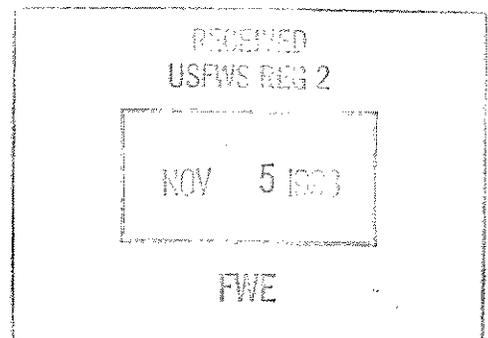


Final Environmental Assessment/Habitat Conservation Plan for  
Issuance of a Section 10 (a)(1)(B) Permit for Incidental Take of the Barton Springs  
Salamander (*Eurycea sosorum*) for the Operation and Maintenance of Barton Springs  
Pool and Adjacent Springs  
City of Austin, Texas

US Fish and Wildlife Service  
Ecological Services  
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October 1998



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data (1993-1998) indicates that the salamander is found not only near the main springs, but also the shallow fissures and beach areas. As many as 19 salamanders were found in the fissures and, on one occasion during the experimental cleanings, 84 salamanders were found on the beach. The highest number found stranded in Eliza Spring was 17. Thus, it became clear that drawdowns have resulted in the stranding of salamanders in the fissures and beach areas as well as Eliza and possibly Old Mill during low flow conditions. In addition, it has become evident that the threat exists for a swimmer to accidentally crush a salamander in the fissures, beach, and Old Mill. In order to maintain and operate the pool and adjacent springs, the City needs a 10(a)(1)(B) permit to authorize take of the Barton Springs salamander. In this document, four management alternatives are presented: No Action, Maintenance Procedures Prior to Listing (May 1997), Preferred Alternative, and Reduction in the Frequency of Maintenance Procedures.

Under the No Action alternative, an incidental take permit would not be issued. This would result in the closing of the pool because the cleaning would not be allowed. The Maintenance Procedures Prior to Listing alternative would operate the pool with the level of maintenance used prior to the listing of the salamander as endangered (May 1997). Adverse impacts of this alternative are the stranding of salamanders during the drawdowns for the cleaning of the deep and shallow ends of the pool and increased siltation of habitat due to shallow end cleaning activities. In addition, a swimmer/wader could cause take by accidentally stepping on a salamander in the fissures, beach, and Old Mill Spring. Under the Preferred Alternative, the potential for take is associated with pool drawdown, cleaning, and use (wading and standing). This alternative proposes modifications to minimize and/or mitigate the potential take by swimmers/waders and adverse impacts of cleaning. Under the Reduced Level of Maintenance alternative pool cleaning would occur once per month. Impacts of this alternative include incidental take due to the stranding of salamanders during drawdown. In addition, salamanders may be crushed accidentally by swimmers/waders in the fissures and beach areas. Also, an increase in slippery and murky conditions could result in pool closures. Measures proposed in the Preferred Alternative (which includes the HCP) would substantially minimize and/or mitigate take. Such measures include lowering of the beach, restricting access to Eliza and Old Mill (Sunken Garden) springs, and minimizing drawdown. The HCP would allow for incidental take of salamanders from the operation and maintenance of Barton Springs Pool and the adjacent spring sites. The biological goal of this HCP is to improve salamander habitat, increase population size, and increase life history information over the term of the permit. Overall, the HCP should improve conditions for the Barton Springs salamander and a net increase in the number of individuals is expected. Under the Preferred Alternative, the City and the Service have agreed to the following measures for the mitigation of incidental take of the salamander as described in Section 6.0 of this document.

- Cleaning of the shallow end without lowering the entire pool
- Lowering of the beach
- Cleaning of the fissures, the new "beach" habitat, and adjacent springs using low-pressure hoses
- Installation of an underwater walkway and a stainless steel railing in the deep end
- Maintenance of 11,000 square feet of "beach" habitat

## 1.0 Introduction

The City of Austin, Texas (Applicant) has submitted a permit application to the US Fish and Wildlife Service (Service) to allow incidental take of the federally-listed endangered Barton Springs salamander (*Eurycea sosorum*). The activity to be authorized is the incidental take of a federally protected endangered species that would result from the operation of Barton Springs as a public swimming and recreational facility. In addition, take would be authorized for the harassment and injury that may occur to the species at adjacent spring locations (Eliza, Old Mill, and Upper Barton springs) in Zilker Park.

This document serves two main purposes: it includes (1) the City of Austin's Habitat Conservation Plan, and (2) the US Fish and Wildlife Service's NEPA documentation (Environmental Assessment) for the Federal action, issuance of a section 10 (a)(1)(B) permit. This document addresses the operation of Barton Springs Pool as a public swimming and recreational area and associated possible impacts that may affect the federally listed endangered Barton Springs salamander. The cool, pristine waters of Barton Springs have attracted humans for centuries. Even though Barton Springs has been a popular swimming and recreational area since the 1800's, the current dam was not constructed until the 1920's. Since that time, Barton Springs Pool has remained one of the most popular attractions in Central Texas, second only to the State Capitol in terms of the number of annual visitors, with an average of approximately 250,000 visitors annually.

During the past 5 years, routine operation of the pool involved the frequent lowering of the pool to remove silt and sediment from the deep end of the pool. High-pressure water hoses were used to remove silt and algae from the deep end of the pool and abrasive mechanical roller brushes and high-pressure water hoses were used in the shallow end of the pool. Areas of the pool that may be impacted by routine pool maintenance, including adjacent springs, are habitat for the federally-listed endangered Barton Springs salamander (*Eurycea sosorum*). The Service has determined that the pool lowering and pool maintenance activities result in an incidental take of the Barton Springs salamander. The Applicant has submitted the necessary 3-200 form, Habitat Conservation Plan (see Section 6.0), and other necessary application materials for a permit under section 10 (a)(1)(B) of the Endangered Species Act (Act) for incidental take. The implementing regulations for section 10 (a)(1)(B) of the Act, as provided by 50 CFR 17.22, specify the criteria by which a permit allowing the incidental take of listed species pursuant to otherwise lawful activities may be obtained. The biological goal of this HCP is to improve salamander habitat, increase population size, and increase life history information over the term of the permit.

Barton Springs, while the remaining 10 percent discharges at ancillary spring sites or is extracted by wells (Slade, et. al. 1985, 1986). The history of human activity near Barton Springs dates back at least 10,000 years, based on numerous archaeological sites located near the springs in Zilker Park (Voellinger, 1993). Various tribes of Native Americans, including the Lipan Apache, Comanche, and Tonkawa have inhabited the area around the springs in past centuries and records indicate that many of the Spanish expeditions of the 16th - 18th centuries passed by the springs. The first Anglo immigrants to settle at the springs arrived in 1837 when William Barton and his family moved to the abundant springs that today bear the family name. During subsequent decades the springs have been the site of a flour mill, a source of drinking water for many citizens, and a popular location for baptisms, family picnics, social gatherings, musical performances, fishing, and swimming.

The dam and many of the structural features that form the current Barton Springs Pool were built during the 1920's. Other major developments or modifications such as the bathhouse, upstream dam, and the skimmer drain were added during the following decades, and the Barton Creek bypass that flows under the sidewalk on the north side of the pool was constructed in 1974-1976. All of these projects have been designed either to enhance the aquatic and recreational use of the springs or to mitigate the impacts of surface water flow from Barton Creek.

During the early 1900's, Eliza Spring was modified to provide a naturally cooled meeting area specifically for the Elks Club. The original concrete enclosure was constructed around 1900 and the confined spring flow of Eliza was a major source of drinking water for Austin citizens during the drought of 1917. Since the original construction of the Elks Pit, a concrete bottom was installed with 15 centimeter (6 inch) diameter holes to allow for spring flow from the aquifer and an additional 0.5 - 1 meter (1.6 - 3.3 feet) of concrete was added to the top of the original concrete wall. For many years, Eliza Spring was open to the public and their pets for swimming and leisure. Public access is now restricted as restoration and enhancement projects are being considered.

Old Mill Spring (Sunken Garden), downstream of Barton Springs Pool, was the location of Austin's first ice factory. In 1935, Austin's first municipal sunken garden was designed by a local architect and constructed with labor provided by the National Youth Administration at this spring location. The purpose of the design was to provide a public, outdoor location for quiet meditation and family picnics. It has been a favorite swimming hole for many people and their pets in past years. During the 1980's an outfall pipe was installed to route spring flow directly from Old Mill Spring (Sunken Garden) underground to lower Barton Creek. During periods of moderate to high aquifer levels, water in Old Mill can reach a depth of 2.0 meters (6.6 feet) and there is abundant surface flow between the springs and the discharge point into lower Barton Creek. Under low flow conditions, surface flow from Old Mill Spring (Sunken Garden) will cease when all of the available spring flow is routed into the outfall pipe. Various sections of the original stone structure around the springs are in disrepair and much of the structure is in need of extensive restoration.

Upper Barton Spring is located approximately 100 meters (328 feet) upstream of Barton Springs Pool near the south bank of Barton Creek. This spring discharges from the Barton Springs

Department (WPD) staff and by University of Texas biologists (Chippendale, et. al. 1993). Based on City of Austin monthly surveys (Appendix B) of the pool and experimental cleaning data (Appendix C), it appears that the main surface population in the pool is located near the main and side spring outlets, the section of gravel beach northeast of these springs, and the narrow fissures with springflow that traverse a portion of the shallow end of the pool.

City of Austin monthly survey counts since July 1993 in Barton Springs Pool have ranged from 1 to 45 individuals. These surveys sample the main surface population but are not a total count for the entire pool. The City of Austin monthly transect methodology covers approximately 185 square meters (2,000 sq. ft.) of this area. Included along these transects are all of the main spring discharges. In addition, biologists inspect the deep end and the beach area to note the presence/absence of salamanders. However, the large area of the beach makes this a difficult place to survey. During the transect surveys, City biologists document the number and size of salamanders, including salamander larvae and eggs, as well as the presence of aquatic fauna, flora, and substrate conditions. These monthly surveys include transects outside of the known habitat of the salamander to determine if the range of the salamander is increasing. Biologists also complete a general survey of plant species, fish and invertebrate species, and substrate conditions, including the presence/absence of sediment and algae along the beach area and throughout the deep end of the pool.

Additional survey data were gathered by the City of Austin and the Service during the experimental pool cleanings conducted March through September 1998 (Appendix C). Results from experimental pool cleanings indicate that salamanders can also be found on the shallow (depth of 1.3 meters) beach area along the north side of the pool. Intensive survey efforts have failed to locate salamanders in the shallow end upstream of the fissure area. An August 1998 SCUBA survey conducted by the Service and the City found 71 salamanders. Based on this information and several other comprehensive surveys conducted by the City of Austin and the Service, the number of salamanders inhabiting surface habitat in Barton Springs Pool is estimated to be approximately three to five times the number of individuals counted during the regular monthly surveys. Accurate population estimates for the Barton Springs salamander are not available and there are not good data for accurate assessments. It is impossible to obtain an accurate estimate because of the inability to obtain a reliable sample. The rocks, crags, large surface area of the springs, and inaccessibility of the aquifer make it impossible to obtain an accurate estimate.

The experimental pool cleanings were conducted to determine the impacts of the pool cleaning process on the salamander and its habitat. With the current gate system, the entire pool must be lowered 1.3 meters (4 feet) to clean the shallow end. During drawdowns, the shallow end, the fissures, and the beach become exposed. In addition, drawdowns may cause habitat at the adjacent springs to become exposed, depending on the aquifer level. During the experimental cleanings, all exposed areas were searched extensively for salamanders. The number of salamanders found in the fissures ranged from 0 to 19. No salamanders were observed in the shallow end, and the range observed on the Beach was 0 to 84. The number found stranded at Eliza ranged from 0 to 17. Although the water levels dropped at Old Mill Spring (Sunken Garden) no areas became exposed. It became clear from the experimental cleanings that current

ceases to flow and salamanders become stranded as the spring rapidly drains and aquatic habitat is no longer available. In March 1997, 188 salamanders were found stranded. Recent attempts by the City of Austin to maintain aquatic habitat (short-term) by pumping spring water from Barton Springs into Eliza Spring during pool lowerings have resulted in dramatic increases in the number of salamanders observed during population surveys. As in the main springs, areas of appropriate salamander habitat, principally composed of cobble and healthy aquatic macrophytes, have decreased in recent years due to the deposition of silt and sediment in the bottom of the spring enclosure. Moreover, the loss of habitat is not solved by the short-term pumping.

Salamanders have been found sporadically in the bottom of Old Mill Spring (Sunken Garden) and in the surface flow from Old Mill Spring to the mainstem of lower Barton Creek. Regular salamander surveys in Old Mill Spring have been difficult to implement due to the deep layer of large rocks that covers the bottom of the springs. The highest observed was 60 during a survey of half the spring pool.

Surveys conducted in 1995 and 1996 at Upper Barton Spring failed to detect the presence of salamanders. However, in April 1997, a survey conducted by City of Austin and Service staff resulted in the discovery of 14 adult salamanders at Upper Barton Spring. This additional site has been added to the list of sites monitored on a regular basis by City of Austin biologists. Various attempts to locate salamanders at Cold Springs, Campbell's Hole, and Backdoor Springs have failed to locate salamanders. No salamanders have been found in the Barton Springs segment of the Edwards Aquifer outside of Zilker Park, Austin, Texas.

Little is known concerning the reproductive biology of the species in the wild and Barton Springs salamander eggs have not been found during surveys at the four spring locations. Recent studies with captive individuals indicate that salamander eggs are 1.5 - 2.0 mm (0.06 - 0.08 inch) in diameter when they are deposited. Young larvae develop and hatch in approximately 25 - 35 days (L. Ables, Dallas Aquarium, pers. comm.). We have no information that relates the percentage of juveniles to adult survivorship. Barton Springs salamander larvae have been found year round in the wild, and juveniles can represent up to 50 percent of the total number of individuals found at a site (see Data Appendix). It has been estimated that sexual maturity can occur when the salamander reaches a length of 2 cm (0.8 inch), (Chippendale, et. al. 1993). Juveniles have been found at all four sites. At the pool, juveniles and gravid females have been found in many areas of the pool, such as the beach, fissures, and the main spring.

The Barton Springs salamander is impacted by the quality of water in the Barton Springs Zone. The salamander has a very restricted range. The majority of pollutants that enter the Barton Springs Segment of the Edwards Aquifer must exit the aquifer by passing salamander habitat. The primary threats to the Barton Springs salamander are degradation of the quality and quantity of water that feeds Barton Springs due to urban expansion over the Barton Springs watershed.

Barton Springs receives groundwater inflows generated from the Barton Springs Zone. Periodically, surface waters overflow from Barton Creek into Barton Springs Pool during flooding events. The Barton Springs Zone consists of the Recharge Zone where rainfall and

Taxa lists for the fauna of Barton Springs Pool include 20 species of fish, 3 species of turtles, 1 species of salamander, and numerous families of invertebrates. Fish species reported in Barton Springs Pool during the past 5 years are native and non-native and range from large schools of thousands of Mexican tetras (*Astyanax mexicanus*) to single specimens of Asian grass carp (*Ctenopharyngodon idella*) and American eel (*Anguilla rostrata*). Other large fishes found in Barton Springs Pool include channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictus olivaris*) and gray redhorse sucker (*Moxostoma congestum*). Major predatory fishes include green sunfish (*Lepomis cyanellus*), bluegill sunfish (*Lepomis macrochirus*), redbreast sunfish (*Lepomis auritus*), longear sunfish (*Lepomis megalotis*), spotted sunfish (*Lepomis punctulatus*), spotted bass (*Micropterus punctulatus*), largemouth bass (*Micropterus salmoides*), and Guadalupe bass (*Micropterus treculi*). Many of the smaller sized fishes found in Barton Springs are representatives of the following species: central stoneroller (*Campostoma anomalum*), red shiner (*Cyprinella lutrensis*), blackstripe topminnow (*Fundulus notatus*), mosquito fish (*Gambusia affinis*), greenthroat darter (*Etheostoma lepidum*), and the Texas log perch (*Percina carbonaria*).

Herpetofauna in and around Barton Springs include three species of turtles and the Barton Springs salamander. The turtle species found in the pool are the red ear slider (*Trachemys scripta*), Texas cooter (*Pseudemys texana*), and snapper (*Chelydera serpentina*). Species of frogs that are common in the area include the Gulf Coast toad (*Bufo valliceps*), Woodhouse's toad (*Bufo woodhouseii*), Blanchard's cricket frog (*Acris crepitans*), spotted chorus frog (*Pseudacris clarkii*) and the Rio Grande leopard frog (*Rana berlandieri*).

