Appendix A

Public Involvement

Appendix A1

Membership of the HCP Management Advisory Committee

Appendix A-1

Membership of the District HCP Management Advisory Committee

Table A-1 Membership of the District HCP Management Advisory Committee (MAC)

Member	Organization	Function
Cindy Loeffler	Texas Parks and Wildlife Department (TPWD)	State Regulatory Agency
Kevin Connally	U.S. Fish and Wildlife Service (FWS)	Federal Regulatory Agency
Chris Herrington	City of Austin	City Government
Jon White	Travis County	County Government
Todd Voteller	Guadalupe-Blanco River Authority (GBRA)	Water Supplier
Laurie Dries	City of Austin	Ecological Expert
Jason Biemer	City of Kyle	Groundwater User/Supplier
Jennifer Walker	Sierra Club	Conservation Group
Bryan Brooks	Baylor University	Ecological Expert
David Loftis	Centex Materials	Groundwater User
Scott Nester	Private Landowner	Private Property Interests
Christy Muse	Private Landowner	Private Property Interests
Clif Ladd	At-large	Consultant
Karen Huber	At-large	Consultant

Appendix A2

Public Comment in Response to Published Notice of Intent by the U.S. Fish and Wildlife Service to Prepare an Environmental Assessment

Appendix A-2

Public Comments in Response to Published Notice of Intent by U.S. Fish and Wildlife Service to Prepare an Environmental Assessment

Notice of Intent to Prepare an Environmental Assessment for the Barton Springs/Edwards Aquifer Conservation District for Proposed Incidental Take Permit Addressing Take of Two Federally Listed Species in Central Texas

Notice by FWS on 03/05/2014

Comment Period Closed on Apr 04, 2014 11:59 PM ET

Docket ID: FWS-R2-ES-2013-0128

Agency: Fish and Wildlife Service (FWS)

Parent Agency: Department of the Interior (DOI)

Summary:

We, the U.S. Fish and Wildlife Service (Service), advise the public that we intend to prepare a draft Environmental Assessment (EA) to evaluate the impacts of, and alternatives to, the proposed issuance of an incidental take permit to the Barton Springs/Edwards Aquifer Conservation District (District). The permit, issued under the Endangered Species Act, as amended (Act), would allow for potential take of two federally listed species associated with the ongoing management and withdrawal of groundwater from the Barton Springs segment of the Edwards Aquifer (Aquifer) in Central Texas.

Comment

I oppose killing two species of salamander for this aquifer. you need to find another plan. there is no reason to allow these two species to be murdered. this comment is for the public record.

Comment

April 4, 2014

RE: "Notice of Intent to Prepare an Environmental Assessment for the Barton Springs/Edwards Aquifer Conservation District for the Proposed Incidental Take Permit Addressing Take of Two Federally Listed Species in Central Texas"

Docket ID: FWD-R2-ES-2013-0128

Dear Mr. Zerrenner:

The notice indicates that the U.S. Fish and Wildlife Service (UWFWS) intends to prepare a draft Environmental Assessment (EA) to evaluate the impacts of, and alternatives to, the proposed issuance of an incidental take permit to the Barton Springs/Edwards Aquifer Conservation District (District). It is the Sierra Club's position that a full Environmental Impact Statement (EIS) is warranted in this case. The potential for significant threat to the survival and viability of the Barton Springs salamander and the Austin blind salamander are real. The threats are numerous, but the one threat that is most directly controlled by the District is pumping from the Barton Springs/Edwards Aquifer. The District's current management plan and rules will allow flow from Barton Springs to decrease to 6.0 cubic feet per second (cfs) during a severe drought. The District's goal or "Desired Future Condition" per their Water Management Plan is to preserve 6.5 cfs of spring flow and it should be noted that the District is working to find solutions towards preserving the full 6.5 cfs. However, this proposed spring flow volume is nearly one half of what has been recorded historically (11.7 cfs) and could result in take or harm of the species in question. For this reason alone, we believe that a full EIS is warranted.

Another key issue in providing take protection associated with very reduced flows during drought periods will be measures to monitor and ensure that the water quality of those flows is high enough to minimize stress to salamanders at all of the spring orifices where salamanders occur. While the District does not directly regulate water quality, lower flows could result in lower water quality.

The notice uses very broad language and states that incidental take "that may result from activities associated with management and pumping of the Barton Springs segment of the Edwards Aquifer in Caldwell, Hays, and Travis Counties, Texas." "Management" is a very broad term and it does not seem appropriate to seek take protection for activities beyond pumping and regulation of pumping from the Barton Springs/Edwards Aquifer. The scope of issues that must be addressed in an EA or EIS would expand dramatically if the intent is to provide broader coverage.

Thanks you for your consideration of these comments. We look forward to working with USFWS and the District on this matter.

Sincerely,

Jennifer Walker
Sierra Club, Lone Star Chapter

Comment

Attention: U.S. Fish and Wildlife Service

Subject: Docket #FWS-R2-ES-2013-0128: Notice of Intent to Prepare an Environmental Assessment for the Barton Springs/Edwards Aquifer Conservation District for Proposed Incidental Take Permit Addressing Take of Two Federally Listed Species in Central Texas

To whom it may concern,

My name is Lexi Erwin, and I am submitting comment as a student studying Programs in the Environment at the University of Michigan. This comment will focus on the proposed environmental assessment to gain the permission to "take" two federally listed species in Central Texas from the Barton Springs/Edwards Aquifer Conservation District. I do not agree with the action that is being proposed and my primary reasons for that are listed below.

First, the term "take" is not defined in the assessment, but federalregister.gov provides the definition. To "take" a specimen from its habitat means to either harm, harass, pursue, hunt, shoot, wound, kill, trap, capture, or collect a specimen. The environmental assessment references the benefits of taking these 2 species from their habitat to better the Conservation District, however: it could be argued that no matter how great the benefits, using these specific measures is ethically wrong.

Second, to "take" equates to harassing the fish, which will mean injuring the animal and disrupting the natural behavior of this fish. The fish will lose its ability to breed, to protect, and to provide shelter for similar species. The fish has the potential of becoming endangered because of the lack of ability adapt to a new habitat or thrive the same way it does now, in a new environment.

Third, the disruption of the individual behavior equates to a lack of diversity in the conservation district. The species-by-species approach, removing and adding one species at a time, will hurt the multispecies habitat in place. This can cause other species to begin to die off because they needed the support and the production of the other species that are being removed from the area.

Thank you for allowing me to comment on the assessment of the Barton Springs/Edwards Aquifer.

Lexi Erwin, a University of Michigan Student

Appendix A3

Minutes from the Public Hearing on the Barton Springs/Edwards Aquifer Conservation District Draft Habitat Conservation Plan Held on September 11, 2014

Appendix A-3
Minutes from the Public Hearing on the Barton Springs/ Edwards Aquifer Conservation District Draft Habitat Conservation Plan Held on September 11, 2014

The following minutes were extracted from the Barton Springs/Edwards Aquifer Conservation District Board of Directors Meeting Minutes of the Regular Meeting and Public Hearing held on September 11, 2014.

> **The Board will hold a Public Hearing for the proposed draft Habitat Conservation Plan (HCP) that has been developed in support of a prospective application for an Incidental Take Permit (ITP) from the United States Fish and Wildlife Service. The proposed HCP includes measures necessary to avoid, minimize, and mitigate potential adverse effects or "take" of the endangered Barton Springs salamander (*Eurycea sosorum*) and Austin blind salamander (*Eurycea waterlooensis*) associated with District-permitted withdrawals of groundwater from the Barton Springs segment of the Edwards Aquifer.**

Dr. Larsen opened the Public Hearing at 6:15 p.m.

Mr. Dupnik and Brian Hunt provided a presentation providing a brief history of the project, the context for the HCP, an HCP overview, and suggested next steps.

Dr. Laurie Dries, the MAC chair, provided a summary of comments from the MAC on the most recent draft plan that was received.

Ms. Dries first stated that the MAC agrees with the conservation measures proposed in the plan and commended the decision to hire a technical editor noting that improving the readability of the document will facilitate document review and reduce future comments. Mr. Dries further described some remaining concerns and questions related to the need to better explain the take estimate methodology, the "gap" between the permitted pumping and the adopted extreme drought MAG, and the absence of a distinction between lethal and sublethal take in the take estimates. Ms. Dries concluded by thanking the District and expressed appreciation for the District's efforts to address all of the MAC comments submitted to that point.

Mr. Jon Beall of Save Barton Creek Association also commended the District for their efforts to obtain the ITP, and thanked everyone who worked on it.

Mr. Dupnik read a letter that was submitted by Save Our Springs Alliance into the record.

There were no other public comments; therefore, Mr. Smith moved to close the Public Hearing at 7:15 p.m.

Ms. Stone seconded the motion and it passed with a vote of 4 to 0.

Appendix A4

Summary of Results of Public Scoping Meeting of August 23, 2005 and Letters Received

Appendix A-4
Summary of Results from Public Scoping Meeting of August 23, 2005 and Letters Received

Table A-4. Summary of results from public scoping meeting of August 23, 2005 and letters received

Issue Categories	Number of Comments
Groundwater flow routes need study	1
Need to protect prey species in aquifer; uncertainty as to how flow changes will impact species and food base	2
Biodiversity unknown, evidence of genetic links between Barton Springs and San Marcos salamander species	3
Consider 1950's drought impacts; restrict water usage during times of drought; CAC should help revise District's Drought Trigger Methodology	4
More outreach needed to make process understandable, alternatives should be described early in HCP process; initial CAC meeting and scoping meeting of the Service on August 23, 2005 were designed to inhibit and manage discussion, as well as information flow; facilitation of communication between the members of the CAC needed; facilitate communication between BAT and CAC; input of the CAC and the BAT is already improperly constrained	7
Investor-owned water utility must balance limiting aquifer pumping against obligation to serve demand under state law	1
Role of conjunctive use in HCP	1
New road and water infrastructure in aquifer contributing and recharge zones needed to serve growth is too expensive, better to use money to buy land and preserve	4
County land regulation authority needed; conservation development emphasis needed	2
Sprawl development subsidizes growth; acquisition of open space needed over the recharge zone and within the service area of the District; address growth served by groundwater	3
Economic impact of pumping limits needs study	1
Sustainable population concept should be considered	1
District should use pricing to manage groundwater via market; greater water conservation from District customers needed	2
Expand scope to address synergistic effects of pollution and water quantity/quality in more detail	1
Pesticides and sedimentation are main threats to species; habitat stressors also include reduced springflows, oxygen content, toxic pollutants including petroleum by-products	2

Table A-4, continued

Issue Categories	Number of Comments
To the maximum extent practicable, minimize and mitigate the impacts of taking and assure that the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; over-reliance on adaptive management to make up for inadequate up-front planning does not meet the legal requirements of the ESA	2
EIS should examine in detail the stochastic risk of species extinction; impact of any authorized take should be minimized by establishing minimum springflows that are clearly sufficient to ensure the continued survival and recovery of the species	2
Captive breeding and off-site refugia are not reliable or legally adequate means of ensuring the continued survival of the species in the wild	1
TOTAL	40

CAC = Citizens' Advisory Committee
HCP = Habitat Conservation Plan
BAT = Biological Advisory Team
ESA = Endangered Species Act
EIS = Environmental Impact Study
Source: Service, draft comments from BSEACD HCP EIS scoping, 09/07/05

Appendix A5

Public Review of DHCP and DEIS and Response To Comments

APPENDIX A5

PUBLIC REVIEW OF DHCP AND DEIS AND RESPONSE TO COMMENTS

The dHCP and dEIS were made available for public review and comment during a 60-day public review period from July 18, 2017, to September 18, 2017. The Notice of Availability was published in the *Federal Register* on July 18 (82 FR 32861) and posted along with the dHCP and dEIS on the Service's Austin Ecological Services website at http://fws.gov/southwest/es/austintexas. Public comments were posted at www.regulations.gov.

An open-house style public meeting was held on August 22, 2017 from 6-8 p.m. at the BSEACD office, 1124 Regal Row, Austin, Texas 78748, during the 60-day comment period. The open-house format provided an opportunity for the public to ask questions about the dHCP and dEIS and learn how the District will help protect the Covered Species.

Three public comment letters (included below) were received in response to the Notice of Availability and public comment period and are included in this EIS. Each of the letters contain comment numbers annotated in the left margin that refer to respectively numbered comments and associated responses that have been compiled in **Table A-5-1**, below.

City of Austin
Founded by Congress, Republic of Texas, 1839
Watershed Protection Department
P.O. Box 1088, Austin, Texas 78767

September 18, 2017

Public Comments Processing
Division of Policy and Directives Management
U.S. Fish and Wildlife Service
Via Regulations.gov

Re: Draft Environmental Impact Statement and Draft Barton Springs Edwards Aquifer Conservation District Habitat Conservation Plan

To Whom It May Concern:

The City of Austin is pleased to submit comments on the Draft Environmental Impact Statement and Draft Barton Springs Edwards Aquifer Conservation District (BSEACD) Habitat Conservation Plan (HCP). The proposed covered activity under the HCP is the withdrawal of groundwater by permitted, non-exempt well owners from a groundwater supply that is managed by the BSEACD. As correctly described in the proposed HCP, the covered activity reduces water levels in the aquifer and thus reduces spring discharge, most significantly during periods of drought, and changes in spring discharge are also related to changes in the water quality at springs. Spring discharge in the plan area is naturally variable depending on regional climatic conditions. Additional reduction in spring discharge beyond natural variability as a result of the covered activity are clearly modification of habitat constituting take of the covered species. The withdrawal of groundwater consistent with BSEACD rules is clearly a lawful activity with a substantial and important beneficial public purpose, and the resulting take of the covered species is incidental.

BSEACD has been and remains a critical partner of the City of Austin in the collaborative protection of the quality and quantity of regional groundwater resources. The cooperative protection of surface water and groundwater resources via the aggregation of both entities regulatory, capital project and programmatic approaches including public education is essential given the unquestionable hydrologic connectivity of these systems. The City of Austin remains committed to continued collaboration with BSEACD to protect the covered species, as evidenced by inclusion of a memorandum of understanding linking the BSEACD with Austin as a conservation measure in the City of Austin's approved HCP for the Barton Springs Complex.

The City of Austin is committed to compliance with the Americans with Disabilities Act.
Reasonable modifications and equal access to communications will be provided upon request.

City staff, including those with particular expertise on these species and in the hydrogeology of their habitat, have reviewed the proposed HCP and their comments are attached. In general, the City disagrees with the methods to quantify take but recognizes the benefits of BSEACD aquifer management during drought conditions and believes they are protective of spring discharge.

Sincerely,

Michael L. Personett, Acting Director,
Watershed Protection Department

Attachments:
General Comments

These remarks were compiled from comments by the following City of Austin Watershed Protection Department staff members: Nathan F. Bendik, Thomas Devitt, Ph.D., Christopher Herrington, P.E., David Johns, P.G., and Donelle Robinson, Ph.D.

