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October 23, 2023

Submitted electronically at **https://www.regulations.gov**

Public Comments Processing
U.S. Fish and Wildlife Service, MS: PRB/3W
5275 Leesburg Pike, Falls Church, VA 22041–3803
Attention: Martha Williams, Director

Re: FWS–R2–ES–2023–0069
Endangered and Threatened Wildlife and Plants; Endangered Species Status for Toothless Blindcat and Widemouth Blindcat, 88 Fed. Reg. 57,046 (August 22, 2023)

Dear Director Williams:

The San Antonio Water System ("SAWS") appreciates this opportunity to submit the following comments in response to the August 22, 2023, proposed rule and request for comment from the U.S. Fish and Wildlife Service ("USFWS") to list the toothless blindcat and widemouth blindcat (together, the "Blindcats") as endangered under the Endangered Species Act of 1973, as amended ("ESA"). 88 Fed. Reg. 57,046 (August 22, 2023) ("Proposal"). We also provide herein comments on the Species Status Assessment ("SSA") for the Blindcats (USFWS 2022). As you know, we have previously requested an extension of the comment period on the Proposal (see Attachment A). Given that USFWS has not as of our submission of these comments extended the comment period, please consider our request for extension as a request for reopening of the comment period. Consistent with USFWS guidance provided during a meeting between SAWS, the Edwards Aquifer Authority ("EAA") and local USFWS personnel, as soon as practicable, SAWS intends to provide data and analysis supplementary to this letter.

In the Proposal, which relies on the analysis in the SSA, USFWS sets forth its determination that the sole threat warranting listing of the Blindcats is groundwater withdrawal from deep artesian wells within the Edwards Aquifer. 88 Fed. Reg. at 57,046. However, as more fully described below, the Proposal represents a scientifically unsupported reversal of prior USFWS determinations relative to the Blindcats and is based on insufficient and/or inaccurate information to support the proposed listing of these species. Therefore, listing the Blindcats in accordance with the Proposal would violate the procedural and substantive requirements of the ESA and would fail as being an arbitrary and capricious agency action prohibited by the federal Administrative Procedure Act ("APA"). Moreover, USFWS has failed to comply with its *Policy*

for Evaluation of Conservation Efforts When Making Listing Decisions, 68 Fed. Reg. 15,100 (Mar. 28, 2003) ("Policy"). For these reasons, we respectfully request that USFWS withdraw its Proposal and issue a "not warranted" "12-month finding" on the 2007 petition to list the Blindcats. In that way, USFWS can close its consideration of the 2007 petition, which provided no new basis for USFWS to reverse its longstanding position on the Blindcats and, in any event, is now far too old and unsubstantial to merit further action by USFWS.

Following, we will describe in detail several key points that need to be considered by USFWS in making a final determination regarding the Proposal:

- The conclusions by USFWS are based almost entirely on assumptions, estimates and hypotheticals, often based on non-similar species.

- USFWS appears to not understand key aspects of the aquifer's hydrology and the interaction with pumping activities.

- There is a significant lack of information about the population size and habitat of the Blindcats that is essential to drawing further conclusions about the species and any threats they may, or may not, face.

- There is a significant lack of understanding of the technical aspects of SAWS groundwater wells, and specifically those under artesian pressure, leading the Service to erroneously conclude that groundwater wells pose a threat to Blindcats.

- The potential impacts of the Proposal are enormous and may severely impact the provision of water to SAWS customers, requiring an entire revamping of several areas of SAWS service area costing billions of dollars.

- The Proposal may also significantly impact the reliability of necessary water supply to major electrical plants that provide electricity to SAWS customers, downtown hotels, businesses, major tourist attractions in the area, hospitals and schools.

- Listing the Blindcats could also undermine the Edwards Aquifer Habitat Conservation Plan ("EAHCP"), which covers 11 aquifer species and provides collateral conservation benefits to many others.

For these reasons, and as more particularly laid out below, USFWS should withdraw its Proposal.

I. Legal Context

The ESA defines an "endangered species" as "any species which is in danger of extinction throughout all or a significant portion of its range[.]" 16 U.S.C. § 1532(6). Under the ESA, USFWS is required to consider five factors when making a listing determination. 16 U.S.C. §

1533(a)(1)(A)-(E). These include: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. 16 U.S.C. § 1533(a)(1)(A)-(E). In so doing, USFWS is required to make listing determinations "solely on the basis of the best scientific and commercial data available" after considering other efforts, if any, made by a political subdivision of a state to protect the subject species. 16 U.S.C. § 1533(b)(1)(A). SAWS is an agency of the City of San Antonio, and thus a government entity, and a public water system providing vital services to over two million people.

A. Review under the Administrative Procedure Act

A listing decision is agency action subject to review under the APA and must be set aside if the determination is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with the law." *Am. Wildlands v. Kempthorne*, 530 F.3d 991, 997 (D.C. Cir. 2008) (citing 5 U.S.C. § 706(2)(A)). Where the agency has "relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise," the agency action is arbitrary and capricious. *Am. Stewards of Liberty v. DOI*, 370 F. Supp. 3d 711, 724 (W. D. Tex. – Austin Division, 2019) (where USFWS's failure to delist the bone cave harvestman was arbitrary and capricious when it did not consider available, substantial scientific and commercial information). A reviewing court is tasked with considering "whether the agency acted within the scope of its authority, whether the agency adequately explained its decision, and whether the agency based its decision on the facts in the record, whether the agency considered the relevant factors." *Moden v. U.S. Fish & Wildlife Serv.*, 281 F. Supp. 2d 1193, 1201 (D. Or. 2003) (finding that USFWS acted arbitrarily and capriciously when denying a petition to delist the Lost River and shortnose sucker fishes where substantial information had been presented by plaintiffs in support of the petition and USFWS did not adequately explain its findings).

There is under the ESA no substantive presumption in favor of a species and USFWS may not employ a "precautionary principle" in listing decisions. *See Me. Lobstermen's Ass'n v. Nat'l Marine Fisheries Serv.*, 70 F. 4th 582, 595-96 (D.C. Cir. 2023). As the D.C. Circuit Court of Appeals clearly stated in *Me. Lobstermen*, "Here, the Service misconceived the law, wrongly claiming the legislative history of the ESA had ordained—if legislative history could ever ordain—a precautionary principle in favor of the species." *Id.* at 597-98. The Court went on to state that, "[b]esides, when the Congress wants an agency to apply a precautionary principle, it says so." *Id.* at 599.

It is also improper for USFWS to employ a "worst case analysis" where scientific data is lacking. *Huls Am. Inc. v. Browner*, 83 F.3d 445, 452 (D.C. Cir. 1996); *Me. Lobstermen's Ass'n v. Nat'l Marine Fisheries Serv.*, 70 F. 4th at 596 (citing *Robertson v. Methow Valley Citizens Council,* 490 U.S. 332, 356 (1989) and describing how section 7 of the ESA does not require a distortion of the decision-making process by "overemphasizing highly speculative harm"). The requirement

that the agency rely on the "best scientific and commercial data available" therefore protects against the ESA being "implemented haphazardly, on the basis of speculation or surmise" or as a result of "agency officials zealously but unintelligently pursuing their environmental objectives." *Me. Lobstermen's Ass'n*, 70 F. 4th at 595 (citing *Bennett v. Spear*, 520 U.S. 154, 176-77 (1997)). Where an agency "entirely fails to consider an important aspect of the problem", the agency's decision may be arbitrary and capricious. *San Luis & Delta-Mendota Water Auth. v. Jewell*, 747 F.3d 581, 636 (9th Cir. 2014) (quoting *Motor Vehicle Mfrs. Ass'n of U.S. Inc. v. State Farm Mut. Auto Ins. Co.*, 463 U.S. 29, 43 (1983)). Conversely, agency action may also be arbitrary and capricious where the agency relies on factors beyond those intended. *See, e.g., Alabama-Tombigbee Rivers Coalition v. Kempthorne*, 477 F.3d 1250, 1254 (11th Cir. 2007) (quoting *Motor Vehicle Mfrs. Ass'n of U.S. Inc. v. State Farm Mut. Auto Ins. Co.*, 463 U.S. 29, 43 (1983)).

B. Policy for Evaluation of Conservation Efforts (PECE Policy)

Listing of the Blindcats pursuant to the Proposal will also fail because of USFWS's failure to comply with the PECE Policy, which was specifically adopted by USFWS to aide its decision-making about species listings in light of other conservation efforts. *See*, *e.g.*, *Defenders of Wildlife v. Jewell,* 815 F.3d 1, 4 (D.C. Cir. 2016) (where the appropriateness of USFWS's choice to withdraw a listing proposal turned on the status and nature of state-level conservation efforts taking place and the court stated, "The Service adopted the [Policy] to assist it in making predictive evaluations about the persistence of a species where there are formalized conservation efforts that have not yet been implemented or have been implemented, but have not yet demonstrated whether they are effective at the time of a listing decision." (internal quotations omitted)). In the context of listing species, the Policy "ensure[s] consistent and adequate evaluation of recently formalized conservation efforts" by considering the likelihood that the effort will achieve the desired outcomes of reducing threats to a species. *Id.* at 4 (describing the purpose of the Policy in "identifying criteria for assessing whether such an effort provides a high level of certainty that the effort will be implemented and/or effective and results in the elimination or adequate reduction of the threats posed to any species being considered for a listing." (internal quotations omitted)). Whether a conservation effort is on schedule, meets its objectives, is modified to adapt to changed circumstances, or new information is discovered, are all important factors to consider when making a listing decision in light of an existing conservation effort. *Id.*

II. About SAWS

As you know, central to SAWS's mission is providing sufficient, clean drinking water to a community of over two million people. To accomplish this, SAWS and the larger community depend upon water from the Edwards Aquifer, which is one of the largest artesian aquifers in the world. We are and have been for many years keenly aware that the Edwards Aquifer provides habitat for numerous species listed or under consideration for listing under the ESA. Those species include the Blindcats, which are known only from specimens found in water drawn from wells accessing the deep aquifer.

As we will detail below, SAWS has long been a leader and partner in protecting rare species dependent upon the aquifer. SAWS's species conservation initiatives include assisting in the development and joint implementation of the Edwards Aquifer Habitat Conservation Plan ("EAHCP"). In fact, SAWS's Aquifer Storage and Recovery ("ASR") program, located at the H2Oaks Center, is the key conservation element of the EAHCP. In addition, SAWS H2Oaks Center is the only known place in the country that maximizes efficiency by providing three different sources of water from one site, including desalinated brackish water, Edwards Aquifer water stored in the ASR, and Carrizo Aquifer water. SAWS also successfully developed the public-private Vista Ridge water pipeline project to provide additional non-Edwards Aquifer water to the San Antonio region. SAWS has also expended millions of dollars in the study and monitoring of the Edwards Aquifer and the species which depend upon it. Moreover, SAWS has not limited its conservation actions to Edwards Aquifer species. For example, SAWS successfully developed an ESA habitat conservation plan for a terrestrial karst invertebrate potentially affected by the Anderson/Micron water transmission line. Under that plan, SAWS created a substantial preserve of over 57 acres for endangered and rare karst invertebrates. Additionally, SAWS is currently seeking a water permit to allow SAWS to dedicate 50,000 acre feet of treated wastewater effluent solely for instream flow purposes to the San Antonio and Guadalupe river basins.

It should also be noted, and given due consideration by USFWS, that as described below, 8 of the 11 wells (73%) known in the past to occasionally discharge Blindcats have been capped and are no longer in use. Indeed, over the many decades during which the Blindcats have been of interest to USFWS, well closure , significant controls on pumping of the aquifer, the establishment of non-Edwards sources of water such as through the Vista Ridge Pipeline, and SAWS's ASR program, the potential threats thought to exist by USFWS to the Blindcats would have been significantly reduced and there is no new information sufficient upon which to reverse USFWS's prior determinations that there is insufficient data upon which to base a listing. In fact, USFWS's Proposal represents a dramatic change in the positions it has taken on the Blindcats for several decades, and a close review of the record reveals no sufficient basis for that reversal.

We note that it is also clear from the Proposal that USFWS does not have a sufficient understanding of how the wells actually work and has made assumptions about how the wells might injure or kill Blindcats that are, in fact, inconsistent with the actual functioning of the wells. Therefore, we also include in these comments a summary and diagrams of how a typical deep Edwards Aquifer well functions. This information makes it clear that such wells are not the threat USFWS perceives them to be.

A. How do SAWS wells work?

At some SAWS facilities Edwards Aquifer water enters the casing of typical public supply wells as a result of artesian pressure. The pumps are appropriately set below the artesian pressure derived water level of the aquifer, so the water enters the casing under natural pressure. When required to run, the pump moves water from inside the casing into the tank, then new water replaces the water removed to continue the process. This is occurring at approximately 500 feet (ft) above the described preferred habitat of the Blindcats, which is assumed to be at a depth of 308 meters (m) or 1,010 ft or greater. The drilled portion of the aquifer is tapered down to a smaller size of

the unconfined opening/cased zone of the well construction. The resulting borehole through the confined artesian depth of the aquifer is an infinitesimally small area compared to the overall potential habitat of the Blindcats. A diagram depicting how a typical SAWS public supply well works is provided below as Figure 1. An illustration of artesian pressure and artesian flow is shown in Figure 2. An illustration of a Typical Cross-Section of the Edwards Aquifer is provided below as Figure 3, and a representative depiction of a karst formation is provided below as Figure 4.

Figure 1. Typical SAWS public supply well.