Aquatic invertebrate species range from crayfish to blind isopods. The common species of crayfish found in the pool is *Procambarus clarkii*. This species has been reported to be extremely abundant at times with an apparent "crayfish bloom" occurring in the spring of 1995 when thousands of crayfish were found throughout the pool. Other non-insect invertebrates found in the pool include ostracods, aquatic earthworms, triclad flatworms of the genus *Dugesia*, glossiphoniid leeches, the amphipod *Hyalalela azteca*, the blind amphipod *Artesia subterranea* and blind isopods. Snails and limpets found at Barton Springs include members of the Physidae, Lymnaeidae, Planorbidae, and Hydrobiidae.

*Stygopyrgus bartonensis* is a small, strictly aquatic hydrobiid gastropod (snail) described in 1986 by Herschler and Longley. Little is known concerning the distribution and ecology of this gastropod, but to date, specimens have only been collected at Barton Springs Pool.

Representatives of at least 6 orders of aquatic insects have been collected in Barton Springs Pool. The recorded specimens include the genus *Argia*, a coenagrionid odonate, the plastron breathing hemipteran, *Criphocricus*, and the psephenid beetle larvae commonly known as "water penny". Larvae of baetid and heptageniid mayflies are quite common, and burrowing nymphs of *Hexagenia* have been found in the sediments downstream of the main spring discharge. And at least four families of aquatic beetles have been collected in Barton Springs Pool. Snail-case caddisflies of the genus *Helicopsyche* are also often found in large numbers in the cobble and along the sides of Barton Springs Pool.

entering Eliza Spring. In addition, the Parks and Recreation Department has designed upgrades for the Barton Springs Pool and bathhouse in compliance with the Americans with Disabilities Act (ADA). These improvements include new ramps, stairs, and railings into Barton Springs Pool that are handicapped accessible. Obviously, work related to these projects has the potential to impact salamander habitat due to sediment and construction material runoff into Barton and Eliza springs, and mitigating measures must be provided to ensure that no impact occurs before or after construction. Any potential take from these projects would not be covered under this permit. Projects in areas of the Barton Springs Zone, outside of the immediate spring discharges and salamander habitat, have been reviewed as part of this EA/HCP to determine the potential impacts on the salamander and its habitat (see Cumulative Effects Section 5.5). Issues pertinent to the potential impacts on water quality and water quantity by development and urbanization in the Barton Springs Zone need to be addressed on a regional basis.

With respect to wetlands determinations, areas subject to jurisdiction under section 404 of the Clean Water Act include the zones that fall at or below the "plane of ordinary high water" of these waterways as defined by 33 CFR 323. No wetland areas have been identified as defined by the criteria established in the 1987 Corps of Engineers Wetland Delineation Manual.

### 3.5 Geology

The Edwards Aquifer is one of the most productive and permeable carbonate aquifers in North America. The Barton Springs Edwards Aquifer is comprised of the Georgetown Formation and Edwards Group (Rose, 1972). This segment of the Edwards Aquifer is divided into two distinct geographic components: the recharge zone, a surface outcropping of the Georgetown and Edwards limestones, and the contributing zone, the area upstream of the Recharge Zone that is underlain by the Glen Rose Formation. The recharge zone covers an area of approximately 90 square miles, while the contributing zone covers approximately 264 square miles. Recharge areas of the aquifer exhibit numerous recharge features such as caves, fissures, fractures, and dissolution voids. Since the Barton Springs segment of the Edwards Aquifer is a karst limestone aquifer with high permeability, water can move rapidly from recharge features to Barton Springs and other ancillary discharge points. This rapid or "conduit" transport of water does not allow for filtration or mitigation of pollutants and sediments that may be associated with point and nonpoint source pollution throughout the recharge and contributing zones. The Texas Natural Resource Conservation Commission has identified the Edwards Aquifer as one of the most sensitive aquifers in Texas (TWC 1989, TNRCC 1994).

### 3.6 Land Use

Land use on properties surrounding the endangered species sites has been restricted to public park land since the early 1900s when the land was deeded to the City of Austin. Barton Springs and the surrounding land was donated to the City of Austin by A. J. Zilker in 1918. In 1934, Mr. Zilker deeded 2 additional parcels of land to the City for a total of 146 hectares (360 acres) of parkland. The dam that forms the main swimming pool at Barton Springs was constructed in 1929. Upstream of Barton Springs Pool, development continues to occur outside of Zilker Park in the recharge and contributing zones of the watershed.

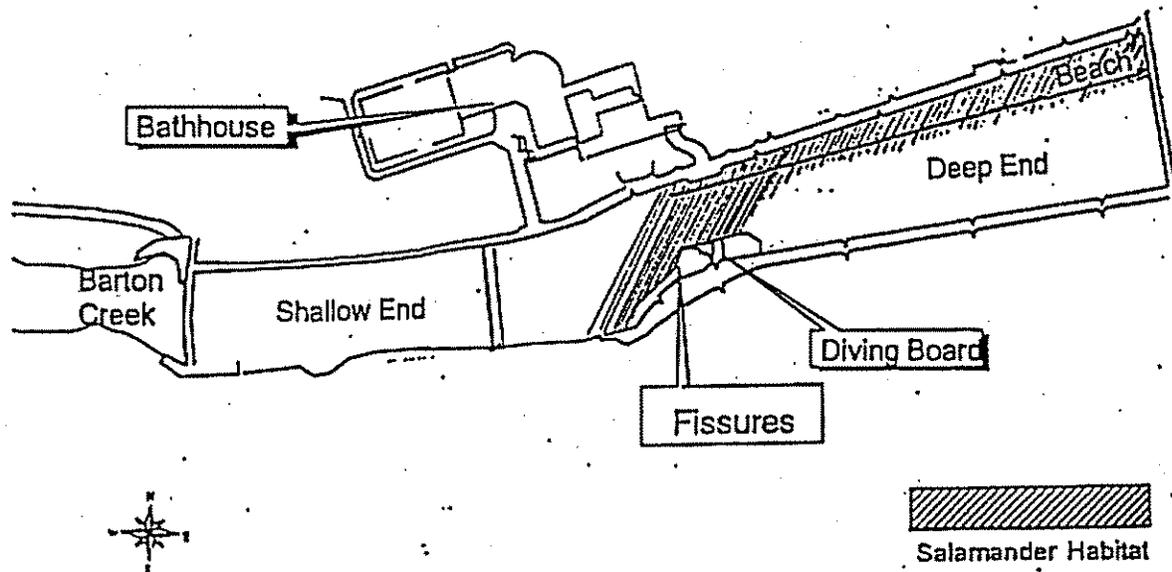


Figure 3: Areas of Salamander Habitat in Barton Springs Pool

Under the No Action alternative, an incidental take permit would not be issued. This would result in the closing of the pool. The cleaning would not be allowed because of adverse impacts on the salamander. This would also cause some salamander habitat to be buried in silt and organic debris from aquifer discharge and creek flooding. The Maintenance Procedures Prior to Listing alternative would operate the pool with the level of maintenance used prior to the listing of the salamander as endangered (May 1997). Adverse impacts of this alternative are the stranding of salamanders during the drawdowns for the cleaning of the deep and shallow ends of the pool and increased siltation of habitat due to shallow end cleaning activities. In addition, a swimmer/wader could cause take by accidentally stepping on a salamander in the fissures, beach area, and Old Mill Spring. Under the Preferred Alternative, the potential for take is associated with pool drawdown, cleaning, and use (wading and standing). This alternative proposes modifications to minimize and/or mitigate the potential take by swimmers/waders and adverse impacts of cleaning. Under the Reduced Level of Maintenance alternative pool cleaning would occur once per month. Impacts of this alternative include an increase in incidental take of salamanders due to habitat loss as well as slippery and murky swimming conditions that could result in pool closures. In addition, salamanders would become stranded during drawdowns and may be crushed accidentally by swimmers. While Barton Springs Pool is viewed as an ecosystem, the discussions below will divide the pool into sections in order to address in detail the various maintenance procedures.

#### 4.1 Alternative 1 - No Action

Under this alternative, no incidental take permit would be issued. The pool would not be cleaned or lowered, and as a result of not cleaning, the pool would be closed for safety reasons. Algae, silt, and sediment would lead to slippery surfaces and reduced water clarity. The fissures, beach, and deep end would receive excess silt and sediment that would lead to increased embeddedness in salamander habitat areas. In addition, to minimize the possibility of incidental take, the adjacent springs, including Eliza, Upper Spring, and Old Mill Spring (Sunken Garden) would be

maintenance does not disturb the vegetation. In addition, while the deep end is lowered, high-pressure sprayers would be used to clean the steps, the side walls, as well as the bedrock areas directly downstream and upstream of the diving board.

During the off-season (October through February) the pool would be lowered once a week for routine maintenance of the shallow and deep ends. This weekly maintenance includes algae and sediment removal. In March, before the main swimming season begins, the pool would be lowered for two weeks for annual maintenance and cleaning. To ensure minimal impact to the salamanders at all of the spring locales, City staff would closely coordinate this major maintenance effort. A City staff biologist would be present to monitor before and during pool drawdown for maintenance procedures.

Swimmers would be prohibited from searching for and capturing salamanders or otherwise disturbing the gravel substrate within the salamander habitat in the pool by the posting of signs that discourage harassment of the wildlife that is found in the pool area. SCUBA diving or the use of any other equipment other than the usual recreational swimming gear (such as snorkels and underwater cameras) by anyone other than authorized City and Service staff would not be allowed without proper authorization. No animals (other than humans) nor any plant, fungus or other organism may be purposely introduced into Barton Springs Pool without the approval of City and Service biological staff.

There would be the potential for a spill or leak of petroleum products (gasoline, hydraulic fluid, or brake fluid) from the use of diesel and gasoline powered machinery in the pool area. This could result in the take of salamanders. The City would provide spill and response training for staff performing maintenance activities.

Under this alternative, historical and structural restoration at Eliza and Old Mill springs would be pursued using available grant funds and private donations. Maintenance at these adjacent springs as well as Upper Barton Spring would be minimal with litter removal and limited habitat restoration. In addition, the installation of a pump system would provide spring water at adjacent springs during low flow conditions. The main purpose of the pump system would be to provide spring water for routine pool maintenance. However, during low aquifer conditions the pump system would also be used to provide spring water to Eliza and Old Mill (Sunken Garden) springs while the main pool is lowered for cleaning. The pump system would only be used for this purpose when the drawdown of the pool causes spring flow to cease at these adjacent springs. The period of drawdown under these conditions would be usually limited to five to six hours for cleaning.

#### 4.3 Alternative 3 - Preferred Alternative

Barton Springs Pool is a favored recreational area for swimming, and, with the implementation of measures discussed, recreational use and conservation of the salamander are compatible. The continued use of Barton Springs Pool as a recreational facility would provide people the opportunity to appreciate this rich natural resource and better understand the relationship between a healthy aquatic environment and water quality. Public education and public support

not been tested. Another option to be considered would be a non-toxic paint that is used to retard the growth of algae. If an alternative method proved to be effective in Barton Springs, then there would not be a need for a water control structure. The sediment that accumulates in the shallow end would be vacuumed out without lowering the water level.

Given that salamanders are utilizing sections of the shallow fissures area, thin limestone slabs would be placed over parts of the shallow fissures so that a swimmer would not accidentally step into a fissure and crush a salamander. This would minimize the possibility of incidental take by swimmers in this section of the pool. To eliminate incidental take in the fissures from pool lowering for the purpose of cleaning the shallow end, the shallow end would be cleaned without lowering the main pool. In the event that the main pool is lowered which would require concurrence by the Service, a spring water supplied sprinkler system would be used on the fissures area to prevent stranding. In addition, the fissures area would be cleaned quarterly or as needed using a combination of low-pressure hoses and wire hand brushes.

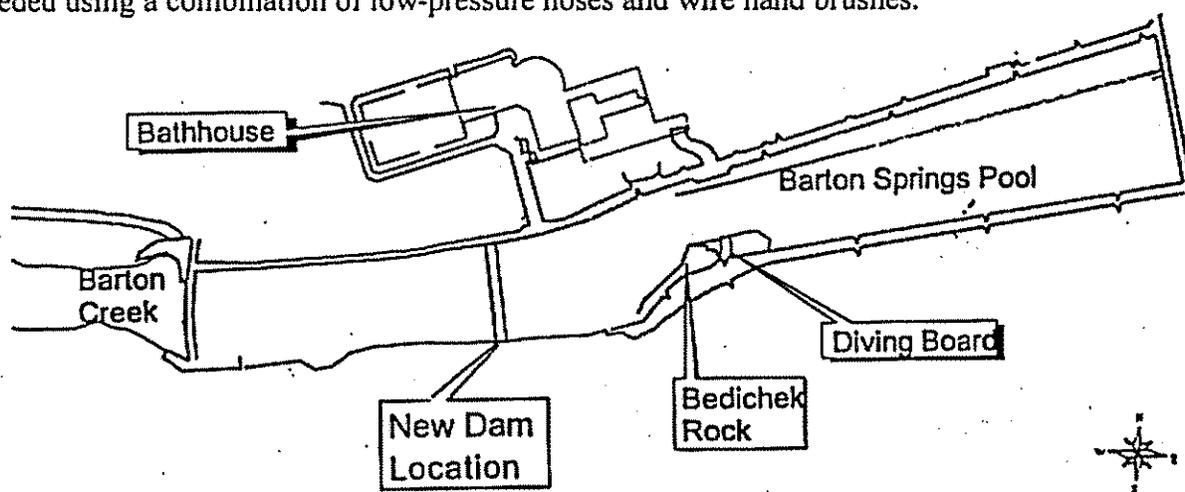


Figure 4: Location of proposed water control structure in Barton Springs Pool

Modifications will be made in the beach area to protect the salamander and provide for swimmer safety. The gravel/cobble beach would be moved toward the center channel and lowered so that the water depth over the beach area would be a minimum of 2 meters (6.5 feet); lowering the beach would prevent the accidental crushing of a salamander by a swimmer. The City would maintain approximately 11,000 square feet of habitat in this area. Gravel/cobble of appropriate size would be used to replace sections of habitat that are washed away. In addition, the beach would be replaced with walkways and wading areas made of exposed aggregate concrete, limestone, or other hardened surface. This surface would be installed at a depth of approximately 4-feet (depth of current beach) along the north wall between the lower dam and the main steps. A hand railing would be installed along the wall. This would provide a shallow place for swimmers to rest that is not salamander habitat.

Lowering the beach would have a short-term impact on the salamander, but, ultimately, this activity would result in the enhancement of habitat. Major construction activities have occurred in the pool in the past when the dams, bypass, skimmer drain, and beach were constructed. This

would be notified by pool management before the pool is lowered. The gates would not be pulled if the flows are less than 54 cfs or the Endangered Species Biologist states that the pool should not be lowered. If flooding of the pool does occur, the City and the Service will collaborate in the evaluation of the impact to the springs and the salamander. After the evaluation is completed, the City will pursue proper mitigation measures with the concurrence of the Service.

In addition to the measures above, the City would maintain a viable captive-breeding program for the Barton Springs salamander. The Service, in its final rule, listed the potential for catastrophic spill as one of the primary threats to the species. The City's captive breeding program would provide a replacement population if needed. Separate populations from adjacent springs would be kept to ensure the maintenance of genetic diversity.

At the adjacent spring sites, the City would restrict access to Eliza Spring and Old Mill Spring (Sunken Garden) to ensure no disturbance of salamander habitat at these areas. In addition, restoration and enhancement efforts would occur at both locales. These restoration efforts would include storm water runoff mitigation, enhancement of the gravel substrate near the spring outlets, removal of silt and organic debris in habitat areas, and planting of native (or removal of non-native types) of aquatic vegetation. In addition, a pump system would be installed to provide spring water for routine maintenance to clean out sediment that accumulates. During the period of time before measures are in place to clean the shallow end without lowering the entire pool, this pump system would be used to prevent Eliza and Old Mill springs from going dry due to drawdown. After the ability to clean the shallow end is in place, the pool would not be drawn down if it would cause the adjacent springs to go dry. Appropriate signage would be erected for public education and outreach at both Eliza and Old Mill springs. Access to Eliza and Old Mill springs would be restricted to ensure no disturbance of salamander habitat at these springs. In the past, inspections of Old Mill Spring have found a 30-gallon trash can, litter, disposable diapers, and exotic fish, as well as human disturbance of habitat areas.

Under the preferred alternative, the City and the Service agree to measures for the mitigation of incidental take of the salamander as described in Section 6.0 of this document. As part of this alternative, the Applicant proposes the following measures:

- Cleaning of the shallow end without lowering the pool
- Lowering of the beach
- Cleaning of the fissures, the new "beach", and adjacent springs habitats using low-pressure hoses
- Installation of an underwater walkway and a stainless steel railing in the deep end
- Maintenance of 11,000 square feet of "beach" habitat
- Removal of sediment and debris from the shallow end of the pool during cleaning
- Removal of silt and sediment in non-habitat areas of the deep end using a combination vacuum system and high pressure hoses
- Modification of the gate system for the drawdown of Barton Springs Pool
- Modification of the bypass system to minimize the frequency of floods in the pool

be used to clean the steps and side walls as well as the bedrock area just downstream of the diving board.

