CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Eurycea naufragia*

COMMON NAME: Georgetown 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: 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 Georgetown salamander was published by Chippindale et al. (2000). This species was formerly included in the *Eurycea neotenes* species group. The Georgetown salamander was formerly a category 2 candidate species on the Service=s proposed Animal Candidate Review for Listing as Endangered or Threatened Species (59 FR 58982). Category 2 candidates were those taxa for which we had information indicating that proposing to list as endangered or threatened was possibly appropriate, but for which sufficient data on biological vulnerability and threats were not currently available to support a proposed rule. Beginning with our February 28, 1996, Notice of Review (61 FR 235), we discontinued the designation of multiple categories of candidates, and we now consider only taxa that meet the definition of former category 1 taxa as candidates for listing.

Description - The Georgetown salamander is entirely aquatic and neotenic, meaning it does not metamorphose into a terrestrial adult. Adults are about 2 inches long. It is characterized by a broad, relatively short head with three pairs of bright-red gills on each side behind the jaws, a rounded and short snout, and large eyes with a gold iris. The upper body color is generally greyish with varying patterns of melanophores and iridophores, while the underside is pale and translucent. The tail tends to be long with poorly-developed dorsal and ventral fins that are golden-yellow at the base, cream-colored to translucent toward the outer margin, and mottled with melanophores and iridophores. Unlike the Jollyville Plateau salamander, the Georgetown salamander has a distinct dark border along the lateral margins of the tail fin (Chippindale et al. 2000).

Habitat/Range - The Georgetown salamander is known from springs along 5 tributaries (South, Middle, and North forks; Cowan Creek; and Berry Creek) to the San Gabriel River and one cave in the City of Georgetown, Williamson County, Texas.

Population Status - Because this species spends a portion of its life underground, and the technology to safely and reliably mark salamanders for individual recognition has not been developed, population estimates are not possible at this time. However, anecdotal information suggests population declines and individual deformities following water quality degradation (see threats, below).

THREATS

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

Primary threats include degradation of water quality and quantity due to urbanization. The Georgetown salamander occurs in an area that is undergoing rapid urban expansion. Williamson County grew 7.7% between 1998 and 1999 (U.S. Census Bureau 2000). Based on population projections from the Texas State Data Center (2000), the population of Williamson County in 2030 is projected to be 7 times the size of the 1990 population (projected increase from 139,551 to 989,139). Georgetown is the fastest growing city in Williamson County, and Williamson County is the second fastest growing non-urban county in the United States (Georgetown Chamber of Commerce 2000).

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, "profound 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).

Research suggests that increases in impervious cover exceeding 10 percent are associated with measurable water quality degradation, loss of sensitive aquatic organisms, reduction in stream biodiversity, stream warming, and channel instability within a watershed (Schueler 1994). Stream aquatic life problems have been identified with watersheds having impervious cover of at least 12 percent, with severe problems in watersheds with impervious cover greater than 30 percent. Generally, stream quality impairment can be prevented if watershed imperviousness does not exceed 15 percent and for more sensitive stream ecosystems watershed imperviousness should not exceed 10 percent (Klein 1979).

Chippindale et al. (2000) state that populations of Georgetown salamanders in the City of Georgetown are Aon the brink of extinction.@Populations along Cowan Creek lie within the Sun City Georgetown retirement community, designed to accommodate 9,000 homes. Salamander sites along the Middle Fork of the San Gabriel River are near and downstream from a large quarry (Chippindale et al. 2000). Many of the springflows have been reduced and the San Gabriel River raised to the point that the direction of flow is often reversed, with river water flowing into the springs (Price et al. 1995).

B. Overutilization for commercial, recreational, scientific, or educational purposes.

None known.

C. Disease or predation.

None known.

D. The inadequacy of existing regulatory mechanisms.

No Federal, State, or local laws provide for the protection of the Georgetown salamander.

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

The Georgetown salamander has a very limited distribution and appears to be highly sensitive to water quality and quantity degradation. Research indicates that amphibians, particularly their eggs and larvae, 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:

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): Based on the known range, it appears that all of the Georgetown salamander locations are under private ownership.

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.

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

Chippindale, P., A. Price, J. Weins, and D. Hillis. 2000. Phylogenetic relationships and systematic revision of central Texas hemidactyline plethodontid salamanders. Herpetological Monographs 14:1-80.

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.

Georgetown Chamber of Commerce. 2000. http://www.georgetownchamber.org.

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.

Klein, R.D. 1979. Urbanization and stream quality impairment. Water Resources Bulletin 15(4): 948-963.

Mayer, F. and M. Ellersieck. 1986. Manual of acute toxicity: Interpretation and data base for 410 chemicals and 66 species of freshwater animals. U.S. Fish and Wildlife Service Resource Publication 160. Washington, D.C.

Phipps, G., V. Mattson and G. Ankley. 1995. The relative sensitivity of three freshwater benthic macroinvertebrates to ten contaminants. Arch. Environ. Contam. Toxicol. 28:281-286.

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, 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

Comments: _____

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(rev. 7/02)