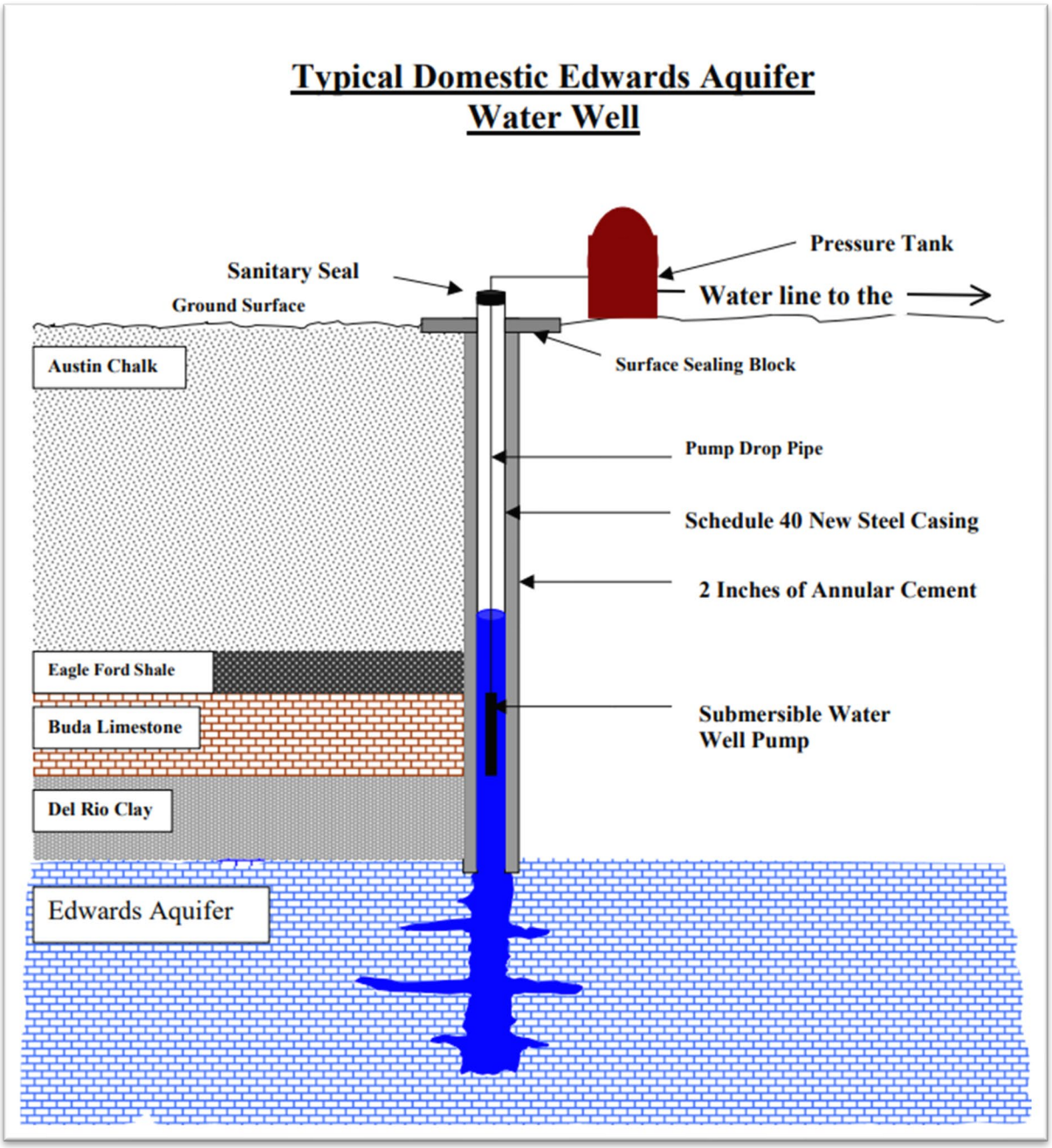


Figure 2. Geological and topographical controls affecting artesian and flowing artesian wells. (USGS Website: Artesian Water and Artesian Wells)

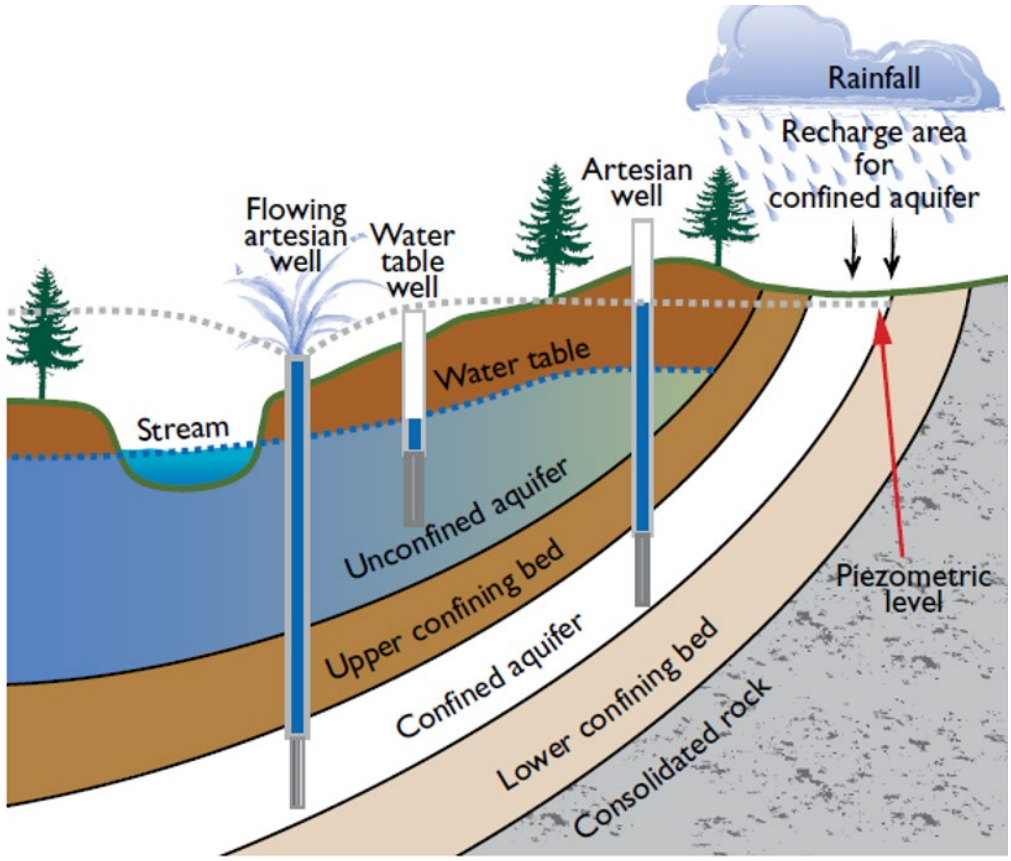


Figure 3. Typical Cross-Section of the Edwards Aquifer

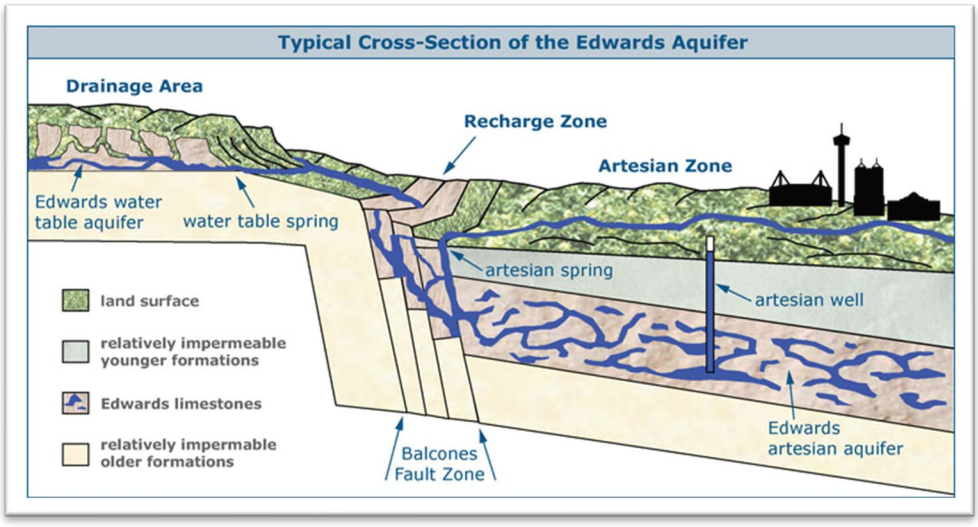
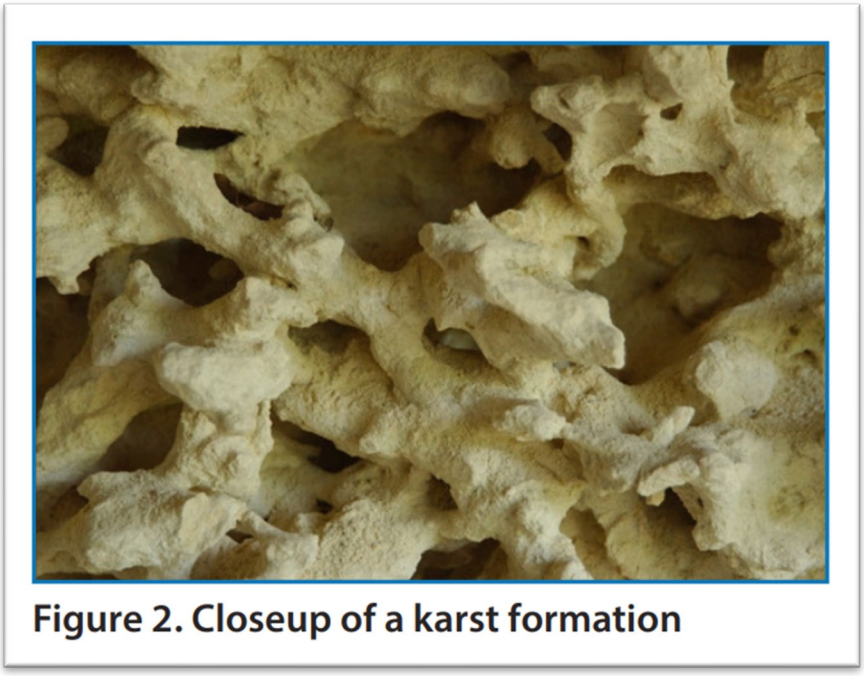


Figure 4. Representative depiction of a karst formation.

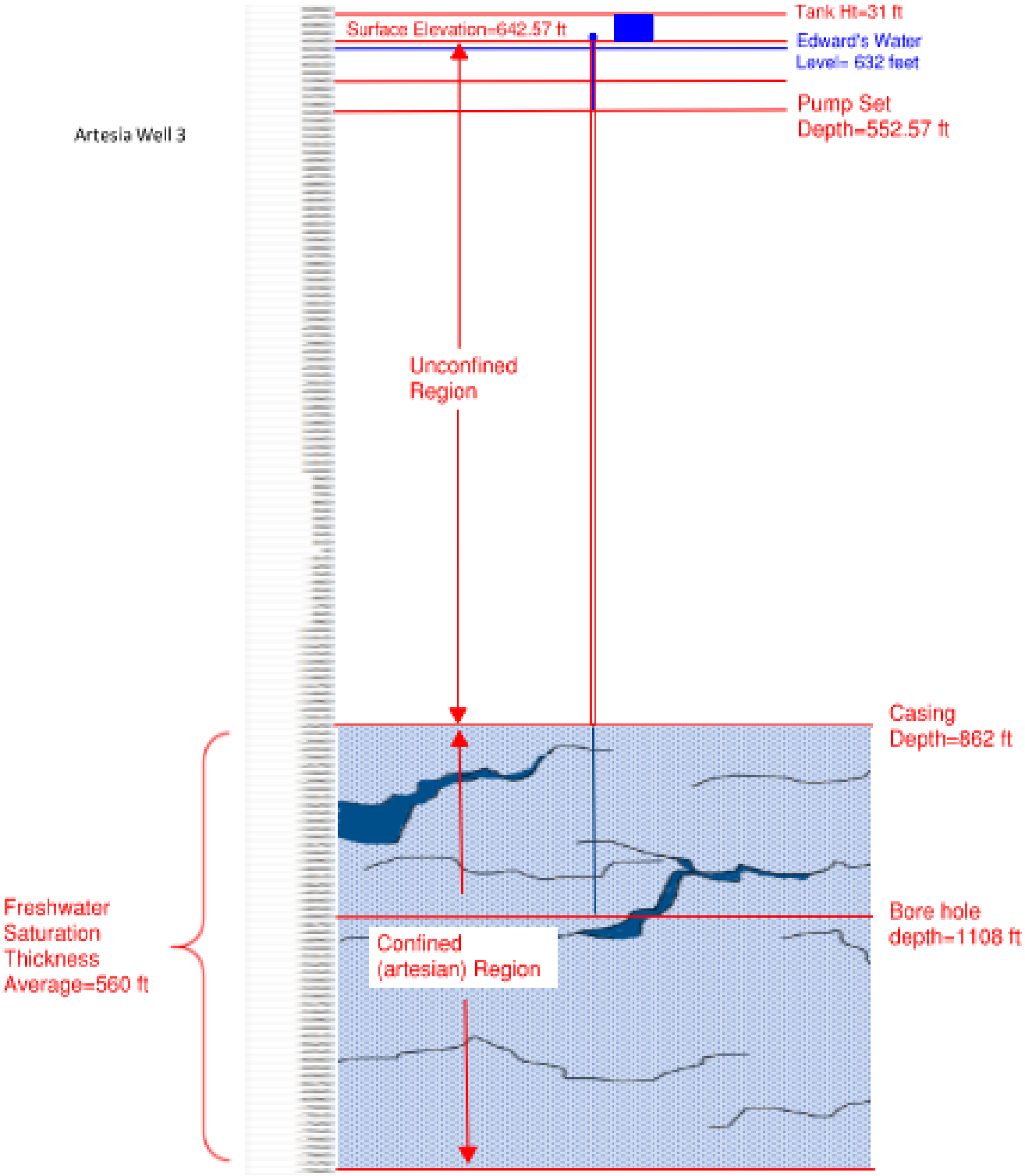


1. ***How deep are the well casings versus the pumps?***

Table 1. Artesia Pump Station Well Data

Station Name Well#	Capacity (MGD)	Surface Elevation (ft)	Year Drilled	Total Casing Length (ft)	Total Depth (ft)	Casing Diameter	Pump Depth from Surface (ft)	Well Status
Artesia # 3	10.1	642.57	1953	862	1108	26" from 0' to 157' 22" from 157' to 862'	90	Active
Artesia # 4	10.1	641.49	1958	982	1380	30" from 0 to 197' 26" from 197' to 840' 24" liner from 840' to 982'	N/A	Active
Artesia # 5	10.1	659.92	1960	968	1412	30" from 0' to 208' 26" from 208' to 968' 26" liner from 0' to 208'	90	Active

Figure 5. Approximate Scale graphic of SAWS Artesia Well 3.



2. ***Is it possible for the pumps to pull up blindcats from the depths that have been presumed for their habitat?***

The pump/motor combinations used in the SAWS wells identified in the SSA have the power and capability to draw water only from a depth of approximately 50 feet below their placement at the associated ground elevation. This is hundreds of feet above the assumed level of the Blindcats habitat.

It should be noted that in 1978, when the species were reported to be collected from Artesia PS, that these wells were flowing artesian the entire year. Meaning, the motors were not energized, and the pumps were not turning. Water flowed freely from the surface level of the Edwards aquifer into the ground storage tank on site. SAWS controlled overflow thereof with valving. Therefore, it is not possible to conclude that any Blindcat species pulled from the 1978 sampling of SAWS Artesia Pump Station were a result of groundwater pumping, as assumed erroneously by USFWS.