Swimmers would be discouraged from searching for and capturing salamanders or otherwise disturbing the gravel substrate within the salamander habitat in the pool by the posting of signs that discourage harassment of the wildlife that is found in the pool area. SCUBA diving or the use of any other equipment other than the usual recreational swimming gear (such as snorkels and underwater cameras) by anyone other than authorized City and Service staff will not be allowed. No animals (other than humans), nor any plant, fungus or other organism may be purposely introduced into Barton Springs Pool without the approval of the City and the US Fish and Wildlife Service.

Additionally, when diesel and gasoline powered machinery is used in the pool area during cleaning there is the potential for a spill or leak of petroleum products such as fuel, hydraulic fluid, or brake fluid which may also result in the take of salamanders. The City would provide spill and response training for staff performing maintenance activities.

With regard to adjacent spring sites, the City would restrict access to Eliza Spring and Old Mill Spring (Sunken Garden). Restoration and enhancement efforts are currently proposed at both locales. These restoration efforts would include stormwater runoff mitigation, enhancement of the gravel substrate near the spring outlets, removal of silt and organic debris in habitat areas, planting of native or removal of non-native types of aquatic vegetation, and the installation of a pump system to provide spring water during pool cleanings under low flow conditions. The pump system would only be used at these springs when natural spring flow ceases during pool drawdown. In addition, attractive wrought iron fencing would be installed to limit public access, and appropriate signage would be erected for public education and outreach. This would protect Old Mill Spring from vandalism; recent inspections have found a 30-gallon trash can, litter, disposable diapers, and exotic fish, as well as human disturbance of habitat areas.

#### 4.5 Alternatives Not Considered in Detail

Proposed alternatives not considered in detail in this document include: relocation of the salamander surface population, capping the adjacent spring locations in Zilker Park to prevent the salamanders from exiting the aquifer and establishing viable surface populations. Another proposed alternative not considered in detail is the demolition of the existing dam that forms Barton Springs Pool and the construction of a new dam and pool downstream of the spring outlets in the existing Barton Springs Pool.

The relocation of the salamander to alternate spring sites may remove a portion of the population of the species from the primary threats in this geographic area, but it would not guarantee the long-term viability and recovery of the species. New sites with similar physical and chemical characteristics would have to be identified and protected from the type of threats that currently endanger the long-term survival of the species in Zilker Park. In addition, the introduction of non-endemic species, whether or not by design, has shown to be problematic and potentially catastrophic from a biological and ecological perspective.

Creek downstream of Barton Springs Pool. The potential effects to each of these areas of concern will be discussed in detail in the individual analysis of the four alternatives.

It is not within the scope of the four alternatives to address two of the primary threats to the species, degradation of water quality and reduction of water quantity in the Edwards Aquifer. Nor do the alternatives directly address the impact of a potential catastrophic event in the recharge or contributing zones of the Barton Springs watershed. However, the NPDES permit does address these concerns. According to the conditions of the permit, the City must reduce loadings of petroleum hydrocarbons, heavy metals and sediments to Barton Springs from current development and other activities located within the Barton Springs Zone, within the City limits, and subject to the City's jurisdiction. This reduction in loadings will be achieved through the measures set out in the NPDES stormwater permit and its reasonable and prudent measures listed in Appendix A.

Continued use of the springs and the pool by swimmers and preservation of the aquatic biota both depend upon the non-degradation of water quality and water quantity and measures that will prevent a catastrophic event upstream of the springs. In fact, events that have resulted in the degradation of water quality and quantity during the past two decades have resulted in the restricted use of the pool by swimmers and at times a decrease in the available surface habitat for the salamander. Issues concerning non-degradation of water quality and quantity and the implementation of measures to prevent catastrophic events need to be addressed on a regional basis by the appropriate public and private agencies and councils. These effects are summarized under the Cumulative Effects Section 5.5.

### 5.1 Environmental Consequences of Alternative 1 - No Action

Under this alternative, Barton and adjacent springs would not be used for recreational activities and maintenance and management practices would be minimal. The pool would not be cleaned or lowered. Algae, silt, and sediment build-up would likely lead to slippery surfaces and turbid water conditions. Due to safety concerns and potential for take, the pool would be closed as a recreational facility. In addition, it is likely that excess silt and sediment would build up along the beach area and the deep end of the pool. At the adjacent spring sites, restoration and habitat enhancement efforts would not be pursued and public outreach programs would be minimal. Fences would be erected to restrict public access at the adjacent spring sites.

#### 5.1.1 Effects of Alternative 1 on the Aquatic Biological Community

Under this alternative, maintenance and recreational activities at Barton and adjacent springs would cease. Silt and sediment would be allowed to build up in all areas of the springs and algal growth would not be removed. Analysis of City of Austin data (June 1993 - August 1998) and historical data indicates that the springs experience episodic events such as flooding, droughts, algae blooms, increased levels of silt and sediment, and rapid increases or declines in aquatic populations such as crayfish or fish. These episodic events, in combination with current baseline levels of sediment and nutrient loading, would result in habitat modification, as well as major changes in the ecology and population dynamics of the springs.

Under this alternative, the Barton Springs salamander would be impacted by the lowering of the pool under varying aquifer conditions. The fissures area becomes exposed when the pool is lowered, leaving salamanders, fish, invertebrates, and macrophytes subject to desiccation. The pool drawdown also exposes the beach area along the north side of the pool. Mortality of salamanders, fish, crayfish, and invertebrates has been documented during these conditions.

The maintenance procedures that would be employed in the pool generate a significant quantity of sediment and detritus. Silt fencing and sandbags would be utilized to prevent this material from entering the deep end of the pool where degradation of salamander habitat and water clarity may occur. In the past, pumping methods for removal of this material have not been 100 percent effective, and some of this detritus enters the deep end of the pool after the weekly pool cleaning is complete. This material, along with naturally occurring sediment that discharges from the aquifer, contributes to the accumulation of silt and sediment which has been a problem along the beach area and the deep end of the pool. The silt and sediment also clogs the interstitial spaces in the gravel and cobble, which is prime habitat for the salamanders and their invertebrate prey base. These organisms depend on the interstitial spaces for protection, habitat, and an abundant supply of well-oxygenated water.

In addition to these potential impacts in the main pool, maintenance procedures under this alternative may cause the springs at Eliza and Old Mill (Sunken Garden) to dry up when the pool is lowered. On two occasions in January and February 1997, before the Barton Springs salamander was listed as endangered by the Service, this activity resulted in the documented mortality of salamanders at Eliza Springs. During the experimental pool cleanings (March - September 1998), individual salamanders were found stranded during pool drawdown on five occasions in Eliza Spring.

#### 5.2.1 Effects of Alternative 2 on the Biological Aquatic Community

This alternative would result in the incidental take of salamanders during operational hours and routine pool maintenance. Although most of the available habitat in the main pool for the Barton Springs salamander is associated with the areas of spring flow, salamanders have also been found along the beach area on the north side of the pool. During routine maintenance drawdown, individual salamanders may also become stranded in the fissures that traverse a portion of the shallow end of the pool. These fissures are suitable habitat for the Barton Springs salamander.

Wildlife will continue to inhabit all of the regions of Barton Springs and the available habitat at adjacent springs. Recreational activities in Barton Springs and pool drawdown and maintenance have the potential to adversely impact individual organisms. During the lowering process, various types of organisms may become stranded in the gravel and cobble. It is not uncommon to find snails, crayfish, and darters stranded in small pools or interstitial spaces in the beach area of the pool, along with various invertebrate species. And recent surveys have found salamanders in the beach and fissure areas. Fauna that inhabit the deeper areas of the pool, such as sunfish, bass, suckers, turtles, and salamanders appear to be unaffected by the lowering process. In Eliza Spring and Old Mill Spring (Sunken Garden), the flora and fauna may also be affected by pool maintenance procedures that occur during low flow conditions. These impacts will be minimized

**Table 1: Estimated Incidental Take by area/activity for Alternative 2**

Area/Activity	# Salamanders	x60 drawdowns	Total Take/Year
Beach	1-84	60-5040	60-5040
Fissures	0-19	0-1140	0-1140
Recreation	400	---*	400
Eliza Spring	0-17	0-1020	0-1020
Old Mill Spring	1	60	60
TOTAL(per year)			520-7660

\* Not associated with pool drawdown

Unfortunately, little is known concerning the surface population of *Eurycea sosorum* at the Upper Barton Creek site. At present, it is difficult to assess the potential impact of activities at this location since neither the range nor distribution of the salamander population is fully known at Upper Barton Spring.

### 5.3 Environmental Consequences of Alternative 3 - The Preferred Alternative

The Preferred Alternative would allow the continued use of Barton Springs Pool as an aquatic recreational facility operated by the City of Austin. Under this alternative, the shallow end could be cleaned an unlimited number of times; the cleaning of the shallow end and cleaning of the deep end would be conducted without lowering the pool. There would be no incidental take associated with the cleaning of the shallow end or the cleaning of the non-habitat areas of the deep end. Measures proposed in this document are designed to minimize and mitigate adverse impacts of pool activities on the salamander, as well as enhance salamander habitat and provide a safe recreational opportunity for swimmers. The continued use of Barton Springs Pool as a recreational facility would ensure that people have the opportunity to appreciate this rich natural resource and better understand the correlation between a healthy aquatic environment and water quality.

#### 5.3.1 Effects of Alternative 3 on the Aquatic Biological Community

The Preferred Alternative would minimize the impacts of pool drawdown and pool maintenance on the aquatic flora and fauna of the pool. The shallow end would be cleaned without lowering the main pool. The sediment and debris resulting from this cleaning would be pumped out of the pool. The deep end would be cleaned with the water level full. Since the cleaning will be conducted without lowering the pool, aquatic organisms will not be exposed as a result of pool maintenance. If necessary, the pool may be drawn down, with Service concurrence, a maximum of four times for cleaning. In addition, lowering of the beach area would ensure that organisms that inhabit this area would not be accidentally stepped on or exposed in the event of a pool drawdown.

In addition, the pool may be lowered in preparation for the potential flooding of Barton Creek. During the preparation process, moveable objects such as trash cans, fencing, and other items would be moved to higher ground. The gates in the dam could be moved in order to lower the

## 5.4 Environmental Consequences of Alternative 4 - Operating Barton Springs Pool as a Recreational Facility with a Reduction in the Frequency of Maintenance Procedures

Under this alternative, the City of Austin would continue to operate Barton Springs Pool as an aquatic recreational facility with a reduced frequency of maintenance. Routine pool maintenance would be restricted to once a month. Less frequent pool cleaning would result in increased silt and algae in all areas of the pool and increased slipperiness in the shallow end.

### 5.4.1 Effects of Alternative 4 on the Aquatic Biological Community

Decreasing the frequency of routine maintenance would reduce the number of times the main pool is lowered to expose the shallow end for removal of silt and algae. As a result, levels of suspended solids and algae growth may increase not only in the shallow, but also the deep end of the pool. Higher levels of suspended solids would result in more turbid conditions throughout the pool. In the past, City of Austin biologists have documented the decline in the number of salamanders in the main pool due to increased sediment and the loss of appropriate habitat (City of Austin, unpublished data). City of Austin biologists have also observed a decline in aquatic macrophytes due to thick layers of silt and algae covering the leaves of the plants. At times, this layer effectively hinders the transmission of light and subsequent photosynthetic processes and normal plant growth.

This action would also include efforts to increase aquatic vegetation in Barton Springs Pool, Eliza Spring, and Old Mill Spring (Sunken Garden). These plants stabilize the silt and sediment in the deep end of the pool, provide nutrient uptake from the water column, and offer suitable habitat for many species of fish, turtles, invertebrates and salamanders.

Wildlife would continue to inhabit all of the regions of Barton Springs and the available habitat at adjacent springs. Recreational activity in Barton Springs Pool has minimal impact on the fauna of the pool. Under a reduced maintenance schedule, some areas of wildlife habitat may be lost due to increased levels of sediment and accumulations of algae growth. Fauna that inhabit the deeper areas of the pool that are not exposed due to drawdown, such as sunfish, bass, suckers, turtles, and salamanders appear to be unaffected by the lowering process but may be impacted by layers of algae and sediment. In Eliza Spring and Old Mill Spring (Sunken Garden), the flora and fauna are most affected by pool maintenance procedures that occur during low flow conditions. These impacts would be minimized by the reduced maintenance schedule and the installation of the pumping system that would provide spring water to both sites when the pool is lowered for cleaning under low aquifer conditions.

### 5.4.2 Effects of Alternative 4 on Recreational Activities

This alternative may result in increased slipperiness in the shallow end and increased silt and sediment in the deep end of the pool. Safety concerns may require the City of Austin to restrict access in the shallow end of the pool if it is deemed unsafe. Under periods of high use during the summer season, silt and sediment are suspended in the water column causing reduced visibility. This would become a safety concern that may result in restricted recreational use of the pool.

The potential of the Edwards aquifer as a karst aquifer to rapidly transmit large volumes of water with little filtration makes it highly susceptible to pollution (Slade et al. 1986). Major potential sources of groundwater contamination have been attributed to leaking underground storage tanks, pipelines, septic tanks, accidental spills, pesticide and fertilizer use, and construction activities (TWC 1989, EPA 1990). Due to its quantity, sediment from soil erosion is the singularly greatest pollutant of surface waters and can carry most pollutants found in water bodies (Menzer and Nelson 1980). Barton Springs is believed to be heavily influenced by the quality and quantity of runoff, particularly in the recharge zone (Slade et al. 1986). Thus, increasing urban development over the area supplying recharge waters to the Barton Springs segment can threaten water quality. Increased demands on water supplies from the aquifer can reduce the quantity of water in the Barton Springs segment and at Barton Springs. The level of water in the aquifer regulates the volume of springflow. Spring discharge decreases as water storage in the aquifer drops (Slade et al. 1986). As urbanization in the outlying areas of Austin expands and reliance on groundwater supplies increases, the number of wells and the total volume of water withdrawal is also expected to continue to increase.

Survey information indicates that the Barton Springs salamander and its prey base are vulnerable to changes in water quality and quantity; in fact, individual salamanders have not survived certain impacts such as the dewatering of spring sites (USFWS 1997). One of the most immediate threats to the Barton Springs salamander is siltation of its habitat, owing primarily from construction activities in the Barton Creek watershed (Slade et al. 1986, City of Austin 1991). In addition to covering habitat, siltation may clog the gills of aquatic species, smother eggs, reduce the availability of spawning sites, fill and block recharge features and underground conduits, restrict recharge and groundwater storage and volume, reduce light transmission needed for photosynthesis, food production, and the capture of prey by sight feeding predators, and expose aquatic life to contaminants that readily bind to sediments (EPA 1986, Schueler 1987). In addition to these factors, the limited range of the Barton Springs salamander and the possibility of eliminating the entire species through chronic habitat degradation and/or one or more catastrophic events makes urban development over the Barton Springs watershed a significantly adverse impact.

The threat of spill, including potentially catastrophic ones, will increase as urbanization expands over the watershed. Pollutant loadings in receiving waters, particularly in areas that have little or no pollution controls, generally increase with increasing impervious cover (Schueler 1991). By the year 2040, the population in the City of Austin will experience a projected increase of more than 400% and undeveloped areas will decrease by 40%. The projected increase in population and impervious cover will result in an increased pollutant concentration by 214% and a decrease in the average spring flow by 6% (City of Austin 1998).

As a result of decreasing water quality in the aquifer, there is an increasing rate of sediment and toxin accumulation and algal blooms in Barton Springs Pool. The level of effort needed to maintain a safe environment for the salamander and swimmers and Barton Springs will likely intensify with increasing urbanization and declining water quality and quantity at Barton Springs.

Until the dam or comparable water control device is installed in the shallow end of the pool, a minimum of four biologists will be present at drawdown to search for stranded salamanders. After installation of the water control device, a minimum of two biologists will be present when the pool is lowered.

