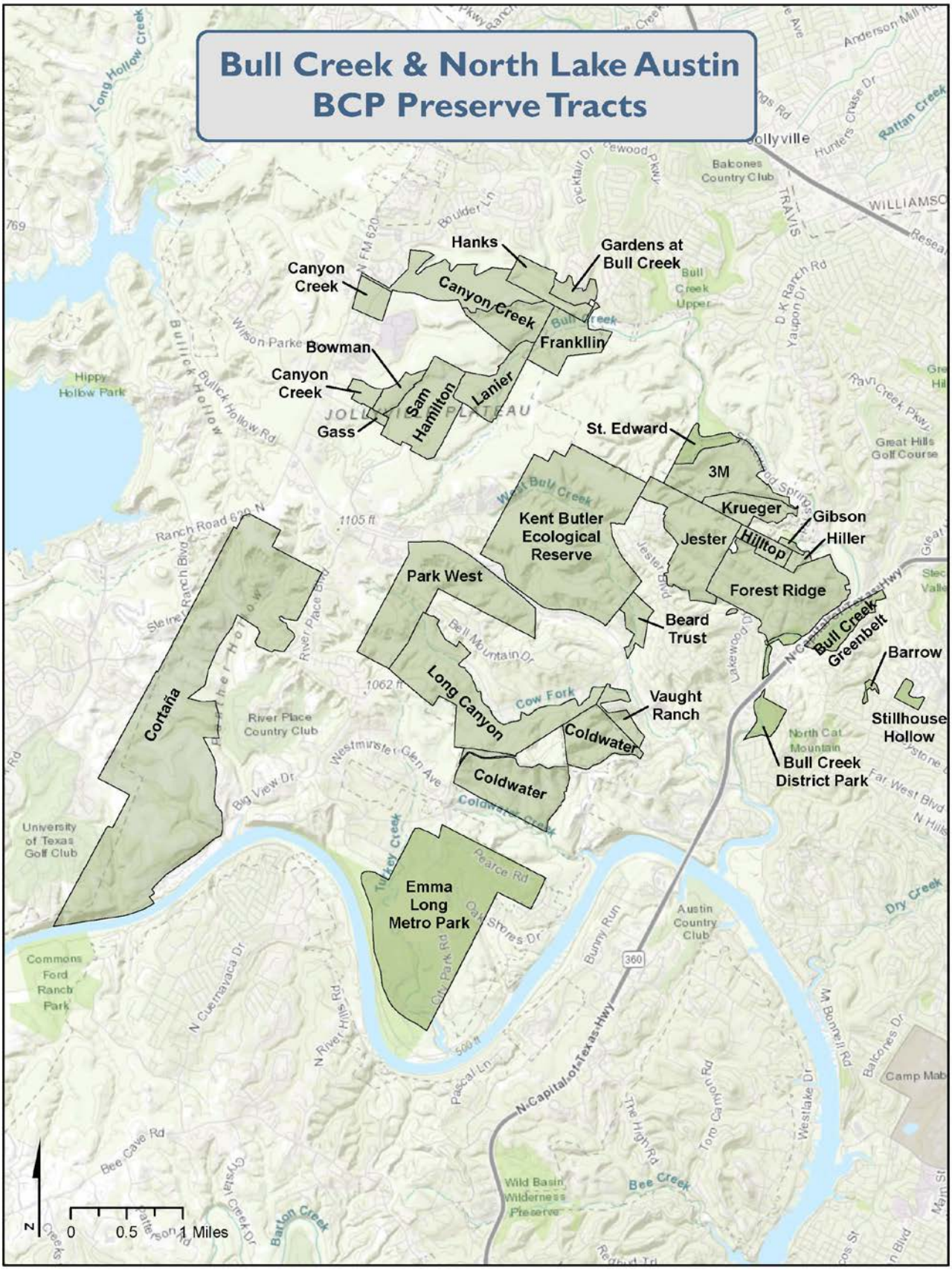

Figure 2. Bull Creek & North Lake Austin COA BCP tracts

Methods

The ultimate goal is to locate and characterize all springs on the BCP, a vast undertaking and reconnaissance for this project is currently ongoing.

Locations to search for springs were chosen by identifying canyons and ravines within the BCP using topographic maps in ArcGIS. Existing spring locations were noted to identify gaps in COA springs data. Priority was given to those tracts where the Jollyville Plateau salamander was likely to be found (e.g. north of the Colorado River, proximity to documented locales). Biologists systematically traversed canyons, ravines, and their tributaries, visually searching as well as listening for spring and seep openings or indicators of groundwater influence (e.g. maidenhair fern (*Adiantum* sp.) presence).