Additionally, and unlike other groundwater aquifers, flow patterns in a karst aquifer include complicated flow conduits, fractures and porous rock which all transmit flow with different flow patterns.

Table 2. System Porosity types in a Karst Aquifer (from Ghasemizadeh et al. 2012)

Flow characteristics of triple porosity components in karst aquifers

Permeability	Dimension	Travel Time	Flow Mechanism	Distribution
Matrix	μm to mm	Long	Darcy law, laminar flow	Continuous
Fracture	10 μm to 10 mm	Intermediate	Cube law, usually laminar flow	Localized
Conduit	> 10 mm	Short	Darcy-Weisbach, open channel and pipe flow, turbulent flow	Localized

Source: Ghasemizadeh, R., Hellweger, F., Butscher, C. et al. Review: Groundwater flow and transport modeling of karst aquifers, with particular reference to the North Coast Limestone aquifer system of Puerto Rico. Hydrogeol J 20, 1441–1461 (2012). https://doi.org/10.1007/s10040-012-0897-4.

Particularly with the Edwards Aquifer, water moves at varying speeds within the conduits, fractures, and matrices, making modeling flow within the Edwards Aquifer particularly challenging as does not fit the pure karst descriptions.

Based on the natural mechanics of a large complex artesian aquifer, which exhibits no classical draw down characteristics, and the designed engineering of the wells and pumps, it would be useless for the well pumps to move water beyond 50 feet. Therefore, the Total Dynamic Head (TDH) of the well pumps at the Artesia Pump Station is approximately 50 feet and the corresponding horsepower of the well pump motors ranges from 150-200 HP. In fluid

dynamics, TDH is the work to be done by a pump, per unit weight, per unit volume of fluid. TDH is expressed as the total equivalent height that a fluid is to be pumped, taking into account friction losses in the pipe. Each of the well pumps only have enough power to lift water the height of the TDH, in our case ~50 feet. This means that energy will be added to the water by the pump to be able to lift it from the static water surface, or slightly below, to the overflow of the receiving ground storage tank. Simply put, the pumps utilized do not have the power or capability to draw water from a depth beyond 50 feet or so of their placement in the casing which is hundreds of feet above the level of the assumed habitat of the Blindcats.

B. SAWS System Design and Operation

1. Pressure zones

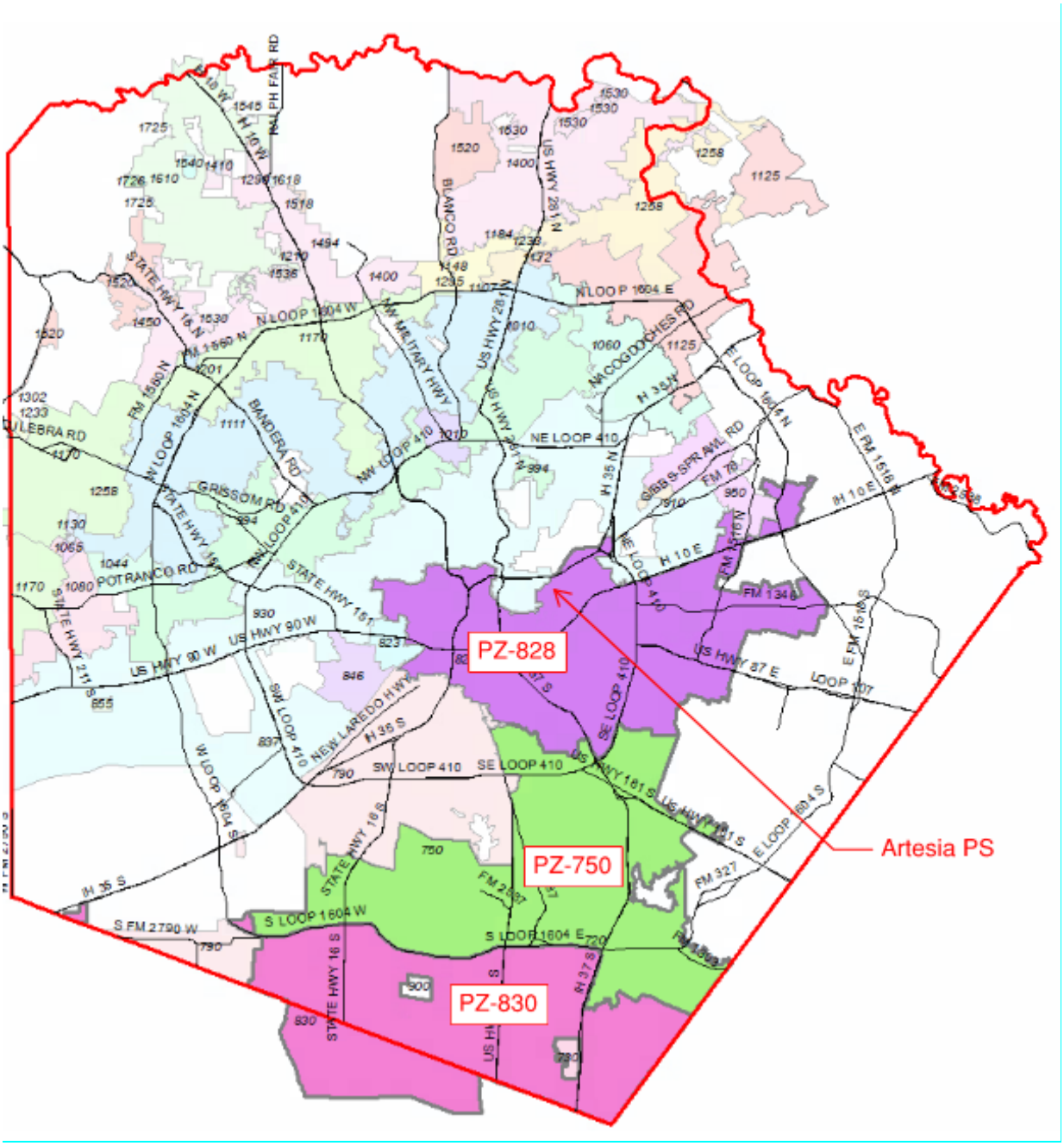
The SAWS service area is not centralized. Certain pump stations serve specific pressure zones (PZ) with occasional opportunities for interconnections between the zones. Pressure zones are distributed throughout the SAWS service area. They are made up of areas of land at ranges of topographic elevations. SAWS produces water from the Edwards Aquifer in centrally located pressure zones and then boosts it up to higher zones and reduces it down to lower zones. For example, the pressure zone within which the Artesia Pump Station (PS) is situated includes land at ground elevations that range from 580 feet to 700 feet. The service pressure that is provided results in water pressures between 56-107 psi to the customers. It is important to note that because of the design and functionality of the SAWS system a non-Edward's source entering a northern section of the SAWS service area cannot necessarily distribute that water to all other parts of the service area.

EXAMPLE: Pressure Zone 828

Source water for PZ-828 is either from the Edwards Aquifer via wells at five separate primary pump stations in the zone (including the Artesia PS) or from the H2Oaks Center. The non-Edwards Aquifer sources that can enter this zone are from the Carrizo and Wilcox Aquifers via the H2oaks Center. The H2Oaks Center is where the ASR facility is housed. Additionally, PZ-828 also supplies water to PZ-750 and PZ-830.

Total connections in the three pressure zones that rely upon the direct Edwards Aquifer supplies and the recovered Edwards Aquifer water from the ASR facility is 133,798, equating to approximately 368,000 people.

Figure 6. SAWS Pressure Zone 828 and Lower Supported Pressure Zones



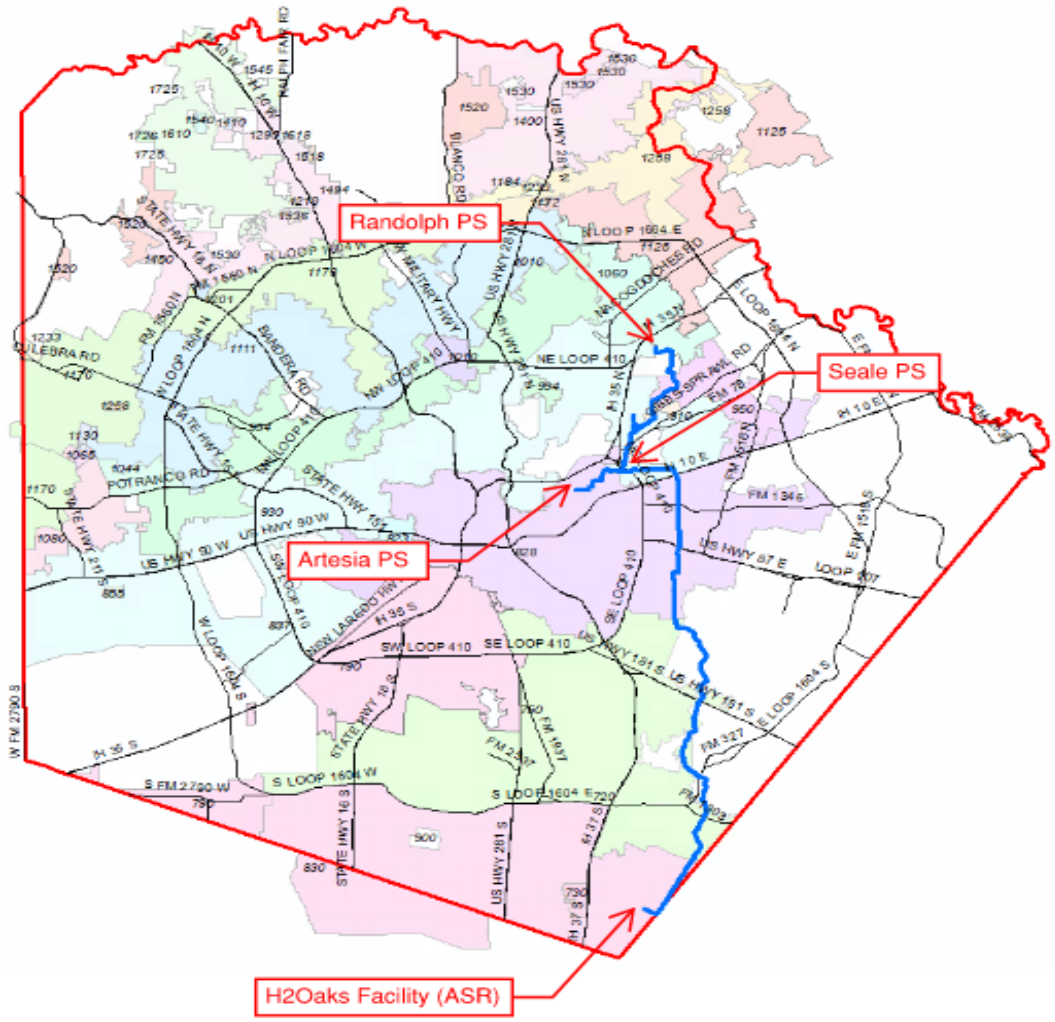
2. *Artesia/ASR Operations and EAHCP*

As stated above, SAWS relies on pressure zones to distribute water through the SAWS system. Artesia, Seale & Randolph are primary pump stations that provide Edwards Aquifer water to store in the ASR Facility. While all three provide water for storage, SAWS Artesia PS is the main facility in this operation, providing approximately 60% of the water stored. Water is either being stored or recovered continuously as part of SAWS daily operation depending on demand and other operational requirements and therefore, Artesia PS is critically important to the full ASR

operation. Without Artesia PS contribution, the SAWS ASR system would reduce in capacity by over half, therefore significantly limiting water provision from H2Oaks into PZ-828 in daily operation.

Additionally, as part of the EAHCP, SAWS uses regionally acquired permitted Edwards Aquifer withdrawal rights to store water in the ASR from these facilities during wet periods for use in the time of drought and forbearance/cutbacks. In exchange for permitted rights provided to SAWS, the EAHCP envisions further pumping forbearance/cutbacks by SAWS beyond all other permittees during severe drought.

Figure 7. SAWS H2Oaks (ASR) System of Water Mains



EAHCP conservation measures associated with SAWS ASR facility capabilities in relation to the EAHCP are designed to protect spring flow for federally listed threatened and endangered species during times of severe, long-term droughts. This is paired with other EAHCP conservation

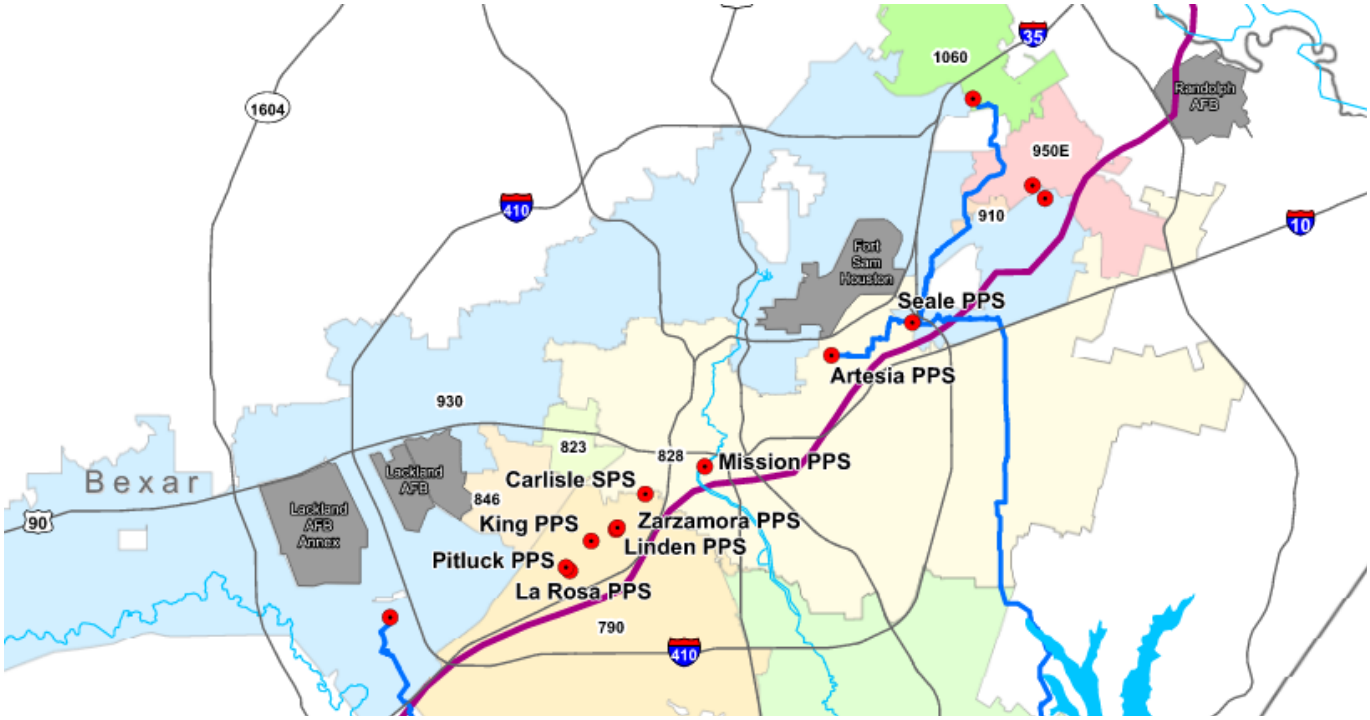
measures impacting municipal, industrial, and irrigation permit holders. through a market driven approach. All programs work together to ensure continuous spring flows to protect the species.

