MANAGEMENT OF THE EDWARDS AQUIFER; A WORK IN PROGRESS

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Abstract

The Edwards Aquifer (Balcones Fault Zone) constitutes almost the entire source of water supply for San Antonio, Texas. The Aquifer contributes surface water flow in the Guadalupe River through Comal and San Marcos Springs, both of which are home to endangered aquatic species, including the fountain darter. Spring discharge also contributes to flow to fulfill water rights on the Guadalupe River, as well as providing the basis for a portion of the plan developed by the South Central Texas Regional Planning Group. In 1993, the late U.S. District Judge Lucius Bunton ruled that the Secretary of Interior had allowed takings of species under the Endangered Species Act (ESA) by not insuring adequate discharge from the Springs. Later in 1993, the 73rd Texas Legislature responded to a court-mandated deadline to protect spring discharge by establishing the Edwards Aquifer Authority (EAA) to regulate groundwater withdrawals. Since the EAA began functioning in 1996, some of the issues that inspired the initial Aquifer litigation have been addressed. However, the most significant issues remain, including the total limit on pumping, reductions during critical periods, and an ESA Incidental Take Permit.

Early Mention of Pumping Limits

On Tuesday, January 10, 1956, in the "San Antonio Express", the then General Manager of the City Water Board (predecessor agency to the San Antonio Water System, SAWS) wrote "in 10 years San Antonio may well face a major catastrophe which could destroy its entire economy. . . . San Antonio's present water supply, in the Edwards limestone . . can no longer be depended upon to meet the continuous increase in water usage, . . . San Antonio's great hope for preventing a water crisis in the years immediately ahead is the planned Canyon Dam and Reservoir . . . on the Guadalupe." (p. 2c) That possible solution has long since evaporated.

The first statewide water plan, A Plan for Meeting the 1980 Water Requirements of Texas, predicted, "assuming that future water levels will not be drawn lower than those which occurred in 1956 [during the drought of record], and also projecting the increased irrigation pumping in Bexar, Medina, Uvalde and Kinney counties, it appears that only about 75,000 to 100,000 acre-feet will remain available to the city of San Antonio annually from the Edwards limestone (fault zone) under 1980 conditions. It is thus expected that, in order to meet the 1980 municipal and industrial water requirements, it will be necessary for San Antonio to obtain surface water supplies." [May, 1961, Texas

Board of Water Engineers (one of the predecessor agencies to the Texas Commission on Environmental Quality, TCEQ), p. 152] Water use from the Edwards in 1957 totaled 208,300 acre-feet: in the Guadalupe River Basin, 8,200; in the San Antonio River Basin, 170,000; and in the Nueces River Basin, 30,000. (Ibid., "Appendix C, Tabulations of Groundwater Information," pp. 197-198.) "Supplying a part of the San Antonio requirements from the Guadalupe River Basin may be within a cooperative endeavor which would give consideration to: (1) recognition that the Guadalupe River Basin is not a basin of surplus water on a long-range basis; (2) recognition of interim needs below the confluence of the Guadalupe and San Antonio Rivers and the permanent needs of the Guadalupe River Basin above the confluence; and (3) provisions that any transfers from the Guadalupe River to San Antonio will be replaced from the San Antonio River when needed in the lower reaches of the Guadalupe." (Ibid, p. 146)

The year 1968 saw completion of the first 50-year plan, The Texas Water Plan which states: "On the basis of studies of historical rates of recharge and the storage capacity and hydraulic characteristics of the Edwards (Balcones Fault Zone) Aquifer, it has been estimated that the pumpage would not exceed approximately 400 thousand acre-feet annually if water levels in the aquifer are to recover following dry periods and the safe yield of the aquifer is to be maintained. However, studies performed thus far indicate that pumpage at this rate would eliminate flow from both Comal and San Marcos Springs part of the time. If adequate minimum springflows are to be insured in the future, these studies indicate that pumpage from the aquifer in the San Antonio area would have to be reduced somewhat below 400 thousand acre-feet annually. Maintenance of some springflows, which provide a part of downstream surface water supplies and enhance the natural waste-assimilative capacities of streams, as well as enhance the scenic, cultural, and recreational value of the area, is considered to be desirable by the Board [Texas Water Development Board, TWDB]. Much additional study, including mathematical and possible hydraulic modeling techniques, will be required to determine more precisely the optimum rate of pumpage and corresponding maintenance of springflow from the Edwards (Balcones Fault Zone) Aquifer." (Texas Water Development Board, November 1968, Vol. I, p. I-15)

Volume of Water Storage in the Edwards

Some in San Antonio who believe the city should be allowed unrestricted pumping from the Edwards repeatedly publicize a statement in a 1996 2-page USGS (United States Geological Survey) "information sheet" titled "Groundwater storage in the Edwards Aquifer, San Antonio Area, Texas": "The average saturated thickness [of the Aquifer] is about 500 feet (ft) for the confined part and 150 ft for the unconfined part. The effective porosity generally ranges from 2 to 14 percent; 6 percent is considered to be average. Using these numbers, the total volume of circulating freshwater in the Edwards Aquifer is about 45 million acre-ft – 38 million acre-ft in the confined part and 7 million acre-ft in the unconfined part. However, much of this water is at depths exceeding current economic limitations." (September 1996, p. 1)

They conveniently ignore a further elaboration in the same document. “Estimates of volumes of water stored above the out-lets of Comal and San Marcos Springs probably are conservative. When comparing the volume of storage above the Comal Springs outlet (at mean discharge) with the total volume of freshwater in the Edwards aquifer (45 million acre-ft), it is apparent that only a small part of the aquifer has been subjected to draining and filling because of changes in ground-water levels. If the storage above the outlet at Comal Springs is equal to the estimated 1.12 million acre-ft, and the volume of water released from storage is equivalent to 30,000 acre-ft/ft at the observation well (AY-68-37-Z03), [also known as J-17], then a long-term drop in water level of about 37 ft at the well during a period of no recharge and no pumpage would be representative of storage depletion that supplied the springflow to Comal Springs.” (Ibid, p. 2)

Recharge and Discharge (Springflows and Pumping from Wells)

The USGS has estimated recharge and discharge (which includes pumped amounts) for the Edwards Aquifer for a data span originating in 1934. Through 1995, they reported in part as follows:

“ The estimated annual recharge for 1995 is 531,300 acre-feet (acre-ft). The estimated annual recharge for 1934-95 ranges from 43,700 acre-ft in 1956 to 2,486,000 acre-ft in 1992. the average and median estimated annual recharge for 1934-95 are 647,200 and 547,100 acre-ft, respectively. . . .

“ The estimated annual discharge from wells and springs during 1995 is 761,000 acre-ft. The estimated annual discharge from wells and springs during 1934-95 ranges from 388,800 acre-ft in 1955 to 1,130,000 acre-ft in 1992. The average and median estimated annual discharge from wells and springs for 1934-95 are 657,400 acre-ft and 618,200 acre-ft, respectively.

“ In 1995, well discharge accounted for approximately 52 percent of the estimated annual discharge. The 1934-95 estimated annual discharge from wells ranges from 101,900 acre-ft in 1934 to 542,400 acre-ft in 1989. The percentage of 1995 well discharge by county is as follows: Bexar, 67 percent; Uvalde, 16 percent; Medina, 9 percent; Comal, 4 percent; Hays, 3 percent; and Kinney, less than 1 percent. Approximately 24 percent of the well discharge in 1995 was used for irrigation.

“San Marcos and Comal Springs discharge accounted for about 87 percent (315,100 acre-ft) of springflow during 1995. The remaining spring discharge was from Hueco Springs in Comal County, San Antonio and San Pedro Springs in Bexar County, and Leona River Springs in Uvalde County. Discharge from Leona River Springs includes underflow from the Edwards aquifer into gravels of the Leona Formation along the stream. The 1934-95 estimated annual discharge from springs ranged from 69,800 acre-ft in 1956 to 802,800 acre-ft in 1992; the average for the period is 365,800 acre-ft and the median is 372,600 acre-ft. (“Recharge to and Discharge from the Edwards Aquifer in the San Antonio Area, Texas, 1995, “Open-File Report 96-181,” April 1996, p. 2)

With the average annual recharge for 1934-1995, 647,200 acre feet, exceeded by the average annual discharge, 657,400, for the same period, the likelihood of periodic low flow, or even no flow, at Comal Springs is almost certain. Thus it is the flow at the Springs which becomes the focus of competing claims.

Continued Evolution of Pumping Limits

In the1984 Water for Texas, "A Comprehensive Plan for the Future," the Texas Water Development Board included "285.1 thousand acre feet from the Edwards, Balcones Fault Zone, Aquifer" as water supply available in the San Antonio River Basin for the year 2030, "01.7 thousand acre feet from the" same source in the Nueces River Basin, and "38.2 thousand acre feet from the" Aquifer in the Guadalupe River Basin. (Technical Appendix, Vol. 2, November 1984, Texas Department of Water Resources, GP-4-1, p. III-18-10, Guadalupe; p. III-21-9, San Antonio; and p. III-19-8, Nueces) The total included in the Plan from the Edwards Aquifer for the year 2030 was 425,000 acre feet. Additional water requirements in these River Basins were to be supplied from other aquifers or surface water sources.

Abbreviated water plans published in 1990 (Water for Texas Today and Tomorrow, Texas Water Development Board, December 1990, Document No. GP-5-199) and 1992 (Water for Texas Today and Tomorrow, Texas Water Development Board, December 1992, Document No. GP 6-1) contain no additional explicit information about the quantity of water to be pumped from the Edwards.

During the litigation, Sierra Club, et al. v. Babbitt et al., The Texas Water Commission (TWC) (one of the predecessor agencies to the TCEQ), prepared an interim plan to reduce pumping intended to satisfy the Endangered Species Act (ESA) as administered by the U.S. Fish and Wildlife Service (USFWS). The Interim Plan provided, in part, as follows:

"4.0 Spring Flow Maintenance Criteria

"The Commission proposes that a ten year interim management plan provide for the maintenance of water levels in the San Antonio Pool of the Edwards Aquifer at or above 632 feet mean sea level (msl), as measured at the J-17 index well in Bexar county. This aquifer level correlates to a spring flow of approximately 100 cubic feet per second (cfs) at Comal Springs. The Commission believes that a flow of 100 cfs at Comal Springs provides a reasonable degree of protection for aquatic ecosystems, recreation and tourism, and surface water rights downstream of the springs for the short-term.

"The Commission recognizes, however, that the proposed spring flow maintenance criteria cannot be assured 100 percent of the time in the event that a severe drought occurs. To guarantee any level of flow at Comal Springs 100 percent of the time would require that average withdrawals from the aquifer be reduced to less than 200,000 acre-feet per year, which is neither realistic nor reasonable in the near-term. The Commission therefore proposes that water levels in the San Antonio Pool be maintained at 632 feet in

the J-17 well at least 80 percent of the time as determined by hydrologic simulations using the 1959-1989 period-of-record. This interim criteria would require that annual withdrawals be reduced to approximately 400,000 acre-feet, unless hydrologic conditions make greater pumpage levels possible. . . .

