

**Travis County FY2011  
Jollyville Plateau Salamander (*Eurycea tonkawae*)  
Monitoring Report**



(c) 2008 Piers Hendrie

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

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



October 1, 2010 – September 30, 2011

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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 15 years since the permit’s inception, 30,171 acres (99% of the minimum requirement) of habitat are protected as of FY11.

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). Due to a backlog of endangered and threatened species on the candidate list, the JPS will remain a candidate until higher priority candidate species listings are addressed.

The Jollyville Plateau salamander 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 remains 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 nine JPS locations, six of which are on Travis County-managed BCP properties, and three sites which are on properties adjacent to BCP tracts (Figure 1). Three of the survey sites, McDonald Spring, SAS Canyon, and Kretschmarr Salamander Cave have been surveyed quarterly since 2006. The other six sites are generally surveyed annually

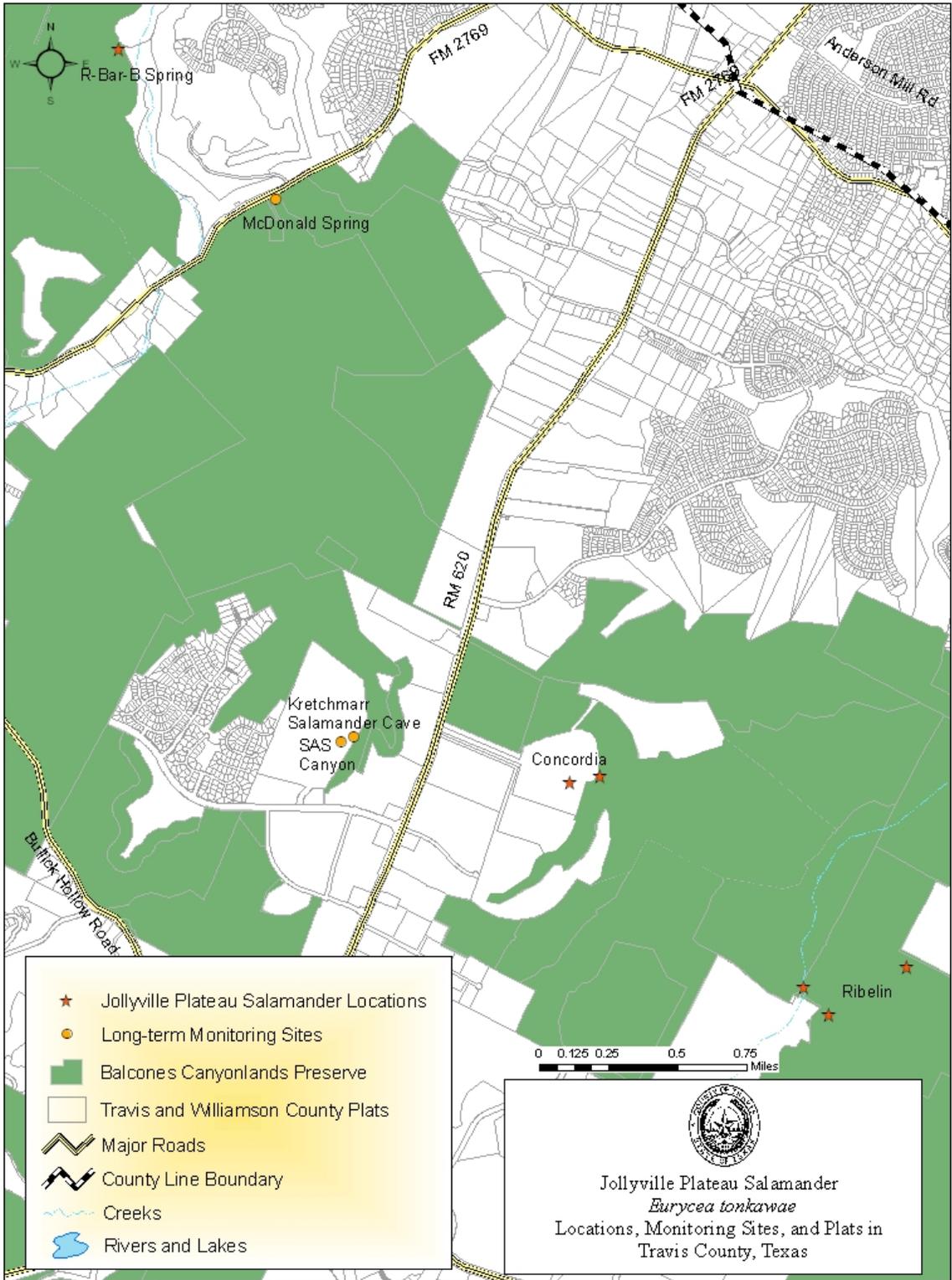


Figure 1. Travis County Balcones Canyonlands Preserve Jollyville Plateau salamander (*Eurycea tonkawae*) locations, monitoring sites, and plat boundaries in NW Travis County.

