

**Travis County FY2012
Jollyville Plateau Salamander (*Eurycea tonkawae*)
Monitoring Report**



Photo: *Jollyville Plateau salamander* Piers Hendrie, Spring 2008

Travis County
Department of Transportation and Natural Resources
Natural Resources and Environmental Quality Division



October 1, 2011 – September 30, 2012

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Background

On May 2, 1996, the City of Austin and Travis County were jointly issued a U.S. Fish and Wildlife Service (USFWS) regional permit referred to as the Balcones Canyonlands Conservation Plan (BCCP). This permit allows “incidental take” of eight locally occurring endangered species in compliance with Section 10(a) 1(b) of the Endangered Species Act (U. S. Fish and Wildlife Service, 1996a). The thirty-year permit covers approximately 561,000 acres in western Travis County, Texas identified in the Habitat Conservation Plan and Final Environmental Impact Statement (HCP) (U. S. Fish and Wildlife Service, 1996b). The permit also covers incidental take of 27 species of concern should any become listed as threatened or endangered during the life of the permit. The plan mitigates the permit holders for capital improvement and infrastructure development and provides landowners and agencies a streamlined alternative process for compliance with the Endangered Species Act.

Under the terms of the permit, the City of Austin and Travis County established the Balcones Canyonlands Preserve (BCP) to set aside and manage a minimum of 30,428 acres of habitat for two endangered bird species, the golden-cheeked warbler (*Setophaga chrysoparia*) and black-capped vireo (*Vireo atricapilla*), and six endangered karst species. The permit holders also agreed to manage twenty-seven species of concern that include populations of two rare plants, Texabama croton (*Croton alabamensis* var. *texensis*) and canyon mock-orange (*Philadelphus ernestii*), and a suite of unique invertebrates located in a total of 62 karst features. In the 16 years since the permit’s inception, 30, 438 acres of habitat are currently being protected.

The Jollyville Plateau salamander (JPS) (*Eurycea tonkawae*) occurs within the BCP and the overall management of Travis County preserve lands benefits the conservation of this species. Although the BCCP 10(a) permit does not cover “take” of this species or require mitigation, the BCCP partners have pledged to protect the species wherever it is located within the BCP. In June 2005, the Save Our Springs Alliance petitioned the USFWS to list the JPS as endangered, and on December 13, 2007, the USFWS announced a 12-month finding that determined listing of the JPS as an endangered species was warranted but precluded (USFWS 2007). On August 22, 2012, the U.S. Fish and Wildlife Service proposed to list four central Texas salamanders, including the JPS, as endangered with designated critical habitat.

The JPS is endemic to springs, spring-dominated surface flows, and stream passages in caves of the Northern Jollyville segment of the Edwards Aquifer in Travis and Williamson

Counties, Texas. The known range of this species is limited to nine watersheds that are recharged by infiltration of rainwater through sinkholes and karst features found throughout the Jollyville Plateau. In Travis County, most detections of the JPS are found within the Bull Creek and Cypress Creek watersheds. The City of Austin, Travis County, and other cooperating agencies have established 13 long-term JPS population monitoring sites throughout Travis County. Most of the monitoring sites are located within the BCP.

For the JPS, spring pools, spring runs, and riffles dominated by spring flows provide the ideal surface habitat. They are also found in stream passages in caves. Typically, JPS are found under loose rock substrates that are free of sediment, and they may also be found in leaf litter and aquatic plants. Because the JPS is aquatic throughout its life, it depends on the quality and quantity of groundwater for its survival. The JPS is typically found in close proximity to spring openings where environmental conditions are most stable. It requires clean, clear, flowing water that has a narrow temperature range (average 20-21°C) and is mostly neutral (pH about 7). Carbon dioxide makes up about 1 to 2% of the total dissolved gases in groundwater where JPS are detected. Carbon dioxide provides the slightly acidic to neutral pH conditions and dissipates quickly once the groundwater surfaces. Stream flow and dissolved oxygen (avg. 4-8 mg/L) are critical for development of the eggs and exchange of gases across the gills and skin.

JPS are about 15 mm total length at hatching, and reach reproductive maturity around 45-50 mm total length within six months to a year. Their diet consists of small invertebrates, including chironomids, ostracods, copepods, mayflies, and snails. The diet is likely more restricted within the aquifer, where stygobitic amphipods and isopods are commonly found. Predators of JPS include carnivorous fish (including sunfish), crayfish, other large invertebrates such as dragonfly nymphs and giant waterbugs, and possibly small watersnakes.