"It should also be emphasized that the proposed spring flow maintenance criteria is an interim objective that should be replaced by a higher standard in a long-range water management plan for the region. That standard should provide for either greater minimum spring flow or a higher degree of spring flow reliability or some combination of the two. Definition of such a standard should be based on the best scientific judgement (sic) as to the flows that are necessary to protect endangered species." ("Avoiding Disaster: An Interim Plan to Manage the Edwards Aquifer," Texas Water Commission, February 18, 1992, Rev. Feb. 19, 1992, pp. 5-6)

The USFWS responded:

". . . . To ensure compliance with the Endangered Species Act and address the possibility for 'takings' of endangered species, we recommend that the State of Texas, or an appropriate regional management agency, apply for an incidental take permit from the Service. The Habitat Conservation Plan (HCP) that would accompany such an application, should be designed to address the potential for lawful 'incidental takings' of endangered species. Based on Current data, the following provisions would be required as part of the HCP:

"* Initially, direct pumpage from the Aquifer is to be limited, in the aggregate, to no more than 450,000 acre-feet per calendar year.

"* Within 10 years, direct pumpage from the Aquifer shall be reduced by 50,000 acre-feet to 400,000 acre-feet per calendar year.

"* In order to protect flows at San Marcos and Comal Springs, special drought management plan must be developed and implemented during extreme drought. Specifically, the drought management plan must reduce direct pumpage from the Aquifer to a rate of 350,000 acre-feet per year at any time the water level in the J-17 index well in Bexar county falls below 625 feet msl [mean sea level].

"* TWC may allow additional withdrawals of "interruptible" (or surplus) water supplies when levels at the J-17 index well are above 665 feet msl. However, such withdrawals should be limited to 88,000 acre-feet to assure that spring flows are not adversely affected during critical drought conditions. Also, allocations of such interruptible water supply should provide for the diversion of at least one-half of the water downstream of the springs and associated critical habitat areas, rather than directly from the aquifer.

"* All wells used for domestic and livestock purposes should be registered with TWC, or an appropriate regional management agency, to enable the monitoring of their cumulative impact of the Aquifer.

"* Maintain moratorium on new wells until the State or local rules go into effect.

"* The Section 10(a) permit length would be 20 years or less." (Letter, U. S Department of the Interior, Fish and Wildlife Service, to Chairman, Texas Water Commission, August 19, 1992, pp. 1-2)

The USFWS noted, "We understand that a cooperative report between the U. S. Geological Survey and the Edwards Underground Water District estimates that the unmetered domestic water use is at least 40,000 acre-feet per year. A program should be started to outfit all wells, domestic and agricultural, with meters. All homes supplied with water by City and private water companies should be required to be metered.." (Ibid., p. 4, emphasis in the original)

The late Judge Bunton in an Amended Judgment entered May 26, 1993, in Sierra Club et al. v. Babbitt et al., repeated an earlier order that plaintiffs "may seek appropriate relief from the Court *after* May 31, 1993, the last day of the current regular session of the Texas Legislature, if *the State of Texas* does not have in effect at such time, pursuant to new or existing State law, a regulatory system pursuant to which withdrawals from the Edwards Aquifer can and will be limited to whatever extent may be required to avoid unlawful takings of listed species, any appreciable diminution of the value of critical habitat for the survival and recovery of any listed species, even in a repeat of the drought of record." (p. 6, italicized in the original.) At the same time, he filed extensive Amended Findings of Fact and Conclusions of Law, which reflect the reasoning behind his decisions. Note that the Court expected the "regulatory system" to protect the species "even in a repeat of the drought of record."

Judge Bunton commented on the litigation in his memoirs while parts of it were still pending:

"In the finding I expressly stated that the solution should be by the state rather than the federal government. . . .

"I do think it ought to be stated, however, that there does need to be some long-range planning by the people in San Antonio. This beautiful city has about two million residents. They get all of their water for drinking, watering lawns, washing cars, and whatever from the Edwards Aquifer. Not one drop of water is supplied by a lake or a river. It all comes from the aquifer, and, as a consequence, San Antonio has the cheapest water of any major city in the United States. . . .

"To the west of San Antonio are the farmers in Medina and Uvalde Counties. They want absolutely no restrictions on their pumping either because they need the water from the Edwards Aquifer to grow their crops and water their livestock.

"Somewhere down the line, there is going to have to be a plan that will allow San Antonio to gather water from some dam or river and use part of that water in lieu of pumping every drop they use from the aquifer. The citizens of San Antonio haven't been overly fond, however, of spending any money to get this done. They have turned down two reservoirs and refused to contribute part of the cost of building Canyon Lake. [Actually, they turned down Apple white twice, rather than two different reservoirs.] I guess somebody in San Antonio is going to have to become a real leader and explain to the people that the aquifer has to be controlled if all are to live in the area that covers the aquifer. There just isn't an unlimited source of fresh water, . . .

"I sincerely hope the Edwards Aquifer Authority is able to do something positive about conserving the water. I certainly never intended, nor do I intend now, to become czar of the Edwards Aquifer. . . . " (A Bit of Bunton, "Memoirs by Lucius Bunton, III," 1999, published by the author, p.311)

Comal and San Marcos Minimum Springflows to Protect Species

Judge Bunton had earlier ordered the USFWS to file with the Court an interim determination of the minimum spring flows essential to the survival and recovery of the protected species, "using its best professional judgment." That agency complied on June 15, 1993. ("Notice of Filing of Springflow Determinations Regarding Survival and Recovery and Critical Habitat of Endangered and Threatened Species," 10 pages.) For the purposes of this discussion, only the flow requirements to prevent "take" of the fountain darter at Comal Springs, 200 cfs and to prevent "jeopardy," 150 cfs, will be utilized here. If these volumes are maintained, the assumption is that similar, but lower, volumes for other threatened and endangered species in both Comal and San Marcos Springs will be adequately maintained.

[A full discussion of the Edwards litigation can be found in Votteler, Todd Hayden, Water from a Stone, The Limits of the Sustainable Development of the Texas Edwards Aquifer, Dissertation, Southwest Texas State University (now Texas State University), San Marcos Texas, February, 2000; Votteler, Todd H. "The Little Fish that Roared, The Endangered Species Act, State Groundwater Law, and Private Property Rights Collide over the Texas Edwards Aquifer", Environmental Law, Northwestern School of Law of Lewis and Clark College, Portland, Oregon, Vol. 28, p. 845, 1998, and Votteler, Todd H., "Raiders of the Lost Aquifer: or, The Beginning of the end to Fifty Year of Conflict over the Texas Edwards Aquifer," Tulane Environmental Law Journal, Volume15, Summer 2002, Issue 2, p. 257) See also Albritton, Eric M., "Comment, The Endangered Species Act: The Fountain Darter Teaches what the Snail Darter Failed to Teach," 21 Ecology Law L. Q. 1007, (1994); and Miles, Matthew Carson Cottingham, "Water Wars: A Discussion of the Edwards Aquifer Water Crisis," 6 South Carolina Environmental Law Journal, 213, (Fall 1997)]

Statutory Pumping Limits

Pumping limits for the Edwards Aquifer prescribed in S. B. 1477, l993, are explicit:

"(b) Except as provided by Subsections (d), (f), and (h) of this section and Section 1.26 of this article, for the period ending December 31, 2007, the amount of permitted withdrawals from the aquifer may not exceed 450,000 acre-feet of water each calendar year.

" (c) Except as provided by Subsections (d), (f), and (h) of this section and Section 1.26 of this article, for the period beginning January 1, 2008, the amount of permitted withdrawals from the aquifer may not exceed 400,000 acre-feet of water in each calendar year. . . .

"(f) If the level of the aquifer is equal to or greater than 650 feet above mean sea level as measured at Well J-17, the authority may authorize withdrawal from the San Antonio pool, on an uninterruptible basis, of permitted amounts. If the level of the aquifer is equal to or greater than 845 feet at Well J-27, the authority may authorize withdrawal from the Uvalde pool on an uninterruptible basis, of the permitted amounts. The authority shall limit the additional withdrawals to ensure that springflows are not affected during critical drought conditions.

"(g) The authority by rule may define other pools within the aquifer, in accordance with hydrogeologic research, and may establish index wells for any pool to monitor the level of the aquifer to aid the regulation of withdrawals from the pools.

"(h) To accomplish the purposes of this article, by June 1, 1994, the authority, through a program, shall implement and enforce water management practices, procedures, and methods to ensure that not later than December 3l, 2012, the continuous minimum springflows of the Comal Springs and the San Marcos Springs are maintained to protect endangered and threatened species to the extent required by federal law. The authority and from time to time as appropriate may revise the practices, procedures, and methods. . . ." (Acts, 73rd Legislature, Regular Session, Ch. 626, Section 1.14 (b), (c), (f), (g), and (h), p. 2363)

One could argue that the 450,000 acre-feet and 400,000 acre-feet limitations had their origin in the 1968 state water plan reiterated in the 1984 state water plan, both prepared by the Texas Water Development Board or in the Interim Plan dated February 18, revised February l9, prepared by the Texas Water Commission reinforced by the USFWS letter of August 19, 1992.

In its August, 1997, Water For Texas, " A Consensus Based Update to the State Water Plan," the TWDB used the 450,000 and 400,000 acre feet maximum pumping for calendar years through 2007 and the 400,000 limit through 2012. The Board added, "Model results currently indicate that a regional level of pumping of 225,000 ac-ft per

year is required to protect endangered species under historic recharge conditions, including a recurrence of the drought of record." (Vol. II, p. 3-215)

Simultaneously with the Edwards Aquifer litigation, the TWDB, the Texas Parks and Wildlife Department (TPWD), and the Texas Natural Resource Conservation Commission (TNRCC) the predecessor to the TCEQ, with participation of affected regional water districts and river authorities, initiated in 1993 several large area water demand and supply studies with projections at ten-year intervals from 2000 through 2050 under the "Trans-Texas Water Program." The Edwards Aquifer and its water users were included in the 32-county West Central Study Area extending from the Nueces River Basin through the Texas lower Colorado River and the intervening coastal basins. A March, 1998, report issued by HDR Engineering, Inc., used the 450,000 and 400,000 acre feet limitations with their statutory deadlines as a component of the available water supply. (Trans-Texas Water Program, West Central Study Area, Phase II, March, 1998, p. 3-1) The Edwards Aquifer Authority was one of the entities participating in this Study.