New spring localities were documented when water issuing from conduits was observed. Seeps were documented where there was not an obvious outlet of water, but the vegetation indicated continuously moist conditions. Coordinates were noted using Garmin GPSmap 62s or Garmin inReach Explorer + and added to the BCP Springs Database using ArcGIS. Flora and fauna in the immediate vicinity of spring and seep outlets were noted. If stygobytic invertebrates were observed at a previously undocumented spring location, a specimen of each genus was collected with a net and preserved in 95% alcohol. On subsequent visits stygobytic invertebrates would be counted and photographed if possible, but not collected. When possible, flow measurements were taken. Due to the variability of springs a variety of techniques for measuring flow were used. The most common is to use a laminated piece of paper to divert all flow into a graduated cylinder for a set number of seconds to obtain ml/second. Another technique is to use micro weirs, specially constructed and calibrated for very low flows. Water quantity metrics were not always assessed due to the nature of springs and seeps issuing as low flow, drip flow, or diffuse flow. Methods are still in development. Equipment for water quality measurement is being acquired.

Researchers temporarily removed cover to search for salamanders within the wetted perimeter in the immediate vicinity of spring and seep outlets where water accumulated enough to provide useable habitat as pools, streams, or within surveyable portions of karst features. Due to the alluvial nature of these springs, in-channel outflows can be difficult to discern. While traversing stream runs in search of spring localities, researchers frequently stopped to informally search what they evaluated as suitable habitat using their best judgement. The nature of the canyon habitat of the BCP makes access challenging and researchers took advantage of the opportunity to informally search for salamanders on these initial visits. Because localities were not known a priori, survey sites were not delimited, and searching times not noted. Methods and site choice are still in development for future surveys.

Researchers took care to avoid potential “take”, observing guidelines as specified in the latest version of “USFWS Section 10(a)(1)(A) Scientific Permit Requirements for Conducting Georgetown, Jollyville Plateau, and Salado Salamander Surveys.”

Once initial locations and descriptions are made, springs will be prioritized for monitoring. Higher priority will go to springs with higher flow or unique species present such as JPS or stygobitic invertebrates. During initial documentation of springs and seeps, a limited number of habitat characteristics are noted such as flora, fauna, flow rate (when possible), and a general description of site. On the sites chosen for monitoring, additional characteristics will be documented such as substrate description (embeddedness, composition), and basic water chemistry (DO, SpC, pH, Temp). Flow will be measured during each visit and searches for spring fauna performed. The monitoring schedule is yet to be determined but will likely be annually or biannually in the future.

Survey Results

The table and maps below show the newly documented springs added thus far (Table 1, Figures 3-7). Representative photos of springs and seeps are shown in figures 8 through 14. No new Jollyville Plateau salamander locales have been found. Surprise Amphipool had stygobytic amphipods (Genus: *Stygobromus*) in the pool the spring feeds into (Figure 15).