To ensure that federally listed threatened and endangered species that rely heavily on Comal and San Marcos Springs receive long term spring flow protection, modeling indicates that in the worst year of a drought combined with the other protection measures of the EAHCP the ASR measures are responsible for about half of the minimum continuous spring flow performance. The species protections provided by the EAHCP are not possible without the ability of the SAWS ASR system to function at least as it does today, and any changes to associated SAWS facilities, particularly that of Artesia pump station, would cripple, if not render impossible, a renewal of the EAHCP which expires in 2028.

3. Impact of Potential Listing

The map below depicts the SAWS wells that are referenced in the SSA. These wells are in pressure zones 828 and 790.

Figure 8. Map of SAWS wells referenced in the SSA



In PZ-828, there are a total of five primary pump stations that house Edwards Aquifer wells. At these stations there are a total of nineteen Edwards wells. Two of the five stations are referred to in the SSA, and these two stations house eleven wells which would be directly affected by the Proposal. Should the unsupported conclusion be drawn that pumping or artesian flow from these eleven wells are impacting species' habitat/mortality rate, the zone would be without production capacity of millions of gallons a day (MGD), and ASR recharge capacity would be equally reduced. This calculates to the water use for over half a million people each day on average using

SAWS GPCD of 117 from 2016. Ultimately, this would leave SAWS with significantly reduced volume of source capacity for the zone. TCEQ (the regulating body for drinking water in Texas) requires 0.6 gallon per minute (GPM) per connection of source capacity. The potential reduction in pumping could leave SAWS with a significant and serious immediate deficit of source capacity for the zone.

In PZ-790, four stations that house Edwards Aquifer wells are referred to in the SSA. These stations contain nine Edwards Aquifer wells with a total production capacity of in the millions of gallons per day. Therefore, the zone would be left without this capacity.

Significant impacts of the potential listing would be felt by the following entities:

- **Food Production**-HEB Food Processing Plant
- **Electric Utilities**-CPS Energy Braunig and Calaveras Power Stations
- **Public Health & Safety**- PZ-828 serves the central business district of San Antonio and many major medical facilities as set out below:

  Table 3: Major medical facilities contained within PZ-828 are:

ID	HOSPITAL
5	Southeast Baptist
11	Santa Rosa Senior Center - Southeast
17	Santa Rosa Rehab Center - San Saba
23	Metropolitan Methodist Hospital
27	Methodist - Central SA
29	Nix Medical Center
34	University Health Center - Downtown
35	University Center for Community Health
38	University Family Health Center - Southeast
130	Children's Hospital of San Antonio
138	Metropolitan Methodist Hospital
146	Mission Trail Baptist Hospital
157	Kindred Hospital - San Antonio Central
159	Baptist Medical Center
186	Texas Center for Infectious Disease
188	San Antonio State Hospital

- **Public Health & Safety**- PZ-790. Total connections in pressure zone 790 that are supplemented by the direct Edwards Aquifer supplies and the recovered Edwards Aquifer water from the ASR facility are 36,304, which equates to approximately 99,800 people. Medical facilities are also located in this zone, as set out below:

Table 4: Major medical facilities contained within PZ-5790 are:

ID	HOSPITAL
144	Southwest General Hospital
164	Baptist Emergency Hospital (Zarzamora)

- **Military**- Ft. Sam Houston's boundary is located less than 3,000 feet from the Artesia Pump Station. The base has its own Edwards Aquifer well(s) that are/is used to serve its services and inhabitants. There is a strong potential for impact to these wells by the Proposal. Furthermore, SAWS provides water to portions of Lackland AFB, and this area is planned to be added to SAWS PZ 828 (described above); and, therefore, impacts to PZ 828 will likely impact military missions at Lackland AFB. Additionally, the USAF also has Edwards Aquifer wells that are very near the saline water line at Lackland AFB. Depending on required actions, water supply to the military bases could be impacted.

III. Environmental Context & Analysis: Technical Comments on the Proposal

A. Comparison of key agency findings or decisions and the available base of information at the time.

USFWS has been considering the status of the Blindcats for more than 40 years. Below, we summarize the history of USFWS decision-making regarding the Blindcats and the information about these species that was available at the time (Table 5). The timeline shows that the USFWS's recent actions to pursue listing are inconsistent with its prior rationale and that the new information documented in Zara (2020) does not provide substantially new or additional information to support the change in position.

Between 1982 and 1998, a period of approximately 16 years, USFWS repeatedly acknowledged that it lacked "substantial," "conclusive," "persuasive," or "sufficient" data to meaningfully evaluate the status of the Blindcats in the context of the ESA. During this period, USFWS had available to it publications describing each of the species (e.g., morphology, anatomy, size distribution, gut contents) and documenting early records and localities (Eigenmann 1919, Hubbs and Baily 1947, Suttkus 1961, Karnei 1978, Longley and Karnei 1978a and 1978b, Langecker and Longley 1993). By its 1998 negative 90-day finding on the American Ichthyologists and Herpetologists Society and Desert Fishes Council petition to list, each species had been reported from 5 wells (with two of these wells producing both species) and collections included dozens of individuals. Most individuals were collected in the late 1970's during Karnei's graduate thesis work.

The Forest Guardians 2007 petition to list 475 southwest species did not offer any new information or analysis on the Blindcats not already available to USFWS. The petitioners only reference the information held in the NatureServe database at the time in support of their claim

that listing is warranted. Two years later in its 2009 positive 90-day finding, USFWS refers to NatureServe to summarize known localities. USFWS cites only two other citations in its positive 90-day finding, neither of which are presently cited in the NatureServe accounts (making it unlikely that they were cited in the 2007 version of these accounts). Nonetheless, USFWS states that these two publications (Ono et al. 1993 and Anderson et al. 1995) were readily available to it and were the substantive basis for its decision.

Of note, both of these "readily available" publications pre-date USFWS's prior 1998 negative finding. Further, the two cited publications address conditions (i.e., aquifer drawdown that moves the "bad water line", pollution and eutrophication, and invasive species) that USFWS has subsequently determined not to be threats to the Blindcats. USFWS clearly erred when it determined the 2007 petition (and other readily available information) presented substantial information that listing may be warranted. USFWS had already considered, many times, the available information about the Blindcats and determined, many times, that it lacked sufficient information to proceed.

USFWS appears to acknowledge in 2012 that pumping from the Edwards Aquifer is unlikely to adversely impact the Blindcats. The USFWS's draft Environmental Impact Statement ("EIS") evaluating the proposed approval of the Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan ("HCP") and issuance of an incidental take permit states: "Because the actions contemplated within the study area are not anticipated to impact the deep Edwards Aquifer ecosystem or change the likelihood of exposing deep-water aquatic species to such threats, these species are unlikely to be adversely impacted by the considered alternatives, and are not considered further in this DEIS." The activities covered by the HCP and evaluated in the draft EIS included pumping from the aquifer by SAWS and groundwater withdrawals by other parties under the jurisdiction of the Edwards Aquifer Authority.

The Zara (2020) study sought to replicate the work of Karnei (1978) and Longley and Karnei (1978a, b) regarding the distribution of Blindcats and their frequency of detection. The Zara (2020) study, supplemented with follow on data reported by Diaz (2021) and in personal communications from Diaz to USFWS, is the only new information specifically addressing the Blindcats published after USFWS's 1998 negative 90-day finding. Further, as we consider in more detail below, the Zara (2020) study is both supplemental to and consistent with the findings of Karnei (1978) and Longley and Karnei (1978a, b), expands the local range and known distribution of the toothless Blindcat, and presents no reliable evidence of population trends for either species.

Yet, despite the consistency of the Blindcat survey data over time, the dismissal of the purported threats that prompted the 2009 positive 90-day finding, and a demonstrable reduction in the now-identified primary threat to the species (i.e., artesian discharge and pumping from groundwater wells, including wells where Blindcats have been detected), USFWS reaches very different conclusions about the present status of these species. The change in opinion appears to derive entirely from a presumption that the Blindcats have certain, strong "K-selected" life history traits that make them unable to numerically or demographically persist under the past, present, and likely future mortality from the operation of artesian groundwater wells. Instead, USFWS has crafted a supposed life history for the Blindcats from data on other species in other habitats. In

fact, USFWS has no information that provides direct or indirect evidence of any of these supposed life history traits or whether well mortality is actually driving the Blindcats towards extinction.

Table 5. History of Blindcat decisions and supporting information

USFWS Finding or Decision	**Discussion**	**Available Scientific or Commercial Information on Blindcats or Habitat**
1982 Category 2 Candidate Status (December 30, 1982; 47 FR 58454)	USFWS assigns Category 2 Candidate status to the blindcats. Category 2 Candidate species are "taxa for which information now in possession of the Service indicates that proposing to list the species as Endangered or Threatened is possibly appropriate, but for which ***substantial data are not currently available to biologically support a proposed rule***. Further biological research and field study will usually be necessary to ascertain the status of the taxa in this category, and it is likely that some of the taxa will not warrant listing" (47 FR 58454; emphasis added).	Early reports (Eigenmann 1919, Hubbs and Baily 1947, and Suttkus 1961) document initial discoveries, species accounts, and historic detections. Longley and Karnei (1978a and 1978b) are status assessments for each of the blindcat species that build on field work reported in the graduate thesis of Karnei (1978), The status reports were prepared on behalf of the USFWS. Together, the status reports document that wells associated with the historic (pre-1970's) detections were either capped or otherwise lost at the time of Karnei's field work. The reports also document Karnei's survey effort that sampled for Blindcats at 33 wells and two springs, detected one or both species at 3 wells. Based on the average flow rate of the Artesia Pump Station well (other wells were not used for this calculation) and the number of Blindcats collected over a 68-day period, the number of widemouth blindcats ejected from the well is 1 widemouth blindcat/6.2 days and 1 toothless blindcat/3.09 days. The authors estimated if the flow rate remained constant that 59

USFWS Finding or Decision	Discussion	Available Scientific or Commercial Information on Blindcats or Habitat
		widemouth blindcats and 118 toothless blindcats would be ejected per year at this well. Considering the best available information, Longley and Karnei (1978a, b) conclude "The numbers of fish collected during this study would indicate a very healthy population" and "From the study of distribution patterns, population estimates, and general condition of this unique ecosystem, we are convinced that [these] species [are] not endangered."
1985—1994 Category 2 Status Reaffirmed in 1985, 1989, 1991, and 1994	USFWS continued to identify the blindcats as Category 2 Candidate species in Notice of Reviews spanning a decade. Continued recognition of Category 2 Candidate status acknowledges that the present state of best available scientific and commercial information was insufficient to "biologically support a proposed rule" to list. In later notices, USFWS rephrases its description of Category 2 Candidate status as: Taxa for which information now in the possession of the Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which ***conclusive data on biological vulnerability and threat*** **(1989)** or ***persuasive data on biological vulnerability and threat are not currently available*** **(1991 and 1994)** or ***sufficient data on biological vulnerability and threat were not***	New publications during this period (1982 through 1994) addressed the geology and hydrology of the Edwards Aquifer (Marclay and Small 1986, Marclay et al. 1980, Groshen 1993) and the morphology, anatomy, and phylogeny of the blindcats (Lundberg 1982, Langecker and Longley 1993). Additional collections of both species were made in the early 1980s at wells that the SSA attributes to the Artesian Well #4 and the O.R. Mitchell well. The identity of the collectors and the nature of the collections (whether part of a study or incidental observations) are undescribed in the SSA.

USFWS Finding or Decision	Discussion	Available Scientific or Commercial Information on Blindcats or Habitat
	currently available **(1996)** to support proposed rules. In 1989, USFWS began to also estimate the status trends of species on its candidate list and assigned the blindcats as having "unknown" status, meaning that "additional survey work is required to determine their current trends" (59 FR 58982).	
1995 ASIH and Desert Fishes Council Petition to List (August 1995)	Petitioners claim to provide "the additional information on the status and vulnerability of this [sic] species requested by USFWS (Federal Register 1989, 54: 554-5) so that… [the blindcats] will be listed as endangered species." The petition notes that the Blindcats are troglobitic, have different morphologies that suggests different prey or feeding strategies, and are detected (often together) in artesian or pumped groundwater wells tapping the San Antonio Segment of the Edwards Aquifer near the "bad water line." The petition also suggests that the "single greatest threat" to the blindcats is "destruction, modification, or curtailment of their underground aquatic habitat by water level decline and/or bad water intrusion caused by human withdrawals of high quality Edwards water and the inadequacy of existing federal, state, regional, and local regulatory mechanisms." Other noted threats include "being sucked up and destroyed in local wellbores"	Additional publications regarding the hydrogeology of the Edwards Aquifer are available (Hovorka et al. 1995, Mace et al. 1995).

USFWS Finding or Decision	Discussion	Available Scientific or Commercial Information on Blindcats or Habitat
	and "contamination of its aquatic habitat due to chemicals (e.g., pesticides, fertilizers) used on the surface of the Edwards Aquifer recharge area and contributing zone." The petition acknowledges that "the size of [the Blindcat] populations cannot be estimated, nor their exact geographic range observed," but that "the number of blindcats emerging from the aquifer has decreased markedly during the past decade," citing to a personal communication from Glenn Longley. No additional information to support this claim of declining abundance is provided.	
1996 Discontinued Category 2 Status Classification (February 28, 1996; 61 FR 7596)	USFWS discontinued the use of the "Category 2 Candidate" classification. Neither Blindcat is identified as a candidate for listing.	Hovorka et al. (1996) addresses topics related to the geology and hydrogeology of the Edwards Aquifer.
1998 Negative 90-day Finding on ASIH and Desert Fishes Council Petition to List (September 9, 1998; 63 FR 48166)	USFWS determined that the August 1995 Petition to List "did not present substantial information indicating that these species warranted listing." USFWS stated that "uncertainties still exist regarding…the distributions of and extent of threats to the [blindcats]. The petition presented no information to resolve these uncertainties." The USFWS found that the petition provided no information that updated the findings of Longley and Karnei (1978a, b) or that offered evidence of population declines or threats from saltwater intrusion, direct	Groschen and Buszka (1997) addresses topics related to the geology and hydrogeology of the Edwards Aquifer.