The McDonald Spring site (also sometimes referred to as McDonald Well) is a spring situated on Travis County's 1,875-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 a management 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 260-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 319-acre Ribelin tract is 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 Ribelin sites were not surveyed by Travis County staff in FY11. City of Austin Environmental Scientist, Nathan Bendik, usually surveys on the Ribelin tract, although he could not survey on Ribelin this year due to lack of stream flow (See Appendix P2 and P3).

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, 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 not surveyed during FY11.

## **Methods**

Please refer to Davis et al. (2001) for information regarding surface count methodology. Travis County staff, with occasional assistance from City of Austin staff, survey the SAS Canyon Spring, Kretschmarr Salamander Cave Spring, and McDonald Spring long-term monitoring sites on a quarterly basis if weather, water flow and quantity, and staffing allow. This report reflects surveys completed during FY11.

## **FY11 Jollyville Plateau Salamander Surveys**

### SAS Canyon Spring

The two sections (upper spring pool and lower spring run) in SAS Canyon Spring were surveyed for JPS on November 9, 2010 and February 15, and May 25, 2011 (Table 1). Other aquatic fauna observed are listed in Table 5. No survey was completed during the Fourth Quarter of FY11 due to lack of flow (spring stopped flowing 8/15/11).

November 9, 2010:

Three large juveniles JPS were observed throughout the survey area. Two JPS were observed in the upper spring pool section and one individual was observed in the riffle/run habitat of the lower spring run section. Staff reported large amounts of leaf litter in the both sections, which may have reduced the ability to detect JPS.

February 15, 2011:

Two individual JPS (one large juvenile and one adult) were observed throughout the survey area. One adult JPS was observed in the upper spring pool and one large juvenile was observed in the riffle of the lower spring run.

May 25, 2011:

Three individuals (two small juveniles and one large juvenile) were observed during this survey. Two small juveniles were observed in the upper spring pool section. Only one JPS (large juvenile) was observed in the lower spring run section.

Table 1. SAS Canyon Spring Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for November 9, 2010 and February 15 and May 25, 2011 on Travis County Balcones Canyonlands Preserve.

<b>FY11</b>	<b>11/9/2010</b>	<b>2/15/2011</b>	<b>5/25/2011</b>	<b>4<sup>th</sup> Quarter</b>	<b>Total by size class</b>
Small juvenile <1inch	0	0	2	No Survey No Spring Flow	2
Large juvenile 1 to 2 inches	3	1	1	No Survey No Spring Flow	5
Adult >2 inches	0	1	0	No Survey No Spring Flow	1
<b>Total by date</b>	<b>3</b>	<b>2</b>	<b>3</b>		<b>8</b>

Kretschmarr Salamander Cave Spring

Staff was not able to survey the cave was for JPS during FY11 because it was flooded to the cave gate. The cave has flooded in the past when roots and debris blocked the drain in the cave floor.

McDonald Spring

McDonald Spring was surveyed two times during FY11 on November 10, 2010 and February 23, 2011 (Table 2). No surveys were completed after the Second Quarter of FY11 due to lack of flow (surface spring flow ceased after 3/14/11). Other aquatic biota observed during surveys given in Table 5.

November 10, 2010:

Forty-one individuals were observed during the survey at McDonald Spring in Fall 2010. Most of the individuals observed were large juvenile (23 individuals). Eleven adults and seven small juveniles were observed during this survey.

February 23, 2011:

One hundred seven individuals were observed during the survey in February. The 107 individuals observed included 35 small juveniles, 43 large juveniles, and 29 adults.

Table 2. McDonald Spring Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for January 21, March 10, and June 3, 2010 on Travis County Balcones Canyonlands Preserve.