Survey Sites & Locality Descriptions

Travis County Natural Resources staff survey seven JPS locations, four of which are on Travis County-managed BCP properties, and three sites which are on properties adjacent to BCP tracts (Figure 1). Four of the survey sites, McDonald Spring, two springs in SAS

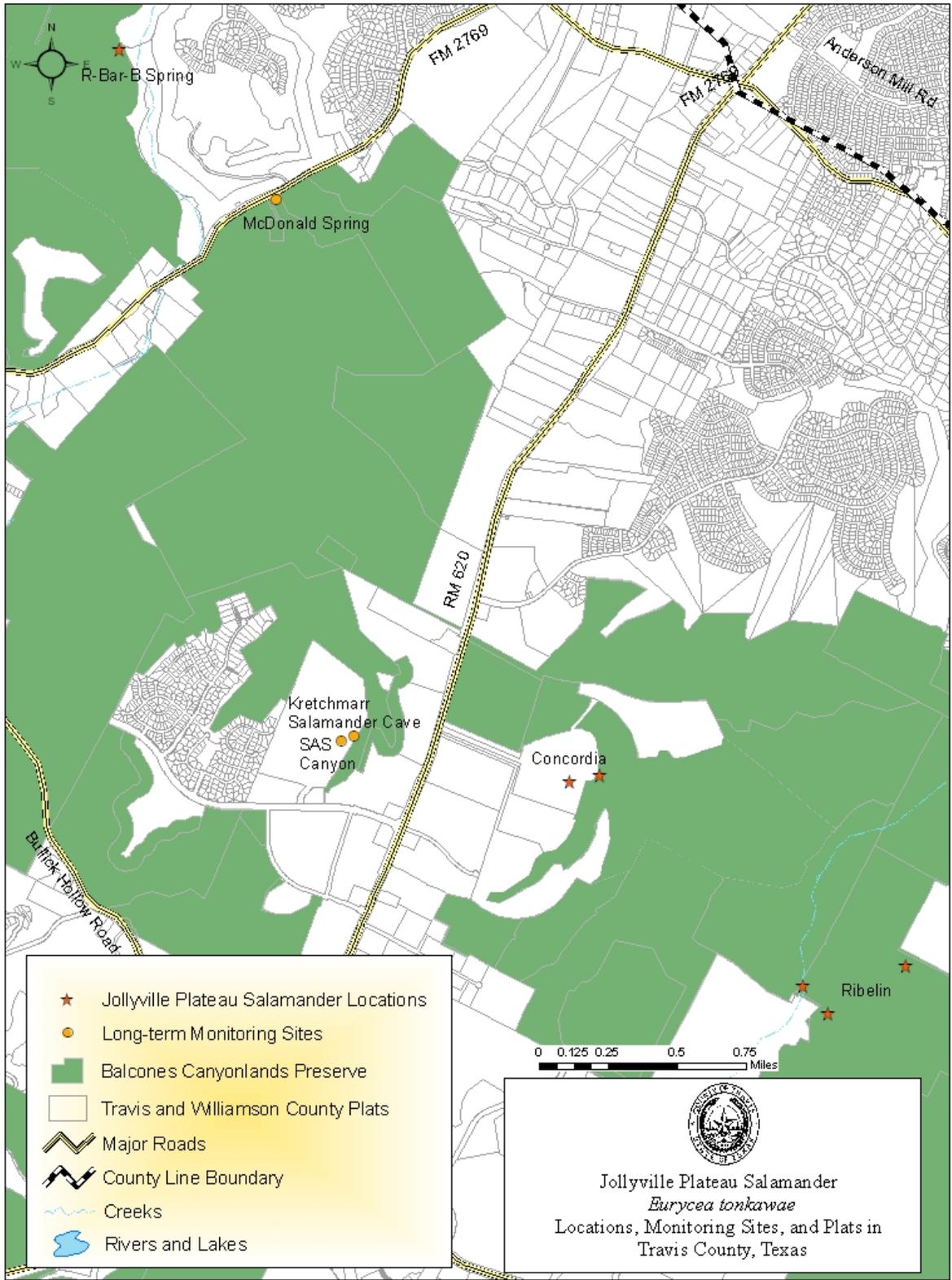


Figure 1. Travis County Balcones Canyonlands Preserve Jollyville Plateau salamander (*Eurycea tonkawae*) locations, monitoring sites, and plat boundaries in northwest Travis County.

Canyon, and Krestchmarr Salamander Cave have been surveyed quarterly since 2006. The other three sites are generally surveyed annually.

The McDonald Spring site (also sometimes referred to as McDonald Well) is a spring situated on Travis County's 1,881-acre Jollyville Unit which is located 13 miles northwest of downtown Austin near FM 2769 (Figure 1). The McDonald Spring site is positioned on an unnamed tributary draining into Cypress Creek on the Bunten tract of the Jollyville Unit.

