2008 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

December 2008

TABLE OF CONTENTS

Background 4

Survey Site and Locality Descriptions.....4

2008 JPS Surveys and Related Activities 7

Scientific Research and Photographic Permits 16

Threats.....16

Future Conservation Efforts.....17

Literature Cited 19

TABLES AND FIGURES

Figure 1. Travis County Balcones Canyonlands Preserve Jollyville Plateau salamander (Eurycea tonkawae) locations, monitoring sites, and plat boundaries in northwest Travis County. 5

Table 1. SAS Canyon Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for November 20, 2007, February 26, May 29, and August 28, 2008 on Travis County Balcones Canyonlands Preserve. 7

Photos 1 through 4. Illustrating Kretschmarr Salamander Cave pooling event.....10

Table 2. Kretschmarr Salamander Cave Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for November 21, 2007, February 26, May 29, and August 28, 2008 on Travis County Balcones Canyonlands Preserve. 11

Table 3. McDonald Well Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for November 13, 2007, February 28, June 4, and August 26, 2008 on Travis County Balcones Canyonlands Preserve. 12

Figure 2. McDonald Well on the Bunten tract of Travis County Balcones Canyonlands Preserve before restoration activities, July 2008. Note the enlarged hole at the base of the concrete cap caused by digging animals attempting to access spring water. 14

Figures 3 and 4. Design plans drafted by Environmental Survey Consulting for the restoration of McDonald Well on Travis County Balcones Canyonlands Preserve, September 2008.....14

Figure 5. Environmental Survey Consulting employees removing the well cap from McDonald Well on Travis County Balcones Canyonlands Preserve. 15

Figure 6. McDonald Well structure removed except for the PVC pipe (approx. 6 ½ feet tall) used to pump spring water out of the well and upslope to past residences on the Bunten tract of the Travis County Balcones Canyonlands Preserve. 15

Figure 7. McDonald Well after one day of restoration activity. The spring was not flowing except for a small puddle of water at the bottom of the structure. No Jollyville Plateau salamanders (*Eurycea tonkawae*) were observed during the restoration process. 15

Figures 8 and 9. The completed restoration structure formerly known as McDonald Well. The design allows spring water to connect with the creek while protecting the structure from possible erosion impacts during flood events. Completed on September 15, 2008 by Environmental Survey Consulting. 17

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 needs 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. The BCCP does not require protections for the Jollyville Plateau salamander (JPS) (*Eurycea tonkawae*), however the overall management of Travis County preserve lands benefits the conservation of this species. In the 12 years since the permit's inception, 28,366 acres (approximately 93% of the minimum requirement) of habitat are currently being protected.

Survey Site & Locality Descriptions

The Balcones Canyonlands of central Texas are characterized by eroded and dissected Cretaceous limestones that form 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 six stream drainages within Travis and Williamson counties. Within Travis County-managed BCP tracts, six JPS locations are known, and two of the sites, McDonald Well and SAS Canyon, have been surveyed quarterly since 2006 (Figure 1).

The McDonald Well 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 MacDonald Well 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 (see page 12 for further discussion).

The SAS Canyon 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). 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 and is privately owned by the SAS Institute Inc. Due to a management agreement between Travis County and SAS Institute Inc., staff is able to access the cave 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. The Concordia tract is 0.58 miles from the Concordia University Drive intersection with RM 620 (Figure 1).

