CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Eurycea chisholmensis*

COMMON NAME: Salado salamander

LEAD REGION: 2

INFORMATION CURRENT AS OF: February 2003

STATUS/ACTION (Check all that apply):
___ New candidate
_X_ Continuing candidate
X Non-petitioned
___ Petitioned - Date petition received: ___
__ 90-day positive - FR date: ___
__ 12-month warranted but precluded - FR date: ___
__ Is the petition requesting a reclassification of a listed species?
___ Listing priority change
Former LP: ___
New LP: ___
Latest Date species first became a Candidate: _____
___ Candidate removal: Former LP: ___ (Check only one reason)
___ A - Taxon more abundant or widespread than previously believed or not subject to a degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
___ F - Range is no longer a U.S. territory.
___ M - Taxon mistakenly included in past notice of review.
___ N - Taxon may not meet the Act=s definition of Aspecies.@
___ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Amphibian, *Plethodontidae* (lungless salamander)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Texas

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Bell County, Texas

LEAD REGION CONTACT: Susan Jacobsen, 505/248-6641

LEAD FIELD OFFICE CONTACT: Austin, Texas FWS, Paige Najvar, 512/490-0057

BIOLOGICAL INFORMATION (Describe habitat, historic vs. current range, historic vs. current population estimates (# populations, #individuals/population), etc.):

Taxonomic status - A description of the Salado salamander was published by Chippindale et al.

(2000). This species was formerly included in the *Eurycea neotenes* species group.

Description - The Salado salamander is entirely aquatic and neotenic, meaning it does not metamorphose into a terrestrial adult. Adults are about 2 inches long. It has reduced eyes compared to other spring-dwelling *Eurycea* in north central Texas and lacks well-defined melanophores (cells containing brown or black pigments (melanin)) and iridophores (cells filled with iridescent color granules and fat soluble pigments). It has a relatively long and flat head and a blunt and rounded snout. Three pairs of reddish-brown to bright red gills are located on each side of the neck behind the jaws. The upper body is generally greyish-brown with a slight cinnamon tinge and an irregular pattern of tiny, light flecks. The underside is pale and translucent. The posterior portion of the tail generally has well-developed dorsal and ventral fins, although the dorsal tail fin may be absent (Chippindale et al. 2000).

Habitat/Range - Bell County has approximately fourteen very small (0.028 to 0.28 cubic feet per second (cfs)) to large (280 to 2,800 cfs) springs (Brune 1981). The Salado salamander was known historically from two spring sites near Salado, Bell County, Texas: Big Boiling Springs (also known as Main, Salado, or Siren Springs) and Robertson Springs (Chippindale et al. 2000). These springs bubble up through faults in the northern segment of Edwards Aquifer and associated limestones along Salado Creek (Brune 1975). Both are considered small to medium springs, depending on flow, by Brune=s (1981) definition.

Population Status - Salado salamanders have not been located in Big Boiling Springs, the type locality, since 1991 despite over 20 additional visits that occurred between 1991 and 1998 (Chippindale et al. 2000). Robertson Springs are on private land and access to the site has not been granted. The last survey at Robertson Springs was in the early 1990's.

Other spring sites may have Salado salamanders, but the Service has no confirmed information on other springs with salamanders. Four other spring sites (Dining Room, Elm or Crtichfield, Benedict, and Anderson Springs) are within a mile of Big Boiling and Robertson Springs (Brune 1981). Salamanders collected from the springs within Buttermilk Creek, which is near Salado Creek, may also be *E. chisholmensis*, but the specimens have not yet been identified (Chippindale et al. 2000).

THREATS (Describe threats in terms of the five factors in section 4 of the ESA providing specific, substantive information. **If this is a removal of a species from candidate status or change in listing priority, explain reasons for change**):

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Primary threats to the Salado salamander include degradation of water quality and quantity due to urbanization and physical modification of its habitat. Most of the spring outlets in the City of Salado, including the type locality at Big Boiling Springs, have been modified during the past 150 years by dam construction in the mid-1800's, to supply power to various mills and a stone wall was built to keep out cattle (Brune 1981).

