Travis County FY2010
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

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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 (*Dendroica 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 13 years since the permit's inception, 28,966 acres (95% of the minimum requirement) 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). 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

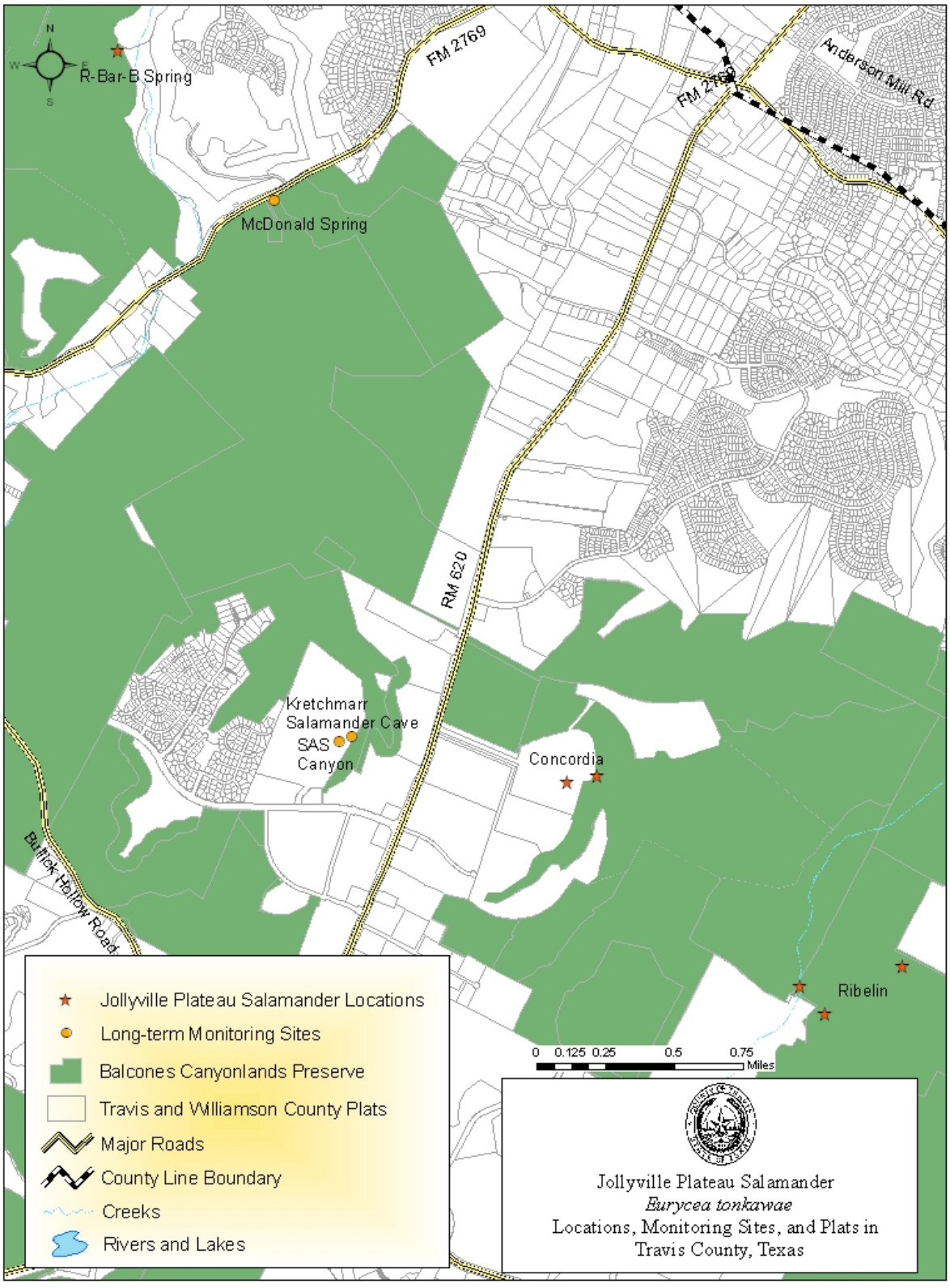

Figure 1. Travis County Balcones Canyonlands Preserve Jollyville Plateau salamander (*Eurycea tonkawae*) locations, monitoring sites, and plat boundaries in northwest Travis County.