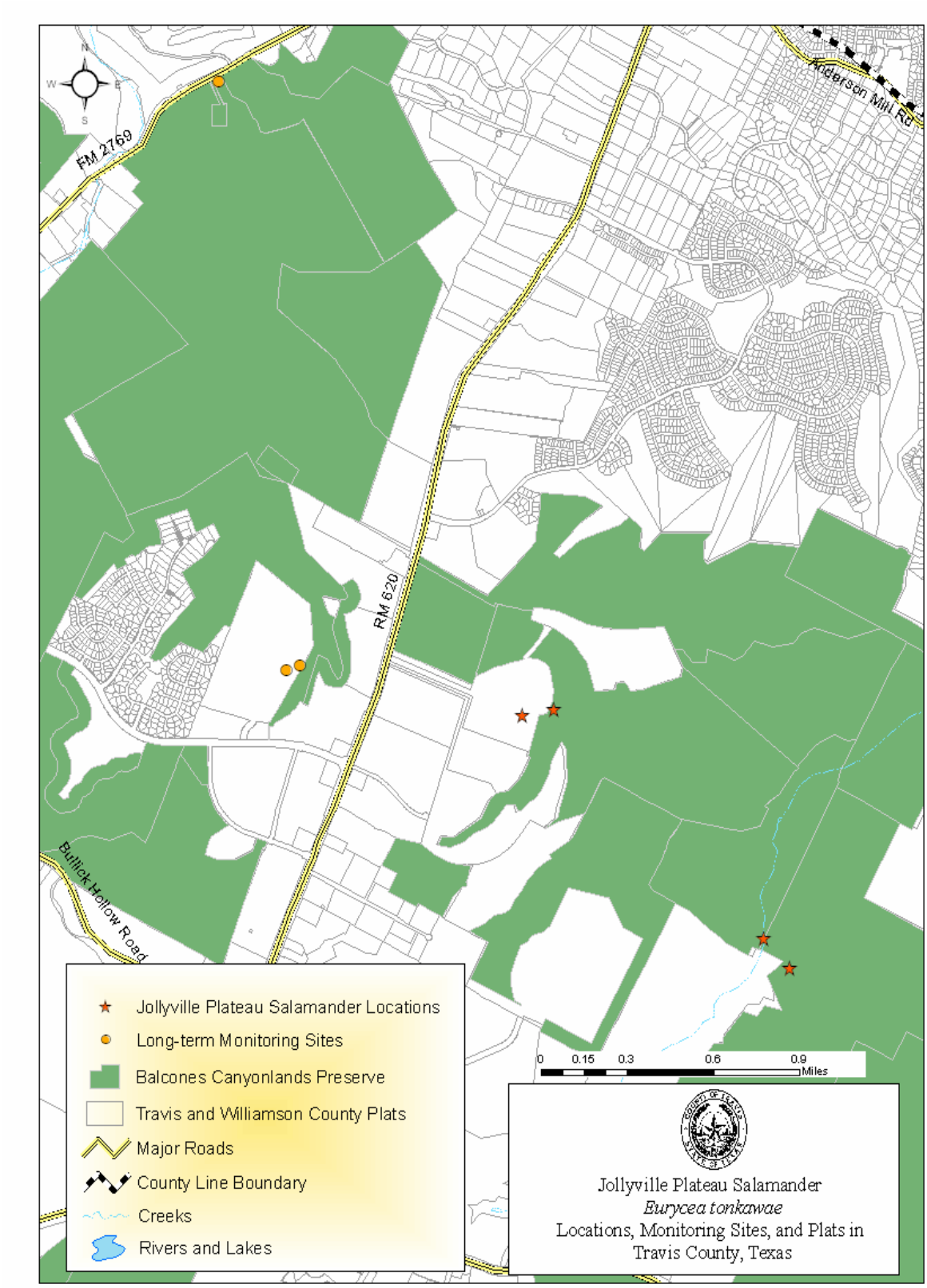


Figure 1. Travis County Balcones Canyonlands Preserve Jollyville Plateau salamander (Eurycea tonkawae) locations, monitoring sites, and plat boundaries in northwest Travis County.

2008 JPS Surveys and Related Activities

Along with the City of Austin, Travis County presented a poster titled "Jollyville Plateau Salamander (*Eurycea tonkawae*): Central Texas's Proverbial Canary in a Coalmine" at the Texas Herpetological Society Symposium on Texas Salamanders from November 3-4, 2007. The poster summarized to date known information on life history, habitat, range, and threats of the JPS.

SAS Canyon

Surveyed on November 20, 2007, February 26, 2008, May 29, 2008, and August 28, 2008 (Table 1).

November 20, 2007:

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. Fourteen individuals were observed while surveying SAS canyon; two large juvenile and 12 adult JPS. A large number of crayfish were also observed throughout the survey area.

February 26, 2008:

Two small juvenile, five large juvenile, and seven adult JPS 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.

May 20, 2008:

Sylvia Pope from the City of Austin's Watershed Protection and Development Review Department collected water samples from SAS Canyon springs to test for semi-volatiles, total suspended solids, *E coli*, Ammonia, total Phosporus, total Organic Carbon, and 17 other compounds. On June 6, 2008, the results from LCRA (Lower Colorado River Authority) Environmental Laboratory Services showed that none of the semi-volatile compounds were detected and all of the other parameters were within normal ranges.