In addition to direct habitat modification, urbanization also contributes to the threats to the

Salado salamander by impairing water quality. Several groundwater contamination incidents have occurred (Price et al. 1995) within Salado salamander habitat. Big Boiling Springs is located on the south bank of Salado Creek in a municipal park, near where past contamination events have occurred (Chippindale et al. 2000, Price et al. 1995). Between 1989 and 1993, at least four incidents occurred within a quarter mile from both spring sites, including a 700 gallon and 400 gallon gasoline spill and petroleum leaks from two underground storage (Price et al. 1995).

Although most of Bell County is still considered rural, population projections from the Texas State Data Center (2000) estimate that Bell County will increase in population by approximately 60 percent from 2000 (population 237,974) to 2040 (population 381,839). Interstate 35 runs through the City of Salado (population 3,475; Texas State Data Center 2000) and offers the perfect expansion corridor for increasing urbanization. Because the springs are located on either side of Interstate 35 (Brune 1981) and Big Boiling Springs is in the center of the city, increasing traffic and urbanization bring increasing risk of contamination spills and higher levels of impervious cover, and their subsequent impacts to the groundwater. Given the extremely limited known distribution of the Salado salamander, groundwater contamination is of great concern and may have already negatively affected the species.

Urbanization can dramatically alter the normal hydrologic regime and water quality of an area. As areas are cleared of natural vegetation and replaced with impervious cover, rainfall no longer percolates through the ground but instead is rapidly converted to surface runoff (Schueler 1991). Streamflow shifts from predominantly baseflow, which is derived from natural filtration processes and discharges from local groundwater supplies, to predominantly stormwater runoff. The amount of stormwater runoff tends to increase in direct proportion to the amount of impervious cover (Arnold and Gibbons 1996). With increasing stormflows, the amount of baseflow available to sustain water supplies during drought cycles is diminished and the frequency and severity of flooding increases. Increasing stormflows result in less water recharging the aquifer, thereby diminishing baseflow. The increased quantity and velocity of runoff increases erosion and streambank destabilization, which in turn leads to increased sediment loadings, channel widening, and detrimental changes in the morphology and aquatic ecology of the affected stream system (Schueler 1991; Arnold and Gibbons 1996).

Even at relatively low levels of impervious cover, Aprofound and often irreversible impacts to the hydrology, morphology, water quality, habitat, and biodiversity of streams@can occur (Schueler 1994). Both nationally and locally, consistent relationships between impervious cover and water quality degradation have been documented. The extent to which impervious cover is controlled in a watershed has been linked with indices of environmental health (City of Austin 1998, Schueler 1994).

B. <u>Overutilization for commercial, recreational, scientific, or educational purposes</u>.

None known.

C. <u>Disease or predation</u>.

None known.

D. The inadequacy of existing regulatory mechanisms.

No Federal, State, or local laws provide for the protection of the Salado salamander. Senate Bill 1, passed by the Texas State Legislature in 1996, charges the thirteen regional water planning regions in the State to develop long-term plans for their water needs. The Brazos (Region G) Regional Water Plan (HDR Engineering, Inc. 2000) states that Bell County is one of 30 counties which has a projected water shortage in the next 50 years in one or more of the six water use categories (livestock, irrigation, mining, municipal, steam-electric, and manufacturing). The projected shortages for Bell County are in the municipal, manufacturing, and steam-electric categories. Senate Bill 1 states that future regulatory and financing decisions of the Texas Water Development Board and the Texas Natural Resource Conservation Commission need to be consistent with the approved regional plans.

The Clean Water Act only relates to state-wide water quality standards for human health and has limited application for groundwater protection. This Act primarily has regulations for point source pollution and no enforceable standards for non-point source pollution (it is all voluntary compliance).