In the 2002 Texas water plan, Water for Texas—2002, the TWDB states, "The South Central Region used 340,000 AFY [acre-feet/year] as the groundwater availability for the San Antonio segment of the Edwards aquifer. This is the temporary value until a better value is attained through the process of developing the Habitat Conservation Plan required by U.S. Fish and Wildlife Service . . ." (Texas Water Development Board, January, 2002, Vol. I—III, Document No, GP-7-1. p. 43.) The USFWS later claimed, "The 340,000 acre-ft/yr total was proposed by the EAA as a number to be used by the State planning group." (See below, letter from USFWS to Bexar Metropolitan Water District General Counsel, May 18, 2001.)

Avoiding Endangered Species (ESA) Act Penalties

The ESA declares, " . . . [I]t is unlawful for any person subject to the jurisdiction of the United States to . . . (B) take any such species within the United States . . . " [16 U.S.C. "Conservation," 1538(a)(1)] " (19) [T]he term 'take' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." (Ibid., 1532, "Definitions.") There are exceptions. Among them: "(1) The Secretary [of the Department of the Interior] may permit, under such conditions as he (sic) shall prescribe--. . . (B) Any taking otherwise prohibited by Section 1538(a)(1)(B) of this title if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." [Ibid., 1539, "Exceptions, (a) Permits"] There is no exception for any person who causes jeopardy, which is defined as "an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." [50 CFR (Code of Federal Regulations) 402.02]

The Act also prescribes the requisite contents of a "conservation plan" which must be acceptable to the Secretary before a "Section 10(a) incidental take permit" may be

granted. The USFWS paraphrased the requirements of a habitat conservation plan (HCP):

" To comply with section 10, your plan must identify specific goals and objectives, clearly delineate the project area and time period of the permit, describe the impact that will result from the 'taking' of listed species, outline the steps to be taken that will minimize and mitigate the impacts of any 'taking', describe the alternatives (sic) actions considered and the reasons why they are not being used, and describe the authorities and funding mechanisms that will be available to implement the plan. All participating agencies will have to enter into a binding agreement with the Service regarding implementation of the short-term plan. This agreement will have to specify the responsibilities of each agency, the conservation and mitigation measures to be implemented, reporting and enforcement procedures, and any other permit conditions. We will be happy to work with you throughout the section 10 process.

"The Service can not approve an incidental take permit which would appreciably reduce the likelihood of the survival and recovery (i.e. 'jeopardy') of any federally listed species." (Letter, U. S. Department of the Interior, Fish and Wildlife Service, to Chairman, TWC, August 19, 1992, p. 2)

Under Texas S. B. 1477, enacted in 1993, which established pumping limits for the Edwards Aquifer, and created the Edwards Aquifer Authority (EAA) to administer and enforce them, the Authority is authorized to "(9) hold permits under state law or under federal law pertaining to the Endangered Species Act of 1973(16U.S.C.1531, et seq.) and its amendments." (Acts, 73rd Legislature, Regular Session, Ch. 626, Section 1.11, p. 236.)

Bexar Metropolitan Water District Seeks Incidental Take Permit. Hoping to avoid being included as a defendant in further protracted litigation, because constitutional and other challenges delayed operation of the EAA, the Bexar Metropolitan Water District (Bexar Met or BMWD) initiated its own Section 10(a) permit application to the USFWS in May, 1996, After two years and six months of preparation, consultation, and negotiation with the USFWS, Bexar Met submitted its draft "Habitat Conservation Plan" on December 20, 1998. The USFWS responded seven months later with a 22-page letter and a four-page addendum. After calculating BMWD's share of total pumping from the Edwards at 4.1%, the Service indicated that, to secure a permit, the District must (1) lower its pumping to its share of 450,000 acre feet in the years 2001 and 2002; (2) realize its share of 400,000 acre feet for 2003 through 2008; and further reduce its pumping to its share of 300,000 acre feet for the years 2009 through 2011, at which time its permit would expire. (Letter from USFWS to BMWD, Cons. #2-15-98-I-47, PLS #844828, July 27, l999, pp. 8-9.) The Service further stated that " SB 1477 . . . implies it is not '2007' but that withdrawals should not exceed 450,000 acre-feet now [l999] through 2007." (Ibid., p.10.) Thus, for the first time, the USFWS not only introduced a lower pumping limit than that stipulated in state law, but also it foreshortened the 2007, 2008, and 2011 statutory deadlines. In a subsequent communication, the USFWS agreed to adjust Bexar Met's share of total Edwards pumping to 3.6% and commented, "The amount of time

allowed to get your share of reduction targets is consistent with the amount of time given to DOD [Department of Defense for Bexar County military installations] in their recently completed Section 7 consultation/Biological Opinion. However, their consultation and incidental take coverage only covers the next 4 years [through December 31, 2003], so they don't reach a point in their coverage where the 300,000 reduction level comes into play." (Letter from USFWS to BMWD, Cons. #2-15-98-I-470, November 23, 1999, p.2.) After several marathon negotiating sessions with as many as 15 participants and the exchange of detailed written communications over several months, Bexar Met abandoned its pursuit a 10(a) incidental take permit, unwilling to endorse a 300,000 acre-feet Edwards pumping limit with foreshortened deadlines and accept other USFWS dictated conditions.

Military Bases in Bexar County and Incidental Take Protection. A different process is prescribed for U. S. Government activities. "Section 7(a) Federal Actions and Consultations-- . . .(2) Each Federal agency shall, in consultation with, and with the assistance of the Secretary [of the Interior], insure that any action authorized, funded or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction of habitat of such species. . . . In fulfilling the requirements of this paragraph, each agency shall use the best scientific and commercial data available. "(16USC1536 "Interagency Cooperation.") The Secretary's conclusions after such consultation are transmitted to the federal agency in a Biological Opinion (BO). [Ibid., "(b) Opinion of the Secretary."]

Federal activities at four installations in Bexar County–Fort Sam Houston, Lackland Air Force Base, Kelly Air Force Base and Randolph Air Force Base are covered under a single Biological Opinion (BO) dated November 5, 1999, with a correction transmitted November 17, 1999. (USFWS addressed to Brigadier General, USAF, corrected copy, 2-15-98-F-759, 65 pgs, with two appendices.) For Kelly Air Force Base, this Opinion constituted an amendment to an earlier one dated June 26, 1997. (Consultation # 2-15-97-F-039.) The USFWS calculated these military installations' share of pumping using the 450,000 and 400,000 acre-feet limits but imposed the first limits for 2000 and 2001 and the second ones for calendar years 2002 and 2003, with an expiration date of December 31, 2003. (BO 2-15-98-F-759, corrected November 17, 1999, p. 52) By agreement of the parties, this BO has been extended for the 2004 calendar year, based on the 400,000 acre-feet limit. Meanwhile, negotiations are underway between the DOD and the USFWS for a new Opinion with the Service again mandating a 300,000 acre-feet pumping limit as the basis for calculating the bases' pro rata share beginning in 2005. (Personal communication)

Edwards Aquifer Authority. Pursuant to S.B. 1477, the EAA in due course launched the preparation of HCP to support its application for a 10(a) permit. In February, 2000, the consultant employed by the EAA to produce the necessary documents was sent the Bexar Met draft HCP and the supporting draft Environmental Assessment (EA) with Supplements (Transmittal letter, BMWD General Counsel to Hicks & Company, February 9, 2000.) On April 14, 2000 the BMWD General Manager sent copies of USFWS correspondence verifying a 300,000 acre-feet limit for the years 2009-2011 to

the General Manager of the EAA. (Transmittal letter, April 14, 2000.) On May 23, 2000, at a meeting of the Citizens Advisory Committee to the EAA for its HCP, a representative of the USFWS characterized the 300,000 acre-feet limitation as "subject to negotiation." Apparently, about this time the figure of 340,000 was mentioned in discussions between USFWS and EAA. This limit was referenced in a letter dated May 23, 2000 from BMWD's General Counsel to the Chief of Engineering of the San Antonio River Authority (SARA) which transmitted the April 14, 2000 letter and attachments. (Letter May 23, 2000.)

Two letters—one on June 8 and another on June 9, 2000-–from the BMWD General Counsel were sent to the USFWS asking clarification for, among other things, the pumping limit that would be acceptable to USFWS after December 31, 2008. (Letters, June 8 and June 9, 2000.) On June 21, 2000, the author of this paper sent a letter to Hicks & Company with copies to the EAA and USFWS transmitting extracts from the July 27, 1999, and November 23, 1999, letters to Bexar Met insisting that 300,000 acre-feet be the limit for 2009-2011. (Letter June 21, 2000.) Nearly a year later, on May 18, 2001, the USFWS responded to the two letters from Bexar Met's General Counsel:

" **Response**: The Service has always maintained that a regional solution was more advantageous than the issuance of individual permits because it offered more options to pursue and accomplish the goal at hand, hence more flexibility. The 340,000 ac-ft/yr total was proposed by EAA as a number to be used by the State planning group. It was not discussed as a limit to their 10(a)(1)(B) permit as was the 300,000 ac-ft/yr total given to Bexar Met. What those future reductions or limits will be for EAA have not been negotiated or finalized." (p.2)

Thus both the 300,000 and 340,000 acre-feet limitations remain in limbo, with no public, firm commitment that USFWS will accept either number. To accept a higher limit than 300,000, would be a major reversal of written commitments.

As late as August 2001, "[four] withdrawal limits . . . 450, 400, 340, [and] 175 [thousand acre feet per year] compared against No limit (Baseline)" remained as alternatives in the HCP "study assumptions." (Hicks & Company, PowerPoint presentation). The following discussion is based on a version of EAA's draft HCP dated November, 2002. In this version, neither the 300,000 nor the 340,000 acre feet limits appear as alternatives. This draft has been under review and may be altered before the next expected draft becomes available sometime later in 2004. (Personal communication.) If substantial changes are made that differ from the provisions cited below, the following discussion may be out-of-date.

Potential Alternative Measures in EAA Draft HCP

2.0 Aquifer Pumping Limits
2.1 Reduction mandates by EAA Act (Reduced annual pumping limits to 450,000 ac-ft through 2007, 400,000 ac-ft from 2008-2012, going to an undetermined level by Dec 31, 2012).
2.2 Reduction mandates by EAA Act (Reduced annual pumping to 450,000 ac-ft through 2007, 400,000 ac-ft from 2008-2012, remaining at 400,000 ac-ft after 2012 through life of Permit).
2.3 Accelerated pumping restriction by EAA from annual limit of 450,000 ac-ft through 2007, to 175,000 ac-ft by Jan 1, 2008 and remaining at 175,000 ac-ft through the life of the permit.
2.4 Adjusted pumping limit to 500,000 acre-feet/year under provisions of EAA Act, Article 1, Section 1.14(d).
2.5 Adjusted pumping limit to levels between 500,000 and 550,000 acre-feet/year under provisions of EAA Act, Article 1, Section 1.14 (d).