USFWS Finding or Decision	Discussion	Available Scientific or Commercial Information on Blindcats or Habitat
	mortality from pumping, or contamination. USFWS stated that "information regarding the distribution of the blindcats and documentation and assessment of threats to these species are needed."	
2007 Forest Guardians Petition to List (June 18, 2007; received June 25, 2007)	Petitioners included the Blindcats in a mass petition addressing 475 southwestern species. The sole basis for the petition was a NatureServe ranking of G1 or G1G2. The petitioners rely entirely on the documentation and analysis of NatureServe to support their petition, stating "we hereby incorporate all analysis, references, and documentation provided by NatureServe in its on-line database." NatureServe ranked the Blindcats as G1G2 at the time of the petition, indicating some uncertainty as to the rarity, geographic distribution, or population trends for the species. The NatureServe accounts for the Blindcats were updated on October 6, 2023, with other specific areas of content last reviewed or updated in 2012. However, the current accounts acknowledge that population size and trends are unknown, but also cites Longley and Karnei (1978; for each species) to suggest that the species are apparently abundant. The NatureServe accounts identify over pumping that moves the location of the bad water line as threatening the species, without mention of direct mortality from pumping as a threat.	The present version of the NatureServe account does not list any information or data pertaining specifically to the Blindcats or their habitat that is more recent than the 1998 negative 90-day finding.

USFWS Finding or Decision	Discussion	Available Scientific or Commercial Information on Blindcats or Habitat
2009 Positive 90-day Findings on Forest Guardians Blindcat Petitions	USFWS determined that the Forest Guardians Petition to List "presented substantial information that listing…may be warranted." USFWS states that the Blindcats were each known to occur in 5 artesian wells penetrating the San Antonio pool of the Edwards Aquifer, citing to NatureServe's database in 2007. The USFWS determined that information in the petition and information that was otherwise readily available provided substantial information indicating that listing the Blindcats may be warranted. The USFWS identified two relevant listing factors contributing to its finding: 1) habitat destruction, modification, and curtailment resulting from water drawdown and pollution, and 2) competition from exotic species. The USFWS cites two sources of information as supportive of its findings: Ono et al. (1983) and Anderson et al. (1995). Neither of these sources are presently cited in the NatureServe accounts for the Blindcats (therefore, it is unlikely that they were cited in 2007) and would have also been "readily available" to the USFWS at the time of its 1996 discontinued Category 2 Candidate classification and the 1998 negative 90-day finding on the ASIH and Desert Fishes Council petition to list. The USFWS does not explain its shift in position.	Ono et al. (1983) – USFWS asserts that this report demonstrates that the aquifer is being overused/drawndown and contaminated by chemical pollution. Anderson et al. (1995) – USFWS asserts this report indicates that altered instream flow, eutrophication, and competition may be a threat due to the rapid increase of exotic species within Blindcat habitat. Both of these "otherwise readily available" publications were available for USFWS to review and consider when it made the prior negative 90-day finding in 1998.

USFWS Finding or Decision	Discussion	Available Scientific or Commercial Information on Blindcats or Habitat
2012 Edwards Aquifer Recovery Implementation Program HCP and EIS	At the end of 2012, the Edwards Aquifer Authority and its partners (including SAWS) released a final version of their HCP. The final HCP describes how a Covered Species Work Group examined the Blindcats for possible inclusion as covered species and ultimately "concluded that seeking coverage for these [deep] Aquifer species was not warranted." USFWS completed an EIS for its proposed action of approving the HCP and issuing the related Incidental Take Permit. The Final EIS is dated December 2012and states: "The Edwards Aquifer supports a unique ecosystem that contains a number of subterranean aquatic **species adapted to deep-water environments (greater than 985 feet [300 m] below the surface) such as the toothless blindcat (*Satan eurystomus*) and the widemouth blindcat (*Trogloglandis pattersoni*),** while the springs host a different assemblage of flora and fauna adapted to the distinctive conditions associated with these near-surface environments (Longley 1986, 63 FR No. 174 48166–48167). … The subterranean portions of the Edwards Aquifer support a highly adapted biological community that may be adversely impacted by many of the same threats as species at the springs, such as water quality contamination or degradation. **Because the actions contemplated within the study area are not**	Even after the USFWS's erroneous positive 90-day finding, the agency considered whether pumping from the Edwards Aquifer would adversely impact these "highly adapted" deep aquifer species. The agency determined, with little actual analysis, that the kinds of pumping addressed as covered activities in the HCP and Incidental Take Permit were unlikely to adversely impact the Blindcats. The brevity of USFWS's review of potential impacts to these species for which it was actively contemplating listing suggests that the agency considered this outcome obvious and non-controversial. USFWS's Biological and Conference Opinion for this action does not mention Blindcats or other deep aquifer species at all.

USFWS Finding or Decision	Discussion	Available Scientific or Commercial Information on Blindcats or Habitat
	anticipated to impact the deep Edwards Aquifer ecosystem or change the likelihood of exposing deep-water aquatic species to such threats, these species are unlikely to be adversely impacted by the considered alternatives and are not considered further in this DEIS." (emphasis added)	
Unified Agenda and Anticipated Date of Action Spring 2023 – 09/2023 Fall 2022 – 05/2023 Spring 2022 – 05/2023 Fall 2021 – 03/2022 Spring 2021 – 09/2021 Fall 2020 – 09/2021 Spring 2020 – 12/2020	USFWS has included a review of the Blindcats as a planned action on the Unified Agenda of Regulatory and Deregulatory Actions since Spring 2020. The anticipated date of possible action at the proposed rule stage was first identified as December 2020, but was pushed back in subsequent agendas. The current Spring 2023 Unified Agenda anticipated action in September 2023, almost three years after the first published date.	It appears that USFWS began substantive work on a listing rule following publication of the Zara (2020) report released in February 2020. Zara (2020) is a final report summarizing a survey effort for blindcats that sought to replicate the work of Karnei (1978). Using similar, although still variable, sampling methods, Zara (2020) looked for Blindcats at 41 wells between 2008 and 2014, only one of which had been previously sampled by Karnei and none of which were previously known to produce blindcats. Of these 41 wells, Zara detected toothless Blindcats at 3 (each a new known locality for the species) with a range of catch per unit effort among these sites of approximately 68 acre-feet to 425 acre-feet per detection. Zara (2020) increased the number of locations where toothless Blindcats have been recorded from 5 wells to 8 wells. One of these wells was described as a "6 km range extension to the southwest" for the toothless blindcat.

USFWS Finding or Decision	Discussion	Available Scientific or Commercial Information on Blindcats or Habitat
		Diaz (2021) and a subsequent personal communication in 2022 reported continued collection of toothless Blindcat parts from Aldridge 209 Well (one of the Zara-sampled wells) between 2020 and 2022. Zara (2020) did not document any widemouth blindcats during its study. But, notably, Zara (2020) did not sample any of the same locations where this species was previously known to occur. Zara (2020) also notes that species in this deep part of the Edwards Aquifer do not appear to be evenly distributed and only two wells have been known to produce both species. Therefore, the lack of new widemouth blindcat detections in this second set of sampled wells is not evidence that the widemouth blindcat is extinct or even that its population has declined in distribution or abundance.
2023 Warranted 12-month Finding and Proposed Rule to List as Endangered (August 22, 2023; 88 FR 57046)	In the proposed listing rule, USFWS now finds that the previously identified threats of habitat destruction, modification, and curtailment resulting from water drawdown and pollution, and competition from exotic species are not relevant to the Blindcats. Instead, "lethal discharge of the species through groundwater wells" is the sole threat to the species leading them towards extinction.	The technical basis for the proposed listing rule is the USFWS's November 2022 Species Status Assessment. The SSA asserts that Blindcats require conditions free of groundwater pumping to maintain "resilience." The SSA concludes "Well mortality has likely reduced the abundances of both blindcats

USFWS Finding or Decision	Discussion	Available Scientific or Commercial Information on Blindcats or Habitat
	USFWS relies on the catch per unit effort calculations based on the work of Longley and Karnei (1978a, b) and Zara (2020) to estimate "the cumulative loss of thousands of individuals" since groundwater pumping began in the late 19th and early 20th centuries. The USFWS then concludes, without evidence, that this cumulative mortality has likely severely reduced Blindcat populations. This conclusion is not based on comparison to total estimated population size or any evidence of population declines, but instead on inferred changes to Blindcat populations based on a set of assumed, K-selected life history traits. Of note, the USFWS press release announcing the proposed listing rule quotes Michael Warriner, Supervisory Fish and Wildlife Biologist for the Austin Ecological Services Field Office, saying that the Blindcats "are among the rarest fish species in the world." However, Longley and Karnei (1978a, b) interpret their data as indicating a "large" and "very healthy" population of both species. The more recent work of Zara (2020) not only produced catch per unit effort estimates within the range derived from Longley and Karnei (1978a, b), but also expanded the number of known localities and range of documented occurrences of the toothless blindcat. While Zara (2020) did not detect widemouth blindcats in any of its sampling, this	with concomitant effects on demographic structure in the form of lower numbers of sexually mature fish, reduced reproductive output, and diminished recruitment of younger individuals." Further, the SSA speculates that because the widemouth blindcat has not been observed from any well in the last 38 years it "may have may have declined to undetectable numbers or become functionally extinct." The SSA predicts the future condition of these species as trending towards extinction based on continued levels of groundwater use and "**Our hypothetical review of potential losses of individual fish to groundwater wells over time**...." (emphasis added)

USFWS Finding or Decision	Discussion	Available Scientific or Commercial Information on Blindcats or Habitat
	study also did not sample any sites previously known to produce this species. The prior studies demonstrate that not all wells produce Blindcats, and not all wells that produce one species also produce the other. Therefore, the lack of widemouth blindcat detections is not dispositive as to a presumed reduction in distribution or abundance.	

B. Acknowledged but unreconciled uncertainty and data gaps.

The Proposal and SSA identify but do not reconcile the implications of substantial uncertainty and critical data gaps in essentially every element of USFWS's analysis, including: life history traits (e.g., longevity, reproduction, life stages and growth patterns, diet and feeding behavior), habitat needs and use patterns, physical habitat characteristics, population size, population range and distribution, and individual or population responses to change. The use of qualifier terms, such as "might" or "potentially," is extensive in both documents, as summarized in Table 6.

Table 6. A count of the number of times each qualifier term appears in either the SSA or the listing proposal.

Qualifier Term	SSA	Listing Proposal
likely	32	40
may/might/maybe	65	66
could/can	70	37
probable/probably	10	2
potential/potentially	81	34
assume/assumed/assumption	28	10
unknown/not known	17	4
think/thought	5	0
hypothesize/hypothesized/hypothetical	19	2
appear/appeared/appears/apparently	11	8
suggest/suggested/suggests	28	6
suppose/supposition	5	0
presume/presumed/presumably/presumptive	10	3

expect/expected/expects	23	6
postulate	7	1
anticipate/anticipated	3	0
TOTAL	**414**	**219**

Below are several examples from the SSA and Proposal that demonstrate how speculation underlies all aspects of the analysis and conclusions.

- "*However, given their obligate dependence and adaptation to subterranean conditions, the blindcats **likely share broad life history traits in common with similarly adapted fishes**. Where appropriate we apply information from better-studied cavefish species to assessment of blindcat status*." (SSA pg. 6; emphasis added). USFWS makes and applies this assumption to the Blindcats without any evidence of the actual life history traits of the Blindcats or an explanation for why these unrelated species from unrelated environments might be adequate surrogates.

- "*Because the toothless and widemouth blindcats are among the deepest and oldest known subterranean fish species the blindcats **may display more pronounced K-selected traits***." (SSA pg. 44; emphasis added). "*Given their long evolutionary history, the toothless and widemouth blindcats are **likely strongly K-selected and comparable to, if not more sensitive than, most other stygobiont fishes** in their response to increased loss of individuals from populations (Poulson 2001, p. 355).*" (SSA pg. 52; emphasis added). USFWS provides no rationale for why being among the "oldest known subterranean fish species" and having a "long evolutionary history" would result in "likely strongly K-selected" traits and make them more sensitive than other cave fish. Also, USFWS has no information about what habitat conditions for these fish were like were like over geologic history, with very little information about habitat conditions even today.

- "*The toothless and widemouth blindcats **could occur outside of this area**, but until new localities are discovered and verified, **we assume the species are limited to an area** of high hydraulic conductivity, paralleling major groundwater conduits and the Freshwater-Saline Water Interface*." (SSA pg. 29; emphasis added). Here, USFWS declines to adopt speculation about a possibly broader distribution for the species. It fails to adopt this degree of caution for other elements of its analysis.

- "*Because the blindcats are obligately subterranean, we **assume that they follow similar life-history patterns** as other stygobiont fishes with females reproducing at later ages, a small percentage of females producing offspring annually, smaller clutch sizes, and longer lifespans. **Age at first reproduction is assumed to be longer** than that of surface ictalurids (i.e., > 2 years) **and probably similar or longer than** age at reproductive maturity noted for the northern cavefish (i.e., > 6 years) [Niemiller and Poulson 2010, p. 221]. Also, like stygobiont amblyopsids (Niemiller and Poulson 2010, pp. 221–222), Because the blindcats are obligately subterranean, **we assume that only a fraction of female toothless and***

widemouth blindcats produce offspring on an annual basis *(e.g., 3%–13%).* ***Clutch size is likely comparable to the small clutches produced by Noturus species (e.g., < 200 eggs). Adult toothless and widemouth blindcats probably reach significant ages for ictalurids, with maximum ages of multiple decades (e.g., >25 years).*** *The blindcats inhabit a subterranean system that is well-buffered from immediate seasonal changes. However, seasonality of reproduction cannot be dismissed as these fish may respond to periods of high or low groundwater flow in relation to aquifer recharge*." (SSA pg. 35; emphasis added). Not only does USFWS speculate that the Blindcats "likely share broad life history traits," with these other species, as described on page 6 of the SSA, but here USFWS goes so far as to estimate actual values for these traits. The Proposal takes this speculation another step further by stating unequivocally that "*These species have life-history traits that limit reproductive capacity and recruitment, as documented in other cavefish species. These same traits make the blindcats more susceptible to long-lasting population impacts from well mortality losses*." (Proposed listing rule pg. 57056). USFWS actually has no scientific or commercial information documenting any life history trait of either species.