The SAS Canyon Spring and Kretschmarr Salamander Cave Spring sites, within the Cypress Creek Watershed, are located approximately 1 mile due north of the intersections of Highway 620 and FM 2222 (Figure 1). Both of these sites are adjacent to Travis County-managed BCP tracts on land privately owned by the SAS Institute Inc. The canyon survey area is divided into an upper and lower pool area. The upper pool is near a spring feature within the boundaries of an intermittent stream that connects the two pool areas during periods of significant rainfall. The lower pools are fed by a spring below a drainage coming from the west. Kretschmarr Salamander Cave is located in the general area of the lower pools. Due to an informal agreement between Travis County and SAS Institute Inc., County staff are able to access the cave and long-term survey site on a quarterly basis to perform surveys for JPS.

The 258-acre New Life tract, acquired by Travis County in FY10, is located off FM 2769 approximately 1.5 miles south of the intersection of Anderson Mill Road and FM 2769 (Figure 1). It is situated within the Cypress Creek Watershed. R-Bar-B Ranch spring is located near the eastern boundary of the New Life tract. This spring discharges 10 to 20 feet below the top of Glen Rose formation and forms the headwaters of Cypress Creek. According to the previous owner, the R-Bar-B Ranch spring was merely a seep before excavation of the spring head with a backhoe in 1973 (Hauwert 1997).

The Ribelin/Sam Hamilton Memorial East tracts are situated within the Bull Creek watershed approximately 2.5 miles ENE from the intersection of FM 2222 and FM 620 (Figure 1). In 2005, JPS were located at three sites in a tributary on the Ribelin tract that drains westerly into Bull Creek, as well as in Bull Creek itself. The City of Austin Watershed Protection Department has monitored these sites since 2007 (See Appendix P1).

JPS were located on the Concordia tract in the summer of 2008. Eight springs were confirmed, and two of the springs had JPS present. Of the two springs with JPS present, one is located on Travis County-managed preserve land and the other is located on Concordia University property that is not part of the preserve. The Concordia tract is 0.6 miles from the

Concordia University Drive intersection with FM 620 (Figure 1). The Concordia JPS sites were surveyed during Fall 2011, but no JPS were detected. Spring X and Y were searched during FY12 quarterly water quality monitoring, but no JPS were detected.

Methods

The surface count methodology used to survey JPS is described in Davis et al. (2001). Travis County staff and volunteers, with occasional assistance from City of Austin staff, surveyed the SAS Canyon Springs, Kretschmarr Salamander Cave Spring, and McDonald Spring long-term monitoring sites on a quarterly basis if weather, water flow and quantity, and staffing allowed. This report reflects surveys completed during FY12.

FY12 Jollyville Plateau Salamander Surveys

SAS Canyon Spring

The upper spring pool and lower spring run in SAS Canyon Spring were surveyed for JPS on December 21, 2011 and April 18, and August 9, 2012.

December 21, 2011:

Eight JPS were observed at the two springs in SAS Canyon. Five adults and two large juveniles were observed in the upper spring. One adult was located in the lower spring run. On the survey date, dissolved oxygen at lower spring was 2.9 mg/L. Water quality was not measured at the upper spring.

April 8, 2012:

Ten JPS were detected at the two springs, seven of which were observed in the upper spring. Like the December survey, five adults and two large juveniles were observed in the upper spring. Two small juveniles and one adult were observed in the lower spring run. On April 3, 2012, dissolved oxygen at the lower spring was 2.6 mg/L. Water quality was not measured at the upper spring.

August 9, 2012:

One large juvenile was found at the upper spring and no JPS were detected in the lower spring run. Travis County began monthly water quality at the upper spring in June 2012. On the survey date the dissolved oxygen at the upper spring was 3.5 mg/L (dropping from 4.5 and 4.0 mg/L in June and July, respectively). In comparison, the dissolved oxygen at the lower spring on the survey date was 0.4 mg/L (down from 1.55 mg/L in June).

Table 1. SAS Canyon Spring Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for December 21, 2011, April 18 and August 9, 2012 on Travis County Balcones Canyonlands Preserve.

FY11	12/21/2011	4/18/2012	8/9/2012	4 th Quarter	Total by size class
Small juvenile <1inch	0	2	0	Survey Results in FY13 Report	2
Large juvenile 1 to 2 inches	2	2	1	Survey Results in FY13 Report	5
Adult >2 inches	6	6	0	Survey Results in FY13 Report	12
Total by date	8	10	1		19

Kretschmarr Salamander Cave Spring

Staff was not able to survey the cave for JPS during FY12 because it was flooded to the cave gate. The cave has flooded in the past when roots and debris blocked the natural drain in the cave floor.