<b>FY11</b>	<b>11/10/2010</b>	<b>2/23/2011</b>	<b>Third Quarter</b>	<b>Fourth Quarter</b>	<b>Total by size class</b>
Small juvenile <1inch	7	35	No Survey No Spring Flow	No Survey No Spring Flow	42
Large juvenile 1 to 2 inches	23	43	No Survey No Spring Flow	No Survey No Spring Flow	66
Adult >2 inches	11	29	No Survey No Spring Flow	No Survey No Spring Flow	40
<b>Total by date</b>	<b>41</b>	<b>107</b>			<b>148</b>

R-Bar-B Ranch Spring

R-Bar-B Ranch Spring was surveyed one time during FY11 on June 1, 2011 (Table 3). Aquatic biota observed on this date are listed in Table 4.

May 1, 2011:

Twenty-three individuals were observed during the survey at R-Bar-B Ranch Spring in June. The twenty-three individuals observed included seven small juvenile, five large juveniles, and eleven adults.

Table 3. R-Bar-B Spring Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for June 1, 2011 on Travis County Balcones Canyonlands Preserve.

<b>FY11</b>	<b>6/1/2011</b>
Small juvenile <1inch	7
Large juvenile 1 to 2 inches	5
Adult >2 inches	11
<b>Total</b>	<b>23</b>

Table 4. Other aquatic fauna observed at SAS Canyon, McDonald, and R-Bar-B Springs in FY11.

	<b>SAS Canyon Spring</b>	<b>McDonald Spring</b>	<b>R-Bar-B Spring</b>
Coleoptera		2/23/11	Elmidae, Psephenidae <i>Psephenus</i> sp 5/1/11
Ephemeroptera	11/19/10, 2/15/11, 5/25/11	11/10/10	Caenidae <i>Caenis</i> sp. 5/1/11
Hemiptera	Gerridae 11/19/10, 2/15/11, 5/25/11 Corixidae 5/25/11		Gerridae 5/1/11
Odonata			
Anisoptera	11/19/10, 2/15/11, 5/25/11	2/23/11	Libellulidae <i>Pseudoleon</i> sp. 5/1/11
Zygoptera	11/19/10, 2/15/11, 5/25/11	11/10/10, 2/23/11	Coenagrionidae <i>Argia</i> sp 5/1/11
Trichoptera	11/19/10, 5/25/11	11/10/10	Calamoceratidae <i>Phylloicus</i> sp. 5/1/11
Gastropoda	11/19/10, 2/15/11, 5/25/11	11/10/10, 2/23/11	
Oligochaeta	11/19/10	2/23/11	
Crustacea	Cambaridae <i>Procambarus</i> sp. 11/19/10, 2/15/11, 5/25/11	Cambaridae <i>Procambarus</i> sp. 11/10/10, 2/23/11	Cambaridae <i>Procambarus</i> sp. 5/1/11
Percidae			<i>Etheostoma</i> sp. 5/1/11
Cyprinidae			<i>Compostoma</i> <i>anomalum</i> 5/1/11
Ranidae		11/10/10	5/1/11
Hylidae		11/10/10	5/1/11

## **Scientific Research Permits**

In FY11, three scientists from the City of Austin Watershed Protection Department conducted research related to JPS at the BCP. 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 groundwater movement, approximate flow velocities, and to determine which springs are in the flow path (See Appendix P8).

SRP #20-2011 was issued to Nathan Bendik, an Environmental Scientist with the City of Austin, for a Mark-Recapture study of JPS. The study objectives are to collect information about the life history and population dynamics of JPS. This 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 Appendices P2 and P3).

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; however Perkins was unable to collect data this year because of lack of spring flow.

## **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. Travis County's JPS populations are impacted by increased water runoff due to expanded development and impervious cover. 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 slated for future development, 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 and assist in water protection measures.

Human-induced landscape changes may contribute to the introduction or resurgence of wildlife diseases. The documentation of chytrid fungus, which causes chytridiomycosis within the JPS population, needs to be researched further to assess the impacts it may have on the amphibian community.

### **Future Conservation Efforts**

To address the conservation of the JPS, Travis County will continue to acquire land to reach the minimum goal of 30,428 acres required for the BCP and seek to protect the 62 karst features listed on the permit; this effort will likely benefit this species since the preserve acquisitions are 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.

## Literature Cited

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