- "*For both species, those researchers* ***assumed that fish were randomly exposed to capture*** *by sampled wells and not clumped due to rate of water flow from those wells (Longley and Karnei 1978a, p. 35; 1978b, pp. 36, 38).*" (SSA pg. 41; emphasis added). As described in more detail below, this assumption is overly simplistic and not likely representative of Blindcat habitat use or exposure to zones of influence from wells in the complex hydrogeologic space of the Edwards Aquifer.

- "*The species' occurrence from multiple wells along a southwest to northeast trending line in Bexar County* ***suggests that the ranges of both species might be relatively continuous.*****"** (SSA pg. 2 and 43; emphasis added). First, the amount of sampling for these species has been very small and wells were not evenly sampled across the San Antonio pool sampled by Karnei (1978) and Zara (2020) in time or space. It is premature to opine on the range of either species with so little data. Other species listed on the basis of presumed "restricted ranges" (e.g., the Bone Cave harvestman) have been later shown to be distributed much more widely than previously believed. Also, there is little information to base an assumption that the two species, which have different morphology and anatomy that suggests different positions in the ecosystem (predator vs detritovore), would use the complex environment of the aquifer in similar ways and to similar (continuous) extents.

- "*The toothless and widemouth blindcats inhabit an interconnected subterranean system that facilitates gene flow across their ranges. As such,* ***we apply the presumption that these two species are sympatric and each exists as singular, interbreeding populations***." (SSA pg. 44; emphasis added) USFWS relies on a "preliminary evaluation" of genetic population structure for another species (a salamander) that uses a "structurally different portion of the aquifer" and a list of citations about other species in different aquifer systems to make this "supposition" about two different blindcat species. USFWS provides no information to link these other species or geographies with either the blindcats or the deep San Antonio pool of the Edwards Aquifer.

- "*As we* ***assume the blindcats have long lifespans, there is an increased likelihood that individuals will encounter the capture zone of an active groundwater well****. Wells operating over several decades, and discharging relatively moderate volumes of groundwater,* ***could result in the loss of over a thousand toothless and several hundred widemouth blindcats per individual well*** *(Table 9)*." (SSA pg. 75; emphasis added). This statement illustrates USFWS's use of speculation in both the assumed lifespan for the Blindcats, for which there is no data; the movements of Blindcats in their habitat, for which there is no data; and the biased and uniform application of the highest estimated CPUE among a range of estimates to imply that some, many, or maybe even most wells may be discharging hundreds or thousands of fish.

C. Compounded assumptions and bias.

USFWS's primary rationale for listing the Blindcats is based on estimates of well mortality and the implications of this estimated past, present, and future mortality on Blindcat abundance over time. At each step, USFWS addresses uncertainty by making assumptions that sit at the most extreme end of the range of possible or probable values. Estimated levels of groundwater well mortality, calculated from the highest value among the wide range of lethal catch per unit effort among 6 Blindcat-producing wells, is deemed significant in the context of an assumed set of K-selected life history traits. Each of the assumed K-selected traits assigned to these Blindcats is assumed to have value at the most strongly K-selected end of the range of values presented for identified surrogate species (i.e., presuming that the Blindcats exhibit traits that are more strongly K-selected than not).

Likewise, USFWS appears to assume that the Blindcats are "among the rarest fish species in the world," based on statements by the Michael Warriner, the primary author of the SSA. This statement demonstrates the agency's bias towards listing, despite the best available data being (at best) inadequate to understand the true size, distribution, or range of these species or (at face value) concluding that populations are healthy and abundant (Longley and Karnei 1978a, b).

On the basis of these compounded assumptions, USFWS reasons that Blindcats are unable to accommodate the estimated level of human-caused mortality. However, no part of this analysis is grounded in clear evidence or robust data.

D. Reliance on speculation.

USFWS instead relies on speculation regarding the biology, life history, habitat, and status of the Blindcats. These life history traits described for the Blindcat species are created out of bits and pieces borrowed from other (often similarly poorly studied) species and habitats.

In the absence of species-specific information on life-history traits, habitat use, biology, behavior, swimming ability, etc., USFWS speculates that pelagic deep-sea fishes and other stygobiont fishes in shallow cave and spring systems are suitable surrogates for Blindcats. However, the literature cited by USFWS does not support these claims. One of the primary citations used (Poulson 2010) provides "…a presentation of retrospective and prospective ideas…" based on the author's experience working with shallow cave species and his "insights" on deep-

sea pelagic species based on the work of others. This article is used extensively throughout the SSA to support the USFWS's opinions on Blindcat ecology and similarities to cavefishes and deep-sea organisms. However, the article does not provide any scientific evidence of similarities between Blindcats, cavefishes, and deep-sea fishes but rather is a reflection on someone's career experiences working with Amblyopsid cavefishes and hypotheses that have come from those experiences. Poulson's article is a useful contribution to science to help guide future work to better understand cave fish ecology but does not meet the standards for best available science that should be used when making listing decisions for Blindcats.

Any comparisons of Blindcats to deep-sea fishes is inappropriate based on the Poulson (2010) article. Poulson clearly states in the article that he is showing how the work and findings of others who research deep-sea organisms have "…influenced my thinking about adaptations to caves among amblyopsid fishes…". Poulson's article is a reflection on a commendable career working on fishes in the Amblyposidae family but does not scientifically demonstrate any relationships between deep-sea fishes and cavefishes, much less any relationship with Blindcats. The article should not be used to suggest that Blindcats are similar to deep-sea fishes.

Comparison of characteristics of fishes from the Amblyopsidae family described in Poulson (2010) and Niemiller and Poulson (2010) to subterranean members of the Ictaluridae family (i.e., the Blindcats) are not appropriate. Poulson (2001) provides ideas and reflections on amblyopsids and does not discuss any similarities between those fishes and blindcats. Amblyopsids are thought to be most closely related to pirate perches and trout perches in the order Percopsiformes (Niemiller and Poulson 2010), while Blindcats are ictalurids in the order Siluriformes. Pirate and trout perches and catfishes have different reproductive strategies, life-history requirements, and habitat preferences. Comparisons of the ecology and life-history of pirate and trout perches and catfishes in surface water systems would not be used to support an ESA listing determination as it would not meet the best available science standard that USFWS must adhere to.

Similarly, comparisons of amblyopsids and subterranean ictalurids should not be made to support listing of the Blindcats. Amblyopsids occupy shallow cave and swamp systems, often with measurable velocities, which are regularly refreshed with detritus and other organic materials from surface flooding (Poulson 2001, Niemiller and Poulson 2010). Several of the amblyopsids even venture outside of cave systems to forage. USFWS recognizes the differences between the two species groups when they state in the SSA: "The environmental stressors that typically affect and influence shallow subterranean systems (e.g., flooding, drying of cave passages/streams, and reduced surface nutrient input) are presumed to not operate, or are muted, at the depths the blindcats occur. The deep artesian zone of the Edwards Aquifer provides a stable nutrient source (i.e., chemolithoautotrophy), consistent water quality (i.e., decades old groundwater), and very attenuated responses to climatic changes (e.g., temperature changes) on the surface." However, USFWS continues to arbitrarily compare the species groups, behaviors, habitats, and life histories despite the recognized differences.

USFWS compares the entrainment of Blindcats in pumped wells to the collection of cavefishes or the commercial harvest of deep-sea fishes to support the following statement in the SSA: "In essence, the capture zones of many groundwater wells may constitute near-permanent population sinks that can result in the mortality of most all blindcat life stages. Loss of immature to adult individuals would constrain population growth through reductions in egg production and recruitment of mature adults. The impact of groundwater well mortality on toothless and widemouth blindcat populations could be substantial." USFWS does not provide any scientific evidence that discrete pumping events in localized areas would be equivalent to or worse than purposeful collection of cavefishes or commercial harvest of marine fishes. Nor does USFWS provide any evidence that entrainment of Blindcats in localized capture zones would create "near-permanent population sinks", lead to "…reductions in egg production and recruitment of mature adults," or result in "substantial" mortality to blindcat populations. These kinds of statements require scientific evidence rather than the speculation and arbitrary determinations of mortality that USFWS has made.

Even under the theory posited by USFWS that some level of mortality does occur from groundwater pumping, there is no evidence presented to demonstrate that the mortality will result in population-level impacts similar to that observed from commercial fishing or result in the sustained levels of mortality described in section 9.2.1 of the SSA where USFWS states that because they "…assume the blindcats have long lifespans, there is an increased likelihood that individuals will encounter the capture zone of an active groundwater well." This assumption results in USFWS determining that groundwater pumping, similar to commercial fishing, will result in continued and long-term removal of the Blindcats from the aquifer. However, USFWS ignored published information that counters their assumption. Poulson (2001) stated that cavefishes "Cannot swim well against fast currents despite well-developed musculature. Their normal musculature allows them to forage in areas of slow current and behaviorally avoid fast currents. I have watched cavefish (*Amblyopsis spelaea*) seek quiet areas under ledges and in back eddies when stream velocities are high during floods and Pearson (personal communication) has seen *Typhlichthys* hide when faced with only subtle increases in stream velocity." The Blindcats may have evolved in a system where areas of high velocity were not encountered or were avoided. Rather than continuous, sustained mortality as described by USFWS, it is equally or more likely that Blindcats behaviorally avoid increased velocities in the capture zones around wells resulting in decreased entrainment of individuals over time rather than the continuous and long-term mortality that USFWS arbitrarily assumed. While we have cautioned the comparison between amblyopsids and Blindcats, USFWS should have considered behavioral avoidance as a possible mechanism for low catch-per-unit effort in some locations rather than assuming that low rates of capture were a result of decreased population size.

Additionally, no consideration is given by USFWS to the fact that the Widemouth species feeds on the Toothless species and their presence in wells could be due to attempted but failed consumption by the Widemouth.

USFWS implies that it knows what conditions are needed by the Blindcats to remain "resilient" over time, including the "absence of groundwater well mortality" based on what it

believes are its strong K-selected life history traits (see "Factors to Maintain Resiliency" on SSA pg. 45; emphasis added):

> Based on these assumptions, populations of the toothless and widemouth blindcats **require the following factors to maintain resiliency** over the long-term:
>
> **Absence of groundwater well mortality**: The blindcats are stygobionts and **may display K-selected life-history traits** (e.g., delayed sexual maturity, lower fecundity, and long-life spans), as documented in other stygobiont fishes, including:
> - Females reproduce at later ages (i.e., > 6 years)
> - Small percentage of females produce offspring annually (i.e., 3%–13%)
> - Small clutch sizes (i.e., < 200 eggs)
> - Long lifespans (i.e., > 25 years)

USFWS continues to rely on these speculated traits – even modifying their prior language of "may display K-selected life-history traits" to a much stronger statement of "given their K-selected life history traits that limit reproductive capacity and recruitment" -- to make its case that the species are being driven towards extinction by groundwater wells (see "Future Scenario Conclusions" on SSA pg. 94):

> It is unlikely that even relatively robust populations of blindcats could indefinitely sustain losses from well mortality given their K-selected life history traits that limit reproductive capacity and recruitment. With ongoing well pumping, we would project that both the toothless and widemouth blindcats will be reduced to such small numbers that these fishes will be at risk of extinction before 2100.

Of note, USFWS does not actually project any population declines for either species using its assumptions about the life history, population size, and range/distribution. There is no analysis of estimated mortality against estimated abundance that considers the population dynamics implied by the assumed life history traits, the known distribution of groundwater wells, and how these wells are operated. The SSA and Proposal simply assume that such declines are occurring.

E. What the actual data says.

The evaluation of Blindcat abundance in the SSA relies on two sets of studies conducted by Karnei (1978) (further documented and analyzed in Longley and Karnei 1978a, b) and by Zara (2020). Both sets of investigations involved filtering well water through netting and standardizing the contents by the volume of water filtered to produce a measure of relative abundance (catch per unit effort [CPUE]).

(i) The probability of detection was extremely low.

While both sets of investigators diligently tried to sample these very difficult-to-access fish communities using the best equipment available for each location, detection probability was low in all cases. Where Blindcats were collected, they required days or weeks of sampling to detect, and the evidence was often microscopic and easy to miss. For example, Zara (2020) describes, "…however, during a site visit [to Jeff Bailey Well] on 30 September 2011, a single bone was retrieved and subsequently identified as belonging to the toothless blindcat. Another sample containing a complete pectoral-fin spine and a small fragment of cleithrum representing the toothless blindcat were collected on 6 October 2011." (page 23). Karnei (1978) describes the damage and destruction of sample contents due to "extreme water pressure" (page 24). Where blindcats were detected, we have evidence of species presence. However, given the extreme difficulty in detecting these species, empty samples cannot be reasonably used to establish species absence.

(ii) The CPUE data are unreliable due to sampling variability

Zara (2020) followed the methodology of Longley and Karnei (1978a, b) to estimate CPUE, intending to compare the results of the two studies. However, inconsistencies in the sampling methodology introduce substantial variability into the results and preclude meaningful comparisons of CPUE between the two studies, among locations, or over time.

- With one exception, none of the same wells were sampled by the two sets of investigators due to changes in access and well operation. The one well sampled by both sets of investigators (i.e., San Antonio Zoo) was never known to have Blindcats. There is no evidence to suggest that the Blindcat populations are evenly distributed throughout the aquifer, so differences in CPUE between two studies surveying different locations cannot be used as evidence of a change in species abundance over time.
- The sampling equipment used varied between studies and among sampling locations. The detection rate using these gear types was not determined, but differences in detection rate would introduce systematic bias into the CPUE estimates.
    - Funnel nets (two types) were used by Longley and Karnei (1978a,b)
    - Net, barrel, in-line, or bottle filters were used by Zara (2020), whichever appeared most effective at an individual well
- The flow sampled varied among wells and over time at the same wells. As described in the SSA (see Figure 22), the capture zone differs based on the rate of pumping, so the amount of habitat sampled varied spatially and temporally. It is also unknown how water volume relates to habitat quantity in the sampled environment and for these Blindcat species.
- In considering these samples representative of the population, the investigators had to assume that there was no "clumping" in the distribution of Blindcats across those habitats. This assumption is unsubstantiated and unlikely.