General Comments:

1. The premise of the Habitat Conservation Plan (HCP) is the assumption that only animals within the vicinity of the Barton Springs will be affected by reduction of dissolved oxygen (DO) from Covered Activities. We believe this is incorrect for two primary reasons. First, *E. sosorum* occurs deep within the aquifer away from the springs, as it has been collected from a well (McDermid et al. 2015) and a cave, Blowing Sink (Bendik et al. 2013). Regarding the 2015 record, the district states that "The individual organism has not yet been confirmed by genetic sequencing as Barton Springs Salamander." Such "confirmation" is not necessary. This species is morphologically distinct from other Texas Eurycea salamanders (Sweet 1977; Chippindale et al. 1993). Experts (A. Gluesenkamp, N. Bendik, T. Devitt, and P. Chippindale; personal communication) agree that this specimen is assignable to *E. sosorum* based on the color photos of this specimen in life. Furthermore, *E. sosorum* also occurs at a number of springs along Little Bear and Bear Creeks (Bendik et al. 2013). For *Eurycea waterlooensis* there are no similar data, although it is our considered opinion that it is more likely to occur deep within the aquifer (beyond the 300 m zone in the HCP) given the relative infrequency of its occurrence at the surface (see additional comments below). Lower water levels in the aquifer from pumping will result in habitat loss and reduce the connectivity of aquifer compartments by creating more perched pools (e.g., Wong et al. 2012) that must wait longer for water levels to rise. This would affect any individuals stranded in pools that may need to rely on water connectivity for delivery of prey items and mates. Thus, whenever aquifer water levels change, take may occur due to pumping, even in non-drought conditions. While little is known of the abundance of salamanders throughout this area, the proposed ITP area including the entire recharge and artesian zones are potential habitat. This aspect of salamander distribution is only considered a changed circumstance in the HCP, which we do not believe is a conservative approach given the vast area of potential habitat that is excluded. Second, reduction of DO is not the only biological effect of reduction in discharge due to pumping. Reduced discharge can cause springs to run dry, alter water temperature, and have other have additional impacts to the ecosystem that increase the take of the covered species. Other environmental factors related to changes in spring discharge that may influence neotenic *Eurycea* biology should be evaluated, such as the effects of drought (Bendik and Gluesenkamp 2013), water temperature (McAllister and Fitzpatrick 1989, Berkhouse and Fries 1995, Crow et al. 2016), flow (Fries 2002, Bendik 2017, Krejca et al. 2017), habitat preferences and associations (Sweet 1982, Pierce et al. 2010, Diaz et al. 2015, Bendik et al. 2016), and interspecific interactions (DeSantis et al. 2013, Gillespie 2013, Zabierek and Gabor 2016).

2. The desired future condition of a combined 6.5 cfs discharge from Barton Springs could possibly result in Eliza Spring going dry or stagnant. Based on the demographic information in the COA survey data, it appears that the spring surface is important for recruitment of juveniles into the adult size class. Because Eliza Spring consistently harbors the largest known abundance of *E. sosorum* and the HCP assumes that the surface population represents a large proportion (mean + 1 SD) of the population at any given time, it is possible that the proposed minimum discharge could result in jeopardy of the species from that point of view. This further underscores the problem of relying on DO as the sole determinant of population persistence. Ignoring discharge means ignoring the importance of the ecological consequences of loss of flowing water to an aquatic organism and the ecosystem it depends on (see previous comment). Thus, further consideration should be given to the consequences of Eliza going dry and the likelihood of that occurring during 6.5 cfs combined Barton Springs discharge.

3. Although we disagree with the singular focus on DO, we believe the general approach to take calculations using a flow threshold can be a workable approach to estimating a single value of take. However, the method should be extended to include an increase in take (or converted sub-lethal take to lethal take) according to the length of time at given low DO thresholds, for example. Take should not be calculated as a rate per month, because low DO conditions are persistent once they occur. That is, once a low DO threshold is reached, take (possibly sub-lethal) then occurs for all salamanders within the aquifer or at least in the springs. It should not apply to a subset of them per month until it reaches their total abundance. Thus, if proceeding with an approach solely based on DO, we suggest a calculation whereby once a threshold is reached due to pumping, take occurs on all individuals at once (initially, as a non-lethal effect) rather than on a smaller proportion per month. Take would apply singularly to each drought event. If pumping only exacerbates (rather than causes) a low DO (or other) threshold, a scalable, rather than wholesale, take calculation should apply. Lethal take could be calculated according to the levels and rates determined by Woods et al. (2010) and applied to different size classes of salamanders, as appropriate. For example, a 28-day LC50 would cause take of half the animals every 28 days, on average. In this way, lethal take could be calculated as a cumulative rate. The difference between LC50 at different concentrations of DO and the time period at that concentration caused by pumping could be factored in to include what proportion is due to natural causes and what proportion due to drought. These can be applied to each of the drought scenarios given in the HCP. Additionally, we note that estimates of take based on projected DO could be incorrect due to observed DO being much lower than what is projected in certain circumstances. For example, during 2006, when USGS combined spring flow was 28 cfs, DO at Old Mill Spring decreased to near 1 mg/l. In 2009 when USGS combined spring flow was 25 cfs, DO at Old Mill Spring decreased below 4 mg/l. A month later even though spring flow increased to 27 cfs, DO at Old Mill Spring had decreased below 3 mg/l. In September, spring flow decreased to 24 cfs and DO at Old Mill Spring was below 2 mg/l.

Alternatively, take calculations could be simplified by acknowledging the biological reality that 100% of all individuals in each population will at a minimum be harassed through habitat modification as a result of BSEACD activities during droughts. Thus, take is simply all individuals of each population, and the recurrence interval of take may then be calculated simply based on the recurrence interval of drought. Drought recurrence intervals may be estimated through statistical analyses of the period of record, modified progressively to account for changing climatic conditions. The benefit of the conservation measures proposed by the HCP may then be estimated simply as change in spring discharge from an unmanaged condition to the conditions with the proposed conservation measures. The change in spring discharges are much more straight-forward to estimate, and this approach has the advantage of not requiring the assumptions inherent to the DO spreadsheet model estimates.

4 4. Because groundwater withdrawal is considered a "covered activity" does this imply that gaining access to that water (drilling) and mechanical extraction of that water (pumping) are also covered activities? If so, the analyses, areas, and take calculations should reflect these actions that could physically impact salamanders within the aquifer. Pumping can suck up salamanders near the intake and drilling can also physically harm salamanders within the aquifer at any time. Otherwise, how is pumping (the method for withdrawal) not covered, while withdrawal is? That is, only the effect of withdrawal, and not withdrawal itself, seems to be implied as a covered activity, although that is not how the document is worded. This should be clarified.

5 5. The Appendices are not provided on regulations.gov, and thus it is not possible to provide a complete review of the official HCP draft without this information.

<u>EIS comments</u>

6a 1. It is a substantial threat to the Covered Species that Alternative 2 may reduce spring flow to conditions worse than the drought of record and increases the frequency that spring flow decreases to drought levels. The comment that "the springs would never cease flowing" under Section 4.3.4.2 of the Environmental Impact Statement (EIS) regarding the impacts of the Habitat Conservation Plan on the Covered Species is incorrect and seems to only consider flow at Parthenia Spring. All springs except Parthenia are likely to have more serious impacts than what is currently described under Alternative 2:

   a. Eliza Spring flows at a combined spring discharge of 14 CFS but may not continue to flow at 6.5 CFS. It is unknown at what USGS combined discharge threshold that Eliza Spring stops flowing. The lowest discharge measured for Eliza Spring was 1.4 CFS on 5/9/2013, or 6.4% of the USGS combined discharge of 22 CFS for that date. The proportion of spring flow at Eliza Spring relative to the USGS combined discharge may decrease as spring flow decreases to near drought of record levels. Given that Eliza Spring is located at a higher elevation than Parthenia Spring, it is very likely that Eliza Spring will go dry sooner than Parthenia Spring. Even if Eliza Spring does maintain some flow at 6.5 CFS, the

flow could be too low to sustain any salamanders irrespective of oxygen supplementation. This is a substantial threat to the species since Eliza Spring is the spring that typically has the largest salamander population.

6b b. The decrease in spring flow will cause Old Mill Spring and Upper Barton Spring to stop flowing more often. According to the spring flows shown on page 4-7 of the EIS, Old Mill and Upper Barton will stop flowing 10% more often, since Upper Barton stops flowing at approximately 40 cfs. The Old Mill stream stops flowing at approximately 20 cfs, leaving a stagnant spring pool with little new groundwater contribution. According to the "percent of time over the period of record average monthly spring flow would have been at or below designated levels" cited in Table 4-1 in the EIS, Old Mill will be impacted approximately 20% of the time, or twice as often compared to other alternatives. Upper Barton will stop flowing approximately 48% of the time, or 25% more often than the other alternatives. The length of these low and no flow periods has long term consequences to these populations. The number of salamanders at these springs has yet to return to the numbers seen prior to the droughts of 2009 and 2011.

HCP Page Specific Comments:

7 p 27 Revise Eliza Daylighting project completion to Fall (September) of 2017

8 p 28. Map is inaccurate and does not reflect the current habitat boundaries identified in COA's 2013 HCP, as suggested.

9 p 28 Fig 3-4: Why are Incidental Take Permit areas and USFWS Critical Habitat for ABS different. Explain.

10 p 29- Fig 3-5 Clarify if this is daily/monthly/annual flows

11 p 30 – Provide supporting data for statement that monthly mean flows would be very similar to weekly or even daily mean flows during drought

12 p 32 – Mentioning that if the Barton Springs Pool downstream dam itself or the gates are damaged by flooding or other means that maintaining water levels in BSP will not be possible which means water levels in Eliza are then unmanageable

13 p 37 "the surface-habitat component of the population for Covered Species is approximated by the observed mean abundance values plus one standard deviation… These statistics are based on the COA's extensive salamander censuses, conducted using the same census standards and protocols approximately monthly over an 8-year period ending in 2011 (City of Austin, 2013)… At best, this is an approximation of the surface-habitat population." More recent estimates of the total population available for capture at Eliza Spring (for a given point in time) have been generated by COA, and are available in COA's annual permit reports (COA 2014; COA 2015; COA 2016). We have found that individuals captured during a single survey often represent less than half of the total number of individuals present at the surface. Thus, the mean + one standard deviation of counts may be too conservative of an estimate for the average population size at the surface over an eight-year period.

14 —— p 37. The biological rationale for why a blind, cave-dwelling obligate species (*E. waterlooensis*) would be restricted only to areas near the spring outlets is not well founded, and these assumptions influence the calculation of take and assessment of jeopardy (e.g., see comment #1). Other, closely-related *Eurycea* have been collected from wells (McDermid et al. 2015; Andy Gluesenkamp, personal communication) and under dry river beds (Potter and Sweet 1981). The fresh-water saline-water interface is replete with life in the southern Edwards Aquifer (Hutchins et al. 2016), and cave fishes have been collected from deep within the aquifer as well (Hubbs and Bailey 1947). These observations suggest that DO conditions can be suitable for vertebrates deep within the aquifer.

15 —— p 38 "But for purposes of the take assessment in this HCP, the population distribution among the outlets is assumed to be related to the quantities (and therefore average flow velocities) of water at the individual outlets, and that this relation increases as combined spring flows decrease" It is unclear whether this statement is claiming that population size at each site increases with discharge or average discharge, or whether the proportion of the population size occurring at each outlet changes according to discharge levels. Please clarify and include the justification for making this assessment.

16 —— p 40 Clarify what the season water temperature effects on DO are

17 —— p 40 After the phrase "…from confined parts of the Aquifer" add " discharge from the springs"

18 —— p 43 2nd paragraph, the phrase "..some stationary and some mobile" is unclear.

19 —— p 43 Paragraph references DO from datasondes but suggests that there isn't a lot of data for DO at low flows, did analysis examine 2011 draught data when spring flows dropped in the mid and low teens comparing DO from datasondes and spring flow?

20 —— p 43 First sentence of 4th paragraph is confusing and unclear, what "influences"?

21 —— p 44 This sentence does not make sense "That salinity variation between average flow and the lowest flows is not much more than the salinity variation in typical flows of the same magnitude."

22 —— p 45 Specific conductance data shown is only for the main spring and doesn't include Old Mill which has a high percentage of saline inflows

23 —— p 75 Does not mention identification of Barton Springs salamanders at sites other than the 4 Barton springs.

24 —— p 75 Should mention Eliza Daylighting project by name

25 —— p 81 Table 5.1 Under the Source of Concern heading, the District does have an indirect effect on this as the agency can review TCEQ Water Pollution Abatement Plans within its jurisdictional area which focus on Total Suspended Solids as the primary pollutant of concern.

26 p 88 Number 4 – There is no data and only a suggestion to support the statement that the Austin Blind Salamander uses the near-surface habitat more than the Barton Springs salamander.

27 p 91 A minor factual error: "One of the primary findings of Woods et al. (2010), in further assessing the results of Poteet and Woods (2007), was that increases in specific conductance do not result in salamander mortality, even increases to very high specific conductance." Woods et al. (2010) concerned DO only and did not address specific conductance. Only the Poteet and Woods (2007) assessed conductivity.

28 p 99, first paragraph. Organismal effects also result in population effects. Retain the discussion of different effects but remove the false distinction here.

29 p 99 Take of Covered Species can occur in the aquifer (i.e. occurrences in Zara well and Blowing Sink)

30 p 101. It is incorrect to call the COA survey a census. A census implies a complete count, e.g., see chapter 12 of Williams et al. (2002). From COA mark-recapture surveys we now know with certainty that count surveys performed were not censuses. Underestimation of the surface population size may therefore underestimate the take calculations made in the HCP.

31 p 101 "since 2003 has used essentially the same protocols and standards for its surveys." This is no longer correct. Survey frequency and data collected (e.g., capture-recapture data) have changed since 2014.

32 p 101. "To reduce this adversely affected population to a single numerical estimate as required for the ITP, the District has designated the number of individuals experiencing incidents of adverse effects arising from DO-related behavioral or physiological effects at the spring outlets to be equivalent to the arithmetic mean-plus-one standard deviation (SD) of the abundance data from the COA's aggregated census counts for each outlet." This does not incorporate temporal variability and the possibility of multiple take events. The section should be rewritten with this in mind because it implies that there is one single population size and one single take event. The number of take events is uncertain and we know for certain that the population size fluctuates.

33 p 102. "Similarly, it does not quantitatively differentiate the potential adverse effects from either physiological response or behavioral effects from changes in DO concentration. To the District's knowledge, quantitative relationships between and among these factors for the Covered Species do not exist." The Woods et al. studies cited within included assessments of physiological response to DO and conductivity for *E. sosorum* and its surrogate *E. nana*, so this is either an incorrect or incomplete statement.

34 p 102. "Further, for simplicity, that portion of the Barton Springs salamander population with habitat that is inaccessible from the surface and therefore not accounted for directly in the COA's censuses but that may be adversely affected **is considered to be included in the stipulated population at the perennial outlets** [emphasis added]." How is this the case when a mean plus one standard deviation applies to surface count data only? What factor has been added to the calculation based on surface counts (mean + 1 SD) to include subterranean animals?

35 p 103. Details for the methods are not presented. The appendices are not available on regulations.gov and were not available on the District's website.

36 p 113 Not clear how the benefits of DO augmentation were quantified, please explain or reference the data.

