# CITY OF AUSTIN

## CISTERN SPRING RESTORATION AND SALAMANDER HABITAT ENHANCEMENT

**BALCONES CANYONLANDS PRESERVE ANNUAL REPORT**

**Fiscal Year 2001-2002**


The City of Austin
Water and Wastewater Utility
Wildland Conservation Division
Balcones Canyonlands Preserve Program

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## Background and History of Cistern Spring

Cistern spring is located on preserve land that is part of the City of Austin's Balcones Canyonlands Preserve (BCP) system. The specific tract is located on the Upper Bull Creek Macrosite and is referred to as the Franklin tract.

This spring is typical of the Jollyville Plateau (Northern segment of the Edwards aquifer). It is a localized discharge from a karst opening from the base of the Edwards geologic formation. Saturated thickness of the aquifer is small for this spring giving rise to small spring flow (City of Austin, 1999).

The City of Austin's Watershed Protection Department has taken multiple water quality samples from this spring. Based on a cursory examination of limited number of samples analyzed for a limited number of parameters, no water-quality concerns were identified (Hauwert, pers com).

Recent human impacts drastically altered the natural flow of the spring. Past property owners had diverted the spring flow, intercepting flow directly from the discharge point and piping flow to a storage cistern that gravity fed water to a nearby house.

## Background on the Jollyville Plateau Salamander

The Jollyville Plateau salamander (*Eurycea tonkawae*) was recently described as a distinct species. The Jollyville Plateau salamander is a neotenic member of the family Plethodontidae. Neotenic salamanders retain gills and other larval morphological features as adults and thus remain aquatic throughout their entire life cycle. The Jollyville Plateau salamander occurs only in springs and spring runs of the Jollyville Plateau region of Travis and Williamson Counties, Texas. Studies have shown a correlation between declines in water quality and declines in salamander numbers. The species is named for the Tonkawa tribe who inhabited central Texas until the 1850's. The Tonkawa made camps around the springs that this salamander inhabits, and the stone tools and other artifacts of the Tonkawa are still much in evidence around many of these springs. Tonkawa is derived from a Waco Indian word meaning "they all stay together," a phrase which also describes the localization of *Eurycea tonkawae* around spring outflows (Chippindale, et.al. 2002).

During the summer of 2000 an adult Jollyville Plateau salamander was discovered at cistern spring by accident when the line from the tank was cut and a salamander washed out.

## Project Scope

In compliance with the BCP land management plan, it was decided that flow to cistern spring would be restored to a natural state. The goal of the restoration project was to improve habitat for both flora and fauna including the endangered golden-cheeked warbler and the rare Jollyville Plateau salamander.

The City of Austin entered into a cost sharing agreement with the Partners for Fish and Wildlife program to help finance this restoration project. Partners for Fish and Wildlife contributed 42% ($6000.00) of the total cost for this project.

The project details included removing all man made structures, constructing "ladder pools" (to create additional salamander habitat) and constructing a game fence around the site (to protect the spring, vegetation and salamanders from hog wallowing and deer trampling and herbivory).

The agreement between the BCP Program and the U. S. Fish and Wildlife Service was signed on January 8, 2002.

## Methods

Restoration

BCP staff supervised volunteers on 4/6, 4/11, and 4/26/02 in removing the man made obstructions (including the cistern, pipe and concrete retaining wall) below the spring, and constructing the "ladder pools".

All water and sediment in the cistern were sifted for any aquatic life. The only life encountered was aquatic amphipods and leeches. The ladder pools were constructed with on site limestone rock. Five volunteers put in a total of 100 hours of labor for this phase of the project.

Game fence construction

BCP staff sought bids for the construction of 800 linear feet of game fence. The fence completely encloses the spring and spring run. The primary purpose of this fence is to protect the spring from hog wallowing and deer herbivory and associated traffic. Prism Development Inc won the winning bid at $6,800.00. Fence construction started on 12/5/02 and was completed on 12/18/02.

## Pre Restoration faunal survey

Prior to the initiation of the restoration effort there was limited surface flow and no aquatic life was encountered. As earlier noted, an adult salamander was found in the cistern a few years prior to the restoration effort. Only leeches and aquatic amphipods were encountered during the removal of the pipes and cistern.

## Post Restoration faunal survey

On December 15, 2002 Robert Hansen, Lisa Weston, and Robert Hansen surveyed the spring and spring run and collected numerous species of aquatic invertebrates. Robert Hansen identified all specimens collected.

Class Gastropoda
- Family Limnaidae (1 adult)

Class Insecta
- Order Hemiptera
  - Family Veliidae
    - *Rhagovelia* sp. (2 adults)
  - Family Gerridae
    - *Aquarius* sp. (2 adults)
- Order Trichoptera
  - Family Xiphocentronidae
    - *Xiphocentron* sp.
  - Family Calamoceratidae
    - *Phylloicus ornatus* (6 larvae)
  - Family Philopotamidae
    - *Chimarra* sp. (4 adults)
- Order Odonata
  - Suborder Zygoptera
    - Family Coenagrionidae
      - *Argia* sp. (4 larvae)
  - Suborder Anisoptera
    - Family Libelluidae
      - *Libellula* sp. (5 larvae)
- Order Coloeoptera
  - Family Hydrophilidae (3 adults)
- Order Diptera
  - Family Chironomidae (2 larvae)

## Future Efforts

BCP staff will continue to conduct quarterly surveys at this site for the presence and population numbers of the Jollyville Plateau salamander.

To minimize disturbance to the spring's flora and fauna staff have placed "refugia bags" at two different locations in the spring. This method has proven effective for other species of salamanders (Pauley, et.al 1998). Each bag or trap consist of netting surrounded by a metal frame, a cotton mop head, leaf litter, sediment, and rocks of various sizes placed inside the netting. Each trap will be checked on a quarterly basis.

The above work will be completed in fiscal year 2003.

## Revegetation

Locally rare spring associated plants will be planted within the fence protected area. BCP staff will collect seed from the Bull Creek watershed of various spring-associated plants such as Carolina Basswood (*Tilia caroliniana*), and Spicebush (*Lindera benzoin*). Staff will either sow these seeds on site or germinate the seed and plant within the fenced area.

This site will be monitored for succession and further enhanced as needed.

## Acknowledgments

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## Literature Cited

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City of Austin. 1999. Jollyville plateau water quality and salamander assessment. Water Quality Report Series COA-ERM 1999-01: 1-138.

Hauwert, Nico, City of Austin Watershed Protection Department, personal communication, 2002.

Pauley, T. K., M. Little. 1998. A new technique to monitor larval and juvenile salamanders in stream habitats. Banisteria, Number 12, 1998: 32-36.

**Pre-Restoration with tank**



**Tank Removal**



**Post-restoration without tank**




**Pre-restoration of cistern spring**



**Cistern spring “ladder pool construction”**



**Site following removal of plumbing infrastructure**