[Source: Draft, Habitat Conservation Plan and Environmental Impact Statement, prepared for the Edwards Aquifer Authority, Hicks & Company/RCON, et al., November, 2002," Table 2.3-1 Comparison of potential HCP and EIS alternative measures (revised July 31, 2002) p. 2-8.]

The preferred alternative is "2.4 Adjusted pumping limit to 500,000 acre-feet/year under provisions of EAA Act, Article I, Section 1.14(d)." (Ibid.) This alternative is defined at the bottom of the Table as "4-Regional Permit–Preferred Pumping Limit (lower economic impacts, no guarantee of springflow, higher springflow impacts). (Footnote, p. 2-10.] The EAA Act Section 1.14(d) provides:

"(d) If, through studies and implementation of water management strategies, including conservation, springflow augmentation, diversions downstream of the springs, reuse, supplemental recharge, conjunctive management of surface and subsurface water, and drought management plans, the authority determines that additional supplies are available from the aquifer, the authority, in consultation with appropriate state and federal agencies, may review and may increase the maximum amount of withdrawals provided by this section and set a different maximum amount of withdrawals."

"If after five years from the date of issuance of the permit [the length of the requested 10(a) permit], the proposed studies and implementation of water management strategies are determined by appropriate state and federal agencies to be insufficient to sustain the 500,000 acre-feet per year limit, the Authority would be subject to withdrawal provisions provided by law (400,000 acre-feet per year by 2008, then to the extent required by Federal law by the end of 2012 [currently undetermined])." (Op. Cit., pp. 2-236 – 2-37.) (Since its already mid-2003, a five-year permit issued by USFWS would extend beyond 2008.)

"Alternative 4 includes a 500,000 acre-feet per year base pumping limit. Aquifer modeling (see Table 9, Appendix B) predicts that if this pumping level is maintained (without demonstration of additional water supplies to the aquifer) and with DM/CPMP [Drought Management/Critical Period Management Plan] reductions, the springflow at Comal Springs throughout the period of record would be at or above 15 cfs [sic, must mean 150 cfs] about 75 percent of the time. However, there would be a likelihood of frequent low flows or complete cessation of flow during droughts. Little or no springflow for prolonged periods could be detrimental to the species and result in some level of take. Under Alternative 4, the risk of little or no springflow is reduced through implementation of DM/CPMP reductions of up to 30 percent from the 500,000 acre-feet per year base limit. Such reductions would result in a pumping limit of 350,000 acre-feet per year (if in effect for an entire year). [In another part of the Draft, p. 2-12, a different figure, 340,000 acre-feet is used, 'with the addition of critical period management measures triggered by drought conditions, additional reductions of up to 15 percent could occur, yielding a maximum pumping limit pursuant to initial regular groundwater withdrawal permits and additional regular groundwater withdrawal permits of 340,000 acre-feet per year through the year 2012 (achieving a 340,000 acre-feet per year pumping limit would require a critical period occurring throughout an entire year).'] Based on a 350,000 acre-feet pumping limit held constant throughout the period of record, aquifer modeling (see Table 9, Appendix B) predicts springflows at Comal Springs at or above 65 cfs about 95 percent of the time, 100 cfs about 90 percent of the time, and 170 cfs about 75 percent of the time. Predicted occurrence of no flow (based on period of record data) would be less than 1 percent (see Table 4-1, Appendix H). Flows less than 30 cfs would be expected to occur between 1 and 2 percent of the time, while flows less than 60 cfs would occur less than 5 percent of the time, and flows less than 100 cfs would occur only about 10 percent of the time. Depending on the requirements of the species, this may result in incidental take." (Ibid., p. 2-37 – 2-38.)

Among the measures selected by the EAA's November 2002 draft HCP to satisfy Section 1.14(d) of the EAA Act are:

1.0 Edwards Aquifer Management Strategies Consistent with EAA 30-year Water Supply Plan (a part of the Comprehensive Water Management Plan)
1.1 Edwards Recharge Enhancement Features – Type 2 Structures (South Central Texas Regional Water Plan Option L-18a, Appendix A, Section 3.2.4).
1.2 Precipitation Enhancement Program (South Central Texas Regional Water Plan (SCTN-5).
1.3 Implementation of alternative management practices, procedures or methods allowed by the EAA Act that are currently undefined or unidentified.

Recharge Enhancement Studies
7.10 Range Management of Woody Species Study.
7.11 Recharge Enhancement Recirculation Studies.
7.12 Springflow Augmentation Feasibility Studies.

Source: Draft, Habitat Conservation Plan and Environmental Impact Statement, prepared for the Edwards Aquifer Authority, Hicks & Company/RCON, et al., November, 2002, Table 2.3-1 comparison of potential HCP and EIS alternative measures (revised July 31, 2002), pp. 2-8 and 2-9.

"**Comprehensive Aquifer Management**

"The aquifer would be managed consistent with the Authority's 30-year Water Supply Plan, which is part of the Comprehensive Water Management Plan mandated by the Act. This would include implementation of the following management measures which are also listed in Table 2.3-1:

> " 1.1 Edwards Recharge Enhancement Features – Type 2 Structures (SCTRWP, Option L-18a) – construction of recharge enhancement structures on streams over the Edwards Aquifer Recharge Zone. [Type 2 Structures are defined as those (on streams that are often dry) which 'impound water only for a few days or weeks following storm events and recharge water very quickly to the aquifer, typically draining at a rate of 2 or 3 feet per day.' (Water for Texas – 2002, Vol. I, Region L, South Central Texas Regional Water Plan, p. 5-66.)]
>
> " 1.2 Precipitation Enhancement Program (South Central Texas Regional Water Plan Strategy SCTN-5).
>
> " 1.3 Implementation of alternative management practices, procedures, or methods allowed by the Act that are currently undefined or unidentified." (Opacity, p. 2-39)

Artificial Recharge of the Edwards. There was statutory authorization for artificial recharge before the EAA was created:

"(c) Unappropriated storm water and floodwater may be appropriated to recharge underground freshwater bearing sands and aquifers in the portion of the Edwards underground reservoir located within Kinney, Uvalde, Medina, Bexar, Comal, and Hays counties if it can be established by expert testimony that an unreasonable loss of state water will not occur and that the water can be withdrawn at a later time for application to a beneficial use. The normal or ordinary flow of a stream or watercourse may never be appropriated, diverted, or used by a permittee for this recharge purpose.

"(d) When it is put or allowed to sink into the ground, water appropriated … [for recharge] loses its character and classification as storm water or floodwater and is considered percolating groundwater." (Texas Water Code, S 11.023)

Section 1.45(a) of S.B. 1477 authorizes the EAA to "build or operate recharge dams in the recharge area if the recharge is made to increase the yield of the aquifer and the recharge project does not impair senior water rights or vested riparian rights." "Only the amount of floodwater in excess of the historic yield as determined by the commission

[TNRCC, now TECQ] may be impounded by a recharge dam built or operated" by the EAA. [Section 1.45(c)] The "historic yield of the floodwater to the Nueces River basin" is defined as "equal to the lesser of: (1) the average annual yield for the period from 1950 to 1987; or (2) the annual yield for 1987." [Section 1.45(b)]

Recharge structures for increasing the volume of water entering the Aquifer were initiated by the Edwards Underground Water District (EUWD), which was replaced by the EAA. Four were completed under the auspices of the District: Parker, 4-20-74 which recharged 10,215 acre-feet in its first 20 years; Verde, 4-28-78, which recharged 14,168 acre-feet in its first 16 years; San Geronimo, 11-13-79, which recharged 10,533 acre-feet in its first 15 years; and Seco, 10-21-82, which recharged 33,059 in 12 years. [EUWD, cited in Moore, Jr., Joe G., Monitor and Votteler, Todd H., Assistant to the Monitor, Draft Habitat Conservation Plan for the Edwards Aquifer (Balcones Fault Zone – San Antonio Region), prepared under Court Order in Sierra Club, et al. v. Babbitt, June 23, 1995, Table 39, following p. 270.) No such projects have been initiated since 1982.

One of the shortcomings of recharge structures is reflected in the following Table:

Table 40. Recharge From EUWD Structures to the Edwards Aquifer in Years with Comal Springs Flow Below 200 cfs 1974 - 1992

Years when Flow Below 200 cfs	Recharge From Structures (Acre-feet/yr)			
	Parker	Verde	San Geronimo	Seco
1980	0	371	903	-
1983	0	254	0	0
1984 *	251*	246*	0*	143*
1985	232	440	1,097	643
1989 *	0*	0*	0*	0*
1990 *	49*	176*	41*	479*
1991	647	966	1,647	2,160
* Comal Spring flow dropped below 150 cfs.				

Source: Edwards Underground Water District, repeated in Ibid., p. 272.

Another negative aspect of recharge structures is a consequence of their purpose – conversion of surface water to groundwater in the affected river basins. A precondition for a project is that it "does not impair senior water rights." Persons and entities holding state granted permits to use surface water view this conversion as having adverse impact on their rights by reducing the amount of surface water available down-stream, particularly in low rainfall and drought years. An engineering survey analysis in April, 1994, of four such proposed projects in the Nueces River Basin reported the following adverse water rights and estuarine inflow impacts: Lower Sabinal, 1,229 acre-feet and 2,566 acre-feet respectively; Lower Verde, 170 and 728; Lower Hondo, 403 and 1,134; and for the Lower Frio 1,152 acre-feet and 2,594 acre-feet respectively. Under drought conditions, the Lower Sabinal recharge was estimated at 2,358 acre-feet annually and the cumulative adverse impact at 3,795 acre-feet annually; Lower Verde 1,719 and 898;

Lower Hondo, 1,193 and 1,534; and for the Lower Frio the corresponding figures were 3,980 acre-feet and 3,746 acre-feet. (Cited in Moore an Votteler, Draft Habitat Conservation Plan June 23, 1995, Tables 41, 42 and 43, following p. 273.) Thus in drought years, estimated recharge for these four structures is 9,430 acre-feet causing and estimated 9,973 acre-feet reduction in flow in the lower Nueces River for which mitigation would be due. When the Edwards water is needed most, the estimated recharge is the lowest and the estimated cumulative adverse impact is the greatest.

A subsequent report, Trans-Texas Water Program, West Central Study Area, Phase II, Edwards Aquifer Recharge Analyses, HDR Engineering, Inc., et al., includes these four along with three others. ("Table 3.3-2, Combined recharge Enhancement Program for Edwards Aquifer", March 1998, p. 3-13, reproduced below.)