37 p 114. "Because, as suggested in Figure 5-10, the pre-HCP management scenario represents a dire adverse situation for the Covered Species, possibly including extirpation, any groundwater management measures that minimize or mitigate take such that the situation is less adverse than it otherwise would be should not generally be considered to appreciably reduce the likelihood of survival and recovery of the species. This assertion is germane even if those beneficial actions otherwise might jeopardize survival and recovery of the species." Wording is confusing. How could beneficial actions result in jeopardy? What is meant by "otherwise might"? If a pre-HCP management includes Covered Activities, then mitigation to address those management practices should reduce the likelihood of jeopardy and increase the likelihood of recovery compared to pre-HCP management.

38 p 118. COA aerated Sunken Garden and Eliza Spring during the past drought, although this did not appear to improve the abundance of salamanders at either site.

39 p 119. Statements about the likelihood of drought severity and frequency are not justified. No citations are provided. The probabilities provided need justification and they should account for different climate change scenarios.

40 p 120. "The Covered Species have population characteristics and individual organism traits that appear to represent more an "opportunistic" life-history strategy than an "equilibrium" life-history strategy" Provide justification and rationale for this statement, preferably supported by the biological literature.

41 p 121. "Some COA biological staff have recently hypothesized that the salamander population(s) may have established a new, smaller equilibrium, with a lower average size about which the population fluctuates more restrictedly (City of Austin, 2013). This would constitute a rapid shift away from a population with more opportunistic life-strategy characteristics toward one with more equilibrium life-strategy characteristics." This is incorrect. Changing population dynamics does not indicate changes in life-history strategies.

42 p 122. "data indicate that DO stress represents the primary factor influenced by the District's activities" This is an unfounded statement. We agree that DO can influence the physiology of salamanders, but there is no analysis or reason presented herein that demonstrates why or how DO stress is a "primary factor" influenced by pumping.

43 p 123. "These thresholds from Woods et al. (2010) appear to represent the best data available for DO stress to any aquatic salamander." Provide justification for this assertion, because other studies of the effects of DO on aquatic salamanders have not been reviewed here (e.g., Issartel et al. 2009).

44 p 123 "The salamander populations appear rather well-adapted to variability in DO concentrations above this level, although some behavioral changes have been observed, which is not unexpected in this circumstance." Provide evidence for this statement.

45 p 126 "The District believes that an unknown but likely substantial fraction of the Barton Springs salamander population will move away from the surface outlet to water that has higher DO concentrations, although how much higher is also unknown." This assumption ignores other aspects of the ecology of these salamanders. As an obvious example, DO is higher at the surface of the water, although salamanders do not occur there. In the closely-related *E. tonkawae*, salamanders are not spatially stratified according to DO, but rather, areas in the stream where groundwater emerges (Bendik et al. 2016).

46 p 127 "Notwithstanding the differences in population sizes and their locations, for the most part the two Covered Species are considered to react and behave similarly, in absence of data to the contrary." This is an odd assumption, given the differences in ecological niche the two species inhabit. *Eurycea waterlooensis* tends to be found in the open and are more likely to swim into the water column compared to *E. sosorum* (personal observations). They are more likely to become prey to predatory fish (e.g., Devitt and Owen 2016) because they are blind and do not seek cover as readily.

47 p 127 "In fact, it seems to spend a substantially greater part of its life in environments of naturally lower DO concentration than the Barton Springs salamander; so it could be reasonably asserted that the Austin blind salamander might be better adapted genetically to such environments." This statement ignores the populations of *E. sosorum* that occur within the aquifer.

48 p 134 Number 1 – The statement "…maintain a positive DO concentration at all times and minimize the areal extent concentration range…" does not make sense. Clarify intent.

49 p 140 "HCP Measure 5-5: Implement a Conservation Permit that is held by the District and accumulates and preserves withdrawals from the Aquifer that were previously authorized with historic-use status and that is retired or otherwise additionally curtailed during severe drought, for use as ecological flow at Barton Springs during Extreme Drought and thereby increase spring flow for a given set of hydrologic conditions." Unclear how the Conservation Permit works. As written, it sounds like there is a Permit or some permitees that willingly reducing pumping during Extreme Droughts. Does the Conservation Permit also contain the recharge water resulting from enhanced or artificial recharge projects? Augmentation of discharge through artificial means may not be protective of salamanders because surface conditions during drought may not be suitable. If salamanders retreat underground in response to low flows, this may be a response to more than low DO. Enhancing flow and DO artificially may therefore create an ecological trap if other drought-related conditions at the surface remain poor. Therefore, the consequences of artificial enhancement of both discharge and DO should be carefully studied before implementation.

50 p 142 Since there is a great lack of understanding in Aquifer ecology, including salamander presence, the District should commit to partnering with CoA and other researchers to investigate

Aquifer Ecology. This could include drilling ecological monitoring wells proximal to the primary spring outlets and in other areas as appropriate. Such a well close to spring outlets could be used for a DO augmentation study.

51 p 143 M-1 averages to $2,000 annually which seems low. This measure should specify what types of actions it could include.

52 p 161 Regular surveys are now performed by COA on a quarterly, not bi-monthly, basis. Not clear if there is an analysis of the CoA survey data with the water quality and other data the District collects. Clarify.

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U.S. Fish and Wildlife Service
Division of Policy & Directives Management
Public Comments Processing, MS: BPHC
5275 Leesburg Pike
Falls Church, VA 22041-3803

Board Members and Staff
Barton Springs Edwards Aquifer Conservation District
1124 Regal Row
Austin, TX 78748

RE: Draft Environmental Impact Statement and Draft Barton Springs Edwards Aquifer Conservation District Habitat Conservation Plan, Docket No. FWS-R2-ES-2016-0141

To Staff of the U.S. Fish and Wildlife Service:

Save Our Springs Alliance, Inc. (SOS) submits the following comments on the Draft Environmental Impact Statement and Draft Barton Springs Edwards Aquifer Conservation District Habitat Conservation Plan (HCP).

SOS appreciates the work of the BSEACD's Board of Directors and staff to manage pumping from the Edwards Aquifer to protect springflows, historic permit holders, and the overall health of the aquifer ecosystem. However, more is needed in the face of continued population pressures, increasing pollutant loadings, and a changing climate. SOS supports
1 the pursuit and finalization of an incidental take permit (ITP) and corresponding HCP that furthers the survival and recovery of the Barton Springs Salamander and Austin Blind Salamander. However, the best available scientific information does not support approval of an ITP as currently proposed.

1. Legal Standard

Congress enacted the ESA, in part, "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved … [and] a program for the conservation of such endangered species and threatened species..." 16 U.S.C. § 1531(b). In fulfilling ESA responsibilities, Congress intended the benefit of the doubt be given to the species (H.R. Conf. Rep. 96-697, 96 Cong., 1st sess. 1979).

Under ESA Section 9, 16 U.S.C. § 1538(a)(1)(B), it is illegal for any person—whether a private or governmental entity—to "take" any endangered species of fish or wildlife listed under the ESA. "Take" is defined to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct." *Id*. at § 1532(19). FWS defines "harm" to include "significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering." 50 C.F.R. § 222.102.

To that end, an applicant for an Incidental Take Permit must minimize and mitigate the impacts of such taking to the maximum extent practicable. 16 U.S.C. § 1539(a)(2)(B)(ii). In order for the Service to issue an ITP, the taking must not appreciably reduce the likelihood of the survival and recovery of the species in the wild. 16 U.S.C. § 1539(a)(2)(B)(iv). In issuing permits and determining whether the ESA's standards have been met, the Service must use the "best available science." 16 U.S.C. § 1536(a)(2); *see also* Habitat Conservation Planning and Incidental Take Permit Processing Handbook, FWS, NMFS, Dec. 2016 ("HCP Handbook") at 9-30.

2. General Comments

The draft HCP demonstrates a fundamental lack of consideration of best available peer-reviewed biological and speleological ecosystem science. There are far too many assertions and statements used to justify proposed scenarios that are refuted by best available science. There are also scientific statements that lack citations for the scientific literature that support them. These statements, assumptions, and assertions are the critical underpinnings for the proposed drought scenarios and the assessment of their potential effects on endangered salamanders. The District has had thirteen years to find the appropriate citations or literature supporting their assertions. The persistent unwillingness to address this lack is troubling because it casts doubt on the commitment of the District to implement what is proposed in this HCP. It also casts doubt on the willingness of the Service to comply with the ESA's mandate to use "best available science."

2

The draft HCP generally approaches ESA compliance under too low a bar. For example, the draft HCP states that the pre-HCP management scenario (i.e., no ESA compliance) is a dire situation for the salamanders, and therefore <u>any</u> measures at all that result in less pumping than otherwise should not generally be considered to appreciably reduce the likelihood of survival and recovery of the species. dHCP at 114. Further it states that "[t]his assertion is germane even if those beneficial actions otherwise might jeopardize survival and recovery of the species." *Id*. It is difficult to make sense of these statements, but what is clear is that they frame the HCP under the wrong legal standard.

3

The District characterizes the HCP as doing the salamanders a great service because without the HCP, nothing could or would be done to protect the salamanders. This prevailing attitude in the draft HCP ignores the fact that an HCP/ITP is an *exception* to the ESA's prohibition on take. *See* 16 U.S.C. § 1538(a). "A world without the ESA" is not the baseline scenario from which an HCP's benefits should be measured. ESA compliance, which means no take unless authorized under specific legal standards, is the baseline condition from which the covered activities must be measured. The draft HCP concedes this: "The springflow of the exempt-only pumping scenario is the baseline for comparison in this HCP." dHCP at 62, 103. For purposes of determining jeopardy and other ESA-mandated requirements, it does not matter that the District has authorized pumping permits that resulted in take, probably in violation of the ESA, since its inception. Nor does it matter that the District authorizes the activity (pumping) that that is then carried out by third parties. If the HCP was not in force, those third parties would be subject to ESA enforcement and pumping could be limited directly by the Service.

Moreover, in opposition to the draft HCP's language, the ESA's clearly stated standard is whether *the taking* will appreciably reduce the likelihood of survival and recovery, not whether actions that reduce taking will appreciably reduce it. Of course actions that decrease take will not appreciably reduce the species' survival. But that is not at issue: it is whether, in light of the measures identified in the HCP, the remaining amount of take will appreciably reduce survival and recovery.

Under this correct standard, the following sentence in the draft HCP makes even less
4 sense ("This assertion is germane even if those beneficial actions otherwise might jeopardize survival and recovery of the species." dHCP at 114.) If the *beneficial* actions of the HCP otherwise might jeopardize survival and recovery of the species, such that they are causing take, and obviously the non-beneficial actions (the covered activities) are also causing take, it cannot be said that the HCP will not appreciably reduce the likelihood of the species recovery and survival. It is logical that no ITP could be issued unless at a minimum the associated HCP included beneficial actions that offset the taking, rather than add to it.

Additionally, it should be noted that the "no appreciable reduction" factor is one requirement *in addition to* the requirement that the HCP will minimize and mitigate the impacts of suck taking to the maximum extent practicable. *See* 16 U.S.C. § 1539(a)(2)(B). So even if this factor were met, it does not follow that an ITP should be issued.

"Doing something is better than doing nothing, even if it's not enough" is the theme of the draft HCP's discussion of regulatory action. Yet this does not satisfy the ESA's stated goal to provide a program for the conservation of such species. In fact, maintaining the status quo, as this HCP does, is not in the best interests of the District. As the HCP

Handbook points out, it is in an ITP/HCP holder's best interest to ensure recovery of the species, such that the species can be delisted and regulatory restraints removed. *See* HCP Handbook at 2-7.

3. Specific Comments

Some of SOS's specific concerns are as follows:

a. Analysis of Jeopardy

5 The available science supports a conclusion that issuing this permit with the HCP will put both species in jeopardy.

i. Determination of Take

The HCP concludes that 50% is an acceptable level of mortality. But that is a huge percentage and number of salamander deaths, and cannot support a finding of no jeopardy. The Service and the District do not seem to acknowledge what losing 50% of a population every month means for viability of an endangered species.

This HCP relies on subterranean refuge during drought for both species, which will put both species in direct competition for limited resources underground, *regardless of whether the DO is higher*. Further, there is no scientific basis for the consideration of the potential detrimental effects of low discharge and low DO on prey populations in assessments of effects on salamanders. *See* dHCP at 127 ("In essence, the District is making an assumption that the macroinvertebrates either are present in sufficiently large population numbers that they are not a limiting factor for the salamanders, or they are not impacted physiologically by low DO concentration to the same extent as the Covered Species, or both. The validity of this assumption is unknown, but it introduces uncertainty that can only be judged qualitatively.").

The "minimum" average of 6.5 cfs is associated with DO concentration that causes 50% mortality *in the laboratory*. There will be competition from other aquatic wildlife for oxygen in the water as well as biochemical processes that remove oxygen. Thus, there is likely to be *less* oxygen available for salamanders of the minimum DO (3.4 mg/l) stipulated in the HCP.

ii. Population Rebound

6 In the draft HCP, the District assumes "that either of the three years of no drought or non-severe drought is long enough for the Covered Species to rebound to the initial condition used in the model." dHCP at 111. It then contradicts the just-made assumption

6 continued by stating: "However, the COA's continuing low census counts after the recent severe drought period that ended in 2011 suggest that at least some if not all outlets may need more time for their populations to recover." dHCP at 111. Thus, the District makes an assumption without citing to any scientific authority, and then immediately states that there is empirical evidence refuting this assumption, without any explanation as to why they are maintaining the assumption or how this might affect the continued viability of the species. The draft HCP then goes on to say that: "The slow recovery and continued low abundances numbers may also be exacerbated by other factors." draft HCP. Yet, the District does not address how these two pieces of information factor into the conclusion that the District's pumping will not jeopardize the continued existence of the species.

7 This HCP relies on complete population rebound within three years of non-drought or three years of "non-severe drought," but all available data indicate that rebound does not happen this fast. The HCP does not adequately account for groundwater withdrawal's contribution to post-drought effects on populations. Without rebound, the populations will go extinct. This is true for populations of <u>any species</u>. Extinction just happens faster when the initial population is small. Stating that there will be 50% mortality every 30 days is admitting that the HCP, even if perfectly implemented, exposes the species to jeopardy and extinction.

8 The draft HCP attempts to address uncertainties and potential adverse impacts by referring to the "conservatively high take estimates" and over-estimation of the adverse impacts of pumping that serve to provide a "buffer of additional protection." *See* dHCP at 1, 108, 111, 129. But the District stretches this cover too thin. By relying on the "conservative take estimates" in disregarding so many potential harmful activities, the District exceeds the alleged "buffer," if there even was one (which is circumspect due to the lack of scientific justification). Furthermore, the take estimate is proportional to the stipulated population. dHCP at 111. The conservatively high take estimates are themselves based on a larger number of salamanders to begin with, making these high take estimates even less able to provide a buffer.

<u>b. The Upper Limit of Authorized Withdrawals</u>

9 The identified measures in the HCP do not minimize or mitigate take "to the maximum extent practicable," as required by the ESA. *See* 16 U.S.C. § 1539(a)(2)(A) & (B). Specifically, the HCP's upper limit on withdrawals is too high and should be reduced to currently authorized withdrawals.