Kretschmarr Salamander Cave have been surveyed quarterly since 2006. The other six 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 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 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 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 in FY10.

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 not surveyed during FY10.

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 FY10.

FY10 Jollyville Plateau Salamander Surveys

SAS Canyon Spring

The two sections in SAS Canyon Spring were surveyed on January 12, March 9, and June 2, 2010. Travis County staff did not complete a survey in the fourth quarter of FY10 due to staff limitations (Table 1).

January 12, 2010:

Nine individual JPS (one small juvenile, three large juveniles, and five adults) were observed throughout the survey area. Most of the JPS (one small juvenile, two large juveniles, and four adults) were observed in the upper pool section. Two individuals (1 large juvenile and 1 adult) were observed in the riffle/run habitat of the lower section. Staff reported large amounts of orange algae in the riffle/run habitat, which made it difficult to observe JPS. Only trace amounts of algae were reported at the upper pool, where staff also observed an Odonate.

March 9, 2010:

Twenty-nine individual JPS (four small juvenile, eleven large juveniles, and fourteen adults) were observed throughout the survey area. Most of the JPS observed were located in the upper pool and riffle (four small juvenile, eleven large juveniles, and ten adults). Four individuals were observed in the lower section, with one adult observed in the lower pool habitat and three adults in the riffle/run habitat. Other aquatic biota observed included Gastropoda, Emphemeroptera, Hemiptera (Gerridae), and crayfish (*Procambarus* sp.).

June 2, 2010:

Thirty-five individuals (eleven small juveniles, sixteen large juveniles, and eight adults) were observed during this survey, with 27 of the 35 salamanders observed in the upper pool section (ten small juvenile, eleven large juveniles, and six adults). Eight JPS were observed in the lower section (one small juvenile, five large juveniles, and two adults). Other aquatic biota observed include: Percidae (*Etheostoma* sp.), Odonata (Zygoptera), Coleoptera, Hemiptera (Gerridae), Tipulidae (*Tipula* sp.), and crayfish (*Procambarus* sp.).

Table 1. SAS Canyon Spring Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for January 12, March 9, and June 2, 2010 on Travis County Balcones Canyonlands Preserve.

FY10	1/12/2010	3/9/2010	6/2/2010	4th Quarter	Total by size class
Small juvenile <1inch	1	4	11	NS	16
Large juvenile 1 to 2 inches	3	11	16	NS	30
Adult >2 inches	5	14	8	NS	26
Total by date	**9**	**29**	**35**	**NS**	**72**

NS = No survey completed during the Fourth Quarter of FY10 due to staff limitations

Kretschmarr Salamander Cave Spring

The cave was surveyed on January 12, March 9, and June 2, 2010. Travis County staff did not complete a survey in the fourth quarter of FY10 due to staff limitations (Table 2).

January 12, 2010:

Three adult JPS were observed during the survey. Algae were abundant during this survey (90% cover). Staff noticed that the hole in the cave floor, where water typically exits the cave, was partially blocked. Debris filling the exit hole was removed, where one adult salamander was observed. Other cave biota observed include: two cave myotis bats (*Myotis velifer*) and six cave cricket nymphs (*Ceuthophilus* sp.).

March 9, 2010:

Staff noted seven JPS individuals (five large juveniles and two adults) during the survey. Algae were abundant during this survey (85 to 95% cover). Other cave biota observed include: one cliff chirping frog (*Eleutherodactylus marnockii*), five cave crickets (*Ceuthophilus* sp.), five isopods, one Oligochaeta (Haplotaxidae), two Arachnida (one Pseudouroctanus and two *Cicurina variens*), and over 30 Collembola, including three bristletail springtails.

June 2, 2010:
Two adult JPS were observed during the survey. Other cave fauna observed include: 30-40 adult cave crickets and five nymphs (*Ceuthophilus* sp.), Collembola (springtails), Arachnida (*Cicurina* sp.), millipede (*Cambala* sp.) and a surface centipede.

Table 2. Kretschmarr Salamander Cave Spring Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for January 12, March 9, and June 2, 2010 on Travis County Balcones Canyonlands Preserve.