Table 3.3-2

Combined Recharge Enhancement Program for Edwards Aquifer

Rank*	Project	Capacity (acft)	Surface Area (ac)	Annual Cost ($)	Average Conditions		Drought Conditions	
					Recharge Enhancement (acft/yr)	Cost/Unit Recharge Enhancement ($/acft/yr)	Recharge Enhancement (acft/yr)	Cost/Unit Recharge Enhancement ($/acft/yr)
1	Lower Sabinal	8,750	454	1,420,829	16,442	86	2,358	603
2	Cibolo Creek	10,000	476	1,165,724	9,733	120	1,485	785
3	Lower Verde	3,600	334	647,148	4,850	133	1,719	376
4	Lower Blanco	50,000	1,408	6,830,020	49,766	137	22,490	304
5	San Geronimo	3,500	183	475,476	3,128	152	645	737
6	Lower Hondo	2,800	232	1,335,515	6,779	197	1,193	1,119
7	Lower Frio	17,500	1,099	3,628,170	17,064	213	3,980	912
	Total	96,150	4,186	15,502,882	107,762		33,870	
	Average					144		458

*Rank is based on cost/unit recharge enhancement for average conditions.

These seven projects are identified as "Option L-18a"; four "are located in the Nueces River Basin and affect inflows to the Choke Canyon Reservoir/Lake Corpus Christi System (CCR/LCC System) and the Nueces Estuary." (2002 Texas Water Plan, Region L, p. 2.2-1) Of the other three, two are in the San Antonio and one in the Guadalupe River Basins. "The combined recharge enhancement program is presented in Table 3.3-2…Development of this combined program could provide 107,762 acft/yr of recharge enhancement under average conditions at an average unit cost of $144/acft/yr ($0.44 per 1,000 gallons). Recharge enhancement under drought conditions would be 33,870 acft/yr at an average unit cost of $458/acft/yr ($1.41 per 1,000 gallons). The total capital cost of the combined Edwards Aquifer recharge enhancement program is estimated to be $141.8 million and the total annual cost for this program would be about $15.5 million [Op.cit, p. 3-11] The EAA statute does not authorize a means for paying these costs.

In the initial August 17, 2000 draft of their regional plan, Region L planners contained a condition for "Aquifer Recharge and Recirculation Systems"; they "indicated the strategy was included for research but not for implementation 'unless the plan is specifically amended to allow implementation'." (Water for Texas – 2002, Region L, p. 5-13,) referencing the IPP [Initially Prepared Plan], footnote, pp. ES-25 and 5-8 in its final version, "The Planning Group has replaced that foot-note with a discussion of its reasons for including the water management strategy for research and not for implementation.

"Members of the SCTRWPG [South Central Texas Regional Planning Group] have expressed a wide range of views about this strategy. On the one hand, the Recharge and Recirculation System is viewed as experimental at best and dangerous at worst by several members of the RWPG. First, communities dependent on springflow from the Edwards formation to meet needs in the Guadalupe River Basin point to computer model runs showing potential aquifer draw downs to levels far below its historic lows in the San Antonio area and the consequent potential for drying up the springs. The downstream Guadalupe River Basin interests state that they cannot accept a regional plan that jeopardizes this essential source of water. They want to see a clear demonstration that implementing Recharge and Recirculation will not damage the springs. Environmental groups wanting to protect endangered and threatened species at the springs also find the risk associated with what is regarded as an unproven technology to be unacceptable. They are also concerned about the potential damage to riparian and estuarine species and habitat if base flows are diverted during drought periods and/or flood flows are diverted during wetter periods. Utility managers, citing their requirements under Certificates of Convenience and Necessity to provide reliable supplies for municipal uses, are concerned that the lack of experience with this technology and the adverse results of computer model runs conducted by the Technical Consultant raise too many questions about the strategy for it to be recommended for implementation.

"On the other hand, some members of the RWPG believe that the computer modeling done to date does not present an accurate picture of the system's effects and capabilities. They believe the modeling is unfair in presenting results for a time period beginning with the drought of record, and they compare this to modeling the yield of a reservoir built early in the drought of record – there would be no yield for many years. (The Technical Consultant states that the modeling of this strategy was based on beginning conditions of a full aquifer and advised that substantial start-up time could be needed upon implementation in order for this strategy to provide additional dependable water supply during drought.) Others fear that implementation of some of the water management strategies included in the plan would preclude implementation of Recharge and Recirculation at a later time. They focus, in particular, on the need to include in the plan the strategy of Lake Dunlap diversions to the recharge area of the Edwards Aquifer…

"All these interests nevertheless agree that the Recharge and Recirculation strategy may hold great promise and that optimizing use of the Edwards Aquifer is a cornerstone of water policy for the Water User Groups dependent on this underground source. They all support inclusion of this strategy in the Regional Water Plan for purposes of assuring continued research. They agree that implementation of the strategy would require an

amendment of the Regional Water Plan. The amendment process can occur at any time after formal approval of the Regional Water Plan and requires a public hearing after a 30-day notice period.

"The members of the South Central Texas Regional Water Planning Group have further agreed that the Recharge and Recirculation strategy must move as expeditiously as possible through the necessary phases of research to resolve uncertainties about how it could work in practice. To this end, the Planning Group members agree to support the accelerated research effort in the manner appropriate to each, whether by providing funding, reviewing research findings, offering in-kind services or other means. The goal of this effort will be to conclude the research as soon as practicable, possibly within a 3-year period and in any case in time for reviewing results for possible inclusion of this strategy in the next planning cycle"… (Ibid, pp. 5-13 – 5-15) The EAA has recently approved a contract with Todd Engineers for a $330,000 study of Recharge and Recirculation.

Every one of these proposed projects has, to a greater or lesser degree, both environmental and annual water rights mitigation costs. Four of them with storage capacities in excess of 5,000 acre-feet would be "major" reservoirs under the TWDB's classification. Before implementation, each recharge project would be subjected to the following:

"Requirements Specific to Surface Recharge Structures

"1. It will be necessary to obtain these permits:
    - "a. TNRCC [now TCEQ] Water Right and Storage Permit.
    - "b. U.S. Army Corps of Engineers Sections 10 and 404 dredge and fill permits for the reservoir.
    - "c. GLO [General Land Office] Sand and Gravel Removal permits.
    - "d. GLO Easement for use of state-owned land.
    - "e. Coastal Coordination Council review.
    - "f. TPWD Sand, Gravel, and Marl permit.

"2. Permitting, at a minimum, will require these studies:
    - "a. Bay and estuary inflow impact.
    - "b. Habitat mitigation plan.
    - "c. Environmental studies.
    - "d. Cultural resource studies.
    - "e. Study of impact on karst geology organisms from sustained recharge.
    - "f. Other environmental studies.

"3. Land will need to be acquired through either negotiations or condemnation.

"4. Detailed geologic and hydrogeologic investigations of the reservoir area to determine natural and expected recharge rates and the subsequent movement of ground water from the site." (Op.cit., pp. 2-35 and 2-38)

Where a diversion pipeline is involved as in the lower Blanco, additional conditions must be met:

"Requirements Specific to Diversion Pipeline

"1. Necessary permits:
    "a. U.S. Army Corps of Engineers Sections 10 and 404 dredge and fill permits for stream crossings.
    "b. GLO Sand and Gravel Removal permits.
    "c. Coastal Coordination Council review.
    "d. TPWD Sand, Gravel, and Marl permit.
"2. Right-of-way and easement acquisition:
"3. Crossings:
    "a. Highways and railroads.
    "b. Creeks and rivers.
    "c. Other utilities." (Ibid, p. 2-38)

The approval and construction process for any one of the three largest recharge projects – Cibolo Creek, Lower Blanco and Lower Frio – could take twenty years before any is operational, because each would "impact senior water rights," could raise environmental concerns, and would likely be challenged in court. Is this level of effort worth the estimated recharge achieved, remembering they will not contribute much during low rainfall and drought periods for the foreseeable future and will require annual mitigation payments for downstream effects?

Range Management of Woody Species. "More than 150 years have passed since permanent settlements were established in the Edward Plateau of south-central Texas. These people found a land rich in native grass; fertile soil; wooded bottomlands; and crystal-clear, spring-fed streams. Ashe juniper and other woody species of brush were known to occur mainly within the steep escarpments. Early historical records indicate that fire was a natural occurrence in the ecosystem. Further, fire is now credited as the primary factor in keeping the invasion of wood species to a minimum. Authorities conclude that since 1900 two factors have modified the ecology of the Edwards Plateau. The first factor is the control of both natural and man-caused fire. Secondly, heavy grazing, particularly during extended droughts, has increased brush invasion and decreased grass growth which would normally carry fire from bush to bush; thus many ranges will not burn.

"Much of the area which contain shrubs and brush today were once essentially grassland. Historically, shrubs were frequent only to areas of surplus moisture (along stream banks, etc.). In the last hundred years, however, overgrazing has damaged many of the original plant communities, and a definite change has occurred. The changes include an invasion of woody plants and a change in composition and density of non-woody plants and grasses. This has resulted in a decrease in rangeland productivity and an increase in soil erosion. Further, it is well documented that noxious brush such as ashe juniper and mesquite consume water to a degree that is detrimental to aquifer recharge and water

conservation." ["Water Conservation for the Edwards Aquifer, Cooperative Solutions to Enhance Water Supplies," Natural Resource Conservation Service, (NRCS) Texas A&M University System and Texas State Soil and Water Conservation Board, March 1995, p.1]

"…Studies indicate that each acre of ashe juniper infested rangeland consumes up to 60,000 gallons (0.18 acre-feet, 2.2 acre-inches) of water more per year than a similar acre of land where ashe juniper was removed and native vegetation was allowed to reestablish. Ashe juniper removal and improved rangeland management in the Edwards Aquifer region can result in significant aquifer recharge." (Ibid., p. 3) While the quantities of savings per acre may seem miniscule, the cumulative effect could be dramatic. (See Moore and Votteler, Draft HCP, June 23, 1995, pp. 212-220). A demonstration project was conducted by the Natural Resource Conservation Service (NRCS) of the U.S. Dept. of Agriculture on Seco Creek in Medina County, a tributary to Hondo Creek which flows into the Frio River and thence to the Nueces. The project evaluated, among other practices, the effect of removal of ashe juniper (*Juniperus ashe*) from pastureland to thereby reduce evapotranspiration and increase soil moisture, runoff and recharge to the Edwards Aquifer.