E. Other natural or manmade factors affecting its continued existence.

The Salado salamander has a very limited distribution and appears to be highly sensitive to water quality and quantity degradation Although no direct data have been collected on the Salado salamander=s sensitivity to water quality, we believe that it is highly sensitive based on other amphibian research. Research indicates that amphibians, particularly during their egg and larval stages, are sensitive to many pollutants, such as heavy metals; certain insecticides, particularly cyclodienes (endosulfan, endrin, toxaphene, and dieldrin), and certain organophosphates (parathion, malathion); nitrite; salts; and petroleum hydrocarbons (Harfenist et al. 1989). Because of their semipermeable skin, the development of their eggs and larvae in water, and their position in the food web, amphibians can be exposed to waterborne and airborne pollutants in their breeding and foraging habitats. Toxic effects to amphibians from pollutants may be either lethal or sublethal, including morphological and developmental aberrations, lowered reproduction and survival, and changes in behavior and certain biochemical processes. Since the salamander is fully aquatic, there is no possibility for escape from contamination or other threats

to its habitat. Crustaceans, particularly amphipods, on which the salamander feeds are especially sensitive to water pollution (Mayer and Ellersieck 1986; Phipps et al. 1995; Burton and Ingersoll 1994).

BRIEF SUMMARY OF REASONS FOR REMOVAL OR LISTING PRIORITY CHANGE: NA

FOR RECYCLED PETITIONS: NA

a. Is listing still warranted? ___

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? __

c. Is a proposal to list the species as threatened or endangered in preparation? ___

d. If the answer to c. above is no, provide an explanation of why the action is still precluded.

LAND OWNERSHIP (Estimate proportion Federal/state/local government/private, identify non-private owners): Salado Springs is located in a municipal park in Salado, Texas. Robertson Springs is on private property.

PRELISTING (Describe status of conservation agreements or other conservation activities): None.

REFERENCES:

Arnold C.L. and C.J. Gibbons. 1996. Impervious surface coverage: the emergence of a key environmental indicator. Journal of the American Planning Association 62(2): 243-258.

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Burton, G. and C. Ingersoll. 1994. Evaluating the toxicity of sediments. *In* The ARCS Assessment Guidance Document. EPA/905-B94/002. Chicago, Illinois.

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City of Austin. 1998. A 319 nonpoint source grant project - urban control technologies for contaminated sediments. City of Austin, Drainage Utility Department, Environmental Resources Management Division. Water Quality Report Series City of Austin-ERM/ 1998. Austin, Texas.

Harfenist, A., T. Power, K. Clark, and D. Peakall. 1989. A review and evaluation of the amphibian toxicological literature. Technical Report No. 61. Canadian Wildlife Service. Ottawa, Canada.

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Price, A., P. Chippindale, and D. Hillis. 1995. A status report on the threats facing populations of perennibranchiate hemidactyliine plethodontid salamanders of the genus *Eurycea* north of the Colorado River in Texas. Draft final section 6 report, part III, project 3.4, grant no. E-1-4. Funded by U.S. Fish and Wildlife Service and Texas Parks and Wildlife Department under section 6 of the Endangered Species Act. Austin, Texas.

Schueler, T.R. 1991. Mitigating the adverse impacts of urbanization on streams: A comprehensive strategy for local government. Pages 114-123 *in* Nonpoint Source Watershed Workshop: Nonpoint Source Solutions. Environmental Protection Agency Seminar Publication EPA/625/4-91/027. Washington, D.C.

Schueler, T.R. 1994. The importance of imperviousness. Watershed Protection Techniques, Volume 1(3). Center for Watershed Protection. Silver Spring, Maryland.

Texas State Data Center. 2000. Projections of the population of Texas and counties in Texas by age, sex, and race/ethnicity for 1990-2030. Produced by Texas Agricultural Experiment Station, Texas A&M University. College Station, Texas.

U.S. Census Bureau. 2000. County population estimates for July 1, 1999 and population change for July 1, 1998 to July 1, 1999. Population estimates program, population division, U.S. Census Bureau. Washington, D.C.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2*
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: Limited distribution of this species makes it extremely vulnerable to extinction from degradation of water quality and decreased water quantity.

Imminence: This species occurs in one of the most rapidly growing regions in the United States, making the loss of spring flow and degradation of water quality an imminent threat of total habitat loss.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all additions of species to the candidate list, annual retentions of candidates, removal of candidates, and listing priority changes.

Approve: Tom Bauer _____ March 14, 2003

Acting Regional Director, Fish and Wildlife Service Date

Concur: _____ _____

Director, Fish and Wildlife Service Date

Do not concur: _____ _____

Director, Fish and Wildlife Service Date

Director's Remarks: _____

_____

Date of annual review: February 2003

Conducted by: Paige Najvar

(rev. 7/02)