  - Given differences in the assumed feeding strategies of these species (i.e., predator [widemouth blindcat] versus detrivore [toothless blindcat]), it is reasonable to assume the opposite—that these species use the habitat differently in locations where they co-exist.
  - Where the pumps have been operating a long time (i.e., at all the wells sampled), the fish may have learned to avoid the capture zone, or the capture zone may have been previously depopulated. Thus, fish density within the capture zone may not represent fish density outside the capture zone at that location.

- The number of samples taken at an individual well varied (e.g., the number of samples ranged from 1 to 153 at wells surveyed by Zara 2020]), the timing and duration of sampling varied, and the volume of water filtered varied, resulting in a widely variable survey effort. Where the effort was greater, the investigators had a greater probability of detecting the species given the low detection rates for these species.
- In the calculation of CPUE, all the samples from a well were grouped and standardized by volume of flow filtered. Mathematically, this is a single sample. There is no way to calculate the confidence in this CPUE estimate (e.g., confidence intervals) from a single sample. It is equally impossible to compare two single samples and determine a statistically meaningful difference.
- CPUE may be biased by changes in detection rate resulting from changes in well operation or artesian pressure in the aquifer. The relatively high CPUE at the Artesia #4 well in 1978 may be a product of different well operations in that year. For the entire year of 1978, this well was flowing under artesian conditions, so no pumps were needed to bring the water to the surface. If the pumps were not operating, it is more likely that the fish that came to the surface were intact and more easily detected by surveyors.

(iii) Expansion of the maximum sample CPUE does not produce a reliable measure of potential fatality.

Considering the unreliability of the CPUE results, it is unreasonable to expand the highest CPUE rate measured (by definition, a measure that has been unrepeatable) to 51 wells operating over a 66-year lifetime to estimate potential fatality (see Table 1 in Proposal). The CPUE measured at the Artesia Pump Station is functionally a single sample collected at a single point in time 45 years ago with no associated measures of accuracy or precision.

The SSA was correct when it described the limitations of these hypothetical scenarios of groundwater well mortality: "They do not account for variability in distribution and extent of suitable blindcat habitat, fish abundances by site, well size and discharge capacity, periods of discharge (e.g., intermittent or constant), location of well casing relative to potential habitat, and reporting of discharged volumes. Complete data on those, and other variables, are not available." (USFWS 2022, page 74). These limitations are fatal flaws for meaningful data expansion.

Furthermore, by expanding this single CPUE measure, USFWS is assuming the population of these fishes are evenly distributed over their range. This assumption is disputed by the analysis in Zara (2020), in which the authors conclude, "A community composition analysis of our sample set compared to historical samples collected by Henry Karnei in 1978 yielded no support for the hypothesis of an even distribution of species across the aquifer." (Abstract). This expanded CPUE estimate does not represent a reliable characterization of well mortality upon which to base a listing decision.

(iv) The presence results are consistent for toothless blindcat and inconclusive for widemouth blindcat.

Considering the species presence data, the findings of the two sets of investigators were not substantially different.

- Zara (2020) sampled 41 sites (875 samples) and detected toothless blindcat at 3 of those sites.
- Longley and Karnei (1978a, b) sampled 33 sites (undisclosed number of samples) and detected toothless blindcat at 3 of those sites and widemouth blindcat at 2 of those sites.

Zara's (2020) failure to detect widemouth blindcat may be due to:

- Chance, because they had an extremely low probability of detection;
- Differences in species distribution, because they did not sample in locations where widemouth blindcat were previously documented; or
- Extirpation of widemouth blindcat.

Given no additional evidence, it would be arbitrary to select one of these explanations over another. There is insufficient evidence to evaluate the status of the Blindcats.

F. Aquifer characteristics suggest the Potential Area of Occurrence is larger than described in the SSA.

The area USFWS describes as potentially occupied by the Blindcats has greater aquifer hydraulic conductivity than other portions of Bexar County. But, cave-sized conduit development is present throughout the recharge and confined portions of the Edwards Aquifer. Cave passages are known to occur within the recharge zone (Veni 1985) and major groundwater conduits have been inferred to exist from Medina County, east to northeast through Bexar County, and into Comal County (Worthington 2003, pp. 31-32; Hovorka et al. 2004, pp. 39-42; Lindgren et al. 2004, pp. 19-22). By nature of being a karst aquifer with high hydraulic conductivity values, high well yields, and significant spring outflows, conduits smaller than cave-sized passages (nonetheless adequately sized for potential movement of Blindcats) are present throughout the Edwards Aquifer. Therefore, conduits for Blindcat movement and occupation are present outside the limits of Blindcat habitat

identified in the SSA. The likelihood of intercepting conduits occupied by Blindcats with a well borehole may be less in portions of the aquifer where hydraulic conductivity values are lower. But suitably-sized conduits exist throughout the aquifer and, in the absence of other clear habitat requirements, suggest that potential habitat may occur over a much wider area than currently assumed.

USFWS specifically excluded shallower wells, as they would not produce the species because they do not reach their presumed habitat. This does not however, mean that the species are not there. Rather, it is saying that USFWS (or others) lack the ability to examine the wells for potential abundance of the species in other areas. Including other locations along the "bad water line" in Hays, Comal, Guadalupe and Medina counties as well as those associated with the Uvalde pool. Just because they did not search these locations does not mean that the species is not present.

G. Blindcat capture as a function of up-hole velocities in wells.

Even when a well is drilled within Blindcat habitat and suitably sized conduits are intercepted by the borehole, the chance of a Blindcat entering the borehole and being discharged at the surface is likely to be slim. When a well is not pumped or is not flowing from the well under artesian pressure, no forces would draw blindcats into a borehole. When a well is pumped or allowed to flow freely under artesian pressure, water would enter the borehole through at least one, but possibly many conduits intercepted by the borehole. The velocity at which water would move into the borehole would be a function of the pumping or flowing rate of the well, and the number and diameter of the conduits intercepted by the borehole.

For example, the velocity of water moving up a 12-inch diameter borehole at a pumping rate of 1,000 gallons per minute (gpm) is approximately 3 feet per second (fps). If that flow rate is fed by one, 12-inch diameter conduit or an irregular shaped conduit of the same size, then the flow rate through the conduit would be the same. If multiple conduits are intercepted by the borehole, then the flow rate would be distributed between the conduits and the flow rate through each conduit would be less. The greater the number of conduits intercepted by a borehole, the more diffuse the flow rates through the conduits would be, which would result in a smaller chance of capturing catfish from water flow into a borehole. Conversely, if all of the flow entered the borehole from one conduit smaller than 12-inches in diameter, the flow rate would be greater than 3 fps.

Therefore, it is apparent that depending on the complex and specific configuration of the aquifer at the borehole, Blindcats may or may not be captured by wells even if the wells are drilled through Blindcat habitat. The small number of wells that have been documented to yield Blindcats may be less a reflection of Blindcat abundance or distribution, but rather more of a function the limited chances that a well will ever capture one in a complex environment.

This complexity contributes to the difficulty (or impossibility) of defining the limits of habitat areas, impact areas, the overall volume of the habitat area, and the numbers of Blindcats present within the aquifer. Wells of equal diameter and pumping rates will have different ability to capture Blindcats based on the number and size of conduits intercepted by the well boreholes.

Borehole diameters for potentially active wells within the Immediate Area Analysis Units and Potential Area of Occurrence described in Appendix B of the SSA range in diameter from 5 to 24 inches, with a mean of approximately 12 inches. Reported yields average 2,802 gpm. Therefore, velocities of water moving up through the casing when wells are pumped or allowed to flow under artesian pressure range from 0.02 fps to 13.1 fps, with an average of 4.99 fps. Review of Texas Water Development Board (TWDB) plugging reports reveal 12 of the 80 wells identified in Appendix B have been plugged, which leaves 68 wells within the Potential Area of Occurrence that might remain active.

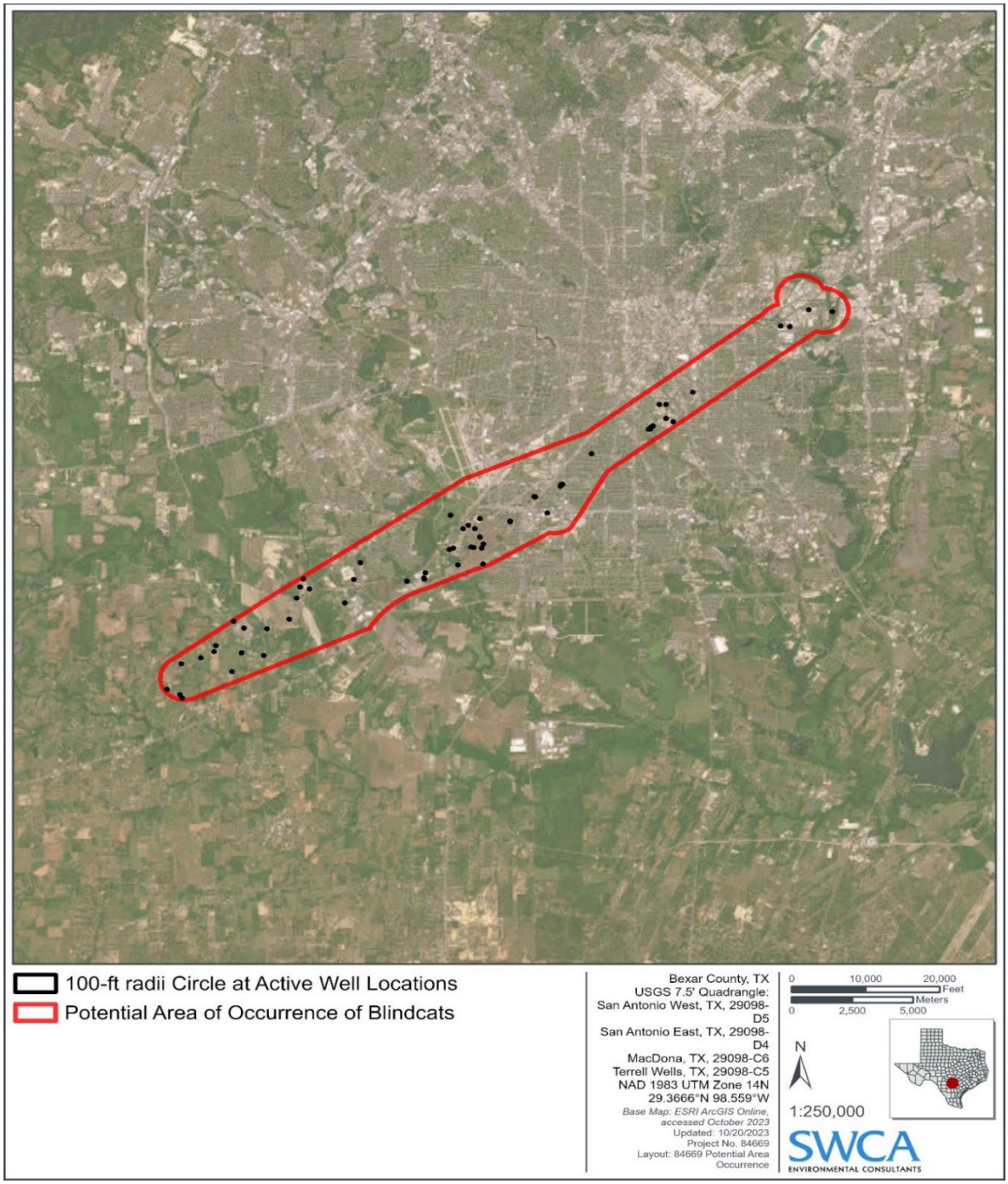
TWDB well reports are available for 6 of the 11 wells with documented Blindcat presence. Four of those wells (ID Nos. 6837508, 6843601, 6843607, 6843802) have yield and casing diameter information. Assuming the lower open hole diameter is the same as the lower casing diameter, the velocities of water moving up through the casing when wells are pumped or allowed to flow under artesian pressure range from 5 fps to 22.7 fps, with an average of 10.7 fps, which is higher than the average of wells within the SSA Potential Area of Occurrence. This suggests that Blindcats may only be captured when up-hole velocities are 5 fps or greater. Only 21 wells within the Potential Area of Occurrence have up-hole velocities greater than 5 fps, based on TWPD well yield and casing or borehole diameter information.

H. Influences of well pumping on Blindcat habitat.

The hydraulic conductivity values for the Edwards Aquifer within the SSA Potential Area of Occurrence ranges from 1,000 to 7,347 ft per day, and the aquifer is roughly 550 feet thick, which equates to a transmissivity range of 550,000 to 4,040,850 cubic feet per day. The storativity value used for aquifer modeling by the USGS (Lindgren 2004) for that area of the aquifer was 8.75 x 10-7. Using a transmissivity value of 2,000 feet per day, a storativity value of 8.75 x 10-7, and a pumping rate of 2,908 gpm, which is the average of wells within the SSA Potential Area of Concern, pumping a well for one full year would be expected to have a drawdown impact of less than 1 feet at a distance of 50 feet from the well. This assumes a homogenous, anisotropic aquifer, which the Edwards karst aquifer is not. However, it still suggests that the distance to which pumping influences water flow within the surrounding aquifer is minimal on average as compared to the size of the Potential Area of Occurrence.

Assuming a 100-foot radius area of influence (i.e., two times the drawdown distance estimated above), the 68 potentially active wells catalogued within the Potential Area of Occurrence in Appendix B of the SSA would collectively influence 49 acres. The total area within the Potential Area of Occurrence is approximately 22,110 acres; therefore, well pumping on average may only affect 0.22 percent of the Potential Area of Occurrence. If the Potential Area of Occurrence is larger than assumed in the SSA, then potential impacts could be less. Figure 9 represents 100-foot radius circles at the locations of the 68 potentially active wells with respect to the Potential Area of Occurrence.

Figure 9. 100-ft radii circles at Potentially Active Well Locations within the SSA Potential Area of Occurrence



I. Well construction as it relates to Blindcat impacts.

Water wells drilled within the artesian zone of the Edwards Aquifer are drilled through hundreds of feet of rock overlying the aquifer itself. Casing is set from the land surface down through the overlying rock and into the top of the aquifer. After the casing is set, the borehole is drilled through the aquifer rock (Edwards Group) until adequate water yield is achieved or the bottom of the aquifer is reached. Because of artesian pressure, water levels rise up to levels near the land surface or in some places flow above the land surface. For that reason, pump impellers

are set at shallow depths near the land surface, and do not need to be set deep. None of the wells drilled within the Immediate Area Analysis Units and Potential Area of Occurrence included in Appendix B of the SSA (SSA 2022) have pump impellers set down below the casing within the open hole portion of the wells. Therefore, in order for a Blindcat reach pump impellers, it would need to enter the well borehole down within the aquifer and rise up hundreds of feet to the pump impellers.