4. The City of Austin will modify the existing gate system on the lower dam for the drawdown of the pool. The new gate system will be designed to control the rate of drawdown and the level of water in the pool. The current system is an all or nothing approach that does not allow control or manipulation of the drawdown process, which is most critical during low aquifer conditions. The new gate system will be in place within one year of the issuance of this permit. If low aquifer conditions (flows less than 54 cubic feet per second) occur during this one-year period, the City of Austin will modify or suspend pool maintenance procedures (in consultation with the Service), to minimize and mitigate incidental take of salamanders.
5. The City of Austin will install a pump system to provide spring water for pool maintenance. The pump system will also provide spring water for the fissures areas during pool drawdown. This pump would use spring water from the main pool. This measure will be in place within six months of permit issuance.
6. The City of Austin will clean the shallow end of Barton Springs Pool without drawdown of the entire pool. One option is to install a water control structure between the shallow and deep ends of the pool to create a permanent barrier between the cleaning operations and the main salamander habitat. The purpose of this water control structure is to eliminate the drawdown of the deep end during routine cleaning of the shallow end. This measure will be in place within six months of permit issuance. If the installation of the water control structure is not completed within the six month deadline due to construction delays or adverse weather conditions, the City of Austin will modify or suspend pool maintenance procedures (in consultation with the Service), to minimize and mitigate incidental take of salamanders.
7. The City of Austin will modify the beach area in Barton Springs Pool. Portions of the beach area will be replaced with walkways and wading areas made of exposed aggregate concrete, limestone or other hardened surface. The remaining beach area will be lowered to a minimum depth of 2 meters (6 1/2 feet) and additional salamander habitat will be created to mitigate for any loss of habitat. This measure will be in place within six months of permit issuance.
  - a) The City of Austin may clean the walkway on an as needed basis (~ 1 per week) using pressure washers (underwater) or other agreed to means.
  - b) The salamander habitat would be cleaned using low-pressure hoses or other agreed to means. This cleaning would be done quarterly or as needed to keep the upper 2-3 inches of habitat from becoming embedded with sediment.

the frequency of floods that affect Barton Springs Pool. A more efficient system will be in place within one year of the issuance of this permit.

15. The City of Austin will implement a program to increase public awareness and community support for the salamander and the Barton Springs portion of the Edwards Aquifer. The **SPLASH!** Exhibit at Barton Springs Pool will be a major focus of this effort.
16. Access to Eliza Spring and Old Mill Spring (Sunken Garden) will be restricted to ensure no disturbance of salamander habitat at these spring areas. These sites will be used as outdoor educational facilities for the study of the biology and ecology of Central Texas springs. These measures will be in place within one year of permit issuance.
17. Educational signs (kiosks) will be installed to enhance public awareness of the salamander and aquifer. Outdoor educational displays will highlight the biology and ecology of the Central Texas springs with emphasis on the Barton Springs salamander. These measures will be in place within one year of permit issuance.
18. The City of Austin will set up a fund for conservation and research efforts for the Barton Springs salamander. The City will deposit \$45,000 annually (for the term of the permit) into this fund from the revenues generated by Barton Springs Pool. This fund will also be open to donations from any group or private individual. A committee of technical representatives will decide the allocation of money from this fund. At a minimum, the committee will consist of one technical representative from the City and one technical representative from the Service. These technical representatives must be experienced in salamander biology. Other committee members could include State, County, University or other qualified biologists and karst aquifer hydrogeologists and swimmer/stakeholder representatives. The City and the Service would both retain veto power in deciding how the money is allocated. The funds will be used for study of salamander biology, captive breeding and refugia; watershed related research, improved pool cleaning techniques, education, and/or land acquisition. The committee will decide how the money will best be spent. The funding will be in place within six months of permit issuance.
19. The City of Austin will deposit \$10,000 (in addition to the \$45,000 mentioned above) into the conservation fund. This will mitigate for the incidental take that occurred as a result of cleaning the pool and operation from May 30, 1997 (listing effective date) to the date the permit is issued. The fund will be set up and the money deposited within 6 months of permit issuance.
20. The City of Austin will prohibit the use of high-pressure hoses in salamander habitat.
21. The City of Austin may remove woody debris by any methods approved by the Service. All debris will be visually inspected for salamanders before and after removal.
22. In the event of a flash flood or potential flash flood, it is necessary to prepare Barton Springs Pool area to limit damage. To prepare for such an event, sections of fence, trash cans,

during the training session, and after the use of the equipment in response to any spill. This measure will be in effect upon the issuance of this permit.

34. Specific areas will be designated for the fueling and maintenance of equipment and vehicles used in maintaining the springs and the areas around the springs. These areas should be selected away from the springs to avoid the chance of impacts to the spring habitats. Absorbent pads will be used during all operation, fueling, and maintenance activities. This measure will be in effect upon the issuance of this permit.
35. The City, with concurrence of the Service, will develop a policy for silt and gravel removal in the deep end of the pool. In the past, silt removal in the deep end has been necessary after the pool has been flooded by Barton Creek, but the City does not have a policy that outlines when and how the removal of material should occur. The take estimate may change due to this policy but would probably be a minor amendment to the HCP. The new policy will be in place within one year of the issuance of this permit.
36. The City of Austin will, in concurrence with the Service, develop a catastrophic spill response plan for Barton Springs. The new plan will be in place within one year of the implementation of this permit. This plan will address spill prevention, containment, remediation, and salamander rescue.
37. Structural and habitat restoration will occur at Eliza Spring and Old Mill Spring. Habitat restoration will include enhancement of bottom substrate with clean cobble and gravel, and the establishment of native species of aquatic plants. Care will be taken to ensure that non-native invertebrates are not introduced. Old Mill Spring enhancement will include the restoration of full surface flow to the stream. All restoration efforts will be reviewed and approved by the Service before implementation. This work will be completed within two years of the issuance of this permit.
38. The City of Austin will continue to conduct monthly salamander surveys at all spring sites, in compliance with Federal and State Scientific Monitoring Permits.
39. The City of Austin will form an Advisory Committee of local and regional experts that will meet at least annually to discuss and refine pool maintenance activities. A variety of interests including swimmers, biology, and hydrogeology will be represented on this committee. In addition, this committee will review this HCP and make suggestions for needed amendments as deemed necessary. The Advisory Committee will also be responsible for refining the habitat conservation plan through adaptive management. Data collected will be used to adapt management actions. The City of Austin will be responsible for implementation of adaptive management changes.
40. The City of Austin must reduce loadings of petroleum hydrocarbons, heavy metals and sediments to Barton Springs from current development and other activities located within the Barton Springs Zone, within the City limits, and subject to the City's jurisdiction. This reduction in loadings will be achieved through the measures set out in the NPDES

Take, as defined under the Endangered Species Act, means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” The term incidental take refers to “take” that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. In the case of this HCP, pool maintenance and recreational use are “otherwise lawful activities.” There are several actions involved with pool maintenance and recreational use that could potentially cause incidental take. Under the Preferred Alternative, pool drawdown, cleaning, and use (wading and standing) causes the incidental take. The definition of incidental take can be further broken down into “harass” and “harm”.

The term “harass” in the definition of take means an intentional or negligent act or omission, which creates the likelihood of injury to wildlife, by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3). Pool drawdown is an intentional act, which creates the likelihood of injury to salamanders from stranding by disrupting normal feeding and sheltering. The Barton Springs salamander is a gill breathing aquatic animal. The stranding salamanders without access to water with oxygen, clearly constitutes harassment. The stranded salamanders must be moved to permanent water. This action, although necessary to prevent further injury, disrupts normal sheltering, and may impact normal feeding.

The term “harm” in the definition of take means an act, which actually kills or injures wildlife (50 CFR 17.3). In the case of pool drawdown, this would apply to any stranded salamander that was not found or which was killed or injured in any way. In the case of recreational use of the pool, this definition would apply to any salamanders that were stepped on by swimmers or waders and killed or injured.

**Determining Anticipated Incidental Take Levels.** In determining the amount of incidental take that will be authorized during the term of the permit, three factors must be determined: (1) the method for calculating incidental take; (2) the level of incidental take and related impacts expected to result from the proposed project activities; and (3) the level of incidental take that the section 10 permit will actually authorize (USFWS 1998).

Proposed incidental take levels can be expressed in an HCP in one of two ways. The first is in terms of the number of animals to be “killed”, “harmed”, or “harassed” if those numbers are known or can be determined. The second way to express incidental take is in terms of the amount or extent of habitat affected by a specified activity, in cases where the specific number of individuals is unknown or indeterminable.

Between the issuance of the permit and March 1999, the City of Austin will be allowed to clean the pool up to ten times using the current drawdown methods. This is to give the City time to try underwater pool cleaning techniques and/or construct a water control structure. Incidental take will be anticipated in the main pool and adjacent spring sites. This incidental take will be authorized.

*Beach Area-* A new sidewalk along the north wall of the pool will be constructed. Incidental take (harass, harm and kill), before and during construction, is anticipated because heavy equipment will be used to relocate the salamander habitat. The area will be searched and salamanders will be moved to permanent water. This will result in harassment. Not all salamanders will be found because the beach is so large (11,000 square feet) and salamanders are not easily found. Incidental take in the form of harm and kill is anticipated. This will be a one-time impact with expected long-term benefits. The new sidewalk would not be salamander habitat so little take is anticipated from underwater cleaning methods in this area. The salamander habitat will be moved over and deepened. The new salamander habitat will be cleaned using low-pressure hoses. Incidental take in the form of harassment is anticipated. This area must be cleaned because the build up of sediment would cause a loss of salamander habitat. Incidental take from the activity of cleaning salamander habitat will be authorized. In addition, the one-time incidental take associated with the sidewalk placement and relocation of salamander habitat will be authorized.

*Fissure Area-* The fissure area is known salamander habitat that is exposed when the pool is drawn down. Salamanders are stranded in this area when the pool is drawn down. Under the HCP, a pump/sprinkler system will be used to keep this area wet during drawdown. This would minimize the amount of incidental take associated with the drawdown. In addition, recreational use of this area will be allowed under the HCP. This recreational use may cause the incidental take of salamanders. Large, flat limestone blocks will be used to cover the portions of the fissure area where the probability of incidental take is the highest. This would minimize the amount of incidental take from recreational use. In addition, this area will be cleaned with low-pressure hoses and hand held wire brushes. Cleaning will maintain the areas as salamander habitat. Cleaning will prevent the build up of sediment that would cause a loss of salamander habitat. The incidental take from sidewalk construction, drawdown, and cleaning of the fissure area will be authorized.

Habitat improvement plans for Old Mill Spring include the restoration of surface flow, enhancement of gravel substrate, and the planting of native plants. Any of these activities may result in some incidental take (harass, harm, kill). Lethal take (harm, kill) is anticipated to be very low. Incidental take at Old Mill Spring (Sunken Garden) of Barton Springs salamander from pool drawdown, cleaning, and habitat improvement is authorized.

#### **Effects of take on the survival and recovery potential for the Barton Springs salamander.**

We have presented the estimated range of salamander numbers that will be taken under the proposed alternative to illustrate the anticipated effects (Table 4). Barton Springs is a very complex and dynamic system. It is extremely difficult to predict precise numbers based on this complexity. Estimates are based on the actual numbers from our experimental pool cleaning results. In all cases, the lower end of the range is 0 or 1 because these are the actual results from the experiments. We do not anticipate that the maximum amount of take would occur each year. Rather we have presented the data to describe the range of probable impacts.

The assessment of take is based upon data collected by the City of Austin from 1993-1998 and data collected by the City of Austin and the Service during March through September of 1998. In addition, data collected by various researchers have also been reviewed. Appendices B and C include data used in the assessment of take.

The take associated with recreational use would involve stepping on salamanders. In the Final Rule to List the Barton Springs Salamander as Endangered (Federal Register Volume 62, No. 83, 4/30/97), the Service stated that the use of the pool does not appear to pose any threat to the salamander. New information on the salamander distribution within the pool, suggests that incidental take from recreational use may occur. This take will be classified as harm. Our estimate of incidental take is based on the surface area available for these activities (about 40,000-sq. ft.) and the probability that salamanders will be using these areas (very low). Our incidental take estimate, from wading and standing, will be 20 salamanders per year (harmed/killed). In addition salamanders may be harassed by recreational use; our estimate of the number of salamanders harassed will be 100 salamanders per year. This would include any take at Upper Barton Springs. Because access to Eliza Spring and Old Mill Spring (Sunken Garden) will be restricted, no take from these sites is anticipated from recreation.

Under the Preferred Alternative, the pool will not be drawn down, after March 1999, without Service concurrence (except for in the preparation for a flood – see Flood Discussion below). For the purpose of estimating the incidental take involved with these drawdowns the Service will assume two drawdowns per year. While up to four drawdown could be allowed the Service does not expect this many drawdowns that are not in relation to floods. The pool will not be drawn down if the aquifer flows are less than 50 cfs or when the drawdown would cause Eliza Spring to go dry. The take associated with pool drawdown involves the stranding of salamanders. This incidental take, assuming that any stranded salamanders are found and returned to the water, will be harassment. Take (harm) from these activities may also occur if the stranded salamanders are not found. However, the possibility of missing a salamander exists and therefore the “harm” from these actions and any other actions (such as a bird eating a stranded salamander), which may cause harm, need to be included in the estimate of take. Under this alternative the pool is not drawn down when the shallow end is cleaned. There should be little take associated with cleaning the shallow end of the pool. The cleaning of the deep end of the pool will also be conducted with the water level full.

The salamander habitat on the beach area will be lowered and a sidewalk or other hardened surface will be placed adjacent to the wall. The new hardened surface (sidewalk) would not be habitat and no incidental take should occur in this area from the underwater cleaning. The salamander habitat will be moved over and deepened so that it is not exposed during pool drawdown and would not be impacted by swimmers and waders. This area of salamander habitat will be cleaned quarterly or as needed and may result in the “harassment” of salamanders. This would occur from the hosing of the habitat to keep the upper 2-3 inches free of sediment. Due to the nature of the pool and the way sediment builds up, this cleaning is necessary to maintain the salamander habitat. The activity of cleaning the 11,000 square feet of salamander habitat would cause harassment of any salamanders present.

There is a provision under this alternative that, if necessary (i.e. if flooding occurs), the pool will be drawn down, with concurrence of the Service. The number of drawdowns allowed per year, without amending the permit will be four. During drawdown, a pump system will be installed to keep a high volume/low pressure of water over the fissures during any drawdown. The pumping of springwater would alter the salamander habitat. The aquatic environment would change from

estimated impact would be 185 salamanders per year. The incidental take of Barton Springs salamanders from flood preparation and after flooding (before gates are raised) will be authorized.

Included in the assessment of take is the take that will be allowed from the time that the permit is issued until the water control structure is installed or an alternative is devised and the beach area is lowered (October 98 – March 99). Current pool cleaning methods, including drawdown, will be used along with any improvements found during this period. The Service is authorizing 10 pool cleanings using these methods. A total amount of incidental take is estimated at 1010 salamanders for these ten pool cleanings.

Population estimates for the Barton Springs salamander are not available and there are no data for accurate estimates. It is impossible to obtain an accurate population estimate because of the inability to obtain a valid sample. The rocks, cracks, large surface area of the springs, and inaccessibility of the aquifer make it impossible to obtain a consistently accurate sample. Based on the experience of finding a much higher range of salamanders in the main pool during drawdown events as compared to SCUBA surveys, we believe that the population is probably 3 to 5 times higher than the highest observed numbers found during SCUBA surveys. SCUBA surveys, in three documented instances, have underestimated the number of salamanders by 55 to 85% (55, 75, and 85). These were cases where actual SCUBA counts were completed shortly before drawdown. The number from SCUBA counts was compared to the number found during drawdown.

Using SCUBA surveys, the following numbers have been documented. Chippendale reported the highest observed number in the main pool as over 150 individuals found on a two-hour dive in the main springs (Chippendale et al., 1993). The highest number reported in recent surveys (last five years) was 71, as found by the City of Austin and the Service in August of 1998 (about 5 hours of effort). The highest observed number at Eliza Spring, not including drawdown information, has been 38 salamanders. The highest observed number at Old Mill Spring has been 60 salamanders. At Upper Barton Spring the highest observed number of salamanders is 14.

During drawdown surveys the highest numbers observed in the main pool has been 84. The highest number reported for Eliza Spring is 188. We have not had surveys in Old Mill Spring or Upper Barton Spring when the aquifer was at a level where these springs could be affected.

The HCP would allow for incidental take of salamanders from the operation and maintenance of Barton Springs and the adjacent spring sites. The majority of the authorized take will be non-lethal harassment of salamanders. This will be from drawdowns (which are greatly reduced). The best salamander habitat in the main pool is located at the outflow from the main springs. This area has never been substantially impacted by pool drawdown and represents the highest density of salamanders in the pool.

There is also a very positive effect of the current pool cleaning techniques as opposed to the techniques that were used at the time of listing. Stranded salamanders that are found are returned to permanent water. Except for work at Eliza Spring when drawdown caused it to go dry, no one

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**Table One: Programs to Address Storm Water Discharges**

**Monitoring Programs**

**1.0 Sediment Screening (Hot-Spot Screening)**

To be conducted in the watersheds located within both the Barton Springs Recharge Zone and the City of Austin Full Purpose City Limits.

**1.1 Barton Creek Watershed**

1.1.1 Sampling to be conducted by ERM-WQM staff will consist of sediment collection in the study reach within the Barton Creek Watershed.

Sampling Sites: Below major tributary or major storm sewer influent (36" or larger outfall pipe)

Sample Frequency: Once during study

Number of Samples: Based on number of identified major tributaries and/or storm sewer influences.