May 29, 2008:

Leaf litter amount and sediment loads were quite heavy during the survey, making surveying difficult. However, twelve individuals were located (5, small juvenile; 4, large juvenile; 3,

adult). Flow was diminished in the upper pool of the survey area while all survey areas in the lower section were connected.

August 28, 2008:
Twenty-two individuals were observed with 15 JPS found in the upper pool of the survey area. Most of those JPS were adults and appeared emaciated. The upper pool's water capacity was noticeably diminished from the survey in May.

Table 1. SAS Canyon Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for November 20, 2007, February 26, May 29, and August 28, 2008 on Travis County Balcones Canyonlands Preserve.

SAS Canyon

FY2008	11/20/2007	2/26/2008	5/29/2008	8/28/2008	Total by size class
Small juvenile <1inch	0	2	5	1	8
Large juvenile 1 to 2 inches	2	5	4	8	19
Adult >2 inches	12	7	3	13	35
Total by date	**14**	**14**	**12**	**22**	**62**

Kretschmarr Salamander Cave

Surveyed on November 21, 2007, February 26, 2008, May 29, 2008, and August 28, 2008 (Table 2).

November 21, 2007:
Since the last survey in August 2007, the surveyor noted a decrease in water quantity and length in the survey area, but the water flow was strong. Three large juveniles were observed during the survey.

February 26, 2008:
Surveyors noted that the flow was diminished from the last survey, and seven JPS individuals were observed in Zone 1 and 2 of the survey area.

May 29, 2008:
Upon entrance into the cave to complete the quarterly survey, surveyors discovered a large pool where water previously had flowed from the western wall of the cave towards the eastern wall. Previously, the survey area had three zones defined and, on this date, other than zone 3, none were distinguishable. No salamanders were detected during this survey. The following information was sent to Travis County, City of Austin, and SAS Institute Inc. staff:

Conditions normally found within Kretschmarr Salamander Cave prior to May 29, 2008:

Zone 3:
This survey zone starts at the western wall of the cave where the water inflow occurs. Water movement through this area is often rapid, and can be heard from outside the cave during particularly strong flow. On May 29, 2008, this part of the survey area had not changed considerably. Water could still be heard outside the cave, but flow was less strong.

Zone 2:
During this portion of the survey, the flow begins to lose momentum, but still has characteristics of a riffle. Salamanders are sometimes observed here.

Zone 1:
In this area, the area of wetted material increases, the flow is still noticeable, and the water exits near the eastern cave wall. Salamanders are often found in this area under the cobble.

May 29, 2008

While conducting a quarterly salamander survey in the Kretschmarr salamander cave on May 29, 2008 at 1:36 pm the following was observed by Kathleen O'Connor and Rachel Barlow with Travis County:

1. Salamander survey zones (1 & 2) had disappeared due to damming of the stream flow by what appears to be sediment (very fine silt with a gray cast). The interstitial spaces amongst the cobble and gravel are non-existent due to sediment.
2. The usual stream is pool-like, and more than double it's normal width for Zones 1 & 2.
3. The only flow observed was at the head of the cave stream (Zone 3); there was almost no flow downstream.
4. The stagnant water had a slight smell of sewage (rotten eggs) in Zone 1 and decomposition (dead fauna) in Zone 3.
5. No Jollyville Plateau salamanders were observed (Since August 25, 2006, the first documentation of surveys in the cave that Travis County has on file, salamanders have been present).

July 31, 2008:
Sylvia Pope (COA), Nathan Bendik (COA), Rusty Mase (SAS, Inc.), and Michael Burns (SAS, Inc.) met with Travis County staff to assess the potential damage created by the

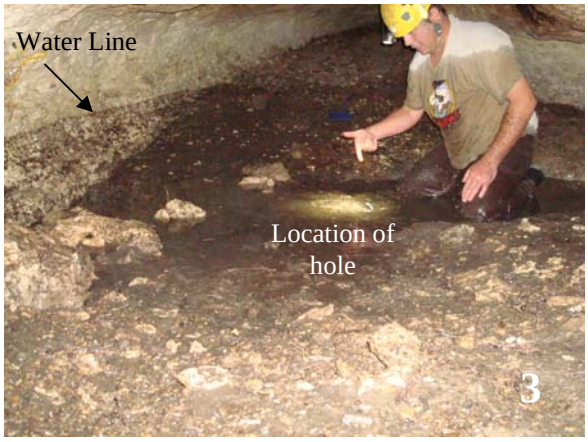
pooling of water in Kretschmarr Salamander cave. Sylvia Pope collected sediment samples while Nathan Bendik searched for salamanders; none were found. There no longer was any odor to the cave, and the water was not as cloudy with sediment. However, the extent of the pooling had increased since May 29. Plans were made to return to the cave, pinpoint the usual exit for the water, and then try to re-open this opening in order to drain the standing water.