McDonald Spring

McDonald Spring was surveyed three times during FY12 on December 12, 2011, February 23 and March 6, 2012 (Table 3). Surveys were scheduled around periods of flow and staff availability. In FY12, McDonald Spring flowed from December 8, 2011 to late May 2012 and again briefly from September 28 to early October 2012.

December 12, 2011:

Sixty-eight individuals were observed during the survey at McDonald Spring in Fall 2011. Most of the individuals observed were adult (forty-eight individuals). Eighteen large juvenile and two small juveniles were observed during this survey. Water quality was monitored on December 8, 2011, when the spring started flowing again after recent rains. Dissolved oxygen was 5.9 mg/L in the spring run. Nitrate-nitrogen, which was approximately 1.0 mg/L from January to March when the spring last flowed, had increased to approximately 3.0 mg/L.

February 23, 2012:

One hundred seven individuals were observed during the survey in February. The one hundred seven individuals observed included thirty-five small juveniles, forty-three large juveniles, and twenty-nine adults. Water quality was monitored on February 14, 2012. Dissolved oxygen was 5.4 mg/L. Nitrate-nitrogen had dropped to 1.0 mg/L.

March 6, 2012

Seventy-seven JPS were detected in the late winter survey. Most individuals were large juveniles (forty-five), with twenty-one adults and eleven small juveniles. Dissolved oxygen on the survey date was 5.0 mg/L (dropping from 5.4 in the previous two months). Nitrate-nitrogen was approximately 2.0 mg/L.

Table 2. McDonald Spring Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for December 12, 2011, February 23 and March 6, 2012 on Travis County Balcones Canyonlands Preserve.

FY11	12/12/2011	2/23/2012	3/6/2012	Fourth Quarter	Total by size class
Small juvenile <1inch	2	35	11	Survey Results in FY13 Report	48
Large juvenile 1 to 2 inches	18	43	45	Survey Results in FY13 Report	106
Adult >2 inches	48	29	21	Survey Results in FY13 Report	98
Total by date	68	107	77		252

R-Bar-B Ranch Spring

R-Bar-B Ranch Spring was surveyed two times during FY12 on October 11, 2011 and August 16, 2012 (Table 4).

October 11, 2011:

Twenty-one individuals were observed during the survey at R-Bar-B Ranch Spring in October. A majority of the twenty-one individuals observed were large juveniles (thirteen). Five adults and three small juveniles were also found.

August 16, 2012:

Seventeen JPS were detected during the summer survey at R-Bar-B Ranch Spring. A majority were large juveniles (twelve), with four adults and one small juvenile also detected.

Table 3. R-Bar-B Spring Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for October 11, 2011 and August 16, 2012 on Travis County Balcones Canyonlands Preserve.

FY11	10/11/2011	8/16/2012	Total by size class
Small juvenile <1inch	3	1	4
Large juvenile 1 to 2 inches	13	12	25
Adult >2 inches	5	4	9
Total by date	21	17	38

Scientific Research Permits

In FY12, three scientists from the City of Austin Watershed Protection Department conducted research related to JPS on TC-managed BCP lands. Travis County Natural Resources issued three Scientific Research Permits (SRP) for this research: #18-2011, #20-2011, and #22-2011.

SRP#18-2011 was issued to David Johns, Senior Environmental Scientist with the City, to conduct dye tracing in the vicinity of a proposed tunnel access shaft in the Four Points area and water transmission tunnel traversing the BCP Sam Hamilton Memorial Reserve and the Bull Creek Preserve. The purpose of this project is to determine the direction of groundwater movement, approximate flow velocities, and to determine which springs are in the flow path (See Appendix P11).

SRP #20-2011 was issued to Nathan Bendik, an Environmental Scientist with the City, for a Mark-Recapture study of JPS. The study objectives are to collect information about the life history and population dynamics of JPS. This information includes individual growth rates, population size trends, survival, and temporary emigration estimates. This information will be used to better understand the ecology of the species and how this species responds to environmental fluctuations (See Appendix P1).

SRP #22-2011 was issued to Thais Perkins, Project Coordinator for the Jollyville Transmission Main (JVTM) and Water Treatment Plant 4 (WTP4). Monitoring is proposed for the Bull Creek watershed to determine effects, if any, of shaft construction and tunneling associated with the construction of the JVTM and WTP4. One monitoring site, called Ribelin Spring 2, is located on Travis County's Sam Hamilton Memorial East tract. Monitoring at Ribelin Spring 2 includes collecting water quality samples and flow measurements (See Appendix P13).

