# Save Barton Creek Association

Save Barton Creek Association is a nonprofit citizen group working to protect and conserve the six watersheds of the Barton Springs Edwards Aquifer (Barton, Bear, Little Bear, Onion, Slaughter and Williamson). SBCA incorporated in September 1979 in response to community concerns about the impact of urbanization on Barton Creek and Barton Springs. SBCA has been one of the lead conservation organizations for more than twenty years working to ensure that future generations may enjoy the cool, clean waters of Barton Springs.

SBCA Trustees and Members have served on every government and non-profit task force addressing issues related to the Barton Springs Aquifer. We have helped write ordinances designed to protect the creeks and watersheds of the aquifer region. We provide funding and scientific expertise for public education opportunities such as the "Splash! into the Edwards Aquifer Exhibit" at the Beverly S. Sheffield Environmental Center in Zilker Park at the historic Barton Springs bathhouse. We offer free tours of the Barton Creek Greenbelt. *For more information, visit our Web site at: www.savebartoncreek.org.*

## OUR PROJECTS

• We regularly sponsor several outreach projects, including the Austin Youth River Watch, the Texas River School, Mother Earth Day at the Springs, the Barton Springs Edwards Aquifer Conservation District Groundwater to Gulf Teacher's Conference, and a door-to-door canvassing program with Clean Water Action that educates homeowners using groundwater about water conservation methods.

• In 1988, SBCA joined a lawsuit over the Outer Loop (SH 45). A settlement established some water quality protections. In certain circumstances, it requires a federal Environmental Impact Statement (EIS), should the road be built.

• For several years, we've been involved in legal efforts contesting permits at the Texas Commission on Environmental Quality allowing direct effluent discharge over the Aquifer recharge zone from developments, including Belterra and Jeremiah Ventures.

• As a member organization of Greater Edwards Aquifer Alliance, we track and act on pertinent legislative issues at the State.

• SBCA participates and/or gives input in City of Austin initiatives as the opportunity arises, such as stakeholder input in: 1) Barton Springs master plan; 2) revision of the City's watershed protection ordinance; 3) Travis County's recent watershed protection regulation.

• We also monitored the City's Bond Development 2012 process and will continue to advocate for funding for preserving sensitive aquifer lands.

• We've worked on broader issues of land use planning in Austin, via the two-year process of Imagine Austin. This included keeping proposed highway SH 45 out of the City's new Master Plan.

• SBCA is one of the environmental sponsors of an informational Web site pertaining to the environmental damage of SH 45 SW: http://keepmopaclocal.org

## OUR PEOPLE

Officers
President – Steve Beers
Vice President – Jackie Goodman
Treasurer – Kathy Smartt
Treasure Emeritus – Shudde Fath

Board Members

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Steve Beers
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Jackie Goodman
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Mary Ann Neely
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Donna Tiemann
Roy Whaley
Stefan Wray

## OUR MEETINGS

*Join Us.* We meet the 2nd and 4th Monday every month between 7:00 p.m. and 9:00 p.m. at:

El Mercado Restaurant
1302 South 1st Street
Phone: (512) 851-8684

Save Barton Creek Association

### Membership

| | |
|---|---|
| Lifetime Associates | $1,000 |
| Patrons | $500 |
| Sustainers | $250 |
| Friends | $100 |
| Donors | $50 |
| Families | $15 |
| Individuals | $10 |
| Students/Retirees | $5 |

You may sign up online at www.savebartoncreek.org/join.asp or send your donation to P.O. Box 5923, Austin, TX 78763.

## The Source of Barton Springs

The Edwards Aquifer is a long, narrow layer of very porous limestone that extends in an arc from Kinney County in southwest Texas, through the Austin-San Antonio corridor, and ends near Salado in Bell County. The Austin part of the aquifer is divided into 3 segments.

The map at the right shows the Recharge Zone where rain and creek flow enter the aquifer through a variety of cracks, crevices, caves, and sinkholes. These recharge features are surface expressions of the "plumbing" network of tiny to large solution cavities below. The Contributing Zone is the area to the left, or western side of the map. In this zone, rainfall collects in the upper reaches of the Barton and Onion Creek watersheds and flows down the creeks to the Recharge Zone, where the Edwards limestone is exposed at the surface. The Artesian Zone, the area to the right, is the portion of the Edwards that lies under relatively impermeable layers of clay. Due to the pressure of water in the Recharge Zone pressing against the water underneath these layers of clay, this zone will rise up into a well to approximately the level of the water in the Recharge Zone.

