2009 Report on the Status of the Jollyville Plateau Salamander (*Eurycea tonkawae*) on Travis County's Balcones Canyonlands Preserve



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 an 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. Department of the Interior, Fish and Wildlife Service, 1996ab). 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. Department of the Interior, Fish and Wildlife Service, 1996c). 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 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, 28,513 acres (approximately 94% 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, however the BCCP 10(a) permit does not cover "take" of this species or require mitigation. The BCCP partners pledged to protect the species wherever it is located within preserve land. 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 2007b). 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 watershed. The City of Austin, Travis County, and other cooperating agencies have established thirteen long-term JPS population-monitoring sites throughout Travis County. A number of the monitoring sites are located within the Balcones Canyonlands Preserve.

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. The JPS is found under loose rock substrates that are free of sediment, and they may also be found in leaf litter and aquatic plants. Because 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 the JPS is detected. CO_2 provides the slightly acidic to neutral pH conditions and dissipates quickly once the groundwater surfaces. Flow and dissolved oxygen (avg. 4-8mg/L) are critical for development of the eggs and exchange of gases across the gills and skin. The JPS are about 15 mm total length at hatching, and reach reproductive maturity around 45-50mm total length within 6 months to a year. The JPS feeds on a variety 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 include carnivorous fish (sunfish), crayfish, other large invertebrates such as dragonfly nymphs and giant waterbugs, and possibly small watersnakes.

Survey Sites & Locality Descriptions

The Balcones Canyonlands of central Texas are characterized by eroded and dissected Cretaceous limestone that forms a complex and dynamic system of karst and hydrologic features. This region is home to a number of endemic organisms associated with these unique subterranean and spring habitats, and they often exhibit very limited distributions. The JPS range is restricted to nine watersheds within Travis and Williamson counties. Within Travis County-managed BCP tracts, six JPS locations are known, and two of the sites, McDonald

Spring (formerly known as McDonald Well) and SAS Canyon, have been surveyed quarterly since 2006 (Figure 1).

The McDonald Spring site is a spring situated on Travis County's Jollyville Unit which comprises 1,881 acres (762 ha), and is located 13 miles (21 km) northwest of downtown Austin near FM 2769 (Figure 1). The McDonald Spring site is on an unnamed tributary draining into Cypress Creek on the Bunten tract of the Jollyville Unit. The site was marked by a large concrete structure previously used as a well that impounded natural spring flow running into the adjacent creek. However, in September 2008, the well structure was removed and the spring area was stabilized with native rock.

The SAS Canyon and Kretschmarr Salamander cave springs 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 preserve on privately owned land 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 and continue to drain in a southerly direction into the Grandview Hills tract of the Jollyville Unit. 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., staff is able to access the cave and long-term survey site on a quarterly basis to perform surveys for JPS.

The Ribelin tract is situated within the Bull Creek watershed approximately 2.5 miles (4 km) ENE from the intersection of FM 2222 and RM 620. In 2005, JPS were located in a tributary on Ribelin that drains westerly into Bull Creek as well as in Bull Creek itself. JPS were also 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 and the other is located on Concordia University property. The Concordia tract is 0.58 miles from the Concordia University Drive intersection with RM 620 (Figure 1).

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, Kretschmarr Salamander cave, 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 FY09 (October 1, 2008 to September 30, 2009).