Many wells drilled into the aquifer are not drilled through the entire thickness of the aquifer, as demonstrated by the construction information (TWDB 2023) for wells included in Appendix B of the SSA (SSA 2022). Because many wells drilled into the aquifer do not fully penetrate the aquifer, it is possible the lateral extent of habitat has been underestimated because the Blindcats are present in deeper portions of the aquifer lower than the wells have reached.

J. SAWS has been a robust partner in regional efforts to conserve the Edwards Aquifer.

SAWS has engaged in numerous efforts to manage and conserve the Edwards Aquifer. USFWS acknowledges the conservation value of some of these efforts, but not all. Nor does USFWS consider at all how these conservation measures contribute positively to the resiliency of Blindcat populations, despite speculating about aspects of analysis that might suggest lower resiliency.

(i) Well Capping Efforts

The City of San Antonio and SAWS have proactively addressed wasteful water use activities, the most significant being an artesian well on the Living Waters Artesian Springs Catfish Farm, which was capable of producing about 45 million gallons of water per day from the Edwards Aquifer -- enough water to serve 250,000 people. This well was developed prior to creation of the Edwards Aquifer Authority, and due to state right of capture laws, well owners could assert the right to as much water as they could produce from a well on their property. To terminate this egregious waste, SAWS bought out the landowner and permanently capped the well in 2018 (San Antonio Express News 2018). It is not known if Blindcats were ever discharged through this highly productive well. But, capping this well removed a significant use of groundwater from the San Antonio pool under artesian pressure.

(ii) SAWS Abandoned Well Program

Abandoned water wells are wells in deteriorated condition which may pose a threat to Edwards Aquifer water quality by providing a direct conduit for contaminants to reach the water supply. Abandoned artesian wells may also waste large amounts of water. The SAWS Groundwater Resource Protection Division is aggressive in its pursuit of identifying abandoned wells and closing them. Through the SAWS Abandoned Well Program, SAWS routinely oversees the plugging of approximately 70 abandoned wells per year (SAWS 2023a).

(iii) Edwards Aquifer Habitat Conservation Plan (EAHCP)

The City of San Antonio, through SAWS, is a permittee under the EAHCP, and the SAWS ASR program is considered a spring-flow conservation measure within the EAHCP to maintain desired flow at the San Marcos and Comal Springs. The EAHCP also includes critical period/drought management triggers based on levels measured in the J-17 Bexar Index Well. The Stage 1 critical period/drought management trigger in the San Antonio pool requires Edwards Aquifer groundwater withdrawal permit holders withdrawing from the San Antonio Pool to reduce their annual authorized amount by 20 percent. The Stage 2 critical period/drought management trigger requires 30 percent reductions for users of the San Antonio Pool. SAWS implements water use restrictions for its customers based on Edwards Aquifer levels and drought management triggers, and both year-round watering rules and drought management restrictions are encoded in San Antonio city ordinance, last updated in 2014.

Another SAWS/EAA conservation measure within the EAHCP is the Voluntary Irrigation Suspension Program Option (VISPO). VISPO is an irrigation suspension program that provides compensation for irrigation permit holders and pays an additional suspension rate in years where irrigation suspension is required (based on J-17 Index Well levels). The VISPO enrollment goal is 41,795 acre-feet of irrigation water (EAA 2023).

As stated in the Proposal, "The voluntary minimization and mitigation measures of the plan are based on maintaining sufficient minimum flows at Comal Spring and San Marcos Spring to sustain listed species during a reoccurrence of prolonged drought conditions (National Research Council 2015, pp. 32–36; National Academies of Sciences, Engineering, and Medicine 2018, pp.67–68; Service 2022, p. 64). A review of the Edwards Aquifer Habitat Conservation Plan suggests that flow protection measures, including groundwater modeling efforts, appear to be effective in meeting flow requirements of covered species (National Academies of Sciences, Engineering, and Medicine 2018, pp. 7–8, 109, 152). Additionally, volumes of groundwater pumped from the San Antonio segment of the Edwards Aquifer have decreased since 2008 (Service 2022, pp. 64–65)." Also as stated in the Proposal, "The toothless blindcat and widemouth blindcat are not included in the habitat conservation plan because the plan's actions are most applicable to spring-dwelling species that inhabit upper portions of the Edwards Aquifer (RECON Environmental, Inc., pp. 1–9). However, protection of sustained flow at the Comal Spring and San Marcos Spring systems does provide overarching protection for species that inhabit deep portions of the San Antonio segment. Persistence of surface discharge at those spring systems suggests that deeper levels of the aquifer have not been appreciably reduced and remain water-saturated (Maclay 1995, pp. 48, 52; Lindgren et al. 2004, 40–41,45)."

While USFWS has determined that habitat loss is not a threat to the species (i.e., the deep aquifer remains saturated and not at risk for depletion), the groundwater reduction measures of the EAHCP also reduce the risk of well mortality. USFWS does not consider how reduced pumping has improved the likely resiliency of the Blindcats over time.

(iv) SAWS Water Conservation and Water Supply Diversification

Because of San Antonio's long-standing commitment and investment in water conservation and infrastructure improvements, SAWS' total per capita water consumption has decreased

significantly from 225 gallons per capita per day (GPCD) in 1982 to 117 GPCD in 2016, and 111 GPCD in 2021, which has resulted in approximately 3.2 million acre-feet of cumulative savings. SAWS has successfully cultivated a very strong local ethic of water conservation and has invested in infrastructure to effectively reduce GPCD water use by approximately 50 percent between 1982 and 2016, all while SAWS' service area population grew by approximately 150 percent (SAWS 2017).

Since the early 2000s, SAWS implemented a robust water supply diversification program which has decreased reliance on the Edwards Aquifer (SAWS 2023). Current non-Edwards Aquifer sources are:

- Trinity Aquifer
- Carrizo Aquifer
    - Local Carrizo Project
    - Regional Carrizo Project
        - Schertz-Seguin Local Government Corporation
        - Buckhorn well field
    - Canyon Regional Water Authority Wells Ranch Project
- Simsboro Aquifer
    - Vista Ridge Project (includes both Carrizo and Simsboro water)
- Wilcox Aquifer
    - Brackish Groundwater Desalination
- Canyon Lake
- Lake Dunlap
- Recycled Water Program (initiated in 1996, up to 25,000 ac-ft per year) + recycled water used for electrical generation.

In addition to the non-Edwards Aquifer sources, the ASR program described above enables storage of excess Edwards Aquifer water during wetter periods. This program began production in 2004 and has a planned total storage capacity of 200,000 ac-ft (SAWS 2023b).

Water conservation continues to be a strategy for long-term water supply. New water conservation investments are projected to result in approximately 4.3 million acre-feet of cumulative water savings by 2070 and will replace the need for approximately 132,000 acre-feet per year of new water projects (SAWS 2017).

To summarize the impact of SAWS investment in water conservation and water supply improvements, in 2000, approximately 70% of the SAWS water supply was from the Edwards Aquifer. In 2022, the proportion of SAWS water supply from the Edwards Aquifer comprised 47% of the SAWS water supply (SAWS 2023b) and is planned to continue to drop to 31% by 2070 (SAWS 2017).

K. Water Loss Program

As described in the SAWS 2019 5-Year Water Conservation Plan, the SAWS water loss control strategy includes conducting annual water loss audits to compile and analyze metering data to determine the most effective investments in technology, infrastructure improvements, and maintenance measures to control water loss (SAWS 2019). Strategies include proactive leak detection, loss testing, water main repair and replacement, and implementation of enhanced metering options.

IV. Conclusion

The Proposal relies on the cumulative effect of compounding assumptions, estimates, and hypotheticals to derive a determination that only seeks to interpret each potential variable in a manner that overemphasizes highly speculative harm at every turn. This bias leads to a conclusion and recommendation for listing that is unsupported by the scientific record and is in contravention of the legal principles applicable to this type of agency action. Respectfully, for the foregoing reasons, the Proposal fails in all respects and should be withdrawn. Should you have any questions about the information included in this document, please contact me by email at Edward.Guzman@saws.org or by phone (210) 233-3858.

Sincerely,

SAN ANTONIO WATER SYSTEM

Edward F. Guzman
Vice President
Environmental Law & Regulatory Compliance

Encl. Attachment A – Letter Request for Extension dated October 12, 2023

Attachment B – Additional References

cc: Martha Williams - *Via E-mail: martha_williams@fws.gov*
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ATTACHMENT A

REQUEST FOR EXTENSION

Edward F. Guzman
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October 12, 2023

Martha Williams
Director, U.S. Fish and Wildlife Service
Department of the Interior
1849 C Street, NW - MIB Rm 3148
Washington, DC 20240

Via E-mail and regular mail:
martha_williams@fws.gov

RE: Request for 90-day Extension of Comment Period for Proposed Listing of the Widemouth Blindcat and Toothless Blindcat cavefish species under the Endangered Species Act of 1973 (Docket No. FWS-R2-ES-2023-0069)

Director Williams,

The San Antonio Water System (SAWS) is an agency of the City of San Antonio, and thus a government entity, and a public water system providing vital services to over two million people. SAWS is significantly concerned about the proposed listing of the widemouth and toothless blindcat species as well as the United States Fish and Wildlife Service's (the "Service") recent Species Status Assessment of these species. The proposed listing has the potential to impact vital components of the SAWS system and its customers, as well as jeopardize the renewal process of the currently existing Edwards Aquifer Habitat Conservation Plan (the "EAHCP"). The EAHCP is a nationally recognized award-winning habitat conservation plan approved by the Service as a regional plan to ensure the protection of eight federally listed endangered species and three non-listed species associated with the Edwards Aquifer while helping to ensure its stability as a regional water supply and critical river flows. As a member of both the EAHCP Stakeholder and Implementing Committees, SAWS actively participates in regional planning and efforts to support and protect the species and the Edwards Aquifer.

As you may be aware, upon our learning of the proposal, we moved as quickly as we could, and in coordination with the Edwards Aquifer Authority, reached out to the Service in a meeting on September 27th. This proactive approach is reflective of our long history of working with the Service towards the conservation of rare species. We are proud to have been a good and diligent partner in that regard. Included among our efforts are the following:

- SAWS is a signatory to the Edwards Aquifer Habitat Conservation Plan and SAWS' Aquifer Storage and Recovery system is a central conservation element of that plan by storing Edwards Aquifer water for use during times of forbearance triggered by certain drought conditions.
- SAWS has sponsored numerous nationally recognized water conservation strategies and municipal regulations and such strategies and water savings are memorialized in the SAWS Water Management Plan, as well as the state water plan.
- SAWS water supply diversification efforts include 7 other supplies outside of the Edwards Aquifer, including the largest water public-private partnership in the Vista

Ridge Pipeline to bring large amounts of non-Edwards Aquifer water to the region and that project itself underwent consultation with the Service under the ESA.

- SAWS also obtained from USFWS an incidental take permit for its Anderson/Micron water transmission main and provided as mitigation over 57.5 acres of high quality karst invertebrate habitat.
- SAWS has also committed to dedicating 50,000 acre feet of privately-owned groundwater based wastewater effluent for environmental flow purposes in the Guadalupe and San Antonio river basins through efforts to obtain a bed and banks permit for SAWS' discharged wastewater effluent.

All of these efforts have been undertaken over many years and cost billions of dollars, which cost is ultimately borne by SAWS' customers.

The proposed listing focuses on the pumping of groundwater in Bexar County, Texas, but fails to take into account the complexity of the SAWS system and its critical role in the Edward Aquifer Habitat Conservation Plan. Specifically, the assessment of potential impacts of the proposed listing is a serious undertaking considering the SAWS system is one of the most complex and decentralized systems in the nation, with an infrastructure that is not interconnected throughout the system. Further, coordination and collaboration with our partners in the Edwards Aquifer Habitat Conservation Plan is vital as this proposed listing comes at a time when the EAHCP is beginning its renewal process. As proposed, the proposed listing of the widemouth and toothless blindcat species reaches beyond its referenced geographic limits and instead impacts regional entities and stakeholders.

SAWS had no notification of if or when such a proposal might be published, and we note that as a 12-month finding it is approximately 13 years past the statutory deadline triggered by the 2009 positive 90-day finding. Given the potential significance of the proposed listing of the widemouth and toothless blindcat species and the fact that it could adversely affect SAWS' absolutely critical health and safety service to residents and businesses of the 7th largest city in the United States and 2nd largest in Texas, the provision of potable water to military bases and installations, the production of electricity in a fragile Texas power grid, and undermine the already existing and widely successful EAHCP, SAWS assumes the Service would be quite willing to extend the comment period to afford an adequate amount of time to allow SAWS to fully develop and submit thorough and meaningful comments regarding the proposed listing of the widemouth and toothless blindcat species.

Finally, the lack of information on the widemouth and toothless blindcat species habitat has caused SAWS to evaluate whether there are technologies that can be brought to bear to allow the Service or other entities to gather tangible and credible information on the species and their habitat. This pursuit has become all the more necessary in light of the fact that our analysis to date reveals significant disagreement regarding the sufficiency and accuracy of the scientific data upon which the proposed listing is based. If an extension of the comment period is granted, SAWS intends to undertake a robust assessment of what technologies may be available and their suitability and effectiveness for these purposes.

SAWS is confident that the Service can appreciate that it is time-consuming to organize our relevant staff expertise, review, and analyze the thousands of pages of information contained in the proposal, the prior regulatory and status assessing actions, the Species Status Assessment, the peer reviews, and the scientific literature. In addition to organizing and engaging SAWS' own staff that must now focus on this rather than their full-time jobs providing for the health and safety of the community, the unusual and specific nature of the proposal required SAWS to retain qualified consulting experts for assistance. As a government entity, this process takes time and careful consideration.

Based on the above, SAWS believes that a 90-day extension of the comment period for this proposed listing of the widemouth and toothless blindcats that is currently scheduled to close on October 23, 2023 is fair and reasonable. Additionally, as stated above, based upon our analysis to date, we are certain there is substantial disagreement regarding the sufficiency or accuracy of the scientific data, and we therefore urge the Service to extend its one-year deadline for final action on the proposal for a period of 6 months.

Sincerely,

SAN ANTONIO WATER SYSTEM

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ATTACHMENT B

ADDITIONAL REFERENCES

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