Tract	Feature Name	Date	Latitude	Longitude	UTM X	UTM Y	Observer
Cortana	Beauty Berry, Porcupines, & Hope	10/22/2018	30.393222	-97.862102	609315.9081	3362908.081	Crystal Datri
Cortana	Canyon Oasis Shelter	5/8/2018	30.381886	-97.859233	609604.2006	3361654.537	Colin Strickland
Cortana	Maiden Shower Spring	5/8/2018	30.384227	-97.859326	609592.6518	3361913.89	Colin Strickland
Cortana	Oak Cathedral	10/17/2018	30.394317	-97.863726	609158.6654	3363027.868	Crystal Datri
Cortana	Panther Hollow S12	4/18/2018	30.393159	-97.857103	609796.2552	3362905.936	Colin Strickland
Cortana	Panther Hollow S13	4/18/2018	30.393081	-97.857124	609794.3249	3362897.272	Colin Strickland
Cortana	Seeping Wall	10/17/2018	30.394162	-97.863353	609194.6732	3363011.05	Crystal Datri
Jester	Emerald Staircase	9/11/2018	30.388785	-97.792552	616003.173	3362485.544	Colin Strickland
Jester	Flat Grotto Spring	9/25/2018	30.398983	-97.800452	615232.168	3363607.689	Colin Strickland
Jester	Jester S01	9/11/2018	30.390337	-97.792267	616028.7214	3362657.839	Colin Strickland
Jester	Jester S02	9/11/2018	30.390157	-97.792461	616010.2949	3362637.692	Colin Strickland
Jester	Screech Owl Drip Shelter	9/12/2018	30.396567	-97.799556	615321.0857	3363340.843	Crystal Datri
Jester	Screech Owl Seep	9/12/2018	30.396456	-97.799718	615305.6524	3363328.377	Crystal Datri
Jester	Seep or No	9/12/2018	30.388152	-97.793632	615900.1539	3362414.285	Crystal Datri
Jester	Sibyl Spring	9/25/2018	30.3986	-97.800925	615187.1765	3363564.761	Colin Strickland
Jester	Silenus Spring	9/11/2018	30.39209	-97.797789	615496.1136	3362846.473	Colin Strickland
Jester	Snapping Turtle Springs	9/12/2018	30.388039	-97.792619	615997.6171	3362402.799	Crystal Datri
Jester	Surprise Amphipool	9/11/2018	30.389475	-97.792633	615994.5752	3362561.932	Colin Strickland
Kent Butler	Braided Branches Spring	9/6/2018	30.390844	-97.825485	612836.6125	3362680.458	Colin Strickland
Kent Butler	Guarded pool	9/26/2018	30.399099	-97.80458	614835.4559	3363616.35	Crystal Datri
Kent Butler	Hillside Garden Spring	9/4/2018	30.391268	-97.821468	613222.0667	3362731.458	Colin Strickland
Kent Butler	KBS02	6/5/2018	30.396982	-97.814761	613859.8273	3363371.446	Colin Strickland
Kent Butler	KBS03	6/12/2018	30.38646	-97.806864	614630.7923	3362213.298	Colin Strickland
Kent Butler	KBS04	6/12/2018	30.389583	-97.807556	614560.6592	3362558.709	Colin Strickland
Kent Butler	KBS05	6/12/2018	30.387389	-97.811856	614150.0708	3362311.213	Colin Strickland
Kent Butler	KBS06	9/4/2018	30.388152	-97.822113	613163.6889	3362385.479	Colin Strickland
Kent Butler	Mossy Log Pool	9/18/2018	30.399	-97.818916	613458.3168	3363590.922	Colin Strickland
Kent Butler	Nightjar Seep	10/11/2018	30.402827	-97.810148	614296.1975	3364023.876	Crystal Datri
Kent Butler	Photenia Spring	10/11/2018	30.403074	-97.810324	614279.0022	3364051.073	Crystal Datri
Kent Butler	Porcupine Demise Seep	9/26/2018	30.399613	-97.804299	614861.8498	3363673.6	Crystal Datri
Kent Butler	Satyr Spring	6/12/2018	30.388974	-97.807487	614567.9993	3362491.285	Colin Strickland
Kent Butler	Steep Drip Seep	9/26/2018	30.398957	-97.804571	614836.4867	3363600.621	Crystal Datri
Kent Butler	Verdant Terraces	9/6/2018	30.390633	-97.825349	612849.9216	3362657.21	Colin Strickland
Kent Butler	Withered Maiden Seep	9/18/2018	30.40015	-97.818349	613511.458	3363718.941	Colin Strickland
Long Canyon	Tree Bridge Spring	7/12/2018	30.378803	-97.835863	611853.2379	3361335.708	Colin Strickland
Park West	Armadillo Shelter Spring	10/17/2017	30.389643	-97.832488	612165.155	3362540.399	Colin Strickland
Park West	Crescent Cliff Seep	7/12/2018	30.379372	-97.840001	611454.9758	3361394.689	Colin Strickland
Park West	Faerie Haunt Pools	8/29/2018	30.379694	-97.843322	611135.5019	3361427.112	Colin Strickland
Park West	Fallen Giant Spring	7/12/2018	30.378952	-97.839441	611509.2622	3361348.693	Colin Strickland
Park West	Gnarly Roots Spring	10/17/2017	30.389858	-97.833076	612108.4153	3362563.644	Colin Strickland
Park West	Gnome Tunnel Spring	5/16/2018	30.38806	-97.831023	612307.7209	3362366.413	Colin Strickland
Park West	Nixie Garden Spring	6/26/2018	30.385355	-97.839158	611529.1829	3362058.589	Colin Strickland
Park West	Park West S2	10/17/2017	30.389761	-97.832917	612123.8025	3362553.051	Colin Strickland
Park West	Pixie Perch Seep	10/17/2017	30.385349	-97.84027	611422.3459	3362056.83	Colin Strickland
Park West	PW Seep CS1	5/16/2018	30.38609	-97.827335	612664.3249	3362151.749	Colin Strickland
Park West	PW Seep CS2	5/16/2018	30.385905	-97.828678	612535.4988	3362129.911	Colin Strickland
Park West	PW Spring CS1	5/16/2018	30.38609	-97.827335	612664.3249	3362151.749	Colin Strickland
Park West	Sentinel Stone Spring	6/26/2018	30.382787	-97.835725	611861.96	3361777.374	Colin Strickland
Park West	Shield Stand Seep	6/26/2018	30.383208	-97.836283	611807.8651	3361823.481	Colin Strickland
Park West	Standing Stone Spring	8/29/2018	30.378314	-97.841058	611354.61	3361276.396	Colin Strickland
Park West	The Naiads Pools	5/16/2018	30.386912	-97.829658	612440.185	3362240.539	Colin Strickland
Park West	Toad Alcove Seep	8/29/2018	30.379687	-97.842477	611216.7042	3361427.165	Colin Strickland