Sample Parameters: PAH

1.1.2 Supplemental samples will be collected at outfalls and subreaches showing significant contamination.

Sampling Sites: Below outfalls which have been identified with a high potential for development impacts based on initial screening, land use maps, and location of commercial businesses; in subreaches near initial screening sites with high values.

Sample Frequency: Once during study or as needed to identify potential source location.

Number of Samples: Based on the number of sites identified in the initial screening as potential contaminant sources.

Sample Parameters: PAH

1.1.3 Subreaches identified as significantly impacted will be resampled and submitted to LCRA laboratory for analysis.

Sampling Sites: Subreaches with high values

Sample Frequency: Once during study.

Number of Samples: Based on the number of sites identified as significant pollutant sources by initial and subsequent ELISA samples.

Sample Parameters: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver, Zinc; PAHs, Oil & Grease, TPH, Chlorinated Pesticides, PCBs; TOC; % Dry weight, Grain size

1.1.4 Sampling to be conducted by ERM-WQM staff will consist of sediment collection at Barton Springs using LCRA laboratory for analysis.

Sampling Sites: Barton Springs Pool

Sample Frequency: Quarterly

Number of Samples: 1 sample/sample event; 1 duplicate sample taken once annually

Sample Parameters: NO<sub>2</sub>+NO<sub>3</sub>, TKN, NH<sub>3</sub>, TP, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Mercury, Nickel, Silver, Zinc; PAHs, Oil & Grease, TPH, Chlorinated Pesticides, PCBs, Chlorophenol Herbicides, Organophosphorus Pesticides; Acid Volatile Sulfides;

TOC; % Dry weight, Grain size

1.1.5 Sampling to be conducted by ERM-WQM staff will consist of sediment collection at Barton Springs using LCRA laboratory for analysis.

Sampling Sites: Eilza, Old Mill and Upper Barton Springs (where sediment accumulation allows)

Sample Frequency: Annually

Number of Samples: 1 sample/site/sample event

Sample Parameters: NO<sub>2</sub>+NO<sub>3</sub>, TKN, NH<sub>3</sub>, TP, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Mercury, Nickel, Silver, Zinc; PAHs, Oil & Grease, TPH, Chlorinated Pesticides, PCBs, Chlorophenol Herbicides, Organophosphorus Pesticides; Acid Volatile Sulfides;

TOC; % Dry weight, Grain size

1.1.6 Review sediment screening data and COA planning studies previously conducted for the Barton Springs Contributing Zone to identify potential retrofit sites or alternative solutions as warranted by the sources.

Date Begin		Date Complete
Oct. 1998	<p><b>Monitoring Programs</b></p> <p><b>1.0 Sediment Screening (Hot-Spot Screening)</b></p> <p>To be conducted in the watersheds located within both the Barton Springs Recharge Zone and the City of Austin Full Purpose City Limits.</p> <p><b>1.1 Barton Creek Watershed</b></p> <p>1.1.1 Sampling to be conducted by ERM-WQM staff will consist of sediment collection in the study reach within the Barton Creek Watershed.</p> <p>Sampling Sites: Below major tributary or major storm sewer influent (36" or larger outfall pipe)</p> <p>Sample Frequency: Once during study</p> <p>Number of Samples: Based on number of identified major tributaries and/or storm sewer influences.</p> <p>Sample Parameters: PAH</p> <p>1.1.2 Supplemental samples will be collected at outfalls and subreaches showing significant contamination.</p> <p>Sampling Sites: Below outfalls which have been identified with a high potential for development impacts based on initial screening, land use maps, and location of commercial businesses; in subreaches near initial screening sites with high values.</p> <p>Sample Frequency: Once during study or as needed to identify potential source location.</p> <p>Number of Samples: Based on the number of sites identified in the initial screening as potential contaminant sources.</p> <p>Sample Parameters: PAH</p> <p>1.1.3 Subreaches identified as significantly impacted will be resampled and submitted to LCRA laboratory for analysis.</p> <p>Sampling Sites: Subreaches with high values</p> <p>Sample Frequency: Once during study.</p> <p>Number of Samples: Based on the number of sites identified as significant pollutant sources by initial and subsequent ELISA samples.</p> <p>Sample Parameters: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver, Zinc; PAHs, Oil &amp; Grease, TPH, Chlorinated Pesticides, PCBs; TOC; % Dry weight, Grain size</p> <p>1.1.4 Sampling to be conducted by ERM-WQM staff will consist of sediment collection at Barton Springs using LCRA laboratory for analysis.</p> <p>Sampling Sites: Barton Springs Pool</p> <p>Sample Frequency: Quarterly</p> <p>Number of Samples: 1 sample/sample event; 1 duplicate sample taken once annually</p> <p>Sample Parameters: NO<sub>2</sub>+NO<sub>3</sub>, TKN, NH<sub>3</sub>, TP, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Mercury, Nickel, Silver, Zinc; PAHs, Oil &amp; Grease, TPH, Chlorinated Pesticides, PCBs, Chlorophenol Herbicides, Organophosphorus Pesticides; Acid Volatile Sulfides;</p> <p>TOC; % Dry weight, Grain size</p> <p>1.1.5 Sampling to be conducted by ERM-WQM staff will consist of sediment collection at Barton Springs using LCRA laboratory for analysis.</p> <p>Sampling Sites: Eilza, Old Mill and Upper Barton Springs (where sediment accumulation allows)</p> <p>Sample Frequency: Annually</p> <p>Number of Samples: 1 sample/site/sample event</p> <p>Sample Parameters: NO<sub>2</sub>+NO<sub>3</sub>, TKN, NH<sub>3</sub>, TP, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Mercury, Nickel, Silver, Zinc; PAHs, Oil &amp; Grease, TPH, Chlorinated Pesticides, PCBs, Chlorophenol Herbicides, Organophosphorus Pesticides; Acid Volatile Sulfides;</p> <p>TOC; % Dry weight, Grain size</p> <p>1.1.6 Review sediment screening data and COA planning studies previously conducted for the Barton Springs Contributing Zone to identify potential retrofit sites or alternative solutions as warranted by the sources.</p>	Sept. 2000
Oct. 1998		Sept. 2003
Oct. 1998		Sept. 2003

City of Austin

Appendix A

Table One: Programs to Address Storm Water Discharges

	Date Begin	Date Complete
<p>2.2.3 Flow and water quality will be monitored at a newly established USGS discharge measurement station.</p> <p>Sampling Sites: Just upstream of Barton Springs</p> <p>Sample Frequency: 7 events/year; 3 storm events and 4 baseflow</p> <p>Number of Samples: 4-5 samples (storm events); 1 sample (baseflow)</p> <p>Sample Parameters: USGS Lab-Temp, pH, Conductivity, TDS, Turbidity, DO; TSS; Fecal Colif &amp; Strep; NO3+NO2, NH3, TKN, TP, Diss P; BOD, COD, TOC; Flow; 3 Heavy Metals; Chlorophyll A (2 baseflow samples)</p>	<p>Oct. 1998</p>	<p>Sept. 2003</p>
<p>2.3 Edwards Aquifer Springs, Barton Springs Pool-Sampling within Barton Springs Pool and associated springs of the Edwards Aquifer.</p> <p>2.3.1 Barton Springs surface water quality will be sampled.</p> <p>Sampling Sites: Barton Springs Pool</p> <p>Sample Frequency: Biweekly</p> <p>Number of Samples: 1 sample (4 liters)</p> <p>Sample Parameters: TSS; NO3+NO2, NH3, TKN, TP, Ortho-P</p> <p>2.3.2 Barton Springs will be monitored.</p> <p>Sampling Sites: Barton Springs</p> <p>Sample Frequency: Semi-annually</p> <p>Number of Samples: 1 sample (7.5 liters)/spring</p> <p>Sample Parameters: TSS; Fecal Colif; NO2+NO3, NH3, TKN, TP, Ortho-P; TOC; Ions, Alkalinity; Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Magnesium, Mercury, Nickel, Silver, Zinc; Oil &amp; Grease, TPH, Organophosphorus Pesticides, Chlorophenoxly Herbicides, Bromacil, Volatiles(Including BTEX and MTBE), BNA Semi-volatiles(Includes PAHs)</p> <p>2.3.3 Two other springs which discharge from the Barton Springs segment of the Edwards Aquifer will be monitored.</p> <p>Sampling Sites: Eliza Springs and Old Mill Springs</p> <p>Sample Frequency: Annually</p> <p>Number of Samples: 1 sample (7.5 liters)/spring</p> <p>Sample Parameters: TSS; Fecal Colif; NO2+NO3, NH3, TKN, TP, Ortho-P; TOC; Ions, Alkalinity; Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Magnesium, Mercury, Nickel, Silver, Zinc; Oil &amp; Grease, TPH, Organophosphorus Pesticides, Chlorophenoxly Herbicides, Bromacil, Volatiles(Including BTEX and MTBE), BNA Semi-volatiles(Includes PAHs)</p> <p>2.3.4 A datalogger will be deployed at Barton Springs.</p> <p>Sampling Sites: Cave at bottom of Barton Springs Pool (within Barton Springs)</p> <p>Sample Frequency: Continual except for maintenance and data retrieval.</p> <p>Number of Samples: NA</p> <p>Sample Parameters: Day, Time, pH, Temperature, Specific conductivity, Turbidity, DO, Depth</p> <p>2.3.5 SPMD sampling to occur at Barton Springs.</p> <p>Sampling Sites: Cave at bottom of Barton Springs Pool (within Barton Springs)</p> <p>Sample Frequency: Once during the permit period</p> <p>Number of Samples: 5 samples (5 devices)</p> <p>Sample Parameters: TPH, PAHs, Organochlorides, Pyrethroids</p>		

**Table One: Programs to Address Storm Water Discharges**

Date Begin	Date Complete
Oct. 2000	Sept. 2001
Oct. 1998	Sept. 2003
Oct. 2001	Sept. 2003
Oct. 2001	Sept. 2003
Oct. 2001	Sept. 2003
Oct. 1998	Sept. 2003

**Mapping and Identification of Resources**

**1.0 Municipal Separate Sanitary Sewer System**

1.1 Mapping of the MS4 will be conducted for those areas where the sediment screening is performed by Watershed Protection Department staff within the Barton Creek Watershed.

**2.0 Karst Features (Study design to be sent to Service for concurrence prior to initiation of study).**

- 2.1 Work on the invertebrate SOC will give the agency ESA coverage for effects of stormwater discharges on these species if they become listed.
- 2.2 Map all karst features within the permit area known to be habitat for listed endangered cave invertebrates and other species of concern.
- 2.3 Identify and map drainage areas and conveyance systems within the drainage area contributing storm water to karst features.
- 2.4 Identify and map land uses within the drainage areas contributing run-off to each karst feature.
- 2.5 Identify karst features impacted by MS4 discharges and the need for mitigative measures.

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APPENDIX B		Monthly Salamander Survey Data Through September, 1998										City of Austin, Watershed Protection Utility - Environmental Resource Management									
Station		Date	Station	Date	Station	Date	Station	Date	Station	Date	Station	Date	Station	Date	Station	Date	Station	Date	Station	Date	
		12/9/95	(24A,16J)																		40
		11/1/95	(17A,10J)																		27
		9/27/95	(17A,4J)									9/10/98	(31A,11J)								21
		9/6/95	(19A,9J)									8/6/98	(19A,16J)								28
		7/29/95	(11A,8J)									7/9/98	(21A,14J)								19
		7/12/95	(20A, 6J)									5/13/98	(22A,12J)								26
		6/13/95	(9A, 2J)									4/22/98	(18A,22J)								11
		5/3/95	(10A,3J)									3/11/98	(22A,13J)								13
		4/5/95	(2A,1J)									2/10/98	(17A,9J)								3
		3/24/95	(9A,2J)									1/13/98	(14A,10J)								11
		3/5/95	(2J)									12/5/97	(38A,6J)								2
		2/1/95	(5A,1J)									10/22/97	(35A,7J)								6
		1/4/95	(1A)									9/30/97	(15A,8J)								1
		12/6/94	(3A,2J)									5/29/97	(4A)								5
		10/28/94	(2A,1J)									4/27/97	(5A)								3
		9/30/94	(7A,5J)									3/12/97	(9A)								12
		9/28/94	(7A,5J)									1/30/97	(6A, 5J)								8
		8/30/94	(3A,12J)									12/17/96	(8A,6J)								15
		8/13/94	(5A,8J)									11/23/96	(11A,7J)								13
		8/2/94	(8J)									10/26/96	(4A,3J)								8
		6/25/94	(2A,13J)									9/27/96	(3A,5J)								15
		5/27/94	(11A,16J)									9/10/96	(5A,3J)								27
		5/4/94	(11A,17J)									8/22/96	(10A,5J)								28
		3/30/94	(10A,8J)									8/3/96	(16A, 13J)								18
		2/19/94	(15A,6J)									7/13/96	(19A, 20J)								21
		1/26/94	(17A)									6/22/96	(6A, 18J)								17
		12/31/93	(18A)									5/30/96	(11A, 8J)								18
		11/6/93	(27A)									4/30/96	(16A, 18J)								27
		10/23/93	(20A,3J)									3/30/96	(3A,10J)								23
		9/4/93	(8A,3J)									3/15/96	(8A,3J)								11
		7/21/93	(12A)									2/28/96	(8A,9J)								12
		TOTAL										1/30/96	(22A,23J)								45
												1/4/96	(26A,15J)								41

(Shaded dates are night dives)

## APPENDIX C - Experimental Pool Cleaning Data

**Table 1: Documented Take Associated with Pool Drawdown**

DATE	TOTAL Salamanders	HOURS	Adults	Juveniles	Beach Area	Fissure Area	Eliza Spring
3/31/98	19	12	9	10	0	19	0
4/2/98	11	24	6	5	2	8	1
4/14/98	36	20	17*	19*	23	11	2
4/23/98	7	14	4	3	0	7	0
4/30/98	1	12	0	1	0	1	0
5/7/98	3	12	1	2	0	3	0
5/14/98	5	12	3	2	0	5	0
5/21/98	5	12	2	3	0	5	0
6/25/98	12	14	6	6	3	9	0
7/2/98	4	16	1	3	2	2	0
7/16/98	8	12	6	2	4	4	0
7/30/98	6	12	5	0	4	0	1
8/13/98	101	29	69	32	84	0	17
8/27/98	5	9	2	3	1	0	3
9/17/98	3	9	3	0	1	1	1

\* On this date ten salamanders were not identified as being either adults or juveniles. For display purposes these have been added to the adults and juveniles (5 each).

**DATE** = The date of the pool cleaning experiment

**TOTAL Salamanders** = the total number of salamanders found during the experiment. Most were stranded out of water but some were still in the water and moved themselves to deeper water. All of the observed salamanders were included in the "take" numbers.

**HOURS** = the approximate total time spent searching for salamanders per pool cleaning experiment.

**Adult** = number of adult salamanders observed

**Juvenile** = number of juvenile salamanders observed

**Beach Area** = number of salamanders observed in the area of the pool known as the beach area

**Fissure Area** = number of salamanders observed in the area known as the fissures area

**Eliza Spring** = number of salamanders observed in Eliza Spring due to lowering of the water level.

## Appendix D

### HCP PUBLIC COMMENTS (July 15, 1998 - August 14, 1998)

#### 1. WATERSHED CONCERNS

- ❖ The permit focuses on pool activities and the impact of swimmers instead of the real threats.
- ❖ I'm disappointed that you are not addressing the problems of alteration of habitat because of upstream development.
- ❖ Focus on increased flooding and sedimentation and not pool cleaning.
- ❖ The HCP focuses too much on the spring and not on development upstream. Isn't the salamander endangered because of construction and development upstream?
- ❖ We are concerned that FWS fails to hold the City accountable for its direct impact to the water quality of Barton Springs and the degradation of salamander habitat. The HCP process would authorize the City to degrade water quality and quantity. This degradation has been documented to harm salamanders. Thus, issues concerning the City's degradation of water quality and quantity must be addressed in the HCP.
- ❖ We support measures to protect the salamander in the pool, even if it means modifying the pool. The evidence suggests that water quality be highly correlated to development and increasing impervious cover in the watershed. We would like to see alternatives considered before something so drastic is done.
- ❖ Discussions within the HCP regarding broader issues of water quality and quantity are inappropriate. The HCP authorizes the City's take of salamanders.

The focus of this document is to minimize and/or mitigate incidental take of the species associated with operation of the springs and use of the springs as an outdoors aquatic recreational facility. The Service recognizes that construction and alteration of habitat in the watershed and increased urban development throughout the watershed pose a significant threat to the species. These watershed issues are being addressed in the recovery planning process and by the Service in negotiations with developers, businesses, environmental groups, municipalities, county and state agencies, and various federal agencies.