10 The upper limit on authorized withdrawals of 16 cfs is not supportable given the ESA's requirements. Current, non-exempt withdrawals total 11.6 cfs (of which 10.2 cfs is historical pumpage). dHCP at 60. Thus, under the HCP, the District could authorize up to 4.4

10 continued cfs of additional pumping during "non-drought conditions." This would be a significant increase that is not scientifically justified. Groundwater withdrawal reduces Barton Springs' discharge under all conditions. Thus, the biological effects of groundwater withdrawal may not necessarily be limited to drought. Although the dHCP states that any new pumping authorized would be conditional, subject to 100% curtailment during drought, higher withdrawals during non-drought can lead to earlier onset of drought conditions. If this water is not currently needed by anyone, why not conserve this 4.4 cfs via a conservation permit? The only justification for increasing pumping allowances beyond the current maximum is to incentivize permit holders to use less water during drought in exchange for being able to pump more during non-drought, and while this is not without its issues, the draft HCP does not even limit future pumping authorizations to this reasonable restriction.

11 The draft HCP states that 16 cfs has been "established by the District Board to allow an acceptable level of acceleration into drought; that is, approximately one month." dHCP at 62. But what is the basis for having one month be the time lapse for the onset of drought? Are all the salamanders going to survive because of that one extra month?

c. The Regulatory Gap and Limits of the District's Authority to Curtail Pumping

12 The District's current regulatory structure leaves a 0.3 cfs "gap" between levels of maximum aggregate curtailment, and pumping levels required to maintain a Desired Future Condition (DFC) of preserving 6.5 cfs average spring flow at Barton Springs during a drought. dHCP at 60. Although SOS applauds the District's accomplishments in reducing the regulatory gap from 1.5 cfs to 0.3 cfs, the Service should not issue an ITP until this gap is actually closed. Many of the efforts identified towards closing the gap are based on voluntary actions to be taken by permittees and are not enforceable. Until the District can enforce limits on withdrawals to 5.2 cfs during DOR conditions—the limit necessary to achieve DFCs, as determined by the District—then the amount of take cannot be guaranteed, and an ITP should not be issued.

Maintaining 6.5 cfs is one of the critical underpinnings of the HCP analysis, yet the District admits the HCP cannot yet reduce pumping to the amount it states is necessary to avoid jeopardy. This point is underlined by the draft HCP's statement that "the DFC-based regulatory program and groundwater management scenario are the core components of the HCP program." dHCP at 61. The draft HCP is insufficient because its "core components" have not yet been fully realized, and a path to their realization cannot be guaranteed. The District "anticipating" that the permitting gap will be bridged does not conform to ESA standards, which are designed to give the species the benefit of the doubt and embody the precautionary principle.

12 continued

The already accomplished narrowing of the gap does not indicate future achievement. The lowest hanging fruit is addressed first; the District is avoiding making the difficult choices it needs to make to close the gap. The draft HCP sates that targeted stop-gap Board Orders may also be used; if that is the case, why not institute a policy of when those stop gap orders will be issued, to which permittees, and for how much? It is likely that these stop-gap orders, if issued *ad hoc*, will not come in time to avoid preventable take of the species. Simply put, the Service should not issue an ITP until the District has shown this 0.3 cfs regulatory gap has been closed.

13

Moreover, one of the measures identified to close the gap is "rules incentivizing higher curtailments during severe drought in exchange for proportional increases in permitted withdrawals during non-drought." dHCP at 60. This is problematic, because higher withdrawals during non-drought can lead to earlier onset of drought conditions. Groundwater withdrawal reduces Barton Springs' discharge under all conditions. The biological effects of groundwater withdrawal may not necessarily be limited to drought. In addition, these incentive programs are completely voluntary and do not ensure any degree of protection.

14

The District should buy pumping rights if that is what is necessary to close the gap, to address its concern about being subject to regulatory takings suits. *Edwards Aquifer Authority (EAA) v. Day* did not involve an Endangered Species Act issue.[1] Case law on takings claims under the Endangered Species Act is complex and varied, but by and large have not been successful, especially those deemed to be temporary takings, as drought curtailments would be.[2] The District appears to be placing the desire to avoid potential "takings" claims above the requirement to do what is necessary to protect the species, and adjusting its level of ESA protection to ensure avoidance of possible takings litigation. This approach is backwards. The ESA puts species, not property rights, first. The District should enact what is necessary to protect the species, and then, in light of those necessary measures, make efforts to avoid regulatory "takings."

For example, the Edwards Aquifer HCP includes a program, the Voluntary Irrigation Suspension Option (VISO), that compensates irrigation permit holders to not pump in drought conditions in an effort to maintain aquifer levels. The District's HCP could include

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[1] In fact, in *EAA v. Day*, the Texas Supreme Court acknowledged the need for groundwater regulation, writing that it "must take into account not only historical usage but future needs, including the relative importance of various uses, as well as concerns unrelated to use, such as environmental impacts and subsidence." 369 S.W. 3d 814, 831 (Tex. 2012).

[2] See Meltz, Robert. *The Endangered Species Act (ESA) and Claims of Property Rights "Takings,"* Congressional Research Service, Jan. 7, 2013, RL31796. Available at https://fas.org/sgp/crs/misc/RL31796.pdf.

14 continued a similar program to address the District's concern about "takings" claims while protecting the salamanders.

15 Additionally, the District should commit to a higher discharge for DFCs during DOR conditions and *state that target higher discharge in the HCP*. The DFC of 6.5 cfs is far too low for all aquatic wildlife, as the lowest recorded springflow that the species have experienced was 9.6 cfs during the 1950-1957 drought of record. The draft HCP includes a conservation measure to work for greater legal authority to limit withdrawal, but without a higher DFC, the District lacks the basis to further limit withdrawals.

Although the District believes that achieving the Extreme Drought DFC is more likely because actual withdrawals are "typically" less than authorized withdrawals, dHCP at 61, this ignores the common sense conclusion that during times of drought, when other water sources are strained, permittees are more likely to withdraw up to their maximum amount authorized.

16 Finally, the District should increase withdrawal curtailment proportions for nonexempt permits during less severe drought stages to reduce acceleration of drought onset. This could entail amending the current regulatory structure to allow drought curtailments to start sooner. This does not mean a drastic rise in the cfs trigger points, but rather slight upticks that will allow for greater water conservation and protection of spring flows for the salamanders.

d. Cumulative Effects

17 The draft HCP has only a cursory discussion of take not related to springflows. The only take quantified from such other sources is take associated with scientific experiments and mitigations activities. dHCP at 110. Take associated with groundwater pollution is only briefly mentioned in Section 5.3.2, "Uncertainties in Take and Impact Evaluations." There, the draft HCP acknowledges that anthropogenic water quality changes may exacerbate adverse effects from springflow-related water chemistry changes. dHCP at 129. However, the draft HCP goes on to say that even though these adverse effects may have significant consequences to the Covered Species, because the District has no control over such factors, those cumulative effects have not been expressly considered in the take estimate. How can the Service sufficiently analyze jeopardy without at least coming up with a rough estimate of the total take of various actions?

18 The draft HCP states that these cumulative impacts are addressed in the draft EIS, dHCP at 129. The draft EIS does discuss cumulative impacts, but it only catalogs them, without discussing how they may impact the species' survival and recovery, or identifying any mitigation measures to reduce such impacts. *See* dEIS at 5-17. The cumulative take from

18 continued the covered activities and water-quality degradation must be assessed in terms of whether the species' survival and recovery may be appreciably reduced.

e. Changed Circumstances

19 The draft HCP needs to be modified to account for more recent scientific data as to the location of the Barton Springs Salamander and scientific advances in climate-change monitoring. Although SOS understands that an HCP must have a reasonable "stopping point" in scientific development and cannot be perpetually open to revision, the following two issues relate to information that has been known for at least one year prior to this draft being published, and the failure to update these sections could invalidate the accuracy of the HCP.

i. Location of Covered Species

Some of the "unforeseen circumstances" described in the HCP currently exist, and the HCP should be modified to take into account current conditions. The District committed to respond to specific "Changed Circumstances," including "additional habitat of Covered Species confirmed at locations beyond the Barton Springs complex." dHCP at 187. However, Barton Spring Salamanders have been found in several previously unknown habitats in recent years.

In addition to the Barton Springs complex, Barton Springs Salamanders have been found at: Cold Spring, Backdoor Spring, Blowing Sink Cave, and State Well 58-50-705 in southern Travis County (Zara Environmental' s monitoring well). They have also been found in Taylor Spring and Spillar Ranch in Hays County. Thus, it is a fact, not a potential "changed circumstance" that Covered Species are located beyond the Barton Springs complex. The HCP should address this fact and include specific measures to ensure protection of the species at all locations that have been confirmed at this time. Even if the Service has not yet "officially confirmed" the taxonomy of the species at this location, the City of Austin has, and the peer-reviewed reports are expected to come out in October
20 2017, well before the HCP will be finalized. The HCP should be modified to measures related to BSS being found in springs outside the Barton Springs complex.

ii. Effects of Climate Change

Much of the draft HCP's references to climate change are from 2000 to 2007, with two
21 references from the years 2013 to 2014. However, more recent studies of climate change have provided valuable information that should be taken into account in formulating drought-management policy.

Recent scientific advances are giving an increasingly clear picture of how global climate change affects local weather. Heat waves, for example, are expected to become more common, intense and longer because of the increase in heat-trapping gases in the atmosphere. Drought is move complicated as it involves multiples factors, but we know rising temperatures worsen drought, as seen in California.

A 2016 report from the National Academies of Sciences, Engineering and Medicine, "Attribution of Extreme Weather Events in the Context of Climate Change" outlined a rigorous system of extreme weather attribution to determine which events are tied to climate change and connecting global warming to the increased risk and severity of certain classes of extreme weather, including some heat waves, floods, and drought.[3] Understanding how climate change is affecting extreme weather is critical for the District and FWS as they assess risk and formulate measures to protect drought-affected species like the salamanders. This knowledge will help the District make better decisions appropriate for the risks, especially regarding water management to reduce the effects of longer and more intense droughts.

Moreover, a new tool called the Evaporative Stress Index (ESI) can, in many cases, indicate the beginnings of a drought two-to-four weeks earlier than current drought indicators.[4] The ESI has been operational since 2016 and is already used by the TWDB for its drought monitoring program.

f. Interlocal Agreement with City of Austin

22 The draft HCP states that a MOU/ILA between the District and City of Austin will "be negotiated within the first year after the District's HCP and permit are approved." dHCP at 113. The ILA/MOU should be negotiated *before* the ITP is approved, or at minimum, more detailed provisions of what will be included in the MOU/ILA should be provided in the HCP.

The only detail about the ILA/MOU is a statement that the District will provide financial support for the captive refugium and studies. This is encouraging, but the agreement should be more fully fleshed out. One measure that should be included is setting up a continuing contract to maintain plants in Barton Springs to help with DO while the District and City are studying the feasibility of other infrastructure to augment DO.

The draft HCP states that the MOU/ILA is a commitment in the HCPs of both entities, so there is no reason at this stage why there should not already be at least a preliminary agreement. The City of Austin's HCP was approved in 2013. The District stated on June 6,

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[3] Cullen, Heidi. *What Weather is the Fault of Climate Change*, NEW YORK TIMES, Mar. 11, 2016.

[4] NASA, July 25, 2017, *The U.S. is Predicting Droughts Sooner with Satellites*, wateronline.com, available at wateronline.com /doc/the-u-s-is-predicting-droughts-sooner-with-satellites-0001.

2014, that it is pursuing an ILA with the City of Austin. Additional Staff Responses to Comments from the District's MAC on the draft HCP at 8. Over three years later, there is no MOU/ILA. This prompts concerns about whether an agreement can be reached, and if so, how much longer it will take. There is no reason to delay the formulation of the MOU/ILA until after the District's HCP is granted.

4. Other Recommendations

The above comments contain many suggestions on improving the HCP and strengthening salamander protections. The following includes additional measures the District should commit to in the HCP before an ITP is granted.

23 There should be annual estimate of exempt well pumping and frequent communication with exempt well owners. The District has the power to reduce pumping from exempt wells by engaging with exempt well owners and working with other entities to offer significant incentives for use of rainwater harvest systems or other conservation measures to reduce pumping.

24 The District should commit to measures to facilitate population rebound, such as a reintroduction program of captive salamanders after drought to bump up the breeding population in the wild. Financially supporting the Captive Breeding program falls short because that program is not moving forward with preparing for reintroduction. This HCP could help make that happen.

25 The District should provide details of specific legislation they will pursue to allow greater authority in regulating groundwater withdrawal. Although the draft HCP vaguely states this as a conservation measure, Moreover, the District did not actively pursue legislation in the 2015 or 2017 legislative sessions that would have allowed the District greater flexibility and authority to enact measures to ensure protection of the salamanders.

26 Because of uncertainties surrounding climate change, increased development and other stressors on our water resources, the term of the permit should be reduced from 20 years. This would allow for greater flexibility and protection of the species. Alternatively, or in addition to a shortened permit term, the District should consider phasing the HCP, such that the HCP would be implemented in adjusted in two or more phases. Phase Two would include modifying any measures necessary through an adaptive management process based on information learned during Phase One. The Edwards Aquifer HCP can provide guidance, as it is a two-phased plan, with each phase lasting seven to eight years.

5. Conclusion

In sum, the concerns identified herein add up to a conclusion of jeopardy, and the HCP needs to be substantially more protective to meet ESA requirements.

Again, SOS genuinely appreciates the efforts of the Board, the District staff and the Management Advisory Committee. SOS looks forward to continuing to be involved in the process and working with all parties involved. If you have any questions, comments or concerns please feel free to contact me at 512-477-2320 ext. 306.

Sincerely,

/s/ Kelly D. Davis

Kelly D. Davis
Staff Attorney

CC: John Dupnik: jdupnik@bseacd.org
Blake Dorsett: bdorsett@bseacd.org
Robert Larsen: drrobertlarsen@gmail.com
Blayne Stansberry: bstansberry@bseacd.org
Mary Stone: mstone@bseacd.org
Craig Smith: csmith@bseacd.org

September 18, 2017

U. S. Fish and Wildlife Service, MS BPHC-PPM
5275 Leesburg Pike
Falls Church, VA 22041-3803

Attn: FWS-R2-ES-2016-0141

Re: Comments on Draft Barton Spring Edwards Aquifer Conservation District Habitat Conservation Plan. *Submitted online via www.regulations.gov*

Dear Mr. Zerrenner,

The Lone Star Chapter of the Sierra Club appreciates the opportunity to comment on the Draft Barton Spring Edwards Aquifer Conservation District Habitat Conservation Plan. We have engaged with the District for many years as they have developed and vetted the HCP and EIS. We appreciate the open dialogue that our organizations have shared over the years as we seek ways manage this important resource in a manner that meets the needs of both people and the organisms that rely on it. We also recognize that the District has been working in good faith to protect this resource throughout this process through their regulatory and education programs. The District is a leader in groundwater management in Texas. We look forward to working closely with the District in this and other matters in the future.

We offer the following comments on the draft HCP.