Threats

The BCP is affected by a number of outside threats such as urban development, water and air pollution, increased water consumption, and non-native, invasive species. JPS populations on Travis County properties may be impacted by water quality degradation and alteration of the natural flow regime caused by increased development and impervious cover within the adjacent watersheds. The increased water runoff can damage stream habitats, increase

nutrient and pollution loads, and decrease overall species diversity in these aquatic systems (Bowles et al. 2006). Areas that drain into SAS Canyon to the east and south of the SAS Canyon sites are being commercially developed, and the area north of the McDonald Spring site has been developed rapidly since the inception of the BCP. The latter development area drains into a creek downstream of the McDonald Spring site, but the subsurface impacts to the source of the spring flow is unknown.

The tributaries for both McDonald Spring and SAS Canyon drain south-to-north. For McDonald Spring, a majority of the drainage occurs within the BCP, although it originates on private property. The head of SAS Canyon begins south of Wilson Parke Avenue with the canyon spring site located north of this road. This drainage may experience more runoff and pollutants due to proximity to development. Unfortunately, there is a paucity of data available about flowpaths of water in the northern segment of the Edwards Aquifer. Implementing research projects that address this issue will help with the conservation of JPS as well as assist in water protection measures.

Urbanization causes degradation of water quality and alteration of the natural hydrologic regime. The City of Austin's population has grown 192% from 1970 to 2007 (COA 2007). Bowles *et al.* (2006) found lower JPS density in developed tributaries compared to springs in undeveloped watersheds. Developed tributaries had higher concentrations of chloride, magnesium, nitrate-nitrogen, potassium, sodium, and sulfate (Bowles *et al.* 2006). Four of nine JPS sites monitored by the City of Austin from 1996 to 2007 showed statistically significant declines in salamander abundance over ten years (O'Donnell et al. 2006).

Another threat that may affect the JPS is drilling and tunneling associated with the construction of the City of Austin's Water Treatment Plant No. 4 (WTP4), vertical shafts, and transmission. Drilling and tunneling may disrupt springs and underground flow paths important for the salamander's survival. WTP4's large intake and transmission tunnels pass through and under several known localities for the JPS. The Jollyville Transmission Main (which is being constructed now) passes directly beneath Bull Creek headwater springs, which are important habitat for the JPS. The Forest Ridge Transmission Main in this same area has been put on hold and is not part of the current plans. In addition, vertical shafts drilled for water delivery and construction are ten to forty feet in diameter and pass through the Edwards Aquifer and underlying Glen rose formations.

On August 22, 2012, the U.S. Fish and Wildlife Service proposed to list four central Texas salamanders, including the JPS, as endangered with designated critical habitat. Proposed

critical habitat (4,460 acres) for the JPS is located in both Travis and Williamson Counties. The basis for the proposed endangered species listing is destruction, modification, or curtailment of habitat or range and inadequacy of regulatory mechanisms. The primary threat is degradation of water quality and alteration of the natural flow regime (USFWS 2012). In Travis County there are eighty-seven JPS localities (springs or wet caves) within five watersheds. Twenty-seven JPS critical habitat units are located within Travis County (approximately 2,600 acres). Of these units, which lie either entirely or partially within the county, there are four critical habitat areas that lie entirely within the boundaries of the BCP. The BCP offers significant protection to six units, two units with 60 to 80% and four units with 40 to 60% of their critical habitat protected within the preserve boundaries. Five critical habitat units are less protected by the preserve, including one unit with approximately 30% of its critical habitat within the preserve boundaries and four units with less than 20% of the total critical habitat area within the BCP. Twelve units are not protected by the BCP at all.

Future Conservation Efforts

To address the conservation of the JPS, Travis County will continue manage and acquire land to protect endangered species, which will benefit this species since the preserve is located within known JPS watersheds. All springs within Travis County BCP tracts will be protected and if found to host JPS, will be managed to protect this species. Travis County will also collaborate in research efforts to elucidate many of the unknowns in regard to JPS life history, habitat preferences, potential threats, and the mechanics of the northern segment of the Edwards Aquifer. Also, Travis County will continue to contribute long-term monitoring and water quality data by performing quarterly JPS surveys at McDonald Spring, SAS Canyon, and other BCP sites where appropriate. Staff will explore other preserve springs, creeks, and tributaries for populations of JPS and document any discoveries in annual reports submitted to USFWS. After discovery of additional populations, staff will return on a regular basis to verify JPS presence at these sites.

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