Water does not undergo significant filtration or cleaning as it would in a sand or gravel aquifer. Thus, filtration can only occur at the land surface where the water may move through vegetated soil before it enters the creeks and recharge features. Contaminated water entering the aquifer is a potential threat to water wells and springs. The primary threat to the integrity of the Edwards aquifer is non-point source pollution -- pollution not attributable to one single identifiable source. Motor oil, gasoline and antifreeze that leak onto roadways, and pesticides and fertilizers applied inappropriately on lawns, commercial landscapes, and agricultural lands are examples of non-point source pollution.

Without the aquifer, there would be no Barton Springs pool, and approximately 45,000 people in southern Travis and northern Hays Counties would be without a water source.

## Tracing Groundwater Flow in the Edwards

While the source of Barton Springs pool has long been attributed to the aquifer below and the creeks that feed it from the uplands, exactly where the water came from and how fast it flowed was not known until dye trace studies were completed in 1996. The project measured travel time and traced the paths that distinctive, non-toxic, organic tracers traveled from the point of injection into the aquifer to the point where they exited through water wells or at Barton or Cold Springs. Traces were performed in the 6 watersheds recharging the aquifer— Barton, Williamson, Slaughter, Bear, Little Bear, and Onion Creeks. Additional tracers were injected into the Blanco River watershed to determine if waters from this watershed recharge the Barton Springs segment.

The results show that groundwater flows rapidly along distinct paths to Barton or Cold Springs. Dye traces revealed that groundwater in this segment can travel from one half mile to one mile per day during very low groundwater-flow conditions (dry periods) and up to over five miles per day during high flow conditions (wet periods).

## Blanco River Recharges Barton Springs During Drought

Initial estimates indicate an overall small contribution of the Blanco River to Barton Springs, only about 4% on average. However, the Blanco River could be Barton Springs' largest sustaining source of recharge during drought conditions when flow is most critical to Barton Springs.

Between May 2008 and February 2009, fluorescent dye injected in the Blanco River watershed was detected at Barton Springs. The tracers also showed up in wells in the Mountain City and Ruby Ranch areas, in addition to wells south of the Blanco River toward San Marcos Springs (Figure 1). These tracer injections targeted below average flow conditions for Barton Springs of about 50 cubic feet per second. During low-flow conditions in 2009, groundwater flow rates through the Edwards Aquifer to Barton Springs decreased substantially compared to the 3-day travel time from nearby Onion Creek measured in 2005, under high-flow conditions. Tracers from the Blanco River generally took about 3 months to arrive at Barton Springs during the 2008 to 2009 traces.

Tracers injected in caves on the channel of Onion Creek under high-flow conditions of 2005 were detected within 3 days at Barton Springs, and later at San Marcos Springs. Under slightly lower flow conditions of 2002, tracer injections in Onion Creek were not detected in San Marcos Springs, but were recovered from Barton Springs. From this information, we infer that Onion Creek serves as the southernmost divide for Barton Springs' source area under certain high-flow conditions, and that the Blanco River does not contribute significantly to Barton Springs during those conditions.

The recharge rate of Onion Creek is several times higher than the recharge rate of the Blanco River when Onion Creek is flowing and its recharge may overwhelm some of the groundwater flow paths to Barton Springs, diverting some Onion Creek recharge to San Marcos Springs.

However, during drought conditions the percentage of contribution to recharge could be much higher. Thus, it appears that the Blanco River might be directly sustaining a significant portion of Barton Springs flow under drought conditions.

To read a full scientific paper on recharge from the Blanco River, go to SBCA's Web site: savebartoncreek.org

*Contributors to this article included Marcus Gary, Nico Hauwert, Brian Hunt, Steve Johnson, and Gail McGlammery.*