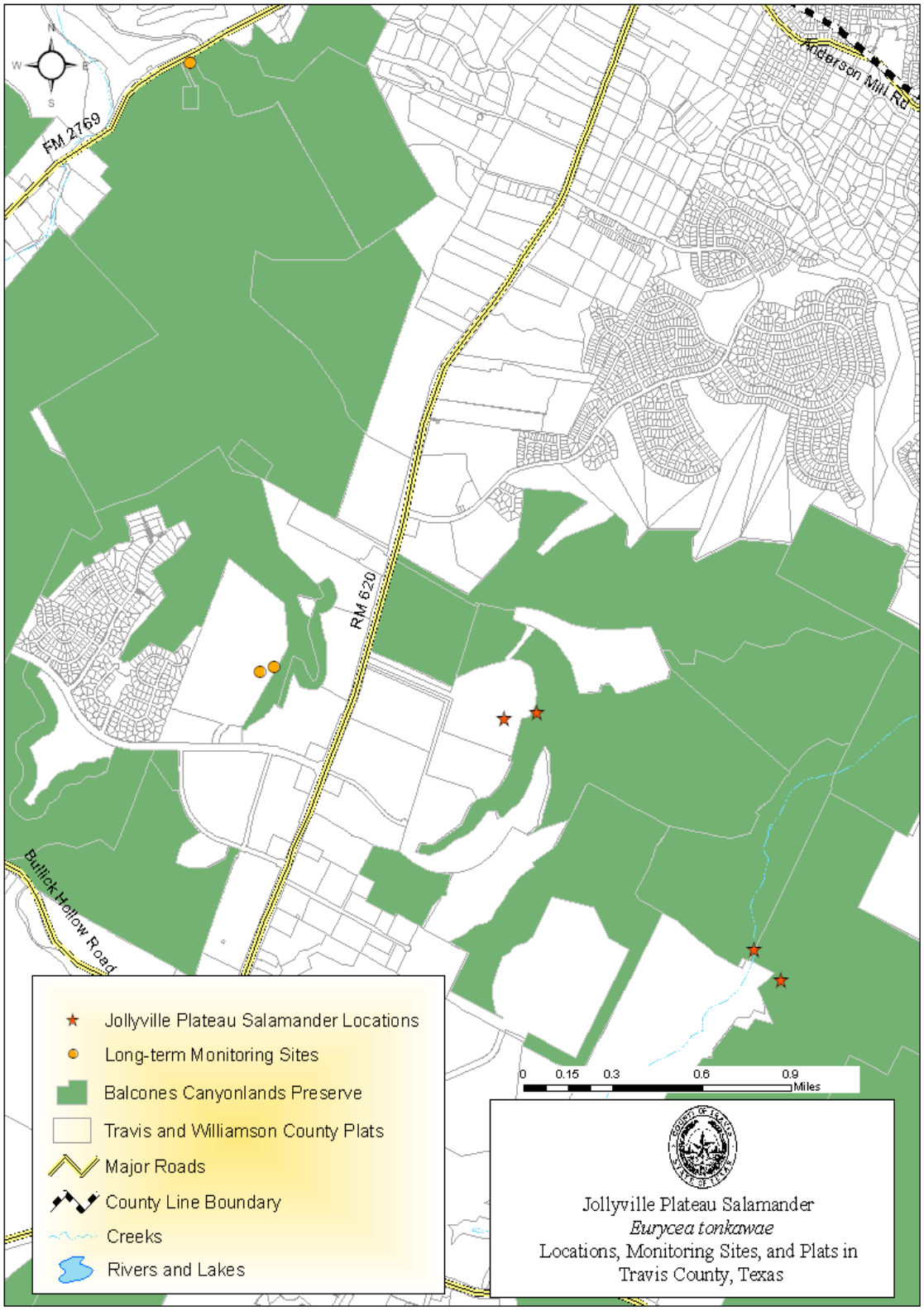

Figure 1. Travis County Balcones Canyonlands Preserve Jollyville Plateau salamander (*Eurycea tonkawae*) locations, monitoring sites, and plat boundaries in northwest Travis County.

FY09 Jollyville Plateau Salamander Surveys

SAS Canyon

The two sections in SAS Canyon were surveyed on November 13, 2008, and March 4 and June 9, 2009. Travis County staff did not complete a survey in the 4th quarter of FY09 due to inclement weather and staff limitations. A number of surveys were scheduled during the 4th quarter but were cancelled due to heavy rainfall on or before the survey date. Staff decided to postpone scheduling any other dates in that quarter due to staff work load and priorities (Table 1).

November 13, 2008:

A lot of leaf cover was present throughout the survey area. When items were moved on the creek bottom, plumes of sediment were created which made surveying difficult, particularly in the pool areas. Also a strong sulfur smell was emitted when the leaves were disturbed. Overall there was minimal flow in the survey sections. Four individuals were observed while surveying SAS canyon - three large juveniles and one adult JPS.

March 4, 2009:

Eleven individual JPS (one small juvenile, five large juveniles, and five adults) were observed throughout the survey area. The largest concentration of JPS was located along the lower section's long riffle (shallow water extending across a streambed and causing broken water) below the two pools. The pool areas of the survey section were nearly impossible to survey due to leaf cover and concentration of suspended sediments once leaves were disturbed.

June 9, 2009:

Nineteen individuals (six small juveniles, eight large juveniles, and five adults) were observed during this survey, and 15 of the 19 salamanders were documented in the upper pool section, which was comprised of 12-ft² area of pooled water and wetted area. No fish or crayfish were noted except in the 2 pools in the lower section of the survey area.

Table 1. SAS Canyon Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for November 13, 2008, March 4 and June 9, 2009 on Travis County Balcones Canyonlands Preserve.

SAS Canyon

FY09	11/13/2008	3/04/2009	6/09/2009	4th Quarter	Total by size class
Small juvenile <1inch	0	1	6	NS	7
Large juvenile 1 to 2 inches	3	5	8	NS	16
Adult >2 inches	1	5	5	NS	11
Total by date	**4**	**11**	**19**	**NS**	**34**

NS = No survey completed during the 4th Quarter of FY09 due to staff limitations and inclement weather

Kretschmarr Salamander Cave

The cave was surveyed on November 13, 2008 and March 4 and June 9, 2009 (Table 2). It was not surveyed in the 4th quarter for the same aforementioned reasons listed for SAS Canyon.