"The juniper stand on them was probably about 15 years old at the time, stood about 10 ft. tall and had some 100 trees per acre…. The entire site is upslope of what is described as the Edwards Aquifer recharge zone. Virtually all of the rain falling on it, that isn't evapotranspired [from] plants in the soil, eventually winds up in the aquifer regardless of whether it percolates into the underlying rock or runs off into Seco Creek." ("A Fear Confirmed: Cedar Really Does Drink Up Water," Texas Farmer-Stockman, July 1994, p.9)

"Average rainfall for the area amounts to 28 in. The watershed above Flatrock Crossing, where the Seco Creek stream flow measurements are taken, amounts to 45 sq. mi. An estimated five trillion gallons of water moves past the point in a year. Juniper removal results in an eight percent decrease in the ratio of percolation to rainfall, according to his [Dugas] measurements. If it is assumed that all of the water from the percolation goes past the gauging station and all of the land in the watershed above the crossing is cleared of cedar, discharge past the point could be increased by 33 percent by the clearing of cedar. To further illustrate the point, Dugas points out that if half the trees are removed from the area as opposed to all of them, stream flow would increase by 16.5 percent." ("Ag Research Worth the Investment," Joe Fohn, San Antonio Express News, April 23, 1995, p.6)

The NRCS has estimated that between 24,117 acre-feet (25% of 96,469 acre-feet estimated annual water savings) and 38,588 acre-feet (40% of 96,469 acre-feet estimated annual water savings) could be recharged to the Edwards Aquifer. ("Water Conservation for the Edwards Aquifer, Cooperative Solutions to Enhance Water Supplies," NRCS, Texas A&M University System, Texas State Soil and Water Conservation Board, March 1995). The assumptions upon which the estimates were based were as follows:

"1. Brush would be removed only where slopes are less than 10% and the total canopy is greater than 20%.
"2. Removal of the brush will be made so as to leave approximately 50% of the ashe juniper in patterns to benefit wildlife, aesthetics, property values, as well as other environmental considerations.
"3. Calculations of water savings were made at both 25% and 40% recharge of the water released by brush removal. Our best estimate based on work with USGS and others is 46%.
"4. Additional costs of personnel, equipment, and supplies will be approximately $750,000-$800,000 per year assuring 10 Range Conservationists at approximately $40,000/yr plus extra vehicles, equipment, etc.
"5. The time frame for treatment of brush would require a minimum of 5 years with an on-going maintenance cost to control brush regrowth." (Letter from Natural Resources Conservation Service to Court Monitor, February 23, 1995, p.1)

"With the possibility of conserving between 20,000 and 35,000 acre-feet of Edwards Aquifer groundwater, acquiring rights to this much water would be economically worthwhile. The program is a long range one, but establishing the necessary institutional arrangements will require attention, time and effort…

"The natural Resource Conservation Service also reported that brush management had been initiated at two military installations north of San Antonio. Of the 27,000 acres in Camp Bullis, 1,000 acres have been treated by prescribed burning and brush clearing. These activities have been conducted will full participation of a representative of the USFWS. At Camp Stanley, 400 of the 4,400 acres are to be treated by mechanical means and prescribed burning. Care is being exercised to preserve habitat of threatened and endangered species. (Personal communication to Joe G. Moore, Jr., Court Monitor, April 5, 1995.)" (Moore and Votteler, Draft HCP, pp. 216-217)

"With regard to golden-cheeked warbler habitat in areas where ashe juniper is prevalent, Secretary Babbitt wrote Governor Ann Richards on September 22, 1994:

'I agree with you that normal agricultural and ranching activities in Texas have little impact on golden-cheeked warbler habitat. Assertions that protection of the warbler in Texas would have a significant negative impact on such practices are wrong. The Department testified recently before a joint hearing of the State Legislature's Natural Resources Committees and said unequivocally that if land has been plowed or farmed for years, it is not warbler habitat. While the Act does not give us the authority to exempt specific land-use practices, as a practical matter traditional ranching and farming activities will not hinder warbler conservation. Regrowth cedar that has invaded cleared fields is also not habitat, and can be cleared without concern. Most warblers live on rocky slopes. Since most agricultural and building activity does not occur on rocky slopes, those activities should not affect warbler conservation.'

"This same viewpoint was echoes by the Texas State Administrator of the USFWS, Sam Hamilton:

" 'The areas where warblers are found are typically on slopes and areas with highly erodible-type soils,' said Sam Hamilton, state administrator for the federal wildlife service. 'Those areas are not that important to livestock production.

" 'Unfortunately, the impression is that any and every cedar tree is valuable for the golden-cheeked warbler, and that's just not the case,' Hamilton said. 'Pure stands and young stands of cedar are simply not habitat.' (San Antonio Express-News, March 21, 1995, p.5A)" (Ibid., pp. 219-220.)

(Partial) Table 29. Seco Creek Water Quality Demonstration Project

ALTERNATIVE ACTION PLAN	TREATABLE UNITS	PARTICIPATION RATE	ANNUAL ON SITE WATER SAVINGS AC FT	ANNUAL AQUIFER RECHARGE OR WATER SAVINGS AC FT	TOTAL 10 YEAR FINANCIAL ASSISTANCE (FA) COST	30 YEAR 8% AMORTIZED ANNUAL FA COST	ANNUAL O&M COST	ANNUAL FA COST + O&M PER AC FT RECHARGED
1. Removal of Ashe Juniper from watershed and recharge zone on slopes < 10% and canopy < 20%	1,397,000 1/(acres) (25% of area to) (remain for wildlife)	50%	96,469	24,117 (Assume 20%) (Recharged)	$44,529,375	$3,955,544	$1,833,563 ($3.50/ac/yr)	$240
				38,588 (assume 40%) (recharged)	$44,529,375	$1,833,563	$1,833,563 ($3.50/ac/yr)	$150

The NRCS projected annual recharge of 24,117 acre feet if 75% of ashe juniper were removed from one half of 1,397,000 acres in 13 counties with slopes of <10% and canopy of >20% and 25% of the 96,469 acre-feet of water saved were recharged and 38,588 acre-feet if 40% of the water saved were recharged.

This alternative appears to have a better chance of early implementation than recharge and recirculation because it is not complicated with environmental and permitting difficulties. The costs per acre-foot of water are also competitive with costs of other options.

Springflow Augmentation. The plan developed by the TWC, "Avoiding Disaster: An Interim Plan to Manage the Edwards Aquifer", February 18, 1992, contained a section on "Spring Flow Augmentation and Enhancement" listing the pros and cons. (p. 14) [The following discussion is based on the Moore and Votteler Draft Habitat Conservation Plan for the Edwards Aquifer (Balcones Fault Zone – San Antonio) June 23, 1995, pp. 282-291.] The USFWS responded with objections in its letter of March 26, 1992, letter to TWC. Adverse Testimony during the trial of Sierra Club et al. v. Babbitt, et al. was cited by the Court in its "Amended Findings of Fact and Conclusions of Law" filed May 26, 1993. In testimony before the Incidental Take Permit Panel created by the Court in 1994, one of the authors of Springflow Augmentation of Comal Spring and San Marcos Springs, Texas: Phase I – Feasibility Study, stated, "we can't say that things are infeasible and we can't say that things may be feasible, but there's an incredible amount

of uncertainty here…" The USFWS reacted, "The Service believes the feasibility of augmentation alternatives presented are not supported by available data." (Letter of January 23, 1995.)

The Court again addressed this subject in Sierra Club et al. v. Babbitt et al. in its "Order on the Sierra Club's Second Motion for Additional Relief" entered March 6, 1995:

"Springflow Augmentation – No es bueno

"Also in this connection, the Court wishes to express extreme frustration with the continuing waste of time and money on springflow augmentation 'studies.' The Court thought it made it clear in its Amended Findings and Conclusions that aquifer levels should never again be allowed to drop below the levels needed to provide adequate natural springflows. This is necessary to protect both endangered species and human water quality.

"The U.S. Fish & Wildlife on January 25, 1995 once again firmly rejected as biologically infeasible the McKinney/Sharp springflow augmentation theories. The subsequent McKinney Sharp 'final' report does not directly address the USFWS' specific comments, but does concede that its biological feasibility is 'uncertain.'

"Springflow augmentation 'studies' also do not appear to be a good-faith effort to do anything, much less to solve the very real problem of the Edwards. Rather, these 'studies' also appear to be a way to pretend to do something – in order to make others less likely to actually do something constructive.

"The Court strongly urges anyone that has anything to do with any ongoing 'study' of whether the Aquifer, or any part of the Aquifer, can be drawn down below the minimum levels needed to provide adequate natural springflows to stop wasting time and money. Instead, spend your time and money wisely, on the two real solutions to this crisis: (1) regulating pumping to avoid violations of federal law and an environmental and water quality catastrophe; and (2) bringing in substantial alternative water supplies to avoid an economic catastrophe." (p. 9, Emphasis in original.)

The fundamental question raised in 1994 and 1995 remains unanswered: How can the EAA ever implement a project opposed consistently by the USFWS when any effort to even demonstrate its feasibility can not begin without a permit from the USFWS?

Drought Management/Critical Period Management Plans The EAA Act also directs:

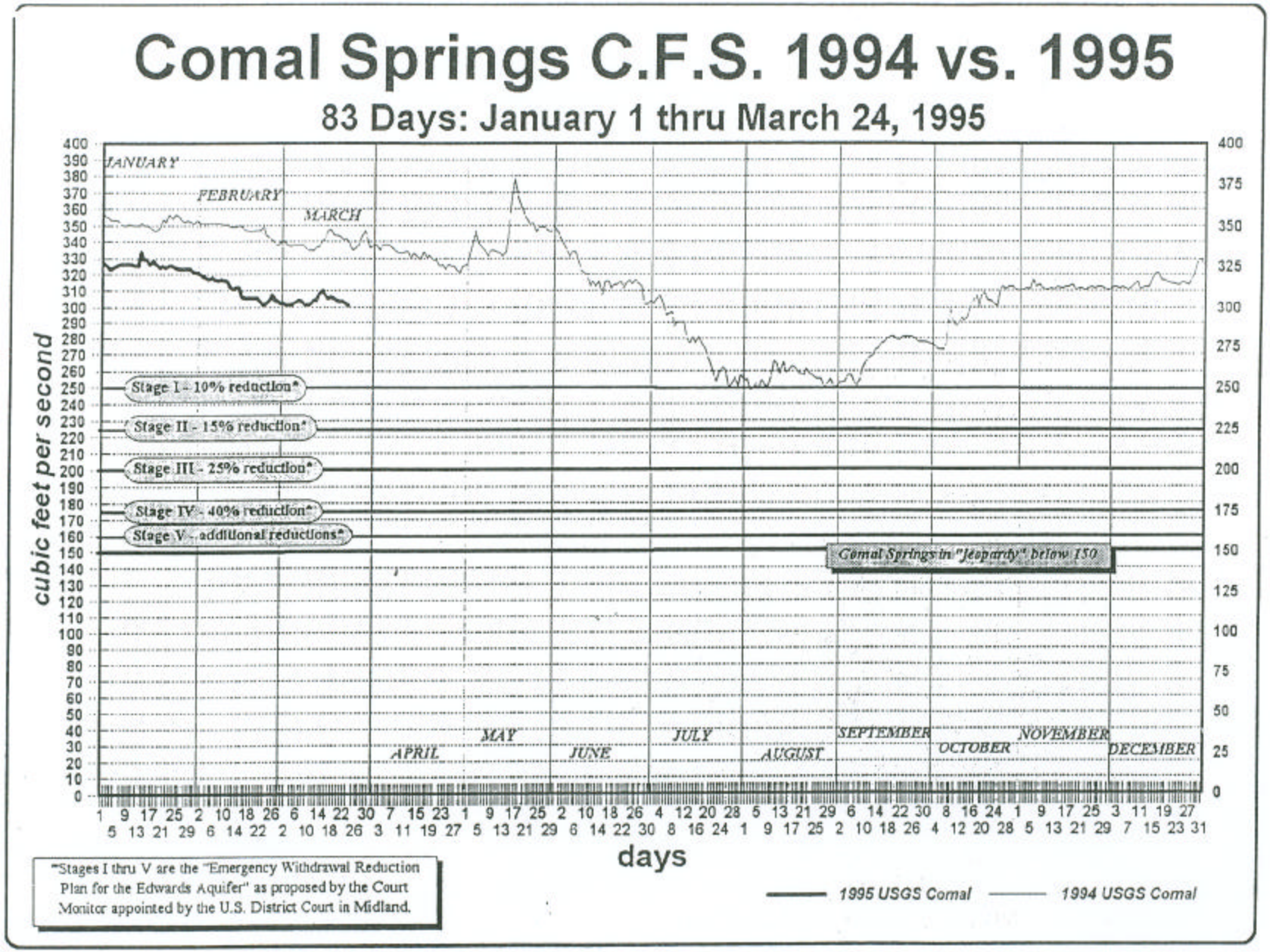
"SECTION 1.26. CRITICAL PERIOD MANAGEMENT PLAN. The authority shall prepare and coordinate implementation of a plan for critical period management on or before September 1, 1995. The mechanisms must:

(1) distinguish between discretionary use and nondiscretionary use;
(2) require reductions of all discretionary use to the maximum extent feasible;

(3) require utility pricing, to the maximum extent feasible, to limit discretionary use by the customers of water utilities; and
(4) require reduction of nondiscretionary use by permitted or contractual users, to the extent further reductions are necessary, in the reverse order of the following water use preferences:
    (A) municipal, domestic, and livestock;
    (B) industrial and crop irrigation;
    (C) residential landscape irrigation;
    (D) recreational and pleasure; and
    (E) other uses that are authorized by law."

During the Edwards Aquifer litigation, four contingency drought plans were developed under orders of the Court-–three during Sierra Club et al. v. Babbitt, et al., and one in Sierra Club v. San Antonio et al. Judge Bunton, after hearings, presentation of evidence and arguments from attorneys representing the parties, concluded these plans were necessary because lack of rainfall and its resultant recharge, plus accelerated pumping to overcome the lack of moisture, were causing declines in springflow that could result in take, or even jeopardy, to the endangered species. They were (1) "Emergency Withdrawal Reduction Plan, "August 1, 1994; (2) "Revised Emergency Withdrawal Reduction Plan, "March 31, 1995; (3) "Compromise Emergency Withdrawal Reduction Plan (CEWRP)" May 31, 1995, prepared by a committee of attorneys representing various parties; and (4) "1996 Emergency withdrawal Reduction Plan," August 23, 1996. The first two were prepared by the Court Monitor and an Assistant, and the latter was prepared by the Special Master in Sierra Club v. San Antonio, et. al. The following graph shows the record of Comal Springflows for 1994 and through March 31, 1995 that precipitated preparation of the first three emergency plans.

The increasing stages of mandatory higher percentage reductions in all these plans, except the CEWRP were each triggered by springflow quantities; the stages in the CEWRP were triggered by J-17 well levels justified as follows:


Comal Springs C.F.S. 1994 vs. 1995
83 Days: January 1 thru March 24, 1995
cubic feet per second
days
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
Stage I - 10% reduction*
Stage II - 15% reduction*
Stage III - 25% reduction*
Stage IV - 40% reduction*
Stage V - additional reductions*
Comal Springs in "Jeopardy" below 150
*Stages I thru V are the "Emergency Withdrawal Reduction Plan for the Edwards Aquifer" as proposed by the Court Monitor appointed by the U.S. District Court in Midland.
1995 USGS Comal
1994 USGS Comal

"Because of the existing sensitivity of the public to aquifer levels as reflected in the J-17 well, and the good correlation between J-17 levels and Comal springflow, the panel recommends primary reliance upon J-17 as a trigger for demand reduction measures. Stages, with corresponding springflows and targeted reductions in use of Edwards Aquifer water from municipal and public water supply systems, are set forth below:

WATER LEVEL WELL J-17	SPRINGFLOW	REDUCTION STAGE	PEAK REDUCTION PERCENTAGE TARGET	MAX. ALLOWABLE PEAK-TO-BASE PUMPING RATIO
> 655 ft msl	> 260 cfs	None	None	Full
655 and less	260 cfs	I	10%	1.8 x base
648 and less	200 cfs	II	20%	1.6 x base
642 and less	175 cfs	III	40%	1.2 x base

NOTES:

(1) Reduction stages will terminate when J-17 levels have been above the trigger level by five feet or more for seven days.
(2) Base usage is indexed to the monthly winter usage, i.e., average of the three lowest months of November, December, January, and February. Total elimination of discretionary use would drop the Peak-To-Base Pumping Ration to 1.0."

Source: "Compromise Emergency Withdrawal Reduction Plan (CEWRP)," May 31,1995.

The USFWS has made a Critical Period Management Plan an essential part of the incidental take process: For the four military installations, the Service accepted a plan structured as follows:

Table 10. New DOD Drought Management Plan Staged Reductions

Stage	Triggers*			Multiplier
	J-17	Comal	San Marcos	
I	5 days where Level ≤ 657.5 ft	5 days at or below 250 cfs	3 days at or below 80 cfs	1.7
II	5 days where Level ≤ 647.0 ft	5 days at or below 200 cfs	Any Stage I trigger, plus 3 days at or below 80 cfs	1.6
III	5 days where Level ≤ 642.0 ft	5 days at or below 180 cfs	Any stage II trigger, plus 3 days at or below 80 cfs	1.4
IV	5 days where Level ≤ 640.5 ft	5 days at or below 160 cfs	Any Stage III trigger, plus 3 days at or below 80 cfs	1.3
V	3 days where Level ≤ 637.0 ft	3 days at or below 100 cfs	Any Stage IV trigger, plus 3 days at or below 80 cfs	1.185

* Whichever comes first. [“Biological Opinion” (BO) 2-15-98-759 p. 22)]

The “Multiplier” is defined as, “Required water reductions will be determined using the installation Base Withdrawal Volumes (BWVs). BWVs will be established by averaging monthly usage data for the period November 1995 through February 1996 using the lowest three months of that period.” (Ibid., p 20.) The BO adds, “ . . . DOD should be able to reduce Edwards water use to this level [Stage V] (basically cutting out all discretionary water use) during a dire situation when flows are below those levels at which the fountain darter, Texas wild-rice and Comal Springs riffle beetle’s probabilities of surviving are being significantly reduced.” (Ibid., p. 21.) Commenting on Bexar Met’s draft HCP, the USFWS stated, “The Service agrees that cfs should be used to set the drought management plan stage levels. On June 26, 1998, at an EAA board meeting, the Service recommended trigger flow rates, based on Comal Springs to set drought management plan stage levels. They were Stage I – 250 cfs, Stage II – 225 cfs. Stage III – 200 cfs, Stage IV 175 cfs and Stage V – 160 cfs.” (USFWS letter July 27, 1999, p. 2)

The EAA’s November, 2002, draft HCP lists three alternatives for a Critical Period Management Plan:

3.0 Critical Period Management Scenarios
3.1 Three-stage percentage reductions of authorized monthly withdrawals, triggered by specified index well levels in 3 areas and regional prohibition of landscape watering when springflow at Comal Springs ≤ 150cfs: Stage 1 (J-17 ≤ 650 msl but above 640, Medina Well ≤ 670 but above 660, Uvalde Well ≤ 845 but above 840, reduction = 5%); Stage 2 (J-17 ≤ 640 but above 630, Medina Well ≤ 660 but above 665, Uvalde Well ≤ 840 but above 835, reduction = 10%); Stage 3 (J-17 ≤ 630, Medina Well ≤ 655, Uvalde Well ≤ 835, reduction = 15%).
3.2 Critical Period Management Plan through 2007: includes 4-stage mandatory reductions triggered by flow of Comal Springs: Stage 1 (20 cfs, reduction = 10%); Stage 2 (225 cfs, reduction = 15%); Stage 3 (200 cfs, reduction = 25%), Stage 4 (175 cfs, reduction = 40%).
3.3 Annual water budget established for each permittee with withdrawal limits declared in advance for each quarter for San Antonio and Uvalde Pools; 4-stage mandatory reductions (Stage 1 = 10%; Stage 2 = 15%, Stage 3 = 20%, Stage 4 = 30%) triggered by J-17 index well levels (Stage 1: < 650'; Stage 2 < 640'; Stage 3 < 630'; Stage 4 < 630' for 30 days) or 5-day average springflow at Comal Springs (Stage 1: < 220 cfs; Stage 2: < 154 cfs; Stage 3 < 86 cfs) or 5-day average springflow at San Marcos Springs (Stage 1: < 110 cfs; Stage 2: < 96 cfs; Stage 3: < 80 cfs).

["Table 2.3-1 Comparison of potential HCP and EIS alternative measures (revised July 31, 2002, p. 2-)

The EAA preferred alternative 3.3. Minimum springflows at Comal and San Marcos Springs determined by the USFWS's "best professional judgment and filed with the Court in Sierra Club et al. v. Babbitt, et al. are shown in the tables below.