# Figure 1. Blanco River Groundwater Tracing 2008-2009

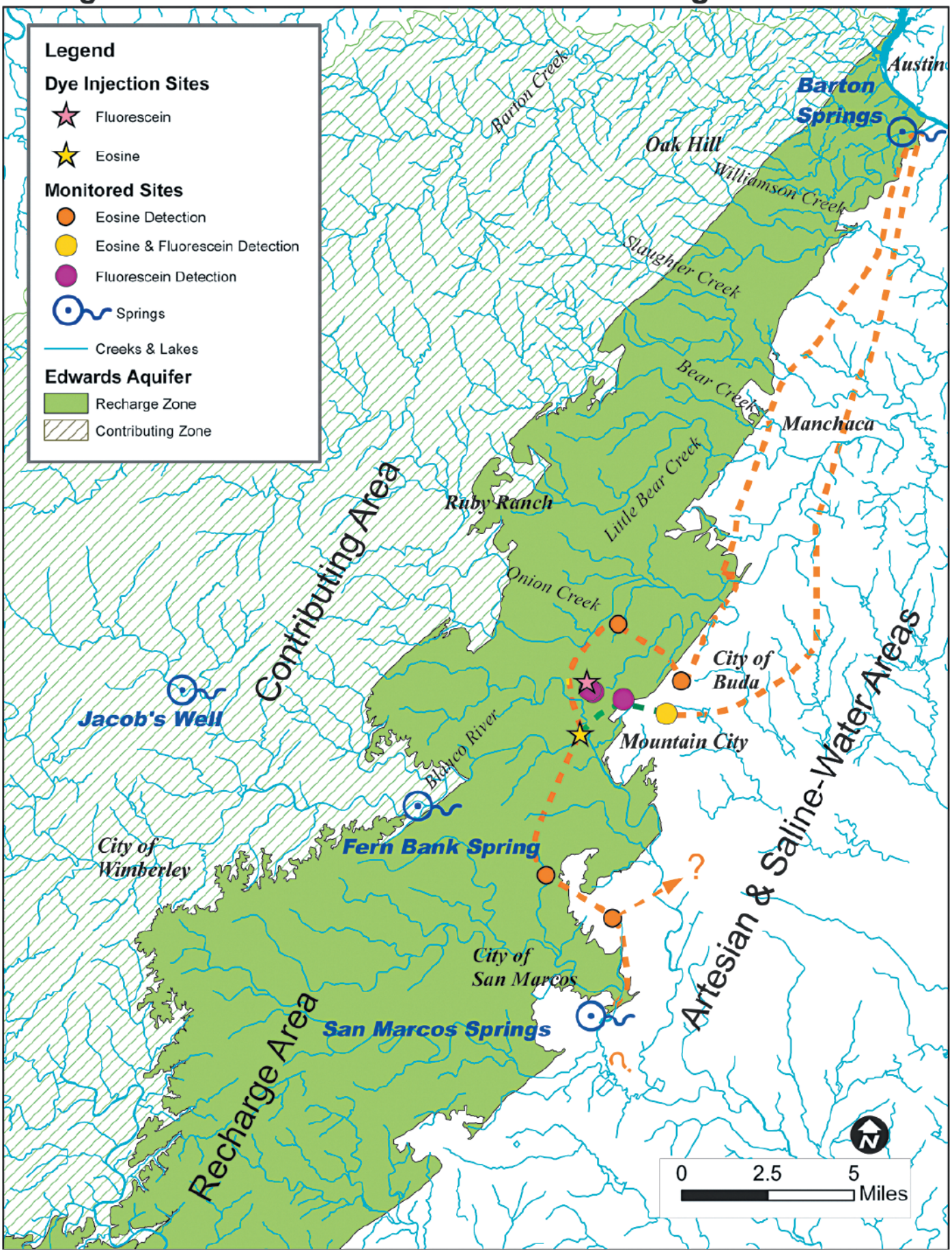


*Figure 1: Groundwater-flow paths at Blanco River injectors. Eosine dye was injected at the mouth of Halifax Creek on four separate pulses.*

# Barton Springs Salamander Update

by Laurie Dries

*Eurycea waterloo* young adult (~ 1.5 in.) in Sunken Garden, 2008

The Edwards Aquifer contains numerous intermittent and perennial springs that are home to several species of solely aquatic, perennibranchiate ("always gilled") *Eurycea* salamanders. Two of these species have two of the smallest known ranges of any vertebrate species, residing only in the complex of springs known as Barton Springs. *Eurycea sosorum*, the Barton Springs Salamander, inhabits the surface and immediate subsurface habitat (epigean) of Parthenia Spring (in Barton Springs Pool), Eliza Spring, Sunken Garden, and Upper Barton Spring. *Eurycea waterlooensis*, the Austin Blind Salamander, inhabits the deeper subterranean habitat beneath the surface of Parthenia, Eliza, and Sunken Garden. Both species require clean, cool, flowing spring water to thrive; they are stream salamanders, not pond salamanders. The small range sizes, threats to quantity and quality of water emanating from the Barton Springs complex, and harm imposed by cleaning and maintenance of Barton Springs Pool are the main reasons *E. sosorum* was added to the federal list of endangered species in 1997, and *E. waterlooensis* was added to the list of candidate species in 2002. We know the most about Barton Springs salamanders.

