

MEMORANDUM

DATE: May 23, 2007

TO: Will Wynn, *Mayor*
Betty Dunkerley, *Mayor Pro Tem*
Mike Martinez, *Council Member*
Jennifer Kim, *Council Member*
Lee Leffingwell, *Council Member*
Brewster McCracken, *Council Member*
Sheryl Cole, *Council Member*
Toby Hammet Futtrell, *City Manager*
Will Amy, *US Fish and Wildlife Service*
Paige Najvar, *US Fish and Wildlife Service*
Victoria Hsu, *Director, Watershed Protection/Development Review Department*
Nancy McClintock, *Assistant Director, WPDRD*
Tom Ennis, *Environmental Resource Management Division Manager, WPDRD*

FROM: The Barton Springs Scientific Advisory Committee

RE: Barton Springs Ecosystem: Restoring Barton Springs Pool and spring complex to enhance salamander habitat and increase patron satisfaction

In 1998, the City of Austin formed the first Scientific Advisory Committee (SAC) in compliance with the federal Habitat Conservation Plan (Permit TE-833851) for protecting the endangered Barton Springs Salamander while retaining Barton Springs Pool as a recreation destination. The SAC is responsible for refining maintenance activities at Barton Springs Pool and adaptive habitat management in all of the Zilker Park springs. In 2003, the City of Austin (COA) and the US Fish and Wildlife Service (USFWS), invited local scientists to form the current membership of the Barton Springs Scientific Advisory Committee (SAC). Our directive was to "...review and develop plans that balance the biological requirements of, and public demands on, the aquatic ecosystems of the [Barton] springs". This memorandum presents our summary of the problems facing the Barton Springs ecosystem and our recommendations for restoring the spring ecosystem to enhance the quality and availability of salamander habitat while also increasing the quality and natural beauty of the pool area for patrons.

Executive Summary

Barton Springs is comprised of four springs that provide the only known habitat for two species of Plethodontid salamanders, *Eurycea sosorum*, the Barton Springs Salamander, and *Eurycea waterlooensis*, the Austin Blind Salamander. *Eurycea sosorum* was federally listed as endangered in 1998 and *E. waterlooensis* is being evaluated for listing by the USFWS. Because *E. sosorum* is endangered and rare, USFWS has mandated that the Barton Springs complex is to be managed so that the salamander populations become sustainable or increase. Barton Springs is also a long-time favorite swimming destination for Austinites and a leading attraction for tourists to Austin. These uses are not mutually exclusive and we think that sustainable salamander populations can coexist with patrons of the Barton Springs Pool. However, salamander populations and the satisfaction of Pool patrons are threatened by degradation of the spring habitat, decreased water quality, and loss of spring ecosystem function. The degradation of the Barton Springs ecosystem is strongly affected by changes in surface and subsurface waters due to inadequacy of the Pool infrastructure, increasing use of Pool facilities, and increased urbanization within the Barton Springs recharge and contributing zones.

Local and regional changes have caused a significant decline in the functioning of the spring ecosystem. This has led to a decrease in the quality and availability of salamander habitat and, likely, prey availability as well as a decrease in swimmer “satisfaction” with the Pool. The main issues in the spring habitat that affect salamanders and humans are:

1. obstruction of flow and inadequate natural flow regime (*local issues*) that have led to
 - increased sedimentation and decreased interstitial habitat availability for salamanders
 - increased turbidity and decreased light penetration in springs
 - channelized Pool profile and homogenization of Pool substrate
 - increased water retention times and therefore decreased flushing of Pool water
2. decreased water quality and spring discharge related to urban development and drought (*regional issues*) have resulted in
 - long-term trend of declining dissolved oxygen
 - seasonal critically low levels of dissolved oxygen and spring discharge
 - contaminated urban runoff in the aquifer

Both local and regional issues have played a role in simplifying the trophic web and altering spring ecosystem function as evidenced by:

- disappearance of most aquatic macrophytes
- decreased fish diversity
- excessively high crayfish densities
- overgrowth of nuisance algae
- probable change in prey composition and availability for Barton Springs and Austin Blind Salamanders

Although both local and regional issues need to be addressed to create the ideal results for the Pool, we realize that the regional issues are beyond the scope of our committee. We have

developed a set of recommendations at the local level that we think will have significant positive outcomes for the salamander populations, the Pool patrons and the spring ecosystem as a whole.

Recommendation #1

Insert gates in the upstream dam and move the downstream dam of Barton Springs Pool to alter the flow path and flow regime in the Pool. The downstream dam needs to be reconfigured with gates that 1) will open fully during flood stage and 2) will release water from the bottom of the Pool.

Advantages

- fully functional gates on both dams will give Pool managers more flexibility in controlling water levels and flow regimes.
- Gates in both dams are especially important during flood conditions when Barton Creek overtops the upstream dam. Fully opening upstream and downstream dams during these conditions will maintain flood energy and will let Barton Springs Pool experience natural scouring floods. This is key for flushing sediments and debris out of the Pool and for maintaining a more natural ecosystem.
- Release of water from the Pool, and especially the ability to release waters at the bottom rather than the water surface, will let Pool managers increase flow along the substrate during non-flood conditions. This flow regime will 1) help eliminate fine sediments from the substrate and 2) increase flow velocities and create heterogeneous flow pathways which will better mimic the flow conditions that salamanders would naturally experience in the spring
- Moving the lower dam downstream from its current position will increase the surface area of Barton Springs Pool and will allow more patrons to enjoy the spring. This will also allow Pool managers to drop water levels to 1) increase flow velocity, 2) decrease amount of required maintenance in the shallow end, and 3) reconnect surface flows between Eliza and Sunken Garden (Old Mill or Zenobia) Springs, and Barton Springs Pool.

Recommendation #2

Reconnect the surface flow between Barton Springs Pool, Eliza Spring and Sunken Garden Spring.

Advantages

- Reconnecting surface flows of the Barton Springs complex will provide dispersal corridors for the Barton Springs Salamander among the springs and increase the likelihood and ease of interbreeding among salamander metapopulations (i.e., salamanders from different spring outlets).
- Create natural waterfalls and streams between Eliza or Sunken Garden Springs and Barton Springs Pool. This would enhance the natural beauty of the Pool, increase patron satisfaction and awareness of the natural spring systems, and make Barton Springs an even more fantastic “jewel in the crown” of the City of

Austin. In addition, we recommend installing interpretive signs for the public to educate them about the connection between the spring flows, the salamander populations, the spring ecosystem, and urban development.

Recommendation #3

Increased infrastructure and support for studies to help inform management of the salamander species and the pool. This would include infrastructure to continuously measure discharge and physicochemical parameters from each spring and the Pool, and support (either logistic or financial) of external research into 1) salamander population ecology, 2) community and ecosystem-level studies, and 3) salamander movement within the Springs complex.

Advantages

- provide data on pool hydrological and ecological mechanisms that will increase the effectiveness of management of the pool.
- Make informed decisions about the needs of the salamander populations and assess species status.

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