#### **Can the City and FWS control problems in the watershed (Mopac, MUDs, and PUDs)?**

The Service recognizes that a regional approach involving all the appropriate governmental, non-governmental, and business concerns will be required to successfully control watershed problems. The legal jurisdiction of the City of Austin covers less than 25% of the Barton Springs watershed.

**This document contains less than 1/2 page of geology and a firm understanding of the geology of the region and the tendency for flash flooding in Barton Creek has to be considered thoroughly since floods will wash salamanders into turtles' mouths in Town Lake.**

The purpose of the "Description of the Affected Environment" section of the EA/HCP is to provide background information and context for the proposed alternatives. Recognized experts in the

**Swimmers are not the problem. Developers are the problem. The entire watershed has to be protected. This plan is very myopic since it does not address the real threats. I predict that Barton Springs will be closed in 30 years. It is ludicrous to restrict swimmers and not development upstream. A total plan for protection of the watershed is necessary.**

The Service openly supports a regional plan for protection of the watershed. The purpose of the proposed EA/HCP is the continued operation and maintenance of Barton and adjacent springs for the protection of the salamander. The Service believes that safe, responsible use of the springs will increase public awareness of the springs and the need to protect the aquifer. The Service also recognizes the efforts of the City and its citizens to protect the aquifer and Barton Springs.

**All of our focus is on a few square yards of the watershed and not the 364 sq. miles of the watershed. Algae don't naturally grow in our low nutrient streams so we need to take the proper steps upstream to protect the aquifer. We need to set up a preserve system in the watershed that restricts impervious cover to 5%.**

Algae grow naturally in all aquatic systems. However, increased nutrients from leaking septic tanks, leaking sewer lines, lawn and garden fertilizers, and highway runoff can result in eutrophic conditions or increased algae blooms. The restriction of impervious cover in the watershed is beyond the scope of this document. The Recovery Team will be evaluating the current and future levels of growth on the aquifer.

- ❖ **Impose development restrictions.**
- ❖ **The City has made monumental and essential steps to stem the tide of development in the watershed. However, we can not ignore pollution from existing development. Pollution reduction measures should and must be mandated in the 10(a) permit.**
- ❖ **The real threat is the unchecked development; the State of Texas is actively promoting development in the area through new highway and road construction, the creation of MUDs, and so-called Water Quality Protection Zones. Until USFWS takes definitive action to reduce these and other threats, any attempts to regulate recreational activities at Barton Springs are largely meaningless.**
- ❖ **Restrictions aimed at swimmers are incomplete and ineffectual if you fail to consider the many other Austin residents and businesses that use the Barton Creek watershed. Upstream of the pool numerous developers and users of homes, shopping malls, golf courses, and office building complexes have been using the Barton Creek watershed as drainage for the last 20 years. I have witnessed the slow degradation of water quality and environment at the pool and surrounding springs.**
- ❖ **More attention should be placed on upstream development rather than on the pool itself. Stratus Properties (formerly FM Properties) is doing massive clear-cutting near Barton Creek under permit from USFWS. How can you permit this, but restrict swimming in Barton Springs. The permit was given because FM Properties donated some 4,000 acres for preservation. The City is purchasing 15,000 acres for preservation. Why do the 15,000 acres not count in the City's favor, but the 4,000 acres give FM Properties carte blanche?**
- ❖ **The salamander has only become endangered in recent years due to upstream development, not swimmers.**

Biological Opinion pursuant to the issuance of the National Pollution Discharge Elimination System (NPDES) permit to the City of Austin (See Appendix A).

**The City has set a double standard with a high bar set for the swimmers while developers have a much lower bar. This approach assures that the salamander will go extinct and that human use and enjoyment of the springs will be impaired. This must be reversed.**

The City does not set standards for compliance with the Endangered Species Act. The Service believes that the proposed HCP will result in a net benefit for all users of the springs.

**We support the preferred alternative discussed in the HCP. However, we would like to see emphasis placed on protecting areas upstream of the pool.**

The purpose of this HCP is to provide the City of Austin with a permit, which will allow for the continued operation and maintenance of Barton and adjacent spring sites. The protection of areas upstream of the pool will be addressed in the Recovery Plan.

- ❖ **Hold developers responsible with "community give back programs."**
- ❖ **Work to gain respect for the Greenbelt with National Park Recognition**
- ❖ **I propose making the entire watershed a park and preserve. The long-term gains from such a park would be great and outweigh the short-term costs.**

The citizens of Austin recently passed a \$65 million bond proposal for the purchase of approximately 15,000 acres in the Barton Springs watershed. This commitment will help protect the upstream habitat and water quality at the springs. Designation of the entire watershed as a park or preserve is beyond the scope of this permit.

**Prevent development in the watershed. More research should be done to find the effects of development on water quality. Money in the conservation fund in the cost analysis should be increased to at least \$100,000 a year. A part of this money should be used for daily monitoring of water quality and then compared to watershed development. Get UT involved.**

During the past 20 years, the City has collaborated with the US Geological Survey, the Center for Research in Water Resources at the University of Texas - Austin, the Barton Springs/Edwards Aquifer Conservation District and various environmental consultants to study the impacts of development and stormwater on water quality. The City of Austin is recognized internationally for its water quality and stormwater monitoring programs. This monitoring will continue but is not specifically tied to this plan.

**What is being asked of the swimming public is insignificant compared to what is asked of the landowner community. The ESA should be applied equally to all segments of the community.**

The Service believes that the current proposed permit adequately addresses the need to minimize and mitigate for the incidental take from pool maintenance operations. The application of the ESA is a site and species specific task.

## **2. EXPERIMENTAL POOL CLEANING**

- ❖ **The US Fish & Wildlife Service should permit the City an additional 15 cleanings for experimental purposes while a meaningful plan is drawn up to remove silt & algae from Barton Springs.**

**Does the City need to advocate a position that will guarantee the growth of the population of the salamander or can we properly advocate a position that will guarantee the survival of the salamander in small areas?**

The City is seeking an incidental take permit that will ensure that effect of spring maintenance and operation on the salamander will be minimized or mitigated. The long-term recovery of the species will be addressed in the Service's Recovery Plan for the Barton Springs salamander.

**I would like to see the City consider taking an aggressive legal strategy to make the point that the salamander is adequately protected without doing anything different except letting the swimmers know that the creature is there and to treat the pool with the reverence it deserves.**

Under the Endangered Species Act, the impacts of otherwise legal activities such as pool maintenance and recreational activities that may result in the incidental take of an endangered species must be covered under an Incidental Take Permit. The HCP and Permit must operate to the benefit of the salamander. Current pool maintenance procedures kill salamanders. Failure to comply with the ESA would result in the cessation of pool maintenance and possibly the closing of Barton Springs Pool. The City of Austin has proposed the HCP as their management plan for the next 15 years. The swimmers have a relatively small impact on the salamander. With regard to the activities in this plan, drawdown of the pool has the greatest potential to impact salamanders.

- ❖ **Alternative 1 should state that water degradation and catastrophic spills would result in incidental take of salamanders.**
- ❖ **The no action alternative needs to be re-worked to show that no action will result in the increase take of salamanders due to siltation, etc.**

Conditions at the spring sites are a function of aquifer levels, levels of sediment, nutrient loadings, and the frequency and intensity of episodic natural events. Under the no action alternative, the effects of natural events and activities throughout the watershed would determine habitat conditions. Catastrophic spills would not be considered incidental take that would result from the lack of pool cleaning.

**I hope you will recommend Alternative 2, Maintaining Prior to Listing. The request for take should encompass the number sufficient to maintain current practices. The City is finding more salamanders now than ever, so if it ain't broke, don't fix it. By requesting any number less is likely to lead to the eventual closure of the pool to the public.**

During the past six years, the City has made significant changes in the maintenance procedures at the spring sites to provide better habitat for the salamanders and swimmers. Although recent survey results indicate a higher number of salamanders at the springs, data from City of Austin surveys and the experimental pool cleanings indicate that pool drawdowns may result in the stranding of as many as 120 salamanders per drawdown. This number is a combination of the highest observed numbers in each area exposed during drawdown. It represents a worst case scenario. This level of take is considered unacceptable for maintaining the long-term survival of the population. The Service believes that the proposed HCP will provide protection for the salamander while maintaining a safe environment for swimmers.

**The HCP fails to ensure that the incidental take resulting from the operation and maintenance of Barton Springs will be "adequately minimized and mitigated to the maximum extent practicable."**

**estimated take of 3875 salamanders since 1997. The \$10,000 that the City proposes for mitigation of these salamanders is inadequate.**

The Service believes that the \$10,000 dollars for mitigation is a reasonable figure. Before the experimental pool cleaning was conducted the extent of take was under estimated.

**The HCP does not explain how the City will ensure that the number of salamander takes from recreational use of Barton Springs will decrease from 400 to 10 takes per year.**

As described in the HCP, lowering of the beach area and the placement of limestone over the fissure area will minimize the incidental take due to recreational activities.

**When the salamander was listed, the monthly surveys identified a population between 1 and 45. Now the HCP allows the take of more than 110 percent of the original population. The approval for such incidental take should warrant significant compensation and/or mitigation, and further question the grounds for listing the species.**

The monthly survey information is not an estimate of the population. It provides information on trends in surface population abundance. Comprehensive survey results indicate the actual population numbers are higher. The approval of the permit is contingent on the implementation of the proposed HCP. Both the take level and the compensation have been re-examined and the Service believes that there is incidental take has been minimized and mitigated to the maximum extent practicable.

**I have requested those documents relating to or describing the method of calculating the "take" in the plan. The City has refused to provide those documents claiming the litigation privilege, due to the "salamander" suit. This is an abuse of the open records law and denies me the ability to comment on the methods used to determine the critical "take" figures. If the "scientific" basis of the plan is a City secret, how can the public effectively participate in commenting on the US Fish & Wildlife Service? The plan should not be formulated while litigation is pending.**

It is the responsibility of the Service to calculate the level of incidental take in the plan. The method of calculation is clearly spelled out in the document.

**The total number of the species is unknown; therefore, actual numerical take calculations are not appropriate.**

Incidental take calculations are based on the results of the experimental pool cleanings. These data are the best scientific information available. In the final HCP incidental take is permitted by area and activity and not by actual permitted numbers. The estimated numbers are displayed.

**The Service has not publicly stated the incidental take levels that can be authorized consistent with section 10 issuance criteria, that is that will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.**

The Service believes that the proposed HCP and incidental take statement are consistent with the issuance criteria.

**Nothing in the EA/HCP serves to mitigate the take of salamander from toxic materials in silt.**

The Service does not have sufficient information to determine the extent of impact from toxic materials on the Barton Springs salamander.

**There is no scientific justification for either the dam or alteration of the beach. There is no evidence to support that 400 salamanders a year are crushed.**

- ❖ **The HCP lacks biological standards, the baseline assessment of the species, and sufficient information on the reproductive biology of the species. Although the HCP provides survey data, there are no criteria associated with the numbers.**
- ❖ **The reproductive behavior of the salamander should be studied. If it reproduces in the aquifer only, then it makes no difference how many are taken in the pool since they are not part of the reproducing population.**

During the past four years, the City and the Service have collaborated with the University of Texas - Austin, University of Texas - Arlington, Dallas Aquarium, Midwest Science Center, and the San Antonio Zoo on captive breeding studies to better understand the reproductive biology of the species. In addition, results from surveys indicate that gravid females and newly hatched larvae are commonly found on the surface throughout the year at Barton, Old Mill, and Eliza springs. The presence of gravid females and newly hatched young at these sites indicate that the surface dwelling salamanders contribute to the population. The baseline assessment of the species is included in the NEPA document. Available data are not adequate to establish biological standards.

**More needs to be known about the survivability of salamanders that leave the security of the fissures areas. I believe a scientific research role is what is needed rather than the role of a construction manager.**

Studies concerning the survivability of salamanders that are stranded during pool drawdown at the fissures and beach area were a component of the Phase II experimental pool cleanings.

**The HCP links the absence of salamanders to the accumulation of silt; also, FWS notes that the species is "clearly capable of living underground." This is inconsistent and contradictory.**

"Clearly capable of living underground" refers to living in the aquatic environment of the aquifer.

**The HCP indicates that "the number of salamanders inhabiting surface habitat in Barton Springs Pool is approximately two to four times the number of individuals counted during regular monthly surveys". This leads to two possible conclusions: the salamanders are more plentiful than indicated in the petition to list, or the pool operation and maintenance is more destructive than initially thought.**

The estimate of the total surface population (two to four times the regular monthly survey number) is extrapolated from the percentage of the appropriate habitat that is surveyed during the regular monthly surveys. The level of take associated with pool operation and maintenance is calculated under the "Assessment of Take" section for each of the four alternative.

**The Federal Register notice of listing did not identify pool cleaning as a threat to the species.**

The final rule to list the salamander did address management of the surface habitat (which includes pool maintenance) as one of the threats that salamanders were facing. Barton Springs is a complex and dynamic system. Overall, the maintenance and operation of the pool may have an adverse impact on the species but the HCP has been designed to minimize and mitigate these impacts.

## **5. EDUCATION**

**Provide updates, education and community parks news at the now empty posting locations.**

Informational posters for the existing kiosks are being updated to reflect the latest information concerning the springs and the salamander. New informational kiosks will be erected at both Eliza and

**A swimmer representative and a pool staff person should be involved in development of silt and gravel removal policy, involved in the scientific advisory committee, and involved in refining the management plan.**

During the past five years, City and Service staffs have worked closely with citizen user groups, various City department staff, and representatives of university and environmental groups in the development of pool maintenance procedures and efforts to protect the springs and the associated biota. The Service believes that this approach will be successful in the future during the implementation phase of the HCP.

- ❖ **Swimmers ask that they are involved in the review process of the annual report. Comments can be made separate from the report but attached to it for delivery to the City manager.**
- ❖ **We would like a swimmer representative and a pool staff person involved in the discussion concerning controlling surface runoff around the pool, and improving the efficiency of the Barton Creek bypass.**

The Service would welcome the participation of swimmers or any interested citizens. The advisory committee in the HCP will be open to swimmer representation.

**We are used to hearing that a public hearing occurred and decisions will be made regardless of what we say.**

As evidenced by the numerous changes in the current HCP, the Service values the public input process and the numerous public comments received from diverse user groups of Barton and adjacent springs.

**Get more input from citizens and swimmers.**

The Service and City representatives continue to meet with concerned citizens and swimmers on a regular basis.

**You did not ask the advice of the people that swim there day after day looking at the pool and the population in the pool.**

The Service has requested the input of swimmers and daily users of the pool on numerous occasions. Many of the comments presented during the public hearings and public comment period were received from regular users of the springs.

**We know that the FWS/COA have been under pressure to develop a plan before the experimental cleanings are done. We are disappointed that the swimmers were not part of this process.**

The Service and the City began development of the EA/HCP during the spring of 1997. The original EA/HCP and 10(a) permit application was submitted in January 1998. Public comments and additional information developed during the experimental pool cleanings have been incorporated into the current HCP. Swimmers and various concerned user groups have been involved throughout this process. The Service believes that the current HCP will minimize the incidental take of the salamander and provide a safe, recreational facility for the many users of the springs.

## **7. HCP AND PROPOSED MEASURES**

**We all know that swimming in and cleaning the pool kills salamanders. The only way to insure the salamander is properly protected is to not allow swimming or cleaning. If you issue a permit**

salamander habitat. The analysis of take, effects of take, and the analysis of the alternatives are the responsibility of the Service.

**We are concerned with the FWS response regarding development: "The Service may be forced to implement measures, which could restrict growth in these areas, if there is not an adequate comprehensive approach to land use planning. " FWS' suggestion that it has sweeping authority to regulate land use is extremely troubling, and likely unconstitutional. The agency's role is simply to protect endangered species; in this case, its responsibility is only to ensure that non-federal parties do not commit unauthorized "takes" of the salamander. The charge of zoning and planning belongs to state and local agencies. The agency's threat to exercise such authority here distorts the Tenth Amendment.**

The Service is responsible for ensuring the continued existence of the species. Zoning and planning are clearly the role of local governments. The Service will take necessary steps, within our authority to protect the species.

**For the first two years of the HCP permit the City should find an independent compliance monitor to review and inspect the activities of the City under the HCP. Neither the Service nor the City should conduct this review.**

The Service does not see a need for an independent monitor. The Service and the City are responsible for ensuring permit compliance.

**The HCP is inadequate in its alternative analysis. Regarding Alternative 1, there is no documentation to support the claim that a cessation in pool cleaning activities will result in the decline of the species due to the accumulation of sediment.**

The Service believes that an adequate range of alternatives have been analyzed. We do believe that a cessation of all pool cleaning activities would result in the degradation of salamander habitat.

**The HCP fails to specify what type of training will be conducted to ensure workers have the skills to identify the Barton Springs salamander and what qualifications are necessary for the position that ensures that the species is protected.**

The City of Austin has a valid scientific permit that would be used as the standard for working with salamanders. The type of training will be jointly worked out between the City and the Service. Different levels of training would be required depending on the role or position of the employee. A lifeguard would get different training than a person who surveys for salamanders.