<u>BSEACD HCP comments</u>

1 1. Section 5.2.3.4, Page 111 - The proposed take amounts of *E. sosorum* and *E. waterlooensis* assume that populations of both species will rebound to pre-drought sizes in 3 years of non-drought. The Draft HCP states that "...District makes an assumption that either of the three years of no drought or non-severe drought is long enough for the Covered Species to rebound to the initial condition used in the model.". However, as of 2013, salamander abundances had not rebounded from droughts that occurred from 2006 to 2011. The HCP acknowledges this fact yet the assumption is still used to estimate future take (pg 111, paragraph 3 states "However, the COA's continuing low census counts after the recent severe drought period that ended in 2011 suggest that at least some if not all outlets may need more time for their populations to recover."). Moreover, U. S. Fish and Wildlife Service 10a1A reports from 2014 - 2016 from the City of Austin indicate populations still have not rebounded in the 5 years of non-drought. It has been 9 years since the record high abundances of 2008. These high abundances are included in the calculations used to determine the stipulated population sizes in this HCP. What specific actions does this HCP require that will guarantee that populations will rebound as assumed? How will the proposed take avoid jeopardy of the species if this assumption is incorrect?

2 2. Section 5.2.3.4, Page 111 - The drought/non-drought scenarios assumed by the HCP aren't clear. The HCP describes an expected 20-year drought/non-drought scenario as 7 years of Drought of Record, 7 years of Hybrid Drought, 3 years Non-Severe Drought, 3 years

2 continued of No Drought. It is stated that, "In this scenario, the two 3-year periods are interchangeable and the two, 7-year periods are interchangeable, so order doesn't matter." Biologically, order does matter. If there are 14 consecutive years of drought, take would be expected to double (1077 x 2 = 2154 *E. sosorum*, 1290 x 2 = 2580 *E. waterlooensis*; page 108). This would certainly put the Covered Species in jeopardy given the initial stipulated population sizes of ≤ 1000. Does the HCP cover more than 7 consecutive years of drought? Does the HCP cover 14 consecutive years of drought? If so, what measures will the District implement to protect salamanders? Actions to respond to such unexpected circumstances, as described under Changed Circumstances (7.2.2.2, pge. 185) include DO augmentation *if feasible*, and requesting some groundwater withdrawal permittees to *voluntarily* agree to temporary curtailment. Neither of these proposed actions is guaranteed. So, if neither is implemented, what will the District do? Is it feasible to guarantee that the measures described above will be implemented if changed or unexpected conditions occur? Will the population of be wild salamanders be relocated into captivity until conditions improve?

3. The HCP proposes to "minimize the areal extent, concentration range, and time duration that springflow-dependent DO concentration at Main Springs and Eliza Spring are less than 3.4 mg/L under all conditions..." (6.1 Page. 134). The HCP states, "It refers to monthly average conditions because the effects of groundwater management and HCP conservation measures are not able to be measured more frequently than monthly as a practical matter."
3 It is unclear in the HCP how frequently DO will be measured during drought. Once per month or multiple times per month? In order to reach the stated goals and protect salamanders, dissolved oxygen (DO) concentrations must be measured at a biologically relevant frequency. A DO of 3.4 mg/L corresponds with 50% mortality within 1 month, so DO measurement multiple times per month would allow for more effective and timely implementation of conservation measures. Dissolved oxygen concentration and discharge
4 data are collected every 15 minutes in "Main Springs" by the U.S. Geological Survey using automated equipment. These data are posted online in real time. Does the District propose to use these data to monitor conditions in "Main Springs"? Eliza Spring typically has lower DO than "Main Springs", how frequently will DO be measured in this site? Placing similar equipment in Eliza Spring would allow the District to monitor DO at biologically relevant frequencies in this site.

5 Similarly, the measurement frequencies that underlie discharge and withdrawal threshold averages are unclear. The minimum discharge is listed as 6.5 ft^3/s monthly average. One interpretation is that discharge will be measured once per week each month and the average calculated. Another interpretation is that discharge will be measured once per day for five consecutive days in a month and the average calculated. Another interpretation is that discharge will be measured 5 times on one day each month, and the average calculated. Each method could result in a very difference monthly average and therefore picture of conditions experienced by salamanders. It would improve clarity for the HCP to state the measurement frequency.

6 4. How and when will the District measure take or know that take is approaching its limit during a drought? Will take be estimated based on duration of DO concentrations and associated lethal concentration values?

7 5. Section 5.2.3.2, Fig. 5-8, Page 108-109 - The HCP and take estimates don't appear to explicitly and numerically state lethal take of Covered Species. The HCP partitions take into "behavioral" and "physiological", with physiological including undefined sub-lethal and lethal effects. What proportion of physiological take is expected to be lethal? Do the take estimates assume a constant mortality rate?

8

6. How was progressive risk incorporated into take estimates? The HCP take and conservation measures do not appear to incorporate the progressive risk to species during drought and how this affects population size at the end of drought. During a drought, discharge would progressively decrease from 20 ft^3/s to 6.5 ft^3/s and Table 4-2 of the Environmental Impact Statement associated with this HCP indicates that mortality rate is expected to increase as DO and discharge decrease. Salamanders will experience cumulative stress and the population will experience cumulative and increasing percent mortality (Woods et al. 2010). Moreover, the length of time animals are exposed to increasingly detrimental dissolved oxygen concentrations influences the severity of consequences. (From Woods et al. 2010, "It is likely that populations on the Barton Springs complex would fare increasingly poorly in lower DOs persisting for 28-60 day periods within this range (3.4 - 4.5 mg/L), but how poorly is unknown.") Yet, these cumulative lethal effects on salamander populations are not clearly enumerated in the HCP.

It is possible to estimate progressive and cumulative lethal effects based on information in the HCP and EIS. We can estimate duration at particular drought discharge levels, the associated DO concentrations, and the expected lethal effects using Table 4-2 of the EIS. We can then apply those mortality percentages and durations to the salamander population size to see the loss of individuals. For example, according to Table 4-2 in the EIS, the percent occurrence of 20 ft^3/s from 1917-2013 is 20%. Using the scenario of 35 months of drought-of-record used in the HCP to calculate proposed take, we could estimate that the duration of 20 ft^3/s would be 7 months. We can apply this to each of the discharge values listed in Table 4-2. Using the DO concentrations and mortality rate (Table 4-2), and assuming the minimum DO of 3.4 mg/L stipulated in this HCP, we can estimate the decrease in population size during each discharge category of the 35 months. Table 1 below shows estimated duration of various drought discharge values down to 6.5 ft^3/s, their associated mortality rates based on predicted DO, and the effect on population size of *E. sosorum*.

Table 1. Estimated duration of various drought discharge values, their associated mortality rates based on predicted DO, and effect on population size during Drought of Record are presented below.

Discharge ft^3/s	% Of 35 Months (DOR[1])	Months at Threshold	% Mortality (from LC[2] DO[3] table 4-2 EIS)	Est. Pop. Size (821 initial size)
20	20	7	5%	573
19	19	7	5%	400
14	8	3	10%	292
12	5	3	25%	123
11	4	1	25%	52
10	3	1	25%	22
6.5	<1	0.4	≥ 50%	17 end size
	Total	22.4 months		

[1] LC = Drought of Record scenario
[2] LC = Lethal Concentration
[3] Dissolved Oxygen Concentration

It doesn't matter whether each of these discharge conditions occur in sequence, because the HCP assumes that *no population rebound will occur during drought periods.* The sequence will only affect the rate at which the population decreases, not the amount of decrease. This provides a much clearer picture of expected lethal take in the context of the population size

8 continued

from which a rebound must occur and how long it may take. These estimates can provide benchmarks against which effectiveness of conservation measures could be compared. They also can provide an expected effect against which actual salamander population decreases can be compared. Similar explicit estimates of lethal take should be included in the HCP for the proposed 7-year Hybrid drought.

9

7. What are the assumptions the Service made in their assessment of potential jeopardy of Covered Species? Will the Covered Species be jeopardized by the amounts of lethal take described in item number 6 above? Assessment of jeopardy should include consideration of background natural mortality rate in addition to the cumulative effects of the actions proposed in this HCP and actions authorized in the City of Austin's HCP for these species. Were these considered?

10

8. Targeted "minimum" discharge of 6.5 ft^3/s is not a true minimum because it is an average over time. This means it can be lower as well as higher. The same is true for the minimum DO concentration. Salamanders don't experience averages. They experience all of the conditions that make up a mathematical average, so they will be exposed to dissolved oxygen concentrations and discharge above and below that chosen for the take estimates. The HCP should include either a firm minimum threshold value or a range of variation that will be allowed. Since DO concentration varies on a daily cycle, (it is lower at night in the absence of photosynthesis) and 24-hour data are available for Main Springs, perhaps these data could be used to define a range of acceptable concentrations around the threshold.

11

12

9. Section 6.2.2.2, Page 143 - Consider shortening the timeline for implementation of DO augmentation infrastructure to 5 or 6 years. Given that we don't know when the next drought will occur and that maintenance of a minimum DO concentration is a conservation measure, the sooner implementation occurs, the better. If severe conditions occur before feasibility studies are completed and methods for DO augmentation are built or obtained, what will the District do to protect the species? Will the District help the City of Austin acquire and maintain temporary DO enhancement equipment (pumps, aerators, etc.) between permit issuance and implementation of District DO augmentation systems?

13

10. The assumption that DO conditions in the subterranean areas of the aquifer will be higher than in surface habitat during drought should be fully demonstrated before relying on it for salamander refuge. Most of the underground aquifer conduits are filled with water; they don't necessarily have air interfaces. There are data on air composition in larger subterranean caves (ex. Blowing Sink) that show the composition is not the same as atmospheric air at the surface, carbon dioxide is high enough and oxygen low enough to be of concern for human survival. Reliance on this air for assuming DO in subterranean caves will increase salamander survival seems tenuous until a more thorough study is completed. The additional investigation proposed in the HCP is a good plan. Ideally this study would be completed a soon as possible and include finer scale geographic distribution of sampling that includes the distant localities of putative *E. sosorum* and *E. waterlooensis*. We should expect salamanders to attempt to travel farther than previously documented to find refuge during the unprecedented severe drought proposed in this HCP. The distribution of DO underground will also help guide feasibility studies of subterranean DO augmentation.

14

11. The HCP states that one of the District's overarching goals is, "Promote recovery of the populations from those decreases to levels required for their long-term viability." The take allotted in this HCP will only maintain current level of endangerment of the species at best because the plan is to support population rebound to pre-drought sizes. The populations

14 continued must increase beyond these sizes for the species to recover. What measures does the plan include that foster recovery?

15 12. Section 4.1.2.2, Page 62 - The District proposes to increase groundwater withdrawal from the Barton Spring segment of the Edwards Aquifer beyond that currently permitted during non-drought. The plan also states that the increased withdrawal will accelerate the onset of drought by one month and that this is acceptable for protecting the target species. What scientific data or literature supports this assumption? Non-drought is the period during which the populations are expected to rebound to pre-drought sizes, which requires enough time for reproduction and growth of juveniles to reproductive adulthood. For both species this takes roughly 4 - 6 months (Dries et al. 2013). So, how much capacity for population rebound will be lost due to the acceleration of drought onset?

Thank you for your attention and please feel free to contact us if you have any questions about these comments.

These comments were prepared in consultation with Dr. Laurie Dries Ph. D.

Sincerely,

Jennifer Walker
Water Resources Program Manager
Sierra Club, Lone Star Chapter
Jennifer.walker@sierraclub.org
512-477-1729

cc: John Dupnik, BSEACD General Manager

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Dries, LA, Herrington, CA, Colucci, LA, Bendik, NF, Chamberlain, DA, Johns, D, and E. Peacock. 2013. Major Amendment and Extension of the Habitat Conservation Plan for the Barton Springs Salamander (*Eurycea sosorum*) and the Austin Blind Salamander (*Eurycea waterlooensis*) to allow for the Operation and Maintenance of Barton Springs and Adjacent Springs. U.S. Fish and Wildlife Service 10(a)1(B) permit # PRT-839031. Watershed Protection Department, City of Austin, Texas. 275 p. http://www.austintexas.gov/watershed_protection/publications/document.cfm?id=196468

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Table A5-1. Public Comments and Service Responses on the BSEACD dHCP and dEIS.

COMMENTS ON THE DRAFT HCP			
Review Comment #/Letter Page #[1]	**Review Comment**	**Response to Review Comment**	**Section/Page of Text or Figure/Table**
Letter 1: City of Austin, Watershed Protection Department (COA)			
COA 1, p.3	The premise of the Habitat Conservation Plan (HCP) is the assumption that only animals within the vicinity of Barton Springs will be affected by reduction of dissolved oxygen (DO) from Covered Activities. We believe this is incorrect.	While the Draft HCP (dHCP) acknowledged the existence of some of these locales, which are remote from the Barton Springs complex, the District changed the Final HCP (fHCP) narrative in several places to consider this as additional known ("far-field") endangered-species habitat. In particular, the population size and take estimates now include the populations in both the areas near to and remote from the Barton Springs complex.	Executive Summary; 3.1.2, 3.2.2.1, 3.2.2.2, 5.1, 5.1.2.1, 5.2.3.1
COA 2, p.4	The desired future condition of a combined 6.5 cfs discharge from Barton Springs could possibly result in Eliza Spring going dry or stagnant.	Insufficient data exists to quantify this probability; therefore, it is also accurate to say that there is a probability that it will not have this result. Provided the COA maintains the normal elevation of water within Barton Springs Pool (BSP), Eliza would likely not go dry or stagnant, regardless of combined drought flows, because BSP is higher than and hydrologically connected to Eliza Spring. This transfer of water has been seen at Eliza during work related to the BSP. However, the District made changes to the narrative in the HCP to explicitly acknowledge these uncertainties, including revising and broadening the scope of Changed Circumstance 7.2.2.2 that would accommodate such unexpected but foreseeable effects.	3.1.2.2, 7.2.2.2
COA 3, p.4	Although we disagree with the singular focus on DO, we believe the general approach to take calculations using a flow threshold can be a workable approach to estimating a single value of take. However, the method should be extended to include an increase in take (or converted sub-lethal take to lethal take) according to the length of time at given low DO thresholds, for example. Take should not be calculated as a rate per month because low DO conditions are persistent once they occur.	Comment noted. The District made no revisions to the HCP document. The HCP calculates "take" based on incidences, not individuals, which can include effects ranging from behavioral changes to death.	-
COA 4, p.5	Because groundwater withdrawal is considered a "covered activity," does this imply that gaining access to that water (drilling) and mechanical extraction of that water (pumping) are also covered activities? If so, the analyses, areas, and take calculations should reflect these actions.	Comment noted. The District made no substantive revisions to the HCP document. The District regulates, manages, and investigates Aquifer groundwater and its pumpage in the ITP Area, which are the Covered Activities, but it does not directly extract Aquifer groundwater, so it is generally unnecessary to consider that a Covered Activity in this HCP. While the District authorizes non-exempt well drilling and construction under a separate part of its regulatory process, the physical criteria for such approval deal only with spacing between wells and property boundaries, and with well construction details for water quality protection. The decision to drill and the exact location of a well are made by the individual well owners. The improbability of their occurrence in areas away from the outlets notwithstanding, any adverse effects on Covered Species that could	-