August 28, 2008:
Kathleen O'Connor (Travis County), Nathan Bendik, and Andy Gluesenkamp (Texas Natural Science Center) entered the cave to attempt to drain the standing water. Water was at the gate entrance for the cave. After a short amount of time, Andy Gluesenkamp removed a substantial root mat from a hole in about the center of the cave, and water began to drain out of the cave immediately. Within seven minutes, the pool of water was gone from the cave. Eight adult JPS were located after the water was drained out of the cave, and three of them were collected as voucher specimens for Travis County Scientific Research Permit #03-2008 (see page 15 for further discussion).

The following photos 1 through 4 show the state of the cave before, during, and after the pooling event first documented on May 29, 2008. Photo 1 shows a portion of the cave covered in dry and wetted leaf litter. The eastern wall of the cave is behind the surveyor, and the surveyor is pointing towards Zone 1 of the survey area, which is comprised of wetted material and cobble with some flow. Photo 2 captures the extent of the pooling that was discovered on May 29, 2008. The water line along the eastern wall of cave is highlighted. Photo 3 illustrates the location of the hole in the center of the cave that had root mats and other debris removed from it. This is where all of the water exited the cave. The discovery of the hole made staff re-evaluate the thought that the water from the cave exited at the base of the eastern wall. The water line from the previous pooling is evident in Photo 3. Photo 4 was taken as a close-up of the hole where water exits during the November 13, 2008 survey of Kretschmarr salamander cave.


1


Water Line
2


Water Line
Location of hole
3


Water flow
4

Table 2. Kretschmarr Salamander Cave Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for November 21, 2007, February 26, May 29, and August 28, 2008 on Travis County Balcones Canyonlands Preserve.

SAS Canyon

FY2008	11/21/2007	2/26/2008	5/29/2008	8/28/2008	Total by size class
Small juvenile <1inch	0	0	0	0	0
Large juvenile 1 to 2 inches	3	1	0	0	4
Adult >2 inches	0	6	0	8	14
Total by date	**3**	**7**	**0***	**8**	**18**

*The composition of the survey area in the cave disappeared due to extensive pooling of the water entering the cave. No salamanders were detected because of the gray, silty sediment in the pool.

McDonald Well

Surveyed on November 13, 2007 and February 28, 2008 (Table 3).

November 13, 2007:

Staff located 52 JPS individuals (29 large juveniles and 23 adults) during the survey. Water flow was minimal and much of the survey area was dry. There was quite a bit of leaves and sediment covering the bottom of the creek, which made surveying more challenging. One dead salamander with advanced decomposition was noted during the survey.

February 28, 2008:

Twenty-one individuals were found during the winter survey. There were four small juveniles, nine large juveniles, and eight adults. One additional small juvenile and adult were stranded under rocks in the mud and were placed in the well. The water level was checked at McDonald Well six days prior to the February 28 survey, and on the day of the survey, the water level and flow had diminished greatly. Most of the JPS found during this survey were concentrated near the opening of the well.

Table 3. McDonald Well Jollyville Plateau salamander (*Eurycea tonkawae*) survey results for November 13, 2007, February 28, June 4, and August 26, 2008 on Travis County Balcones Canyonlands Preserve.