**The FWS should designate critical habitat for the Barton Springs salamander.**

The Service declined to designate critical habitat for the species when the final rule to list the salamander was published. Critical habitat has not been proposed for the Barton Springs salamander. The Act requires that critical habitat be designated for a species at the time it is listed unless designation is not prudent or not determinable. Listing regulations at 50 CFR 424.12(a)(1) provide that critical habitat is not prudent if no benefit to the species is derived from its designation. Designation of critical habitat benefits a listed species only when adverse modification or destruction of critical habitat could occur without the survival and recovery of the species also being jeopardized. Because the Barton Springs salamander is restricted to one area that discharges water from the entire Barton Springs watershed, any action that would result in adverse modification or destruction of the salamander's critical habitat would also jeopardize its continued survival and recovery. Designating critical habitat would therefore not provide a benefit to the species beyond the benefits already provided by listing and subsequent evaluation of activities under the jeopardy standard of section 7 of the Act. Because jeopardy to the species and adverse modification of its critical habitat are

habitat for the next 15 years.

**There is no specific monitoring plan that establishes reporting requirements or biological criteria for measuring the plan's success in removing silt and algae from Barton Springs Pool.**

The City of Austin has presented a plan for removing silt and algae from the pool in the HCP. The Service believes that this plan is thorough and comprehensive. We do not have the information necessary to establish biological criteria for the effects of silt and algae on the salamander. Some level of silt and algae are necessary components of a functioning ecosystem. The Service believes that the current plan proposes adequate silt and algae removal for salamander habitat improvement and protection.

**The section 10 issuance criteria has not been provided in a public manner, making comments and participating in plan evaluation impossible for the public.**

The issuance criteria for a Section 10 permit under the ESA and its implementing regulations are clearly spelled out. The Act and the regulations are public documents and have been discussed in public meetings. The public has been given adequate information to evaluate the proposed activities.

- ❖ **Why wasn't the permit drafted before the listing, since the listing was anticipated, and why wasn't it submitted immediately to ask for the kind of take that has been happening over the last five years of pool cleaning?**
- ❖ **The City is deficient in not working plan up year and a half ago.**
- ❖ **FWS fails to address why the City delayed applying for a Section 10 permit. The same level of tolerance has never been afforded to the private sector.**

The first draft of the HCP was written before the listing took effect. The City and the Service have shared over ten separate draft versions of the proposed plan. The impact from cleaning operations before the listing was not deemed appropriate to ensure the survival of the species in the long-term. The Service has been working with the City since the listing to complete this HCP. New information gathered through the experimental pool cleanings, and the additional thirty-day public comment period, have necessitated the extended timeframe.

**The same individuals developing the biological components of the plan will implement the plan, have established the plan's "take" survey's, methodology, and performed the calculations and respond to public comments. This is substantial conflict of interest and has resulted in creating a sense that those individuals have a personal stake in the plan beyond the scientific aspects of their responsibilities. The personal stake of the biologists involved has hampered the resulting process of public comment and informal plan negotiations. In short, the public has been addressing closed minds. This is not the 'good faith' required by law.**

The Service believes that the individuals preparing the plan are the best ones to address the public comments. The changes from draft to final version of the EA/HCP clearly demonstrate that the process has been open and the plan has been substantially adapted based on the public comment.

**The plan exceeds the legal standard needed for issuance of the 10a permit which is that the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of incidental takings. The plan seeks to eliminate take. This standard is arbitrary.**

The plan does minimize and mitigate, to the maximum extent practicable, for incidental take from the operation and maintenance of Barton Springs and the adjacent spring sites. The proposed HCP is the City of Austin's proposal for management of the salamander surface habitat for the next

**The original petition to list the salamander as endangered did not identify cleaning as a threat to the species.**

In the final rule to list the salamander as a federally protected endangered species, the Service recognized "impacts to the salamander's surface habitat" as a major concern. During the past five years, the City, the State, and the Service have worked jointly to evaluate the impact of pool maintenance procedures on the salamander and the biota of the pool and adjacent springs. These governmental entities, in conjunction with users and concerned citizens, have worked diligently to develop maintenance and operational procedures that will minimize the impact on the biota of the springs and will provide a safe, aquatic recreational facility for all users.

**The plan, in effect, nullifies the very favorable ruling of U.S. District Judge Sparks who found that pool cleaning does not endanger the survival of the salamander.**

In his ruling, U.S. District Judge Sparks noted those pool-cleaning procedures, especially the lowering of the pool, has a deleterious impact on the salamander. However, his ruling supported the experimental pool cleanings and the completion of the Incidental Take Permit process. Thus, Judge Sparks' ruling supports the development of the HCP and completion of the Incidental Take Permit process in order to minimize the impact on the salamander and the continued use of the springs by the citizens of Austin.

## **9. IMPACTS OF RECREATIONAL ACTIVITIES**

**Salamanders I have seen are not easily stepped on, so it is not necessary to rope off huge expanses of the beach.**

Salamanders are often discovered in the areas under rocks and gravel. It would be easy for a wader or swimmer to step on rocks where salamanders hide without realizing that they have stepped on a salamander. Measures are contained in the HCP, which will minimize the potential for the incidental take of salamanders due to recreational activities in the springs. Under the current HCP, all areas of the pool will be open to recreational activity.

**Any mortality that could be caused by recreational activities can be more than offset by creating a gravel bed in the center of the deep end to create more salamander habitat.**

There is some opportunity to improve the existing habitat for the salamander and this is maximized under the HCP. Within the pool, several areas including the deep end, the beach, and the fissures will be improved to provide additional habitat for the salamander.

**The proposed thin limestone slabs to cover the fissures look like a good solution. The impact on swimmers appears to be minimal while salamanders in the fissures enjoy full protection.**

The Service agrees that this measure, in conjunction with efforts to educate the public as to the importance of preserving salamander habitat, will provide protection for the salamander in this area of the pool.

**We have higher priorities than addressing the harassment of the salamander by swimmers.**

The Service and the City are committed to the protection of endangered species and compliance with federal law. Failure to adequately address activities that have the potential to result in the incidental take of the federally protected salamander could result in the closing of Barton Springs. The Service and the City are committed to keeping Barton Springs open for swimming.

**Large rocks that can be stepped on can be removed from the pool and grooves can be cut into large stable rocks to create new salamander habitat.**

Rocks and gravel provide valuable surface habitat for the salamander. The Service believes that available surface habitat can be enhanced with the addition of rocks and gravel in the deep end along with more extensive revegetation efforts in the deep end.

**Alternatives to keep water in the fissures during cleaning should be explored.**

Under the current HCP, water will be maintained over the fissures area when the shallow end of the pool is cleaned or when the pool is lowered.

**The fissure area should be a swim only area.**

The Service believes that proposed measures in the HCP will provide for protection of the species, enhanced public awareness, and the opportunity for swimmers to appreciate this unique natural resource.

**The fissures should not be closed since the place where the water leaves the ground holds a special attraction to humans and an educational lesson about the workings of an aquifer to our children.**

The Service believes that the current HCP will provide this opportunity for many future generations.

❖ **I support roping off the fissures.**

❖ **Keep some of the ropes. They are not a big problem.**

Under the current HCP, the need to rope off areas of the pool has been minimized.

**The best way to protect underwater nature is for people to see and appreciate what's there and to educate others.**

The Service agrees with this comment. The current HCP contains numerous measures to increase educational efforts and enhance public awareness of this unique natural resource.

**Regular divers in the springs know all of the fish, crayfish, etc. Divers have never bothered or hurt any of the life in the springs. These divers take care of the springs by picking up trash, etc. The idea that divers bother salamanders and fish is ludicrous.**

Although many users of the springs work diligently to protect the springs and its biota, a few individuals have acted irresponsibly in the past. The Service believes that educational measures are the most effective way to increase the awareness and appreciation of the springs.

**Many snorkelers disturb and harm the habitat so snorkeling should be restricted to surface areas.**

The Service believes that snorkeling can be a valuable educational activity. With proper education and supervision, snorkelers can continue to enjoy the springs without disturbing salamander habitat.

**Why can't we use underwater cameras?**

The HCP contains no restrictions on the use of underwater cameras.

**Are you going to have a pump at the low portion to run the water out of there for possible cleaning?**

A drain would be installed into the bypass tunnel or skimmer drain to lower the water level in the shallow end if a water control structure is built.

**You should take short steps at a time, rather than making many modifications at once. Rather than putting a three-foot high dam, just building a low-height structure (10-15 in. off the bottom) would do what needs to be done during drawdowns to clean the shallow end.**

A low profile berm does not address incidental take during pool drawdown in the fissures area and the adjacent springs sites that are habitat for the salamander. A water control structure would minimize incidental take while allowing the City to clean the shallow end of the pool as often as needed.

**Changes need to occur at the pool, e.g., the dam is a good idea for pool cleaning.**

Evaluation of pool maintenance procedures is an on-going process. The Service supports the City's efforts to develop pool-cleaning procedures that are effective and minimize the incidental take of the salamander. The proposed water control structure would allow the City to clean the shallow end of the pool as often as desired while minimizing the impact to salamanders. The proposed structure would also allow wading and swimming to continue in the deep end of the pool while the shallow end is lowered for cleaning. The Service is not requiring that a water control structure be built. The HCP says that the City must be able to clean the shallow end of the pool without drawing down the deep end of the pool.

- ❖ **Building the dam is a very permanent feature and if it doesn't function properly then tearing it out will do more harm to the pool.**
- ❖ **Many measures in the HCP are good and supported by the community but the dam and deepening of the beach are measures that need better evaluation. The dam will cut the pool in half and render it unsightly and turn the shallow end stagnant. I urge you to support making the dam movable rather than a permanent structure.**
- ❖ **With the new proposed location of the dam, the dam must be removable or swimmers will be impeded. A permanent dam with wide spaces for passage of swimmers would not be effective. A logjam of swimmers frequently occurs at the proposed location of the dam with nothing there now. The new location is preferable to the 1/8-mile marker provided swimmers have unimpeded swim space. This location is preferable because more shallow area can be cleaned. However, an unimpeded swim space could only occur with a removable dam. Create a permanent "team" to install the dam and to remove it at cleanings. This team could be from Public Works or from PARD operations. Do not use lifeguards for this work. It should not be their job and if some other entity has the responsibility, then PARD should not object to a removable dam. The team could be funded from Barton Springs Pool revenue.**

The design and construction of the dam is an engineering task that can be accomplished, as evidenced by the upstream and downstream dams that form the existing pool. The permanent dam, if implemented, would be designed to facilitate water circulation in the shallow end of the pool. Circulation in the shallow end of the pool is determined by the capacity of the skimmer drain. The permanent water control structure is only one of various options that will be evaluated by the City of Austin and its consultants.

Salamander take and mitigation associated with the construction of the sidewalk and creation of new salamander habitat have been included into the HCP.

**I oppose deepening the beach, as the impact on the salamander is unknown for such an operation. Also, dredging will be needed to remove sedimentation.**

Incidental take associated with the lowering of the beach area has been incorporated into the HCP. The installation of the sidewalk along the beach and the lowering of the remaining beach area will minimize the need for silt and sediment removal in this area of the pool.

If lowering the beach area turns out to be necessary, I suggest the positioning of large limestone blocks whose flat surface is at a depth of 4 ft. These could serve as safety islands for swimmers while their flat and smooth surface would not represent salamander habitat.

The installation of the hardened surface would provide safe areas for waders and swimmers. It will also be designed to withstand flooding. Limestone blocks are one of the alternatives being evaluated.

**Since Barton Springs varies in flow rate, more data should be collected on the distribution of the population under varying conditions of low and high flow before cement is poured on the beach.**

The City has collected more than five years of salamander population data under varying aquifer conditions, including low and high spring discharges. The Service believes that the current information from the experimental pool cleaning is sufficient to justify the proposed measures.

The beach population may be an anomaly due to unusually high flows of late 1997. The other possibility is that biologists planted the salamanders seeking to profit as agents of upstream developers and their attorneys. It is noteworthy that in over 8 years of research by the university and the City no population of salamanders was found on the beach.

The City's monthly monitoring protocol was developed to provide data concerning the size and distribution of the salamander population upstream and downstream of the springs. These data indicate a high degree of variability in the population size and distribution. However, only six square meters of beach area are surveyed during the monthly surveys. Under the experimental pool-cleaning program, surveys indicate that distribution of salamanders on the beach area is also highly variable. The highest number of salamanders found on the beach area, 84, occurred during the lowest flow conditions recorded during the experimental pool-cleaning period.

**With the new gate system, most of the existing beach would not require lowering since the new gate system would allow the beach to remain submerged during partial drawdown of the pool.**

This is true. However, the new gate system does not address incidental take associated with wader and swimmer activities on the beach area, on the fissure area, and in the adjacent spring sites.

**The population of salamanders is likely to fall to zero in the winter, thereby reducing the need to modify the beach area to accommodate this sporadic seasonal population.**

Barton Springs has a relatively constant temperature and salamanders are found throughout the year. There is no evidence to date that supports seasonal fluctuations within the population.

**The beach should be protected from exposure during drawdown.**

The Service agrees and this measure is part of the HCP. The HCP is designed to minimize incidental take associated with pool drawdown.

salamander habitat. The proposed permit should be helpful in improving and protecting the use of the pool for recreational, therapeutic, and medicinal purposes.

**Study the beach area after a major flood to see the impact. Is it fair to taxpayers to make them pay for all these changes just to protect 4 salamanders on the beach area? For safe swimming in Barton Springs, a shallow area is needed so swimmers can rest and relax.**

The proposed sidewalk, in conjunction with the entire shallow end of the pool, will provide a safe area for waders and swimmers. The sidewalk will also provide an area of non-salamander habitat that will facilitate cleaning and maintenance after major floods. The Service considers the beach to be salamander habitat. The total number of salamanders in this area is not known. During the experimental pool cleaning, the highest count was 84 salamanders on the beach.

**There is no plan for dealing with a major flood event; if the beach is removed, there will be no access for removal of sediment such as in past floods. How would the sediment be removed?**

The City will address techniques for the removal of silt and sediment after major floods in the feasibility study currently under contract to a private engineering and environmental consulting firm.

**It is a mistake to lower the beach too much below 6 ft. Put a sidewalk along the Beach.**

The HCP proposes the installation of a nine-foot wide sidewalk along the beach area at a depth of four feet. Waders and swimmers can use this area while the incidental take of salamanders is minimized.

**Devise new methods to clean the beach.**

The proposed measures are designed to address incidental take associated with pool drawdown, beach cleaning techniques, and recreational activities. The proposed sidewalk along the beach will also provide a safe area for waders and swimmers while minimizing incidental take of the salamander.

**Make the proposed concrete sidewalk narrower. Construct a limestone walkway/swimway to be somewhat narrower. Mitigate the addition of concrete with the removal of concrete so that there is no net gain of concrete in the pool. Also, remove the concrete in the shallow end of the pool.**

The proposed width of the sidewalk is based on input from citizens, spring users, City engineers, and City department staff. The Service believes that decisions concerning the net gain or loss of concrete in the pool are the responsibility of the City.

## **12. DEEP END POOL LOWERING FOUR TIMES PER YEAR**

- ❖ **The plan allows only 4 full pool cleanings per year. In the past, the pool was cleaned as needed but never less than 50 days per year. By picking a fixed, arbitrary number of cleanings per year, the plan puts the pool at risk for indefinite closure after floods.**
- ❖ **If the City tried to clean more than the fixed 4 times, they would be subject to more of the same lawsuit harassment, with the possibility of an unfavorable decision.**
- ❖ **The HCP does not say if the 4 cleanings will be equally spaced throughout the year, or will this give the City an excuse to have 4 cleanings at the summer and close the pool in the winter when the proceeds are low.**

❖ **The plan does not explain why the gate system will be redesigned if partial drawdowns are not permitted.**

The HCP permits partial drawdowns with Service concurrence. The modified gate system will allow pool staff to partially lower the pool if deemed necessary for cleaning activities. In addition, this gate system would also allow pool staff to lower the pool when flooding occurs without endangering their personal safety.

**There is no scientific evidence that partial drawdowns of the pool will take salamanders.**

Experimental pool cleaning data indicate that take of salamanders can occur in the fissures area during partial pool drawdown.

**Appropriate cleaning should be permitted and required at Barton Springs Pool. There is no evidence that drawdowns of the pool after floods or to facilitate cleaning appreciably reduce the likelihood of the survival and recovery of the species in the wild.**

The data collected by the City and the Service during the past two years indicate that pool drawdown is one of the major causes of take at Barton and adjacent springs. The HCP is designed to minimize take associated with drawdown and other pool maintenance and operational activities. The HCP also allows for the routine maintenance of the springs and additional cleaning activities to mitigate for the impacts of flooding when necessary.