		be inferred to be generally associated with well drilling and extraction *per se* are associated solely with the well owners' decisions and actions, and therefore, are not the District's Covered Activities. The only District actions related to well drilling and extraction that are Covered Activities and therefore potentially creating incidental take are certain mitigation and research activities involving well construction and use by the District, and the analysis and take calculations included that possibility.	
COA 5, p.5	The Appendices to the dHCP are not provided on regulations.gov, and thus it is not possible to provide a complete review of the official HCP draft without this information.	The appendices to the HCP have been publicly available on the District's website since December of 2014, and have not changed. Additionally, the COA has been a member of the MAC, since it formed in 2013, and as a member was informed of the availability of the appendices on the website (pers. comm. Kirk Holland, BSEACD, 2018).	-
COA 6a, p.5	Comment 6a is in response to the dEIS.	See dEIS response to comment 6a below	-
COA 6b, p.6	Comment 6b is in response to the dEIS.	See dEIS response to comment 6b below.	-
COA 7, p.6	Revise Eliza Daylighting project completion to Fall (September) of 2017	The District incorporated changes in the HCP to respond to this comment.	3.2.2.1.1. 5.1.2.1
COA 8, p.6	Figure 3-4 is inaccurate and does not reflect the current habitat boundaries identified in COA's 2013 HCP, as suggested.	The District incorporated a new map provided by the COA and revised the text in the HCP accordingly to respond to this comment.	Figure 3-4, 3.2.2.1.1
COA 9, p.6	dHCP p. 28, Figure 3-4, Why are Incidental Take Permit areas and USFWS Critical Habitat for ABS different?	Comment noted. The District made no revisions to the HCP document. The District's ITP Area includes the entire area not only where take occurs (including take in the newly designated BSS habitat remote from Barton Springs) but also where conservation measures are applied. The ABS Critical Habitat Area was previously and separately defined by the Service to delineate areas essential to the conservation of ABS and possibly requiring special management. The Critical Habitat Area for ABS is included in the ITP Area.	-
COA 10, p.6	dHCP p.29, Fig 3-5, Clarify if this is daily/monthly/annual flows.	The District revised the caption of this figure to specify that the hydrograph depicts daily average flows.	Figure 3-5 in 3.2.2.1.2
COA 11, p.6	dHCP p. 30, Provide supporting data for statement that monthly mean flows would be very similar to weekly or even daily mean flows during drought.	Comment noted. The District made no revisions to the HCP document. The District made those conclusions from looking at the publicly available USGS springflow hydrographs. While there can be brief sudden rises in flow due to rain events, generally daily, weekly, and monthly flows would be similar during a drought.	-
COA 12, p.6	dHCP p. 32, The HCP should mention that if the BSP downstream dam or the gates are damaged by flooding, or other means, then maintaining water levels in BSP will not be possible, which means water levels in Eliza are then unmanageable.	Comment noted. The District made no revisions to the HCP document. The District's Covered Activities are separate and unrelated to flood events. Additionally, the COA's HCP covers structures at the BSP.	-
COA 13, p.6	dHCP p. 37, The surface-habitat component of the population of the Covered Species is approximated by the observed mean abundance values plus one standard deviation. More recent estimates of the total population available for capture at Eliza Spring (for a given point in time) have been generated by the COA, and show the mean plus one standard deviation of counts in the HCP may be too conservative of an estimate for the average population size at the surface over an eight-year period.	On the basis of new information provided by the COA since the dHCP was issued, a new population estimate has been developed and language revised in the HCP to differentiate between counts and censuses and between populations and superpopulations in estimating abundance. In turn, the new population size affects the take estimate.	3.2.2.2.1, 5.2.3.1

COA 14, p.7	dHCP p. 37, The biological rationale for why a blind, cave-dwelling obligate species *(E. waterlooensis)* would be restricted only to areas near the spring outlets is not well founded, and these assumptions influence the calculation of take and assessment of jeopardy (e.g., see comment #1)	While the Critical Habitat Area for the ABS designated by the Service was used, along with other assumptions, to derive the *stipulated* population of ABS proximal to the outlets, no inference was intended as to a limitation on the extent of the habitat. The District revised the narrative to reinforce the more widespread existence of both ABS and BSS.	3.2.2.2.1, 5.2.3.1
COA 15, p.7	dHCP p. 38, "But for purposes of the take assessment in this HCP, the population distribution among the outlets is assumed to be related to the quantities (and therefore average flow velocities) of water at the individual outlets, and that this relation increases as combined springflows decrease." It is unclear whether this statement is claiming that population size at each site increases with discharge or average discharge, or whether the proportion of the population size occurring at each outlet changes according to discharge levels. Please clarify and include the justification for making this assessment.	The District revised the narrative in the HCP to clarify why and how the apportionment of the stipulated population was used in the take estimate.	3.2.2.2.1
COA 16, p.7	dHCP p. 40, Clarify what the season water temperature effects on DO are.	The District revised the HCP to respond to the comment. It should be understood that DO changes related to temperature arise primarily from seasonal and episodic effects, not from the Covered Activities *per se*.	3.2.2.2.2
COA 17, p.7	dHCP p. 41, After the phrase "... from confined parts of the Aquifer," add " discharge from the springs."	The District revised the HCP to clarify the sentence.	3.2.2.2.2
COA 18, p7	dHCP p. 43, 2nd paragraph, The phrase "...some stationary and some mobile" is unclear.	The District revised the HCP to clarify this sentence.	DO and Springflow in 3.2.2.2.2
COA 19, p.7	dHCP p. 43, This paragraph references DO from datasondes but suggests that there isn't a lot of data for DO at low flows. Did analysis examine 2011 drought data when springflows dropped in the mid and low teens comparing DO from datasondes and springflow?	The District revised the HCP to clarify what drought regime the assertion refers to.	DO and Springflow in 3.2.2.2.2
COA 20, p.7	dHCP p. 43, First sentence of 4th paragraph is confusing and unclear, what "influences"?	The District revised the HCP to clarify this sentence.	DO and Springflow in 3.2.2.2.2
COA 21, p.7	dHCP p. 44, Clarify the sentence "That salinity variation between average flow and the lowest flows is not much more than the salinity variation in typical flows of the same magnitude."	The District revised the HCP to clarify the meaning of this sentence.	Salinity and Springflow in 3.2.2.2.2
COA 22, p.7	dHCP p. 45, Specific conductance data shown is only for the main spring and doesn't include Old Mill, which has a high percentage of saline inflows	The District revised the HCP to note what outlet the data are for and that it is shown to illustrate the trend, rather than characterize all outlets.	Salinity and Springflow in 3.2.2.2.2
COA 23, p.7	dHCP p. 75, The BSS section does not mention identification of Barton Springs salamanders at sites other than the 4 Barton Springs locations.	This section, and now elsewhere in the HCP, discuss the far-field population of BSS. Please see the response to the City of Austin's Comment 1 above.	3.2.2.2.1
COA 24, p.7	dHCP p. 75, Please mention the Eliza Daylighting project by name.	District revised the sentence here and elsewhere to respond to this comment.	5.1.2.1
COA 25, p.7	dHCP p. 81 Table 5.1, Under the Source of Concern heading, the District does have an indirect effect on this as the agency can review TCEQ Water Pollution Abatement Plans within its jurisdictional area which focus on Total Suspended Solids as the primary pollutant of concern.	Comment noted. It is not clear to what Threat Factor or Source of Concern the comment specifically refers. However, a footnote was added to clarify that "Affected by District" refers only to direct District actions within its authority as a GCD to respond to and affect a particular concern.	Table 5-1 in 5.1.3
COA 26, p.8	dHCP p. 88, Number 4, There is no data and only a suggestion to support the statement that the Austin Blind Salamander uses the near-surface habitat more than the Barton Springs salamander.	Comment noted. The District made no revisions to the HCP, since the HCP did not make this statement.	-

COA 27, p.8	dHCP p. 91, "One of the primary findings of Woods et al. (2010)..." does not use the correct citation. Only Poteet and Woods (2007) assessed conductivity.	The District revised the HCP to correct the citation.	5.2.1.2
COA 28. p.8	dHCP p .99, Organismal effects also result in population effects. Suggest retaining the discussion of different effects but remove the false distinction.	The District revised the HCP in response to this comment.	5.2.1.3
COA 29, p.8	dHCP p. 99, Take of Covered Species can occur in the aquifer (i.e. occurrences in Zara well and Blowing Sink).	The District revised the HCP to explicitly acknowledge this circumstance and to include take of the species in these habitats in the take estimate. Also, please see response to COA Comment 1.	3.2.2.2.1, 5.2.3.1
COA 30, p.8	dHCP p. 101, It is incorrect to call the COA survey a census. A census implies a complete count. From COA mark-recapture surveys we now know with certainty that count surveys performed were not censuses. Underestimation of the surface population size may, therefore, underestimate the take calculations made in the HCP.	The District revised the HCP to correct the statement. See response to COA Comment 13.	3.2.2.2.1, 5.2.3.1
COA 31, p.8	dHCP p. 101, "…since 2003 has used essentially the same protocols and standards for its surveys." This is no longer correct. Survey frequency and data collected (e.g., capture-recapture data) have changed since 2014.	The District revised the HCP narrative to update this information.	5.2.3.1, 6.3.1
COA 32, p.8	dHCP p. 105, "To reduce this adversely affected population to a single numerical estimate as required for the ITP, the District has designated the number of individuals experiencing incidents of adverse effects arising from DO-related behavioral or physiological effects at the spring outlets…." This statement does not incorporate temporal variability and the possibility of multiple take events. Instead it implies that there is one single population size and one single take event.	The District revised the HCP narrative to reinforce what is and is not intended in the methodology and findings of the take estimates. The temporal variability in the magnitude of take, as drought deepens and multiple take events are occurring, are accounted for on a cumulative basis via the monthly take factors, which includes habitat modification and behavioral and physiological effects. There is no basis for quantifying variability of lethal and non-lethal take, although the revised narrative does address this circumstance.	5.2.3.1, 5.3.2.2
COA 33, p.8	dHCP p. 106, "Similarly, it does not quantitatively differentiate the potential adverse effects from either physiological response or behavioral effects from changes in DO concentration. To the District's knowledge, quantitative relationships between and among these factors for the Covered Species do not exist." The Woods et *al.* studies cited within included assessments of physiological response to DO and conductivity for *E. sosorum* and its surrogate *E. nana*, so this is either an incorrect or incomplete statement.	The District revised the HCP narrative to clarify and reinforce what is intended in the subject statement.	5.2.3.1
COA 34, p.8	dHCP p. 102**,** "Further, for simplicity, that portion of the Barton Springs salamander population with habitat that is inaccessible from the surface and therefore not accounted for directly in the COA's censuses but that may be adversely affected **is considered to be included in the stipulated population at the perennial outlets** [emphasis added]." How is this the case when a mean plus one standard deviation applies to surface count data only? What factor has been added to the calculation based on surface counts (mean + 1 SD) to include subterranean animals?	The District revised the HCP narrative and population estimates to better account for uncounted individuals in the near field and a stipulation as an estimated far-field cohort. The District is no longer relying on the mean-plus-one estimates, rather on abundances from COA's CMR studies.	3.2.2.2.1, 5.2.3.1
COA 35, p.9	dHCP p. 103, Details for the methods are not presented. The appendices are not available on regulations.gov and were not available on the District's website.	Comment noted. The District made no revisions to the HCP. See response to COA Comment 5.	-
COA 36, p.9	dHCP p. 113, Not clear how the benefits of DO augmentation were quantified, please explain or reference the data.	The District revised the HCP narrative by providing a new footnote that addresses how the benefits of DO re-aeration and augmentation were quantified.	5.2.3.5

COA 37, p.9	dHCP p. 114**,** "Because, as suggested in Figure 5-10, the pre-HCP management scenario represents a dire adverse situation for the Covered Species, possibly including extirpation, any groundwater management measures that minimize or mitigate take such that the situation is less adverse than it otherwise would be should not generally be considered to appreciably reduce the likelihood of survival and recovery of the species. This assertion is germane even if those beneficial actions otherwise might jeopardize survival and recovery of the species." Wording is confusing. How could beneficial actions result in jeopardy? What is meant by "otherwise might"? If pre-HCP management includes Covered Activities, then mitigation to address those management practices should reduce the likelihood of jeopardy and increase the likelihood of recovery compared to pre-HCP management.	The District revised the HCP narrative to better explain what is meant and intended.	5.2.3.5
COA 38, p.9	dHCP p. 118, COA aerated Sunken Garden and Eliza Spring during the past drought, although this did not appear to improve the abundance of salamanders at either site.	Comment noted. The District made no changes to the HCP document.	--
COA 39, p.9	dHCP p. 119, Statements about the likelihood of drought severity and frequency are not justified. No citations are provided. The probabilities provided need justification and they should account for different climate change scenarios.	The District revised the HCP to explain better how the stated probabilities were calculated and by whom.	5.2.3.5
COA 40, p.9	dHCP p. 120, "The Covered Species have population characteristics and individual organism traits that appear to represent more an 'opportunistic' life-history strategy than an 'equilibrium' life- history strategy." Provide justification and rationale for this statement, preferably supported by the biological literature.	Comment noted. The District made no changes to the HCP document. The statement is simply a straight-forward comparison made by the District between the documented characteristics of these populations vis a vis the accepted general descriptions of the two life-history strategies.	-
COA 41, p.9	dHCP p. 121, "Some COA biological staff have recently hypothesized that the salamander population(s) may have established a new, smaller equilibrium, with a lower average size about which the population fluctuates more restrictedly (City of Austin, 2013). This would constitute a rapid shift away from a population with more opportunistic life-strategy characteristics toward one with more equilibrium life-strategy characteristics." This is incorrect. Changing population dynamics does not indicate changes in life-history strategies.	The District revised the HCP narrative to respond to this comment.	5.2.3.5
COA 42, p9	dHCP p. 122, "…data indicate that DO stress represents the primary factor influenced by the District's activities" Please provide citations.	The District revised the HCP narrative to emphasize this statement relates only to stressors influenced by the District's Covered Activities, and provided an appropriate citation.	5.3.1
COA 43, p.9	dHCP p. 123, "These thresholds from Woods et al. (2010) appear to represent the best data available for DO stress to any aquatic salamander." Provide justification for this assertion, because other studies of the effects of DO on aquatic salamanders have not been reviewed here (e.g., Issartel et al. 2009).	The District revised the HCP narrative to include the referenced citation and to modify the statement to reflect its intent and source.	5.2.3.5 5.3.1
COA 44, p.10	dHCP p. 123, "The salamander populations appear rather well-adapted to variability in DO concentrations above this level, although some behavioral changes have been observed, which is not unexpected in this circumstance." Provide evidence for this statement.	The District revised the HCP narrative and provided citations.	5.2.1.2 footnote; 5.3.1
COA 45, p.10	dHCP p. 126, "The District believes that an unknown but likely substantial fraction of the Barton Springs salamander population will move away from the surface outlet to water that has higher DO concentrations, although	The District revised the narrative to clarify what is and is not intended by this statement, and to reinforce what is and is not known about salamander ecology as it relates to their distribution. Please note that this paragraph is	5.3.2, in Covered Species