SAS Canyon

FY2008	11/13/2007	2/28/2008	6/04/2008	8/26/2008	Total by size class
Small juvenile <1inch	0	5	2	dry	7
Large juvenile 1 to 2 inches	29	9	2	dry	40
Adult >2 inches	23	9	0	dry	32
Total by date	**52**	**23**	**4***	**0**	**79**

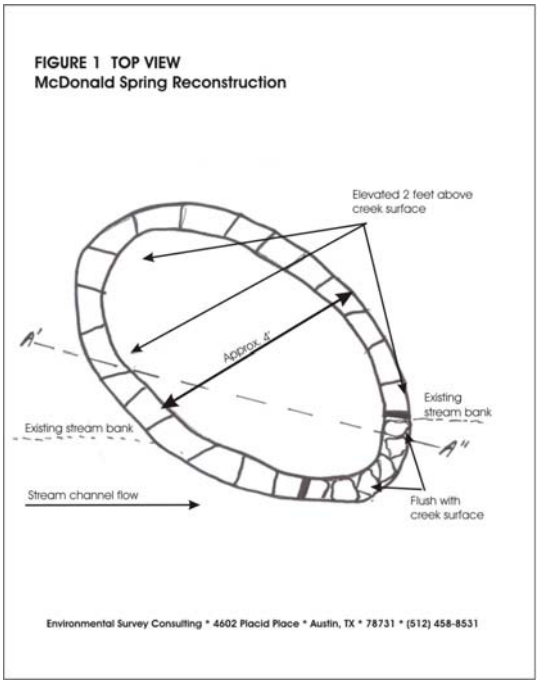
*The four individuals found on June 4, 2008 were under rocks in a muddy area. They were moved to the captured spring water in the well. The entire survey area was otherwise dry and the survey was cancelled.

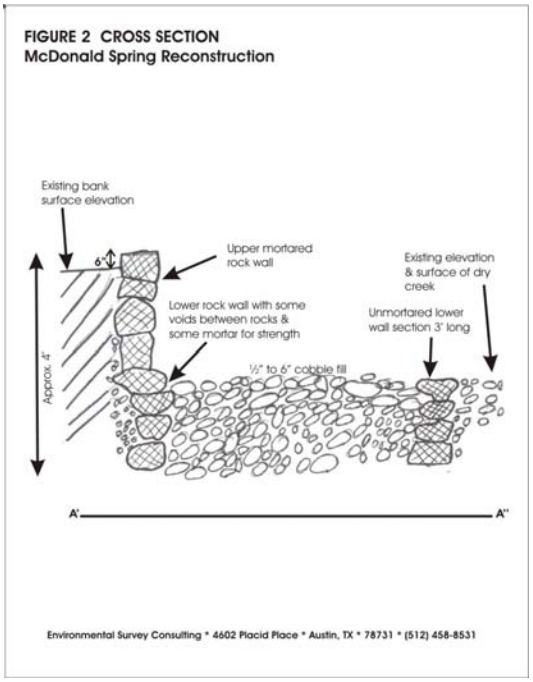
McDonald Well was scheduled for a survey on June 4 and August 26, 2008, however they were cancelled due to the lack of water. While assessing the survey section on June 4, two large and small juveniles were found under rocks in a muddy area, and they were placed into the stored spring water in the well. Staff also noted the overall disrepair of the well cap and erosion on the back wall of the well. There also was evidence of animal digging at the base of the well, which was increasing erosion of sediment into the well (Figure 2). After the June 4 site visit, staff coordinated a planning process to investigate the opportunities to restore McDonald Well to a more natural spring state. During the summer of 2008, staff consulted with other knowledgeable Travis County and City of Austin staff about design options and to assess overall impact to the local JPS population.

Environmental Survey Consulting (ESC) was hired to design and build a more natural spring outflow feature to the benefit of the JPS. Figures 3 and 4 illustrate the design used by ESC to replace the man-made structure of McDonald Well with native cobble and boulders. Work was completed on September 15, 2008 after three days of work. Figures 5, 6, and 7 show the progression of work on the first day of restoration. During the construction, staff was available to collect any JPS found but none were observed. Two darters were rescued from amongst the rocks and released elsewhere. All of the cobble and boulders used during the restoration were collected from the creek bed (outside of the survey area) and surrounding preserve land by ESC staff and an American Youth Works crew (Figures 8 & 9). From September to December of 2008, no substantial rainfall has fallen to recharge the spring feature, so staff has yet to evaluate the effectiveness of the design.



Figure 2. McDonald Well on the Bunten tract of Travis County Balcones Canyonlands Preserve before restoration activities, July 2008. Note the enlarged hole at the base of the concrete cap caused by digging animals attempting to access spring water.





Figures 3 and 4. Design plans drafted by Environmental Survey Consulting for the restoration of McDonald Well on Travis County Balcones Canyonlands Preserve, September 2008.



Figure 5. Environmental Survey Consulting employees removing the well cap from McDonald Well on Travis County Balcones Canyonlands Preserve.