FY10	1/12/2010	3/9/2010	6/2/2010	4th Quarter	Total by size class
Small juvenile <1inch	0	0	0	NS	0
Large juvenile 1 to 2 inches	0	5	0	NS	5
Adult >2 inches	3	2	2	NS	7
Total by date	**3**	**7**	**2**	**NS**	**12**

NS = No survey completed during the Fourth Quarter of FY10 due to staff limitations.

McDonald Spring

McDonald Spring was surveyed three times during FY10 on January 21, March 10, and June 3, 2010 (Table 3). The first quarter survey was conducted September 18, 2009, so that information was submitted in the FY09 Annual Report.

January 21, 2010:
Eighty-nine individuals were observed during the survey at McDonald Spring in January. Most of the individuals observed were adult (82 individuals) with only seven large juveniles and no small juveniles observed during this survey. Staff observed Ephemeroptera (Heptageniidae), Diptera, and gastropods in the spring run, as well.

March 10, 2010:
One hundred nineteen individuals were observed during the survey in March. The 119 individuals observed included 18 small juveniles, 34 large juveniles, and 67 adults. Abundant algae (90% cover) and leaf litter (80% cover) in the spring run reduced visibility during this survey.

June 3, 2010:
One hundred thirty-four individuals were observed during the survey in June. The 134 individuals included 27 small juveniles, 53 large juveniles, and 54 adults. The algae (5%) and leaf litter (45%) cover during this summer survey was much less abundant than it was during the March survey. Staff also observed the following aquatic biota in the spring run:

Hemiptera (Gerridae), Odonata both Zygoptera and Anisoptera (Libellulidae), Diptera (Tipulidae), Emphemeroptera (Baetidae), Coleoptera (Dytisidae), and Gastropoda (*Physella* sp.).

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

FY10	1st Quarter	1/21/2010	3/10/2010	6/3/2010	Total by size class
Small juvenile <1inch	Survey 9/18/2009	0	18	27	45
Large juvenile 1 to 2 inches	Survey 9/18/2009	7	34	53	94
Adult >2 inches	Survey 9/18/2009	82	67	54	203
Total by date		**89**	**119**	**134**	**342**

R-Bar-B Ranch Spring

R-Bar-B Ranch Spring was surveyed one time during FY10 on June 29, 2010, shortly after the New Life tract was acquired by Travis County for the BCP (Table 4).

June 29, 2010:

Thirteen individuals were observed during the survey at R-Bar-B Ranch Spring in June. The thirteen individuals observed included one small juvenile, five large juveniles, and seven adults. Staff also observed Percidae (*Etheostoma* sp.), Cyprinidae (*Compostoma anomalum*), Odonata (Zygoptera), Coleoptera (Psephenidae), Hemiptera (Gerridae), and crayfish (*Procambarus* sp.).

Table 4. R-Bar-B Spring Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for June 29, 2010 on Travis County Balcones Canyonlands Preserve.

FY10	6/29/2010
Small juvenile <1inch	1
Large juvenile 1 to 2 inches	5
Adult >2 inches	7
Total	**13**

Scientific Research and Photographic Permits

Travis County Natural Resources reissued Scientific Research Permit (SRP) #08-2010 (formerly #06-2009) during FY10. SRP #08-2010 was issued to Nathan Bendik, an Environmental Scientist with the City of Austin, who collaborated with Travis County Natural Resources staff in searching for additional spring locations that have JPS present. Tail clips were taken from a subset of individuals located to further an ongoing population genetic study at the University of Texas at Arlington. Travis County staff coordinated and assisted in spring and JPS searches with Nathan Bendik at the Ivanhoe tract of the BCP in May 2010. No new JPS locations were documented; however 3 springs were digitally recorded with a GPS unit. Searches will continue into FY11 on the remaining Travis County BCP properties.

Two Photographic Permits (PP) were issued in FY10 to capture images of the Jollyville Plateau salamander on film. One filmmaker made a short documentary about the BCP and the Jollyville Plateau salamander at McDonald Spring (PP #01-2010). Two photographers photographed the salamander and its habitat at McDonald Spring for an upcoming book about nature in the Austin area (PP #06-2010).

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 as well as 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, which 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.

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