**The City could use partial drawdowns with new floodgates during high or normal flows (during which a berm would be sufficient and swimmers could swim over). During low flows, no drawdowns could be mandated. The shallow end could be cleaned with panels placed in the berm to create a temporary dam. Thus, PARD would only have to deal with a dam during low flow conditions. With the pump system at Eliza Springs and Sunken Garden, and the beach removed, the only remaining impact to salamander habitat would be to the fissure area during high and normal flows because even partial drawdowns would expose this area.**

A temporary dam is one of the water control structures currently under evaluation by the City. The HCP provides the City of Austin with the flexibility to implement the water control structure configuration that the City feels will best address cleaning and staffing requirements for the continued maintenance of Barton Springs. The Service believes that limiting drawdown protects salamanders in all areas of the pool and adjacent spring sites.

**With redesigned gates, the take associated with drawdown would be minimized; there would be no need to limit partial drawdowns, as determined by spring flow rates and interaction of the new gate system and the pump systems for the adjacent springs. The plan should therefore allow enhanced cleaning of the deep end, including stairs, rocks around the diving board and non-habitat bottom areas using appropriate equipment to hose or vacuum the silt and remove debris.**

The HCP permits routine cleaning of all areas of the pool. The areas considered non-habitat for the salamander include the shallow end of the pool, the proposed sidewalk along the beach, stairs, and areas of the deep end comprised of solid limestone substrate.

**What rate of water fall can the salamanders tolerate? Does it make sense to start lowering the pool on Monday night to have it ready for work on Tuesday morning?**

Data collected during the experimental pool cleanings indicate that drawdown rate is not a major factor in determining the level of salamander take related to lowering the level of the pool.

**There is no scientific basis to determine that there will be a "net benefit" to the species until a plan to reduce silt loading is included in this plan.**

The plan has been changed to include measures to reduce sediment buildup in the pool. The Service does not make the argument that pool cleaning is necessarily a benefit to the salamander population. However, the dam, which creates the pool, also creates a place for sediment deposition. Location and rate of sediment deposition is dependent upon aquifer conditions and the frequency and severity of floods. When the sediment is allowed to build up, the gravel and rocks underneath quickly become unusable from the perspective of the salamander. Anoxic conditions underneath the sediment make the gravel unusable. Periodic cleaning does improve conditions for salamanders in some areas of the pool.

**Failure to test the toxicity of Barton springs silt is a major biological error, and no reasonable plan can be developed without strict, historic and future monitoring of the silt's composition.**

The City of Austin has been monitoring the toxicity of sediments in Barton Springs and Barton Creek for several years. Routine toxicity testing of sediment is a vital component of the City's Watershed Protection Department monitoring protocol. The City has also collaborated with the US Fish and Wildlife Service in the deployment of sensitive semi-permeable membrane devices (SPMDs) to monitor the levels of potential pollutants in the aquifer. The extensive database of surface water, ground water, stormwater, and sediment pollutant levels is a crucial component in the development of the Recovery Plan for the salamander.

**The plan does not specifically state those adaptive management approaches required to mitigate take associated with toxic substances found in the silt at the pool's bottom.**

The plan has been amended to include the periodic removal of sediment from all areas of the pool.

- ❖ **Threshold levels of silt and toxic materials should be developed, with specific monitoring and removal plans in place.**
- ❖ **No one has suggested how the vacuuming will take place. I am in favor of some sort of vacuuming method but the practicality and expense may be more than the City can bear. To remove silt through vacuuming, the spoil will need to be dewatered and then removed, or the water and silt must be placed in trucks for off-site disposal. Either way is very expensive and difficult to achieve. Allow budget and staff time to research silt removal techniques within this coming year. In the interim, use full drawdowns when needed to protect swimmers and salamanders from silt and algae loadings. Test the bottom material for toxic substances before disturbing.**

As stated above, the City has an on-going monitoring program for the levels of pollutants in Barton Springs and Barton Creek sediment. Previous routine methods of sediment removal (e.g., dragging the beach area, fire hosing the beach area, and fire hosing the deep end of the pool) moved the sediment from one area of the pool to another but were very limited with respect to sediment removal. These methods temporarily suspended the sediment in the water column but did little to remove the sediment from the pool. The City is currently evaluating various sediment removal techniques, which are more effective than previous routine methods. The flexibility to refine these methods has been built into the HCP.

**Cleaning the springs and beach makes better salamander habitat. It may kill individual salamanders, but it helps the species as a whole.**

which includes all of the spring sites in Zilker Park that provide surface habitat for the salamander. The City would survey all of these sites on a daily basis under the HCP.

**A stone bench should be placed at the Sunken Garden.**

The Service supports the efforts of the City and its citizens to restore Sunken Garden and improve the aesthetics of the facility but will not require these measures as part of the HCP

**I oppose the closing of Sunken Garden to recreational use. It should be a free swimming and educational area. Eliza and Upper Spring could be educational areas only.**

Recreational use of Sunken Garden, as practiced in the past, has the potential to result in the take of salamanders. Based on the activities that City staffs have documented during the past year, restrictions need to be placed on the use of Sunken Garden to protect the springs, the habitat, and the salamander.

**I support the installation of an iron grate near the bottom of Sunken Garden. That way, human users will not pose a danger to salamanders. An educational display should be installed to inform the public of the sensitive nature of the site, and PARD police and workers need to monitor human activity. I favor an upgrade or redesign of the Sunken Garden (and Eliza Spring) and the Barton Hills Neighborhood Association would be very pleased to play an active role in this process.**

The Service supports the efforts of the City and its citizens to upgrade and restore the historical structures at Sunken Garden and Eliza Spring. The Service believes that both of these sites provide excellent opportunities for educational programs and public awareness efforts. Even though the installation of an iron grid system in the bottom of Sunken Garden is feasible, this proposal does not address all take of salamanders at these sites.

**The fence at Sunken Garden should be taken down. Sunken Garden is not permanent salamander habitat. Flow is irregular from the spring and sometimes stops flowing.**

Under the HCP, capping the underground outfall pipe that diverts springwater into Barton Creek will enhance surface spring flow at Sunken Garden. The Service believes that Sunken Garden provides excellent habitat for the salamander. Data indicate that the largest number of salamanders found at any of the four spring sites often occurs at Sunken Garden.

**The total take of 400 salamanders is split evenly between Barton Springs and Sunken Garden. I can not believe that half of this would be from Sunken Garden given that it is a smaller area and that the number of swimmers in the beach and fissure areas vastly exceeds that of Sunken Garden. I see no support whatsoever for the claim that swimmers in Sunken Garden will cause more than insignificant fractions of the total recreational take.**

During the past summer, City biologists have observed as many as 16 swimmers and four dogs in Sunken Garden at one time. This level of activity is comparable to or exceeds that of swimmers/surface area in Barton Springs. For this reason, the take numbers were divided evenly between the two sites.

**I feel that Sunken Garden was closed due to discomfort on the part of the City that its lack of full-time supervision over the site could be construed in a court of law to constitute negligence under the ESA. The City's discomfort with it has to do also with its perception that it is dealing with the behavior unruly vagrants.**

City biologists requested the installation of a temporary fence at Sunken Garden after a thorough assessment of the potential for take of salamanders at this spring site. City biologists

Eliza Springs. The Service anticipates that the City will continue to rely on citizen involvement and review during all phases of the design and implementation process.

**The ornamental iron fence may compliment the existing stone work around the pools.**

The Service agrees. The City has stated that any modifications at Eliza Springs and Sunken Garden will comply with existing design guidelines for Zilker Park and would be accomplished with public input.

**Remove the concrete floor of Eliza. Using a rock saw and a strong vacuum, the floor could be cut out and all the concrete dust could be simultaneously vacuumed out. This would allow for the ability to create much better natural habitat (including aquatic plants). This would also help in reducing the number of stranded salamanders that are being trapped during pool lowering.**

The City has proposed partial removal of the concrete floor of Eliza Springs in order to evaluate the habitat conditions under the concrete. Based on this evaluation, the City, in concurrence with the Service, will decide if complete removal of the concrete floor is warranted for the net benefit of the species.

## 16. ECONOMIC CONCERNS

**Any plan to pave the beach as described by City officials is not contained in the fiscal cost estimate, and will exceed the cost of the proposed dam, based upon City official's statements.**

The fiscal cost estimate for the implementation of the HCP has been updated to include the installation of the sidewalk and wading area along the beach.

**The plan does not describe the costs to the City associated with obtaining any needed waivers, approvals or other modifications to ordinances prior to construction projects in the pool.**

City staff will address any waivers, approvals, or ordinance amendments that may be required for the implementation of the HCP. As such, the City will not incur additional expenditures.

**The cost estimate does not describe the costs associated with future plans to remove silt and algae from the pool.**

The cost estimates included in the HCP are specific to measures included in Section 6 of the document. The cost estimate does include money spent for the removal of silt and algae from the pool.

**The plan will cost far in excess of the sums estimated in the plan. This money is misspent since it is aimed at reducing not enhancing the removal of dangerous and toxic silt and algae.**

In this cost estimate, \$607,000 is allocated for specific improvements or modifications that will mitigate the impacts of stormwater and flooding, effectively minimizing the quantity of silt and sediment that enters the pool. In addition, these measures will facilitate the removal of silt and algae from all areas of the pool.

**You have collected 4 years of data, and now you want to waste our money by spending \$45,000/year to study the salamander more.**

Over the past five years, the City has shown a strong commitment to protect the salamander and the springs. The data collected by the City and the Service during these years were vital to the development of the HCP and the Recovery Plan for the species. However, significant questions remain unanswered concerning the reproductive biology of the species, population dynamics, and tolerance of the species to chronic and acute pollutant levels. A better understanding of the biology

Future financial responsibility for changes resulting from adaptive management would rest with the permit holder (City of Austin) as outlined in the HCP.

**As a public entity, any commitments of the City to spend money in furtherance of the HCP will be subject to the political appropriations process. Yet, the HCP provides no funding plan or assurances relative to funding at all. Nor does it indicate the cost of the items proposed.**

The estimated costs for implementation of the HCP are outlined in the EA/HCP, Appendix E. Acceptance of the 10(a) permit includes the responsibility for the funding of the plan.

## 17. GENERAL

**What is good for the salamander is good for the swimmers and vice versa.**

The Service agrees with this comment. Implementation of the HCP will minimize the incidental take of salamanders while providing a safe, recreational facility for swimmers and waders.

**Salamanders and people have been co-existing for many years and I believe we can continue to co-exist. The pool should be cleaned and maintained for our children and grandchildren. If cleaning destroys the salamander, I'm sorry. I can't have a lot of sympathy for the little critter if the pool can't be cleaned.**

The Service believes the proposed permit would not alter this relationship.

**The building of a dam and the modifications to the beach will be a blow to the historic use and character of Barton Springs Pool. Silt and algae removal will be all but eliminated and conditions in the pool will only worsen. Every reasonable alternative proposed by the public has been informally vetoed by government biologists. The public is powerless to alter the outcome.**

Numerous changes have been made to the HCP based on the comments received from the many diverse users of the springs. Implementation of the HCP will provide for the continued removal of silt and algae from all areas of the pool while preserving the historic use and character of the springs.

**This plan makes any benefit from the \$65 million bond package to buy sensitive land on the aquifer illusory.**

The HCP would compliment the land bought on the aquifer by providing a clean safe spring for both people and salamanders.

**The evidence is that silt and algae are the only real threats to the survival of the species. Swimmers and salamanders need the same water quality. Only the plan has given the appearance of pitting one against the other by alleging that wading and cleaning are the problems.**

Threats to the species from maintenance and operational activities are well documented. Minimization of these threats is addressed under the preferred alternative. However, the Service agrees that protection of water quality at the springs is necessary for the continued survival and future recovery of the species.

**Could the shallow end be painted with blue paint that prevents algae from growing?**

The City would pursue this proposal and evaluate the effectiveness in the shallow end of the pool under the HCP. A paint product that inhibits the growth of algae could be a useful tool for pool maintenance. Clear paint may be a better choice to keep with the character of the springs.

people with masks and snorkels have to be more responsible in policing the activities of other snorkelers.

The Service agrees that education and public awareness are vital components to any effort to protect the springs.

**I'm opposed to unnecessary intervention to change the pool procedures unless mandated by law. I believe the proposed changes are not essential, and, until they are, money should be used to preserve the aquifer and swimming at Barton Springs Pool.**

Sufficient data exist to document the impact of pool maintenance and operation on the species. Federal law requires the City to obtain an incidental take permit if the City continues to operate Barton Springs as an aquatic recreational facility.

**The City has insisted on strong, industrial methods to clean the pool that are unnecessary; we can come up with better cleaning methods. I withdraw my support of USFWS because of this document that overreaches and is punitive to the users of Barton Springs. The fencing off Sunken Garden is repression. How long will it be until USFWS closes down Barton Springs?**

The City believes that the pool cleaning methods represent a necessary and cost effective means of ensuring a clean safe recreational environment. New techniques would be developed to ensure the same or better standard of care under the HCP. The Service believes that the HCP, as proposed by the City, would be beneficial to spring users. The continued use and protection of the springs is the primary goal of this document.

**I support the efforts to protect the Barton Springs salamander.**

Thank you for your comment.

**Barton Springs is a key element in Austin's wonderful quality of life, and therefore business and developers need to preserve it for their own self-interest. Cooperative solutions need to be found to protect the watershed for Barton Springs Pool, even if it costs more or is more trouble.**

The Service agrees that long-term protection of the aquifer will require a regional approach supported by public and private agencies and enterprises.

**The document is an attempt to draw attention away from the true endangered species at Barton Springs - the swimmers.**

The HCP is designed to minimize the incidental take of salamanders while providing for the needs of all users, including swimmers and waders.

**The City's plan seems hasty and drastic. A competition using students and teachers should be used to come up with real solutions.**

Development of the HCP has been neither hasty nor drastic. City and Service staff began development of the document in the spring of 1997. The draft HCP was submitted to the Service in January 1998. During the past eight months, the plan has been open to a 45-day public comment period, a 30-day public comment period, two public meetings and two public hearings. The Service and the City have met with numerous interested citizen groups and concerned citizens. Numerous changes have been made to the document based on the comments received from the public.

**The pool should be called Barton Springs, not Barton Springs Pool.**

The Service is not opposed to a name change to better reflect the ecological character of the springs.

limestone slabs could be installed in the fissure area to minimize the incidental take of salamanders. Under the HCP, access to the fissure area would not be restricted.

**This is a vengeance strategy to try to shut down the pool. We can work out a solution that protects the salamanders and allows swimming.**

The Service believes that this plan will ensure the continued use of the springs for all users. Implementation of the HCP will maintain the recreational use of the pool while minimizing the impact on the salamander.

**I think that you should do whatever you need to do to protect the salamanders. Curtailing human activity is entirely acceptable.**

The Service believes that swimmers and salamanders can peacefully co-exist and continue to enjoy the springs for many future generations.

## Appendix E

### Cost Analysis for Implementation of the HCP (Section 6.0)

<b>1) Cost of Individual Measures to Minimize or Mitigate Incidental Take of Salamanders</b>		
Pump system for the fissure area		3,000
Cap underground outflow drain at Old Mill Spring (Sunken Garden)		500
Mitigation for take (May 30, 1997 - permit issuance date)		<u>10,000</u>
<b>Subtotal</b>		<b>13,500</b>
<b>2) Cost of Individual Measures to Improve Pool Operation and Maintenance Procedures and Minimize Incidental Take of Salamanders</b>		
Modification of the existing gate system		30,000
Design and installation of pump system		70,000
Design and installation of water control structure		300,000
Design & install underwater sidewalk (including habitat restoration)		146,000
Temporary silt fencing for stormwater runoff at all spring sites		1,000
Design and install permanent stormwater runoff mitigation		60,000
Design and install new bypass grate		30,000
Public awareness program		30,000
Fencing at Eliza Spring and Old Mill Spring (Sunken Garden)		8,000
Educational kiosks		<u>2,000</u>
<b>Subtotal</b>		<b>677,000</b>
<b>3) Cost of Individual Measures that will extend over the 15 year permit period</b>		
Conservation Fund for research	(45,000/year)	675,000
Daily inspection of all spring sites	(3,650/year)	54,750
Visual inspection of beach and fissures area	(1,600/year)	24,000
Monthly salamander surveys	(1,920/year)	28,800
Captive Breeding Program	(20,000/year)	300,000
*Average Annual Pool Maintenance Costs	(40,430/year)	<u>606,450</u>
<b>Subtotal</b>		<b>1,689,000</b>
<b>TOTAL (13,500 + 677,000 + 1,689,000)</b>		<b>2,379,500</b>
<b>TOTAL Estimated HCP Implementation Costs</b>		<b>2,379,500</b>

- \* The Average Annual Pool Maintenance Costs Estimate does not include the additional \$3,143,550 the City will spend for the general operation of Barton Springs over the 15 year permit period.