Figure 6. McDonald Well structure removed except for the PVC pipe (approx. 6 ½ feet tall) used to pump spring water out of the well and upslope to past residences on the Bunten tract of the Travis County Balcones Canyonlands Preserve.



Figure 7. McDonald Well after one day of restoration activity. The spring was not flowing except for a small puddle of water at the bottom of the structure. No Jollyville Plateau salamanders (*Eurycea tonkawae*) were observed during the restoration process.




Figures 8 and 9. The completed restoration structure formerly known as McDonald Well. The design allows spring water to connect with the creek while protecting the structure from possible erosion impacts during flood events. Completed on September 15, 2008 by Environmental Survey Consulting.

Scientific Research and Photographic Permits

Travis County Natural Resources issued Scientific Research Permit (SRP) #02-2008 and 03-2008 during fiscal year 2008. SRP #02-2008 was issued to Dr. Andy G. Gluesenkamp with the Texas Natural Science Center of the Texas Memorial Museum at the University of Texas at Austin for the express purpose of documenting and collecting any *Eurycea* salamanders found while surveying Reimer's Ranch Park, Pogue Springs Preserve, and Hamilton Pool Preserve. SRP #03-2008, 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. Also during FY2008, a photographic permit (#01-2008) was issued to Piers Hendrie for the purpose of developing a technique to successfully acquire underwater pictures of JPS in their natural habitat.

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 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 Well site has been developed rapidly since the inception of the BCP. The latter development area drains into a creek downstream of the McDonald Well spring site but the subsurface impacts to the source of the spring flow is unknown.

The tributaries for both McDonald Well and SAS Canyon drain south-to-north. For McDonald Well, 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 Well, 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.

Literature Cited

Bowles, D. E. (ed.) 1995. A review of the status of current critical biological and ecological information on the *Eurycea* salamanders located in Travis County, Texas. Texas Parks and Wildlife Department, Austin, Texas.

Bowles, B. D., M. S. Sanders, and R. S. Hansen. 2006. Ecology of the Jollyville Plateau salamander (Eurycea tonkawae: Plethodontidae) with an assessment of the potential effects of urbanization. Hydrobiologia 553:111-120.

Chippendale, P. T., D. M. Hillis and A. H. Price. 1994. Relationships, status, and distribution of central Texas hemidactyliine plethodontid salamanders (*Eurycea* and *Typhlomolge*). Section 6 Report Part 1, Texas Parks and Wildlife Department, Austin, Texas.

Sweet, S. S. 1982. A distributional analysis of epigean popolations of *Eurycea neotenes* in central Texas, with comments on the origin of troglobitic populations. Herpetologica 38(3):430-444.

Travis County. 2002. Ecological note confirming a locality of the Jollyville Plateau Salamander (*Eurycea tonkawae*) on the Balcones Canyonlands Preserve. Travis County Transportation and Natural Resources Department, Natural Resources Division, Project Number 0905-01904.

Travis County. 2003. Monitoring of the Jollyville Plateau Salamander (*Eurycea tonkawae*) on Travis County tracts of the Balcones Canyonlands Preserve. Travis County Transportation and Natural Resources Department, Natural Resources Division, Project Number 0905-0223.

U. S. Department of the Interior, Fish and Wildlife Service. 1996a. Federal Fish and Wildlife Permit No. PRT-788841.

U. S. Department of the Interior, Fish and Wildlife Service. 1996b. Federal Fish and Wildlife Permit No. PRT-812695.

U. S. Department of the Interior, Fish and Wildlife Service. 1996c. Final Environmental Impact Statement / Habitat Conservation Plan for Proposed Issuance of a Permit to

Allow Incidental Take of the Golden-cheeked Warbler, Black-capped Vireo, and six karst invertebrates in Travis County, Texas.

U. S. Fish and Wildlife Service, Austin Ecological Services Field Office. 2007a. "90-Day Finding on a Petition to List the Jollyville Plateau Salamander as Endangered." *Federal Registe*r 72:29 (13 February 2007) pp. 6699 – 6703.

U. S. Fish and Wildlife Service, Austin Ecological Services Field Office. 2007b. "12-Month Finding on a Petition to List the Jollyville Plateau salamander (Eurycea tonkawae) as Endangered with Critical Habitat." *Federal Register* 72:239 (13 December 2007) pp. 71040 – 71054.