Table 1. Newly documented spring & seep locations

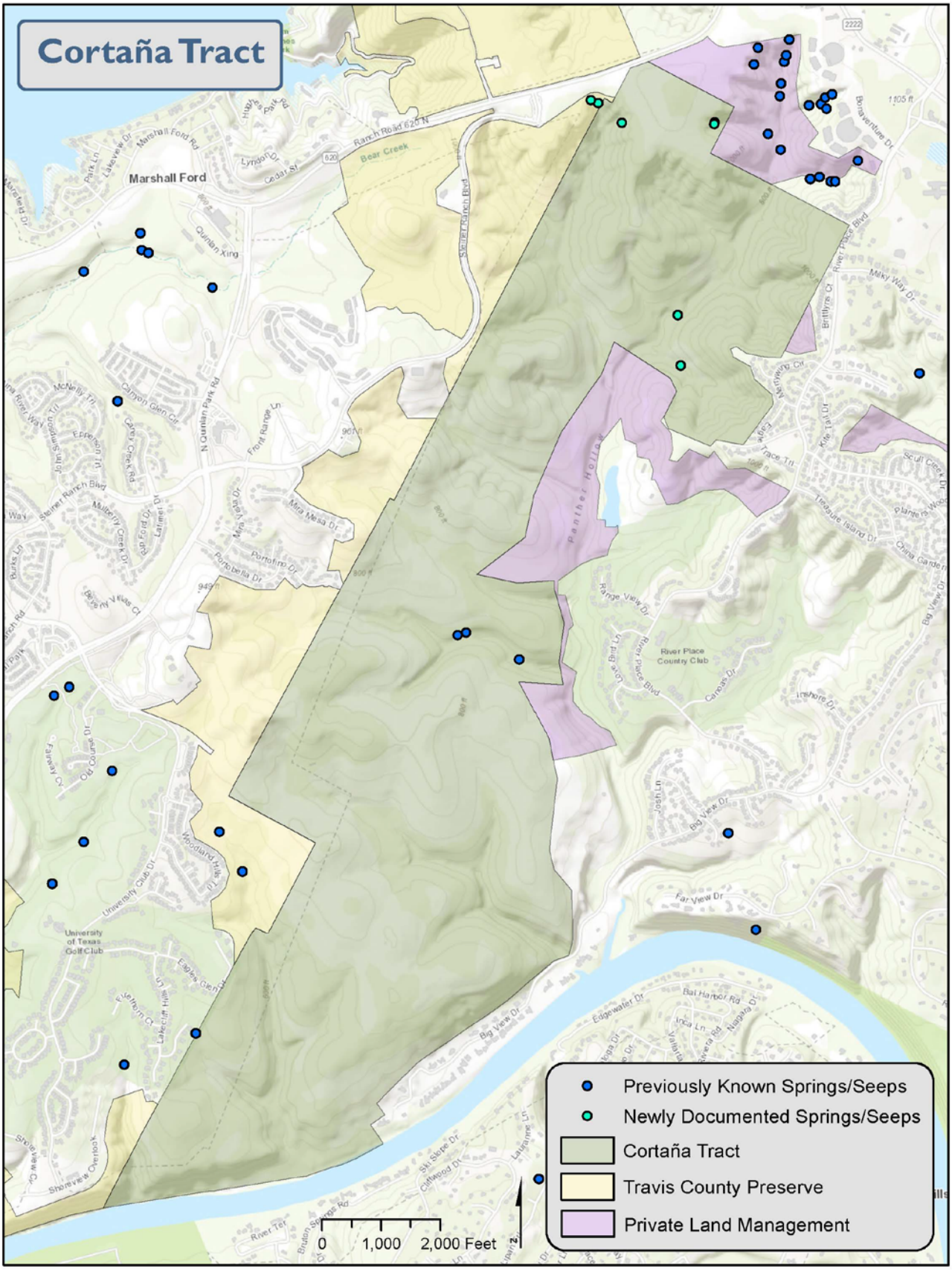

Figure 3. Cortana tract overview

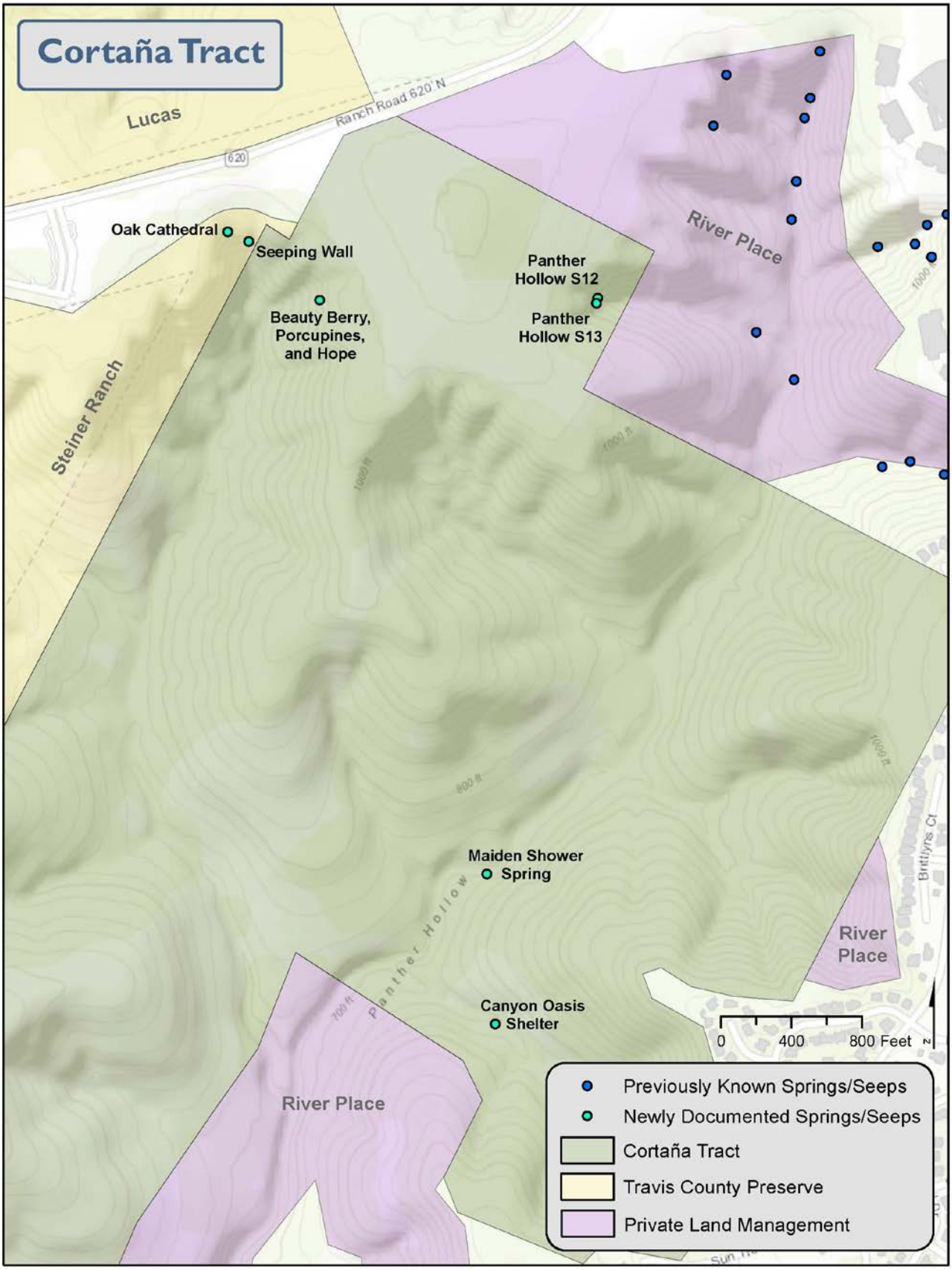

Figure 4. Cortana tract new spring & seep locations

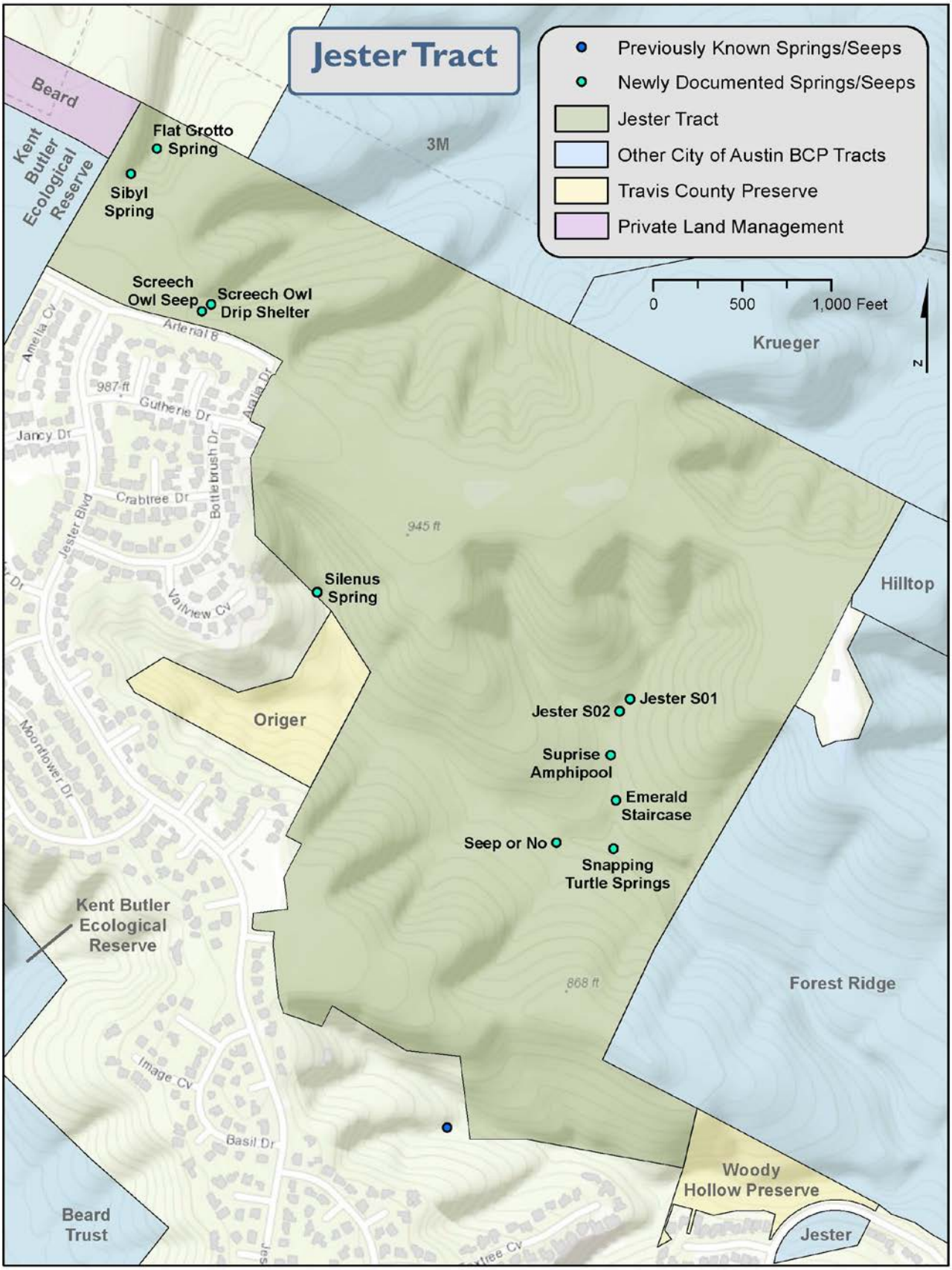