	how much higher is also unknown." This assumption ignores other aspects of the ecology of these salamanders.	in the Uncertainties section.	Population Size and Distribution
COA 46, p.10	dHCP p. 127, "Notwithstanding the differences in population sizes and their locations, for the most part the two Covered Species are considered to react and behave similarly, in absence of data to the contrary." This is an odd assumption, given the differences in ecological niche the two species inhabit.	The District revised the HCP narrative to reinforce what is and is not being characterized by this statement. Please note that this paragraph is in the Uncertainties section of the HCP.	5.3.2, in Non-modeled Differences Between the Two Species
COA 47, p.10	dHCP p. 127, "In fact, it seems to spend a substantially greater part of its life in environments of naturally lower DO concentration than the Barton Springs salamander; so it could be reasonably asserted that the Austin blind salamander might be better adapted genetically to such environments." This statement ignores the populations of *E. sosorum* that occur within the aquifer.	The District revised the HCP narrative to emphasize what is intended by this statement, and made reference to the remote BSS population. See also the response and changes to COA Comment No. 1 above. Note that this paragraph is in the Uncertainties section.	-5.3.2, in Non-modeled Differences Between the Two Species
COA 48, p.10	dHCP p. 134 Number 1, The statement " ... maintain a positive DO concentration at all times and minimize the areal extent concentration range..." needs clarification of intent.	The District revised the HCP narrative to reword this objective and clarify its intent and component parts.	6.1
COA 49, p.10	dHCP p. 140, "HCP Measure 5-5 - Implement a Conservation Permit that is held by the District and accumulates and preserves withdrawals...and thereby increase springflow for a given set of hydrologic conditions." It is unclear how the Conservation Permit Works. Does the Conservation Permit also contain the recharge water resulting from enhanced or artificial recharge projects? The consequences of artificial enhancement of both discharge and DO should be carefully studied before implementation.	Comment noted. The District made no changes to the HCP document. In general, the conservation permit serves as a means of aggregating all retired firm-yield freshwater Edwards groundwater production such that it is unavailable in perpetuity. A more comprehensive description of the purpose, function, and use of the Conservation Permit as a regulatory measure (District Rule 3-1.20(E)) is in the District Rules and Bylaws document, at http://bseacd.org/uploads/081816FINAL-BSEACD-Rule_MASTER.pdf.	--
COA 50, p.10	dHCP p. 142, Since there is a great lack of understanding in Aquifer ecology, including salamander presence, the District should commit to partnering with COA and other researchers to investigate aquifer ecology.	Comment noted. The District made no changes to the HCP document. The HCP makes such a commitment in several places, especially in the research and mitigation narratives.	-
COA 51, p.11	dHCP p. 143, M-1 averages to $2,000 annually which seems low. This measure should specify what types of actions it could include.	Comment noted. The District made no changes to the HCP document. The COA will be responsible for defining how these funds are best used on a continuing basis.	-
COA 52, p.11	dHCP p. 161, Regular surveys are now performed by COA on a quarterly, not bi-monthly, basis. It is not clear if there is an analysis of the COA survey data with the water quality and other data the District collects.	The District revised the HCP narrative to update the frequency of the surveys and to clarify the scope of the analyses.	5.2.3.1 6.3.1
Letter 2: Save Our Springs Alliance (SOS)			
SOS 1, p.1	SOS supports the pursuit and finalization of an incidental take permit (ITP) and corresponding HCP that furthers the survival and recovery of the BSS and ABS. However, the best available scientific information does not support approval of an ITP as currently proposed.	Comment noted. The District made no changes to the HCP document. Without specific information, as to why the commenter does not believe an ITP should be issued, it is difficult to respond to this comment.	--
SOS 2, p.2	The draft HCP demonstrates a fundamental lack of consideration of best available peer- reviewed biological and speleological ecosystem science. There are far too many assertions and statements used to justify proposed scenarios that are refuted by best available science. There are also scientific statements that lack citations for the scientific literature that support them.	Comment noted. The District made no changes to the HCP document specific to this general comment; however, the responses to comments and revisions to the HCP do clarify many of the District's assertions and statements.	--

SOS 3, p.2	dHCP p. 114, The draft HCP generally approaches ESA compliance under too low a bar. For example, the draft HCP states that the pre-HCP management scenario (i.e., no ESA compliance) is a dire situation for the salamanders, and therefore <u>any</u> measures at all that result in less pumping than otherwise should not generally be considered to appreciably reduce the likelihood of survival and recovery of the species. Further it states that "[t]his assertion is germane even if those beneficial actions otherwise might jeopardize survival and recovery of the species." *Id*. It is difficult to make sense of these statements, but what is clear is that they frame the HCP under the wrong legal standard.	The District revised the HCP narrative to better explain the meaning and intent of this statement.	5.2.3.5
SOS 4, p.3	dHCP p. 114, "This assertion is germane even if those beneficial actions otherwise might jeopardize survival and recovery of the species." If the *beneficial* actions of the HCP otherwise might jeopardize survival and recovery of the species, such that they are causing take, and obviously the non-beneficial actions (the covered activities) are also causing take, it cannot be said that the HCP will not appreciably reduce the likelihood of the species recovery and survival.	The District revised the HCP narrative to eliminate this confusing and unnecessary sentence. That notwithstanding, the conservation measures, including minimization and mitigation measures, for the Covered Activities are beneficial under any circumstance.	5.2.3.5
SOS 5, p.4	The available science supports a conclusion that issuing this permit with the HCP will put both species in jeopardy. The HCP concludes that 50% is an acceptable level of mortality. But that is a huge percentage and number of salamander deaths, and cannot support a finding of no jeopardy.	Comment noted. The District made no changes to the HCP document. The HCP does not conclude that any specific percentage is an "acceptable level of mortality," nor does the HCP conclude that 50% of the salamander populations will die as a result of the Covered Activities. The final jeopardy determination is made by the Service in their Biological Opinion after considering all facts and factors.	--
SOS 6, p.4	dHCP p.111, In the dHCP, the District assumes "that either of the three years of no drought or non-severe drought is long enough for the Covered Species to rebound to the initial condition used in the model." It then contradicts the just-made assumption by stating: "However, the COA's continuing low census counts after the recent severe drought period that ended in 2011 suggest that at least some if not all outlets may need more time for their populations to recover." The draft HCP then goes on to say that: "The slow recovery and continued low abundance numbers may also be exacerbated by other factors." Yet, the District does not address how these two pieces of information factor into the conclusion that the District's pumping will not jeopardize the continued existence of the species.	The District agrees with the substance of the comment and has revised the HCP narrative and the scenario for calculating cumulative take to address the stated concern, and to emphasize that this scenario is not a prediction of the future but the basis for quantifying take, if any, in each year of the ITP term and cumulatively.	5.2.3.4
SOS 7, p.5	The dHCP does not adequately account for groundwater withdrawal's contribution to post-drought effects on populations. Without rebound the populations will go extinct. Stating that there will be 50% mortality every 30 days is admitting that the HCP, even if perfectly implemented, exposes the species to jeopardy and extinction.	Comment noted. The District made no changes to the HCP document. The species is exposed to threats with or without the Covered Activities. After a drought is over, the Covered Activities will have no substantive continuing effect on the DO or springflow regime that will *per se* affect rebound. Please also see our response to your comment SOS #5 and #6 above. Further, there is a legal and practical limitation on how much curtailment of groundwater withdrawal can be imposed under any condition of the Covered Activities, as discussed in HCP Section 9.1, Analysis of Potential Alternatives to Avoid Take.	--
SOS 8, p.5	dHCP pp. 108,111,129, The draft HCP attempts to address uncertainties and potential adverse impacts by referring to the "conservatively high take estimates" and over-estimation of the adverse impacts of pumping that serve to provide a "buffer of additional protection." By relying on the	Comment noted. The District made no changes to the HCP document The comment does not provide any specific justification supported by available science that would reduce the number or the level of uncertainties. "Conservative" estimates and protective "buffers" mentioned in the HCP	--

	"conservative take estimates" in disregarding so many potential harmful activities, the District exceeds the alleged "buffer," if there even was one (which is circumspect due to the lack of scientific justification).	have a demonstrable, described rationale. The District's discussion of uncertainties included both positive and negative influences on take. Not all adverse effects on the salamanders are due to the District's Covered Activities.	
SOS 9, p.5	The identified measures in the dHCP do not minimize or mitigate take "to the maximum extent practicable," as required by the ESA. *See* 16 U.S.C. § 1539(a)(2)(A) & (B). Specifically, the dHCP's upper limit on withdrawals is too high and should be reduced to currently authorized withdrawals.	Comment noted. The District made no changes to the HCP document The upper limit on withdrawals does not come into play when take is occurring during drought, which in fact has measures that substantially curtail withdrawals below the authorized amount Please see also our response to SOS Comment #10 and SC Comment #15.	--
SOS 10, p.5	dHCP p. 60, The upper limit on authorized withdrawals of 16 cfs is not supportable given the ESA's requirements. Current, non-exempt withdrawals total 11.6 cfs (of which 10.2 cfs is historical pumpage). Thus, under the HCP, the District could authorize up to 4.4 cfs of additional pumping during "non-drought conditions." This would be a significant increase that is not scientifically justified. If this water is not currently needed by anyone, why not conserve this 4.4 cfs via a conservation permit?	The District revised the HCP narrative to better explain the conditions applicable to the Upper Limit on Authorized Withdrawals. All authorized withdrawals higher than 10.2 cfs and less than 14 cfs would be Conditional Permits that would not allow any pumping during drought and accordingly would not produce any take, which is the purview of the ITP. Withdrawals between 14 cfs and 16 cfs are reserved for use in Aquifer Storage Recovery, which are a mechanism for promoting substitution of existing historically-permitted groundwater. Please see also our responses to SOS Comment #9, SC Comment #16, and COA Comment #49.	4.1.2.1
SOS 11, p.6	dHCP p. 62, The dHCP states that 16 cfs has been "established by the District Board to allow an acceptable level of acceleration into drought; that is, approximately one month." But what is the basis for having one month be the time lapse for the onset of drought? Are all the salamanders going to survive because of that one extra month?	Comment noted. The District made no changes to the HCP document. The Board policy decision (a 16 cfs cap on withdrawals during non-drought) would actually minimize acceleration into the first stages of drought by at least one month. Please see also the response to SC Comment 15.	--
SOS 12 p.6	dHCP p. 60,61, The District's current regulatory structure leaves a 0.3 cfs "gap" between levels of maximum aggregate curtailment, and pumping levels required to maintain a Desired Future Condition (DFC) of preserving 6.5 cfs average springflow at Barton Springs during a drought. Until the District can enforce limits on withdrawals to 5.2 cfs during drought of record (DOR) conditions—the limit necessary to achieve DFCs, as determined by the District—then the amount of take cannot be guaranteed, and an ITP should not be issued. Simply put, the Service should not issue an ITP until the District has shown this 0.3 cfs regulatory gap has been closed.	The District has revised the HCP narrative to reinforce its success in narrowing the gap because of actions taken by the District and its permittees over the past few years and the reasons why even that small gap is expected to be closed in the near future. Further, as a groundwater conservation district in Texas, the District is legally mandated to ensure that the Extreme Drought DFC is achieved, and it will be monitoring modeled available groundwater and DFC status on a continuing basis to ensure compliance. The persistence of the gap is not allowable. And the HCP describes emergency measures that the District Board could take if the gap was not closed at the time of a DOR recurrence.	4.1.2.1
SOS 13 p.7	dHCP p. 60, One of the measures identified to close the gap is "rules incentivizing higher curtailments during severe drought in exchange for proportional increases in permitted withdrawals during non-drought." This is problematic, because higher withdrawals during non-drought can lead to earlier onset of drought conditions. Groundwater withdrawal reduces Barton Springs' discharge under all conditions. The biological effects of groundwater withdrawal may not necessarily be limited to drought. In addition, these incentive programs are completely voluntary and do not ensure any degree of protection.	Comment noted. The District made no changes to the HCP document The problem described in the comment is the reason that an Upper Limit on withdrawals exists under non-drought conditions. Please see also the response to comments to SOS Comment #11 and SC Comment #15.	--
SOS 14 p.7	The District should buy pumping rights, if that is what is necessary to close the gap, to address its concern about being subject to regulatory takings suits and could also implement a program similar to the Edward Aquifer Authority' Voluntary Irrigation Suspension Program (VISO) to pay pumpers to not pump during drought conditions.	Comment noted. The District made no changes to the HCP document The District does not have and is unlikely to acquire the financial wherewithal to buy pumping rights.	--

SOS 15 p.8	dHCP p. 61, The District should commit to a higher minimum discharge than 6.5 cfs during DOR conditions and state that higher discharge target in the HCP.	Comment noted. The District made no changes to the HCP document. There is no science that indicates a springflow of 6.5 cfs during a DOR recurrence will be problematic for the Covered Species. If new information comes to light, the District Board will consider the need to change this DFC and make such a recommendation to Groundwater Management Area (GMA) 10.	--
SOS 16 p.8	The District should increase withdrawal curtailment proportions for nonexempt permits during less severe drought stages to reduce acceleration of drought onset.	Comment noted. The District made no changes to the HCP document. Curtailments during drought cannot affect the acceleration of onset to drought from non-drought.	--
SOS 17 p.8	dHCP p.110, The draft HCP has only a cursory discussion of take not related to springflow. How can the Service sufficiently analyze jeopardy without at least coming up with a rough estimate of the total take of various actions?	Comment noted. The District made no changes to the HCP document. Section 5.2.3.3 does estimate the number of the Covered Species expected to be impacted by the non-spring flow Covered Activities.	--
SOS 18 p.8	dHCP p. 129, The draft HCP states that cumulative impacts are addressed in the dEIS. The dEIS does discuss cumulative impacts, but it only catalogs them without discussing how they may impact the species' survival and recovery, or identifying any mitigation measures to reduce such impacts. *See* dEIS at 5-17. The cumulative take from the covered activities and water-quality degradation must be assessed in terms of whether the species' survival and recovery may be appreciably reduced.	Comment noted. The District made no changes to the HCP document. See DEIS Response to Comments SOS #17 below for a response.	--
SOS 19 p.9	The draft HCP needs to be modified to account for more recent scientific data as to the location of the BSS and scientific advances in climate-change monitoring.	See response for COA Comment #1 and corresponding document revisions. It is unlikely that any new climate change effects on water supply and demand beyond those reflected in the recent period of record will be substantially manifested in the ITP Area during the 20-year term of the ITP/HCP. The District added to the narrative to address the relatively small effect that climate change is anticipated to have during the ITP term.	Executive Summary; 3.1.2, 3.2.2.1, 3.2.2.2, 5.1, 5.1.2.1, Old 7.2.2.4 (deleted); 3.2.3
SOS 20 p.9	dHCP p. 187, The HCP should be modified to measure BSS being found in springs outside the Barton Springs complex.	The District revised the narrative, populations, and take estimates in numerous locations in the HCP document. See response for COA Comment #1 for more information.	Executive Summary; 3.1.2, 3.2.2.2.1, 3.2.2.2.2, 5.2.3.1, Old 7.2.2.4 (deleted)
SOS 21, p.9	Much of the dHCP's references to climate change are from 2000 to 2007, with two references from the years 2013 to 2014. However, more recent studies of climate change have provided valuable information that should be taken into account in formulating drought-management policy.	Comment noted. The District made no changes to the HCP document. Drought management policy is formulated primarily to address types and amounts of groundwater use and aquifer response to those demands, not necessarily climate change. Also, it is unlikely that any new climate change effects on water supply and demand beyond those reflected in the recent period of record will be substantially manifested in the ITP Area during the 20-year term of the ITP/HCP.	--
SOS 22, p.10	dHCP p. 113, The draft HCP states that a MOU/ILA between the District and City of Austin will "be negotiated within the first year after the District's HCP and permit are approved." The ILA/MOU should be negotiated before the ITP is approved, or at minimum, more detailed provisions of what will be included in the MOU/ILA should be provided in the HCP.	The District provided a description of the scope of the ILA/MOU in Section 6.5.2, but it has revised the HCP narrative to include additional information. The ILA/MOU, which is currently in draft form, cannot be finalized until all the requirements and limitations have been established under both the District's and the City's approved HCP/ITP. Both parties are committed to executing the ILA/MOU as quickly as possible after the ITP is issued. The	6.5.3