From 2003 through 2008, abundance of *E. sosorum* had been increasing in all of the spring sites, with periods of reproduction and high number of juveniles and young adults, particularly in Eliza Spring. Unfortunately, the severe drought of 2009, and subsequent lesser drought of 2011, took their toll on Barton Springs salamanders. Drought affects our salamanders by reducing the amount of oxygen in the water available for respiration. During drought, the volume and rate of water exiting the aquifer, known as discharge, decreases and, as discharge decreases, so does concentration of oxygen dissolved in that water. Lower oxygen concentration puts our aquatic salamanders at risk of dying because there isn't enough oxygen to breathe. Barton Springs Salamanders stop reproducing because they lack enough metabolic energy to produce eggs.

These effects are evident in the abundance of salamanders at all three perennial spring sites, Eliza Spring, Sunken Garden, and Parthenia Spring in Barton Springs Pool. For several months, number of adults was less than 200 in Eliza Spring, less than 20 in Parthenia Spring, and 0 in Sunken Garden. There were nearly no juveniles in all three sites. Although the drought broke with rainfall in October of 2009, and Barton Springs' discharge was above average for 11 months, juvenile salamander abundance did not increase while the number of adults remained relatively steady or decreased. This lack of reproduction continued through another dry and wet cycle of 2010-2012. Adult Juvenile salamanders finally began to reproduce in the fall of 2012. Since October, the number of juveniles in Eliza Spring has steadily increased to nearly 200. As of June 2013, we are seeing roughly 400 salamanders, roughly equal proportions of juveniles, young adults and adults.

*Eurycea sosorum* adult (~ 2 in.) in Eliza Spring, 2011

Unfortunately, the pictures in Parthenia Spring and Sunken Garden are not so rosy. Salamander abundance in Parthenia has hovered around 50 in the past 6 months, while we have found 10 salamanders or less in Sunken Garden since 2009. We don't know why there was a 3-year delay before salamanders in Eliza Spring began to reproduce, and we don't know why so few salamanders are seen in Parthenia Spring or Sunken Garden. We have seen very few Austin Blind Salamanders in any of the spring sites since 2008, so we don't know much about their fate during these droughts.

There are still many aspects of the biology and ecology of both of our native salamander species that remain a mystery. If we are successful in our efforts to protect and study these wild salamanders, one day we will learn the answers to our questions, and in the process learn how to protect our precious springs.

## SBCA Thanks Shudde Fath for Her Dedication to Protecting The Springs!

Ave Bonar

Shudde Fath, a Bastrop County native and long-time Austinite, served on the Save Barton Creek Association Board of Trustees as Treasurer from 1980 to 2010, and still dedicates her life to being a champion for Austin's environment, and for just and transparent government. Shudde realized the importance of Barton Springs as the life's blood of our fragile ecosystem early on. Cooling off in the Springs was the daily practice of Shudde and many locals before air conditioning. Shudde Fath is one of those all-too-rare selfless, dedicated and outspoken conservation champions to whom the community owes a huge debt of eternal gratitude for helping to preserve the cool, refreshing waters of Barton Springs. She is an inspiration to every one who has labored by her side during the past four decades.

In the 1980s, Shudde and SBCA realized laws would be necessary to limit development (and the resulting non-point source pollution) in the Barton Springs Edwards Aquifer region. She helped craft what would come to be known as the "SOS Ordinance" through hundreds of meetings, and helped garner voter support by phone banking, handing out flyers, and showing up regularly at City Hall to try to "talk some sense" into the City Council. Just as Barton Springs is the "Crown Jewel" of Austin, Shudde Fath is the much loved jewel of the environmental community. Her light still shines brightly and helps guide our future with courage and wisdom to continue the "good fight" for the Springs.

Shudde also kept meticulous records for decades of the efforts to protect Barton Springs. SBCA is eternally grateful to Shudde for archiving this history and intends to preserve her treasure trove of many large file boxes at the Austin History Center.

Thanks, Shudde!


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