Figure 5. Jester tract new spring & seep locations

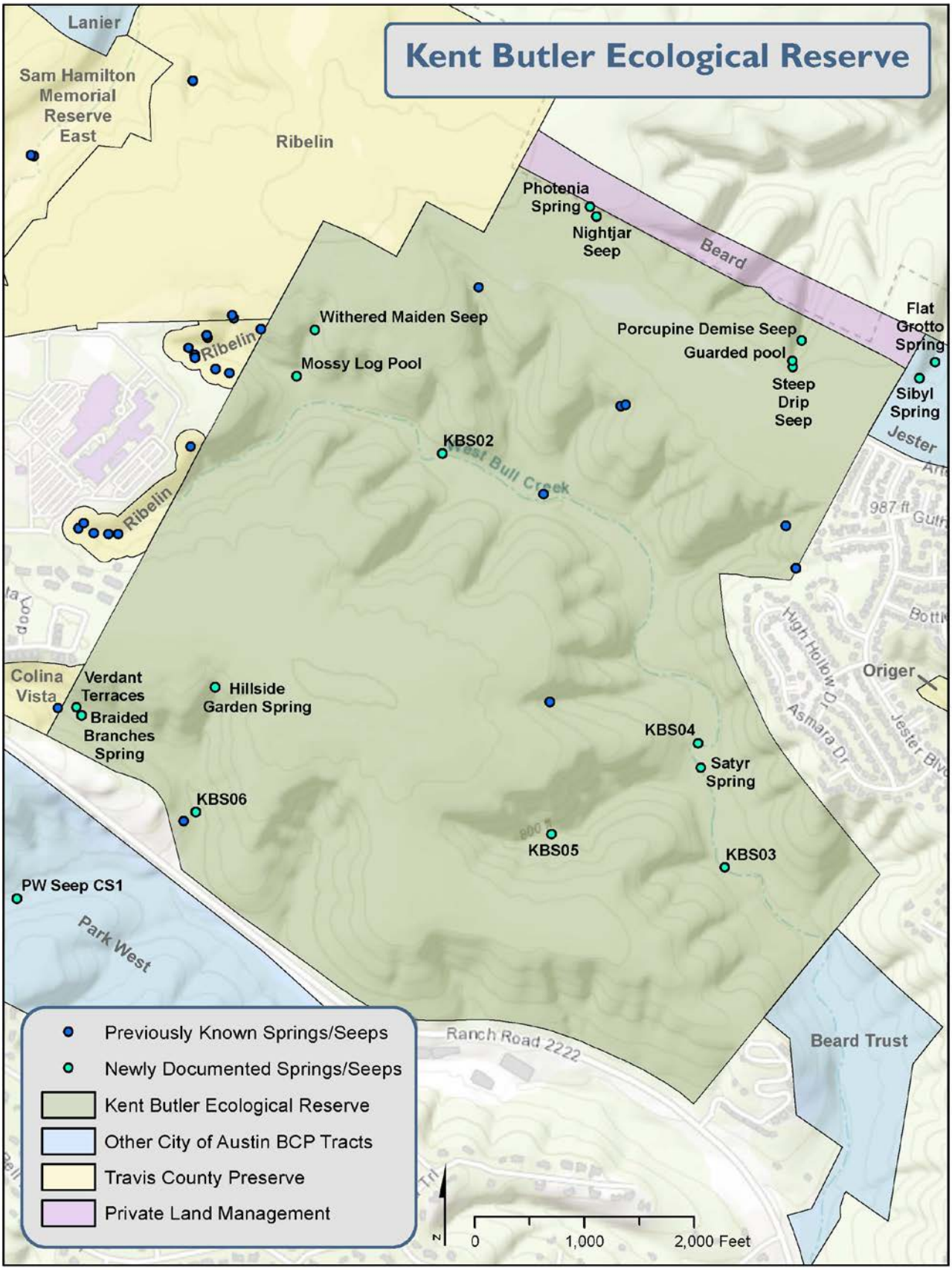

Figure 6. Kent Butler tract new spring & seep locations

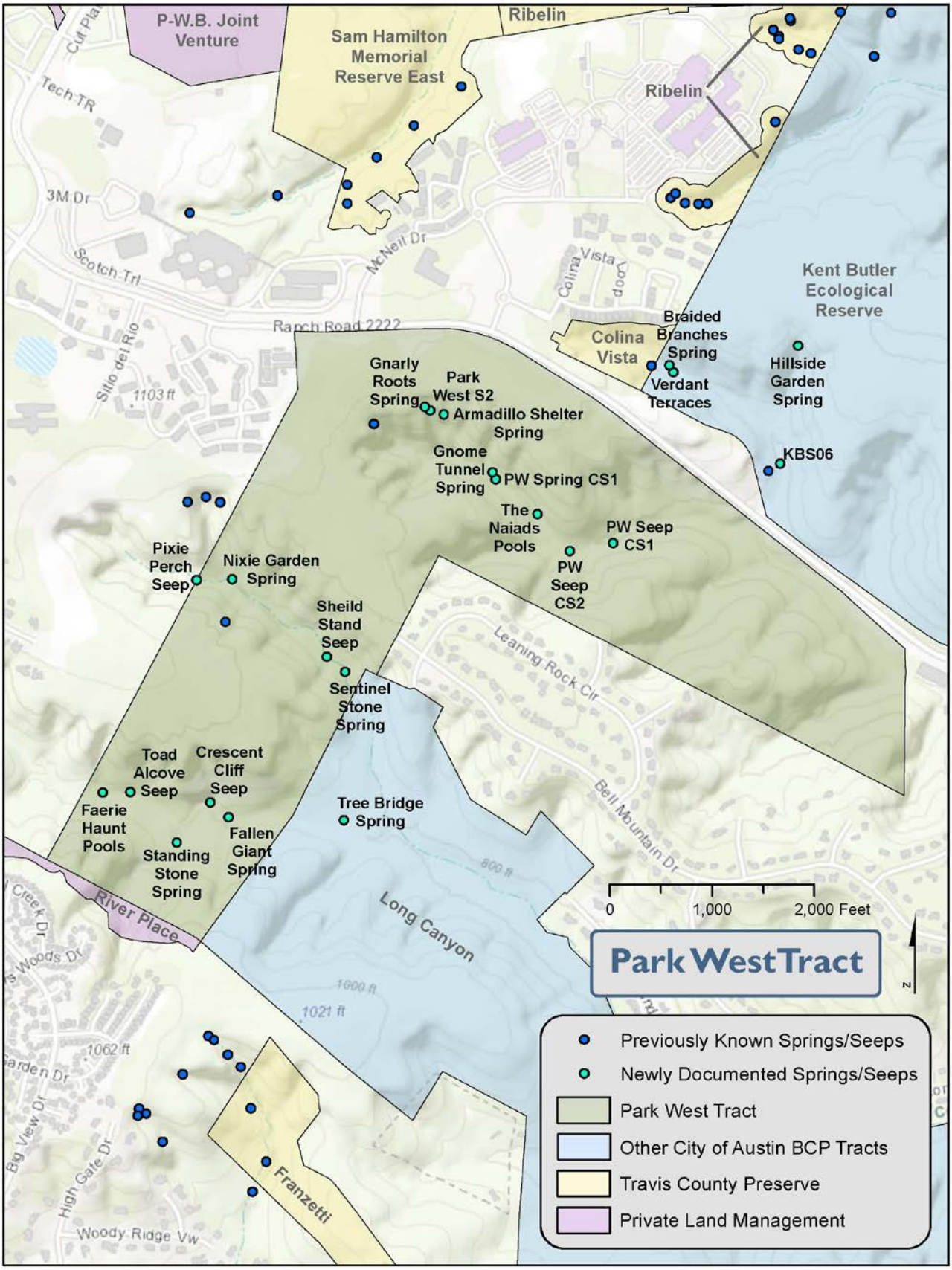

Figure 7. Park West tract new spring & seep locations



Figure 8. Sibyl Spring (See Figure 5), Photo by Colin Strickland



Figure 9. Satyr Spring (See Figure 6), Photo by Colin Strickland



Figure 10. Pixie Perch Seep (See Figure 7), Photo by Colin Strickland



Figure 11. Springhead at Beautyberry, Porcupines, and Hope springs group (See Figure 4), Photo by Crystal Datri



Figure 12. Sheild Stand Seep (See Figure 7), Photo by Colin Strickland



Figure 13. Screech Owl Seep (See Figure 5), Photo by Crystal Datri



Figure 14. Verdant Terraces a series of spring-fed pools (See Figure 6), Photo by Colin Strickland



Figure 15. Amphipods (Genus: *Stygobromus*) collected from Surprise Amphipool (See Figure 5), Photo by Colin Strickland

Literature cited

City of Austin BCP. Balcones Canyonlands Preserve Land Management Plan. City of Austin BCP, 2007.