November 13, 2008:

This was the first survey in the cave since a hole in the floor of the cave was unclogged to alleviate the large amount of water pooling in the cave (see page 8 of the 2008 Travis County JPS report for more information about this event (Travis County 2008)). Surveyors noted that the water was quickly entering and then exiting the cave through the hole before reaching the eastern wall of the cave. The amount of cover available had decreased, and only one adult salamander was observed.

March 4, 2009:

Surveyors noted three adult JPS during the survey, and they added more rocks to the flowing water through the cave to create more cover habitat.

June 9, 2009:

Four JPS were observed during the survey (three large juveniles and one adult), and one of the individuals was located inside the entrance to the hole in the floor of the cave. Surveyors noted the presence of a white gelatinous fungus in a portion of the survey area.

Table 2. Kretschmarr Salamander Cave Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for November 13, 2008, March 4, and June 9, 2009 on Travis County Balcones Canyonlands Preserve.

SAS Canyon

FY09	11/13/2008	3/04/2009	6/09/2009	4th Quarter	Total by size class
Small juvenile <1inch	0	0	0	NS	0
Large juvenile 1 to 2 inches	0	0	3	NS	3
Adult >2 inches	1	3	1	NS	5
Total by date	**1**	**3**	**4**	**NS**	**8**

NS = No survey completed during the 4th Quarter of FY09 due to staff limitations and inclement weather

McDonald Spring

McDonald Spring was surveyed twice during FY09 on March 19 and September 18, 2009. Travis County staff were unable to survey any other times due to the drought conditions in Central Texas. McDonald Spring is more ephemeral in nature than the springs found in SAS Canyon and usually needs a significant rain event to recharge. Due to the lack of rain, the survey in March was the first time the area was assessed since the restoration effort was completed in September 2008 (Travis County 2008). The restoration of the spring was a success; water flowed freely from the limestone basin and the two surveys completed in FY09 documented some of the highest abundance numbers since the survey area was established (Table 3).

March 19, 2009:

The survey at McDonald Spring in March was impromptu in nature since the drought in Central Texas made it impossible to survey this area successfully since February of 2008. A significant rainfall event occurred the week prior and created substantial water quantity and flow in the survey area. Due to the spontaneous nature of this survey, staff were unable to complete the 85 foot long survey area. Approximately a 10-foot section in front of the spring was not covered. Despite the incomplete survey, 186 individual JPS were observed (2 small juveniles, 112 large juveniles, and 72 adults).

September 18, 2009:

Two hundred twenty-five individuals were observed during the survey in September and this is the second highest total number observed in the survey area. On May 19, 2006, 236 individuals were observed, which to date is the most seen during a survey at McDonald Spring. The 225 individuals observed included 22 small juveniles, 104 large juveniles, and 99 adults. One of the adults observed was an albino; the first time an albino was observed at

McDonald Spring was on October 30, 2006, which was collected by Lisa O'Donnell and placed in the captive breeding program at the City of Austin.

Table 3. McDonald Spring Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for March 19 and September 18, 2009 on Travis County Balcones Canyonlands Preserve.

SAS Canyon

FY09	1st Quarter	3/19/2009	3rd Quarter	9/18/2009	Total by size class
Small juvenile <1inch	dry	2	dry	22	24
Large juvenile 1 to 2 inches	dry	112	dry	104	216
Adult >2 inches	dry	72	dry	99	171
Total by date	**0**	**186***	**0**	**225**	**411**

*A portion of the survey area was not completed due to time conflicts

Scientific Research Permits

Travis County Natural Resources reissued Scientific Research Permit (SRP) #06-2009 (formerly #03-2008) during FY09. SRP #06-2009 was issued to Nathan Bendik, an Environmental Scientist with the City of Austin, who will collaborate with Travis County Natural Resources staff in searching for additional spring locations that have JPS present. Tail clips will be 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 Nate Bendik in September 2009. No new JPS locations were documented, however 5 springs were digitally recorded with a GPS unit. Searches will continue into FY10 on the remaining Travis County BCP properties.

Threats

The Balcones Canyonlands Preserve protects habitat for eight federally endangered species, but also consequentially provides protection for a number of plants, animals, and invertebrates, including the Jollyville Plateau salamander. The goal of the BCP to set aside a minimum of 30,428 acres in western Travis County will contribute to the overall conservation of Central Texas species, however this preserve system is not unaffected by outside threats like 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 will 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 BCP boundaries, however 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, so 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 JPS 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 regards to JPS life history, habitat preferences, and 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 preserve 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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