		District has committed in the HCP to instituting and implementing the ILA/MOU during the first year of the HCP term.	
SOS 23 p.11	There should be annual estimates of exempt well pumping and frequent communication with exempt well owners.	Comment noted. The District made no changes to the HCP document. The State's water planning process requires the District to estimate (or have the TWDB estimate) exempt use in both of its GMAs every five years. The character of the District suggests that exempt well use of the Aquifer in the ITP Area will change only very slowly. Further, exempt well use in the District is a very small portion of the total Aquifer use.	--
SOS 24, p.11	The District should commit to measures to facilitate population rebound, such as a reintroduction program of captive salamanders after drought to bump up the breeding population in the wild.	Comment noted. The District made no changes to the HCP document. It has already committed to working with and supporting programs of the COA to accomplish these and related goals, as a specific mitigation measure (M-1).	--
SOS 25, p.11	The District should provide details of specific legislation they will pursue to allow greater authority in regulating groundwater withdrawal.	Comment noted. The District made no changes to the HCP document. This would be speculative and is not a requirement for issuing an ITP	--
SOS 26, p.11	Because of uncertainties surrounding climate change, increased development and other stressors on our water resources, the term of the permit should be reduced from 20 years. Alternatively, or in addition to a shortened permit term, the District should consider phasing the HCP, such that the HCP would be implemented in two or more phases.	Comment noted. The District made no changes to the HCP document. It should be noted that the term of the ITP/HCP was reduced from the initial term of 50 years, consistent with the water planning horizon with the State of Texas, to the current 20 years at the behest of the Service, specifically to better accommodate any new climate change effects that might manifest themselves in the future.	--
Letter 3: Lone Star Chapter of the Sierra Club (SC)			
SC 1, p. 1	dHCP, Section 5.2.3.4, p. 111, The proposed take amounts of *E. sosorum* and *E. waterlooensis* assume that populations of both species will rebound to pre-drought sizes in 3 years of non- drought. What specific actions does this HCP require that will guarantee that populations will rebound as assumed? How will the proposed take avoid jeopardy of the species if this assumption is incorrect?	The District agrees with the substance of the comment and has revised the HCP narrative and the scenario for calculating cumulative take to address the stated concern, and to emphasize that this scenario is not a prediction of the future but the basis for quantifying and evaluating take, if any, in each year of the ITP term and cumulatively.	5.2.3.4
SC 2, p. 1	dHCP, Section 5.2.3.4, p. 111, The drought/non-drought scenarios assumed by the HCP aren't clear. Does the HCP cover more than 7 consecutive years of drought? Does the HCP cover 14 consecutive years of drought? If so, what measures will the District implement to protect salamanders? Actions to respond to such unexpected circumstances, as described under Changed Circumstances (Section 7.2.2.2, p. 185) include DO augmentation *if feasible*, and requesting some groundwater withdrawal permittees to *voluntarily* agree to temporary curtailment. Neither of these proposed actions is guaranteed. So, if neither is implemented, what will the District do? Is it feasible to guarantee that the measures described above will be implemented if changed or unexpected conditions occur? Will the population of wild salamanders be relocated into captivity until conditions improve?	The District revised the HCP narrative and the cumulative take scenario to provide additional clarity to respond to the questions in this comment. The actions proposed under the referenced Changed Circumstance do not supplant or replace the curtailments that will be mandated by District Rule under its drought management program, including >50% curtailments for individual permittees, at the Board's discretion in a declared Emergency Response Period. Additional narrative addressing this circumstance has been added. The District has no authority to relocate salamanders that are on COA property; furthermore the COA biologists are best able to judge the necessity and efficacy of such actions.	5.2.3.4, 7.2.2.2
SC 3, p. 2	dHCP, Section 6.1, p.134, It is unclear in the dHCP how frequently DO will be measured during drought. Once per month or multiple times per month?	The District revised the HCP narrative to describe what conditions will control the frequency of the DO measurements at the spring outlets. The DO measurements and their frequencies will be discussed and negotiated with the COA personnel as part of our ILA/MOU, and such measurements will incorporate existing COA monitoring plans to the maximum extent possible. The intent is to provide sufficient and representative data to	7.2.2.2

		assess compliance with or progress toward the biological objectives, for inclusion in annual reporting. All aspects of the monitoring program in the HCP are subject to ongoing reviews as part of the proposed Adaptive Management Program, described in Section 6.4.2 of the HCP.	
SC 4, p. 2	Section 6.1, p.134, Dissolved oxygen concentration and discharge data are collected every 15 minutes in "Main Springs" by the USGS using automated equipment. These data are posted online in real time. Does the District propose to use these data to monitor conditions in "Main Springs"? Eliza Spring typically has lower DO than "Main Springs", how frequently will DO be measured in this site?	Comment noted. The District made no substantive changes to the HCP document, although some re-wording was made at several places for clarity. See also response to comment SC #3. The USGS data will be monitored by both the COA and District as a matter of course as part of the joint monitoring program.	--
SC 5, p. 2	Similarly, the measurement frequencies that underlie discharge and withdrawal threshold averages are unclear. It would improve clarity for the HCP to state the measurement frequency.	Comment noted. The District made no changes to the HCP document. See response to comment SC #3.	--
SC 6, p. 2	How and when will the District measure take or know that take is approaching its limit during a drought? Will take be estimated based on duration of DO concentrations and associated lethal concentration values?	Comment noted. The District made no changes to the HCP document. As described under 5.2.3.2, take will be evaluated based on ongoing hydrological drought conditions, and in turn referenced to springflows and corresponding DO concentrations.	--
SC 7, p. 2	dHCP, Section 5.2.3.2, Fig. 5-8, p. 108-109, The HCP and take estimates don't appear to explicitly and numerically state lethal take of Covered Species. The HCP partitions take into "behavioral" and "physiological", with physiological including undefined sub-lethal and lethal effects. What proportion of physiological take is expected to be lethal? Do the take estimates assume a constant mortality rate?	Comment noted. The District made no changes to the HCP document. The take estimates consider, on a continuing basis, both hydrological springflow characteristics, where applicable, and hydrochemical characteristics of springflow on the Covered Species. The District has not attempted to parse lethal and sub-lethal take related to Aquifer conditions numerically, as the Service does not distinguish between those in defining take, and those are poorly known in the wild. As described in the HCP, the monthly take factor essentially is a metric that incorporates both sub-lethal and lethal take incidents (not individuals) and accounts for progressive risk of increasing mortality as an individual drought endures and cumulatively over the ITP term.	--
SC 8, p. 3	How was progressive risk incorporated into take estimates? The HCP take and conservation measures do not appear to incorporate the progressive risk to species during drought and how this affects population size at the end of drought. Cumulative lethal effects on salamander populations are not clearly enumerated in the dHCP. It is possible to estimate progressive and cumulative lethal effects based on information in the dHCP and dEIS. We can estimate duration at particular drought discharge levels, the associated DO concentrations, and the expected lethal effects using Table 4-2 of the dEIS. We can then apply those mortality percentages and durations to the salamander population size to see the loss of individuals (see Table 1 within this comment). Similar explicit estimates of lethal take should be included in the HCP for the proposed 7-year Hybrid drought.	See response to SC Comment #7. The District revised the HCP narrative to better explain the progressive risk.	5.2.2, 5.2.3.1
SC 9, p.4	What are the assumptions the Service made in their assessment of potential jeopardy of Covered Species? Will the Covered Species be jeopardized by the amounts of lethal take described in Comment 8 above? Assessment of jeopardy should include consideration of background natural mortality rate in addition to the cumulative effects of the actions proposed in this HCP and actions authorized in the COA's HCP for these species. Were these	Comment noted. The District made no changes to the HCP document. The Service will include the factors it considered in its Biological Opinion, along with a jeopardy analysis. It is not appropriate for the District in its HCP to suggest what and how factors are considered by the Service in its Biological Opinion.	--

	considered?		
SC 10, p. 4	Targeted "minimum" discharge of 6.5 ft^3/s is not a true minimum because it is an average over time. This means it can be lower as well as higher. The same is true for the minimum DO concentration. The HCP should include either a firm minimum threshold value or a range of variation that will be allowed. Since DO concentration varies on a daily cycle (it is lower at night in the absence of photosynthesis) and 24-hour data are available for Main Springs, perhaps these data could be used to define a range of acceptable concentrations around the threshold.	Comment noted. The District made no changes to the HCP document. There are several factors that affect DO concentration at a given springflow, but only the amount of groundwater discharging from the Aquifer is subject to the District's governance. That governance can only be referenced to monthly averages, since the reporting and curtailments of pumping (Covered Activities and Conservation Measures) are able to be adjusted no more frequently than monthly, practically speaking. It should also be noted that there is no photosynthesis within the Aquifer, so DO cycles would not replicate those found in surface water.	--
SC 11, p. 4	dHCP, Section 6.2.2.2, p.143, Consider shortening the timeline for implementation of DO augmentation infrastructure to 5 or 6 years. Given that we don't know when the next drought will occur and that maintenance of a minimum DO concentration is a conservation measure, the sooner implementation occurs, the better.	The District agrees that the subsurface DO Augmentation feasibility study and its implementation should be completed as soon as possible. However, discussions with the COA staff, which controls access to and ultimately would approve and co-implement such a project, indicate that the time period stipulated in the HCP is realistically needed to avoid take and other damage to the complex. The District has revised the HCP narrative to describe that the mitigation measure will be available as soon as feasible, the time periods stated in the HCP notwithstanding.	6.2.2.2, Measure M-2
SC 12, p. 4	dHCP, Section 6.2.2.2, p.143, If severe conditions occur before feasibility studies are completed and methods for DO augmentation are built or obtained, what will the District do to protect the species? Will the District help the COA acquire and maintain temporary DO enhancement equipment (pumps, aerators, etc.) between permit issuance and implementation of District DO augmentation systems?	Comment noted. The District made no changes to the HCP document. The COA already owns some augmentation equipment. Additionally, the District is committed to implementing the conservation measures, including the drought management plan and the mitigation measures, to reduce the impacts on the species if severe conditions occur.	--
SC 13, p. 4	The assumption that DO conditions in the subterranean areas of the aquifer will be higher than in surface habitat during drought should be fully demonstrated before relying on it for salamander refuge. The additional investigation proposed in the HCP is a good plan. The distribution of DO underground will also help guide feasibility studies of subterranean DO augmentation.	Comment noted. The District made no changes to the HCP document. In addition, the characterization of the BSS population remote from Barton Springs and the factors that determine its spatial and temporal distributions will assist in evaluating the subterranean DO regime.	--
SC 14, p. 4	The HCP states that one of the District's overarching goals is, "Promote recovery of the populations from those decreases to levels required for their long-term viability." The take allotted in this HCP will only maintain current level of endangerment of the species at best because the plan is to support population rebound to pre-drought sizes. The populations must increase beyond these sizes for the species to recover. What measures does the plan include that foster recovery?	Comment noted. The District made no changes to the HCP document. The District maintains that the full implementation of the proposed Conservation Measures, including mitigation, will increase the likelihood of survival and recovery of the species. The population size at the outset and the end of a particular drought episode will vary by episode, regardless of whether Aquifer pumping occurs. The Conservation Measures provide a foundation for recovery of the Covered Species, but the rate and extent of recovery will depend on factors mostly unaffected by the District's Covered Activities.	--
SC 15, p. 5	dHCP, Section 4.1.2.2, Page 62, The District proposes to increase groundwater withdrawal from the Barton Spring segment of the Edwards Aquifer beyond that currently permitted during non-drought. The plan also states that the increased withdrawal will accelerate the onset of drought by one month and that this is acceptable for protecting the target species. What scientific data or literature supports this assumption? Non-drought is the period during which the populations are expected to rebound to pre-drought	Comment noted. The District made no changes to the HCP document. Without the HCP total groundwater production during non-drought would be unlimited, and drought conditions would rapidly return without recourse. With the HCP the District will cap non-drought withdrawal to 16cfs slowing acceleration into drought by at least one month. Further, the earliest stages of drought, which are entered from a non-drought condition at about 40 cfs, have few to no behavioral or physiological effects, which	--

	sizes, which requires enough time for reproduction and growth of juveniles to reproductive adulthood. For both species, this takes roughly 4 - 6 months (Dries et al. 2013). So, how much capacity for population rebound will be lost due to the acceleration of drought onset?	begin at about 30 cfs, and would not substantively inhibit population rebound.	

COMMENTS ON THE DRAFT EIS

Review Comment #/Letter Page #[1]	Review Comment	Response to Review Comment	Section/Page of Text or Table
Letter 1 City Austin Watershed Protection Department (COA)			
COA # 6a, p.5	The comment that "the springs would never cease flowing" under Section 4.3.4.2 of the dEIS regarding the impacts of the HCP on the Covered Species is incorrect and seems to only consider flow at Parthenia Spring. All springs except Parthenia are likely to have more serious impacts than what is currently described under Alternative 2; Eliza Spring flows at a combined spring discharge of 14 CFS but may not continue to flow at 6.5 CFS. This is a substantial threat to the species, since Eliza Spring is the spring that typically has the largest salamander population.	Revisions to the dEIS were made to include the information provided by these comments.	Section 4.2.3.2, page 4-6; Section 4.3.4.2, page 4-14 New Reference added to Chapter 8, page 8-4
COA # 6b, p.6	The decrease in springflow will cause Old Mill Spring and Upper Barton Spring to stop flowing more often. The length of these low and no flow periods has long term consequences to these populations. The number of salamanders at these springs has yet to return to the numbers seen prior to the droughts of 2009 and 2011.	Revisions to the dEIS were made to include the information provided by these comments.	Section 4.2.3.2, page 4-6; Section 4.3.4.2, page 4-14 New Reference added to Chapter 8, page 8-4
Letter 2 Save Our Springs Alliance (SOS)			
SOS 17 p.8	dHCP p. 129, The dHCP states that these cumulative impacts are addressed in the dEIS. The dEIS does discuss cumulative impacts, but it only catalogs them, without discussing how they may impact the species' survival and recovery, or identifying any mitigation measures to reduce such impacts. *See* dEIS at 5-17.	Comment noted. No changes to the EIS were made. Effects of cumulative impacts involving groundwater pumping, climate change, decreased water infiltration to the aquifer, saline water encroachment, and increased competition for space and resources are summarized on page 5-14 of the current dEIS. Mitigation measures are listed with cumulative benefits on page 5-13. These statements address the missing information/discussion implied by the comment. No revisions are needed.	See 5-14, and 5-13