Table 1. Required Springflows for Threatened and Endangered Species at Comal Springs (Sources: U.S. Fish and Wildlife Service, April 15, 1993 and June 15, 1993 letters filed with the Court)

SPECIES	STATUS	SPECIAL CONDITIONS	CFS MINIMUM TO AVOID TAKE	CFS MINIMUM TO AVOID JEOPARDY	CFS MINIMUM TO AVOID HABITAT MODIFICATION
Fountain Darter	Endangered	Current Conditions	200	150 for short, undefined, periods	--
" "	" "	Ramshorn Snail Controlled	150	60 for short, undefined, periods	--

Table 2. Required Springflows for Threatened and Endangered Species at San Marcos Springs (Sources: U.S. Fish and Wildlife Service, April 15, 1993 and June 15, 1993 letter filed with the Court)

SPECIES	STATUS	SPECIAL CONDITIONS	CFS MINIMUM TO AVOID TAKE	CFS MINIMUM TO AVOID JEOPARDY	CFS MINIMUM TO AVOID HABITAT MODIFICATION
San Marcos Salamander	Threatened	Current Conditions	60	60	60
Fountain Darter	Endangered	Current Conditions	100	100	100
" "	" "	Aquifer Management Plan & Control of Exotics	--	An undefined CFS <100, for short, undefined, periods	An undefined CFS <100, for short, undefined, periods
San Marcos Gambusia	Endangered	Current Conditions	100	100	100
" "	" "	Aquifer Management Plan & Control of Exotics	--	An undefined CFS <100, for short, undefined, periods	An undefined CFS <100, for short, undefined, periods
Texas Blind Salamander	Endangered	Current Conditions	50	50	--
Texas Wild-Rice	Endangered	Current Conditions	100	100	100
" "	" "	Aquifer Management Plan & Control of Exotics	--	An undefined CFS <100, for short, undefined, periods	An undefined CFS <100, for short, undefined, periods

Under the EAA's chosen DM/CPMP, jeopardy to the fountain darter at Comal Springs would be reached before Stage 3 (<86 cfs 5-day average springflow) is triggered and for the same species and Texas Wild Rice at San Marcos Springs (100 cfs) before Stage 2 (96 cfs 5-day average springflow) is imposed. While the USFWS would allow both 150 cfs of flow at Comal "for short undefined periods" and "an undefined CFS <100, for short, undefined periods" under jeopardy minimums, whether the EAA's predicted prescribed jeopardy numbers will be acceptable is problematic.

Parks and Wildlife Comments on EAA Draft HCP. In 1999, the Texas Legislature prescribed a process through which HCP's are to be reviewed. (Acts, 76th Legislature, 1999, Ch. 1268, effective September 1, 1999. V.A.T.C. Title 5, Parks and Wildlife, Sections 83.011 – 83.020.) Those participating in an HCP (in this case, the EAA), "(a)…shall appoint a citizens advisory committee to assist in preparing the regional habitat conservation plan and the application for a federal permit….[and] (d) the commission [the Parks and Wildlife Commission] shall appoint one representative to the citizens advisory committee…[who] is a voting member…" [Ibid., 83.016 (a) and (d)]. A "'regional habitat conservation plan' means a plan or program to protect endangered species by habitat preserves or other protection strategies developed in order to obtain a federal permit that requires the acquisition or regulation of land or interests in land not owned by a plan participant at the time of application for a federal permit." [Ibid., 83.011(12)]

In addition, "(c)" The plan participants, together with the commission and the landowner members of the citizens advisory committee, shall appoint a biological advisory team. At least one member shall be appointed by the commission and one member by the landowner members of the citizens advisory committee. The member appointed by the commission serves as presiding officer of the team. The team shall assist in:

"(1) the calculation of harm to the endangered species; and

"(2) the sizing and configuring of the habitat preserves." [Ibid., 83.15(c)]

" 'Biological advisory team' means three or more professional biologists retained to provide biological guidance to plan participants." [Ibid., 83.011(1)]

A procedure is prescribed for the filing of a grievance with the Commission by any "individual appointed to a citizens advisory committee" "if the individual believes that the plan is being developed in violation of this sub-chapter." [Ibid., 83.020(a)] Such grievance can be dismissed if the commission "finds that the grievance has no merit;" otherwise, the commission "must hold a public hearing" and "take testimony." The Commission then votes "on whether to approve or dismiss the grievance or to schedule a public hearing." If a public hearing is held, the commission then votes "whether to approve or dismiss the grievance." [Ibid., 83.020(c)] Should the commission approve the grievance, it "shall instruct the plan participant or participants to amend the plan so that it will comply with this subchapter. The plan participant may not submit an application for a federal permit until the commission is satisfied that its instructions to amend the plan to comply with this subchapter have been carried out." [Ibid., 83.020 (d) and (c)]

The TPW Commission was briefed about this procedure on January 22, 2003. ["Edwards Aquifer Authority Regional Habitat Conservation Plan – TPWD Role (S 83.020) and Related Issues," PowerPoint presentation, TPWD, "Revised and Updated From TPW Commission Item, January 22, 2003," Dr. Larry McKinney.] The Biological Advisory Team appointed by the EAA provided its formal review of the Draft HCP, on January 31, 2003. (Ibid.)

The DPWD had earlier submitted the Department's comments:
"The preferred alternative (Alternative 4) of 500,000 acre-feet/year with a maximum of 30% CPMP reduction is not an acceptable alternative because it poses significant risks for dewatering Comal and/or San Marcos springs and downstream aquatic habitats during droughts. Table 2-4-1 indicates that Alternative 4 would result in Comal Springs dropping below the jeopardy level determined by the Fish and Wildlife Service at least 10% of the time, probably more. Even Alternative 3 would appear to result in Comal Springs drying up 4% of the time (pg. 2-30)." (Letter, TPWD to EAA, January 14, 2003, p.1)

"Most of the data presented in the plan and EIS indicate that a withdrawal of 300,000 – 325,000 acre-feet a year is most likely to provide spring levels similar to those seen historically (Figure 4.2-4; Appendix H, Figure 4-1). Appendix H, Table 4.1 indicates that pumping will need to be less than 325,000 acre-feet a year to assure that the springs will not go dry. The summaries concerning Alternative #2 and Alternative #3 indicate that these are the better alternatives, providing the lowest risk to rare species while assuring springflow during dry conditions (pp. 4-26 and 4-28 respectively)." (Ibid., pp. 1-2)

"The draft HCP depends on several unrealistic mitigation measures that would be implemented in the event of reduced or cessation of spring-flows. These mitigation measures rely heavily on captive propagation of the endangered species and various adaptive management strategies. Depending on captive propagation is not realistic; the only successful captive propagation programs for any of the endangered species listed in the HCP is for the fountain darter. Other captive breeding programs exist for Texas wild-rice, and for the Texas Blind and San Marcos salamanders, but these programs have not been able to reliably produce progeny and have experienced numerous problems. There are no captive breeding programs for any of the endangered invertebrates or the for the Cagle's map turtle….

"For example, spring-flow augmentation is offered as an adaptive management strategy although this proposal has been largely rejected by the scientific community, including TPWD and the Biological Committee of the Edwards Aquifer Authority Technical Advisory Group. Similarly, under Alternative 4, aquifer recharge enhancement structures are expected to contribute an additional 80,000 acre-feet of discharge (peg 4-29), but the likelihood of this actually occurring is speculative." (Ibid., pp. 2-3)

Status of Permitted Pumping Allowed by the EAA
(Spring 2004)

Satisfying the 450,000 acre-feet pumping limit by December 31, 2007. Faced with the fact that its chosen procedure for granting final pumping permits resulted in total permitted pumping in excess of the prescribed statutory amount, the EAA on December 16, 2003, adopted what it describes as a "junior/senior" classification of permits. (EAA Order No. 12-03-478) The system has also been characterized as "two-tier." "Senior" rights are not interruptible unless the water level in the J-17 well (Bexar County) is below 650 amsl and that of the J-27 well (Uvalde County) is below 845 amsl; "junior" rights can be exercised when the Aquifer level is above 665 amsl in J-17 and 865 amsl in J-27. This system resulted in 450,000 acre-feet of "senior" rights and some 120,000 acre-feet of "junior" rights; this Order expires on December 31, 2007. The highest calculated pumping, 542,400 acre-feet occurred in 1989, a year of drought. Under S.B. 1477, pumping is to be limited to 400,000 acre-feet/year beginning with 2008.

South Central Texas Water Advisory Committee (SCTWAC). The same Act that created the EAA established this Committee to "advise the board [of the EAA] on downstream water rights and issues." (Acts, 73rd Legislature, Regular Session, 1993, Section 1.10) Members are "appointed by the governing bod{ies}" of Atascosa, Caldwell, Calhoun, Comal, DeWitt, Goliad, Gonzales, Guadalupe, Hays, Karnes, Medina, Nueces, Refugio, San Patricio, Uvalde, Victoria and Wilson Counties and the Cities of San Antonio, Victoria and Corpus Christi. It is authorized "by resolution … [to] … request the board [of the EAA] to reconsider any board action that is considered prejudicial to downstream water interests. If the board review does not result in a resolution satisfactory to the advisory committee, the advisory committee by resolution may request the commission [TCEQ] to review the action. The commission shall review the action and may make a recommendation to the board. If the board determines that the board's action is contrary to an action of the commission affecting downstream interests, the board shall reverse itself." [Ibid., Section 1-10(f)]

On February 12, 2004, the SCTWAC adopted a resolution requesting the EAA Board to "reconsider Resolution and Order No. 12-03-478 adopting its Revised Permit Rules" "no later than April 15, 2004," (Resolution No. 02-2004-01, SCTWAC, February 12, 2004, p. 3; see also Bowen, Greg, "Guadalupe Committee Forces New Vote on River Flow", The Victoria Advocate, February 13, 2004, http://TheVictoriaAdvocate.com.) The Committee called EAA's rules a "bifurcated" system. On May 11, 2004, the EAA Board rejected the SCTWAC claims, reaffirming its earlier action. The next step is an appeal to the TCEQ, "an" which can then make a recommendation to the EAA Board. Based on the Board's actions to date, a reversal is unlikely. Presumably, the Committee or other affected parties could initiate a Court challenge of the Board's final decision.

Some Concluding Thoughts

1. While knowledge about the Edwards Aquifer has been widely disseminated to the affected persons and entities and the general public in the last ten years, the threatened and endangered species dependent on Comal and San Marcos springflow remain as vulnerable to drought and overpumping as they were in 1990.

2. Effective pumping limits at levels necessary to protect the species and assure downstream water quantities adequate to fulfill rights in the Guadalupe River Basin remain elusive.

3. Existing and proposed Drought Management/Critical Period Management Plans (DM/CPMPs) are probably inadequate to prevent jeopardy to the species in a repeat of the droughts of the 1980's and 1990's, much less in a repeat of the drought of record. Take of species during drought remains a certainty.

4. Operation of the 1999 statute requiring TPW Commission review of an HCP would probably prevent an HCP similar to the EAA November 2002 draft from ever reaching the USFWS.

5. Unless there is closer adherence to the pumping limits in S.B. 1477 by the EAA and an adequately stringent DM/CPMP, further litigation is almost certain; should the SCTWAC's objections to the EAA's December 2003 pumping order be ignored, downstream water users on the Guadalupe are faced with the same prospects as when Sierra Club, et al. v. Babbitt, et al. was launched in the 1990's. Litigation has not been initiated since 1996 largely because adequate rainfall has kept the Aquifer recharged.

6. Should any one dissatisfied party file suit, all other interested and affected parties would have to join in order to protect their perceived positions.

7. New state legislation may be an option; an attempt to amend any one provision of S.B. 1477 will open all its provisions to amendment with all parties seeking language favorable to each.

8. Only adequate rainfall and recharge to the Aquifer postpones renewal of the inevitable struggle to impose pumping limits and a DM/CPMP adequate to protect the species and to fulfill water rights downstream on the Guadalupe.