1 CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Pyrgulopsis trivialis*

COMMON NAME: Three Forks springsnail

LEAD REGION: 2

INFORMATION CURRENT AS OF: Feb. 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: ___
___ 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 "species."
___ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Gastropoda, Hydrobiidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Arizona

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Arizona, Apache County

LEAD REGION CONTACT (Name, phone number): Susan Jacobsen (505) 248-6641

LEAD FIELD OFFICE CONTACT (Office, name, phone number): Arizona Ecological Services Field Office, Phoenix, Mike Martinez, (602) 640-2720 x 224

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

Hydrobiid snails occur in springs, seeps, marshes, spring pools, outflows, and diverse lotic (flowing) waters. The most common habitat for *Pyrgulopsis* is a rheocrene, or a spring emerging

from the ground as a free-flowing stream. Three Forks springsnail habitats are isolated, permanently saturated, spring fed aquatic climax communities commonly described as ciénegas. This species was describe by Taylor (1987). Firm substrates such as cobble, gravel, woody debris, and aquatic vegetation are typical. *Pyrgulopsis* snails are rarely found on or in soft sediment. Aquatic vegetation within these habitats includes watercress (*Nasturtium* spp.), *Ranunculus*, and filamentous green algae. Springsnails are commonly found among watercress. Other mollusks include *Anodonta californiensis, Valvata humeralis, Physa gyrina, Radix auricularia, Gyraulus parvus, Pisidium casertanum, P. compressum,* and *P. variabile*.

The Three Forks springsnail is an endemic species with distribution limited to the Three Forks Springs (T5N, R29E) and Boneyard Springs (T6N, R29E) spring complexes in the North Fork East Fork Black River Watershed of east-central Arizona. The springsnail is known from free-flowing spring heads, concrete boxed spring heads, spring runs, and spring seepage at these sites. Three Forks Springs consists of more than ten spring heads confined to an area of approximately 0.1 $km^2$. The extirpation of springsnails from at least two concrete boxed spring heads at Three Forks Springs has been confirmed (see threats below).

Recent studies have provide some insight into habitat preferences and population sizes. Preliminary analysis of substrate influence on Three Forks springsnail density, based on data collected during the summer of 2001, revealed that snail densities were significantly higher in gravel/cobble substrate versus sand/silt substrate, particularly when watercress was present (Martinez and Myers, 2002). Initial calculations during April 2002, from a single spring run at Three Forks Springs showed a total population size = 129,135 springsnails, SE = 31,511, within a habitat area of 213.09 $m^2$, and a density = 606 springsnails $m^2$, SE = 148, (Martinez, unpublished data). These calculations were based on the methodology described by Seber (1982) and Cochran (1977), and although they are characterized by large standard errors they indicate that Three Fork springsnail populations may be large, at least seasonally.

Monitoring surveys by Arizona Game and Fish Department (AGFD), the U.S. Forest Service, and the U.S. Fish and Wildlife Service (FWS) in 2001-02 revealed a preliminary estimate of average springsnail density at the Three Forks complex (samples pooled from 3 springs) was: approximately 60 snails/$m^2$ during the Summer (Nelson et al, 2002). Individually, springs at Three Forks varied in snail densities of 0 to nearly 300 snails/$m^2$. The preliminary estimate of average springsnail density at the Boneyard Bog complex (samples pooled from 6 springs) was: approximately 790 snails/$m^2$ during the Summer (Nelson et al, 2002). Individually, springs at Boneyard Bog varied in snail densities of approximately 90 to 9300 snails/$m^2$. Most springsnails at Boneyard Bog were found within the first 5 m of the drainage from the springhead. In contrast, Three Forks snails appear to have lower densities throughout the spring drainages, not concentrated near the springheads (Nelson et al, 2002).

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 a change in listing priority, explain reasons for change**):

A. <u>The present or threatened destruction, modification, or curtailment of its habitat or range</u>.

Throughout most of the 20th century, Three Forks and Boneyard Springs have been subjected to various levels of livestock grazing. In the mid- and late 1990's livestock were fenced out of the immediate areas containing the spring complexes, although trespass livestock may occasionally gain access to springsnail sites. Ungulate grazing can result in significant degradation of the aquatic environment and has been implicated in the extirpation of other hydrobiid snails.

Although cattle have largely been removed, free-ranging elk (*Cervus elaphus*) have access to all spring areas containing springsnails. During the summers of 1999 and 2000 Forest Service and FWS biologists became concerned with potential effects of elk at Boneyard Springs. Observations of elk within the Boneyard Bog livestock exclosure appear to correlate with the occurrence of elk wallows, heavy grazing of *Carex*, and soil disturbance from elk hooves within the livestock exclosure. Elk impacts at Three Forks appear at this time to be much less consequential to the riparian and aquatic habitats than at Boneyard Bog. AGFD biologists believe that although elk wallowing at Boneyard may be a problem for maintaining springhead integrity, the amount of habitat disturbed is not alarming (AFGD, 2003). Our primary concern with elk wallowing is that bank degradation of spring runs may be correlated with changes in substrate composition within springsnail habitats. Specifically, wallowing may result in the filling of gravel substrates with fine sediments, which data suggests are less conducive to occupation by springsnails.

Three Forks Springs has also been affected by modifications of natural spring head integrity. During the 1930's concrete boxes were constructed around four of the spring heads at the Three Forks site. However, it does not appear that these modifications have negatively affected habitat suitability for the species and springsnails have been known to be locally abundant within spring boxes and associated outflows. We are unaware of any proposed projects or management plans that would further modify springsnail habitats.

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

The Three Forks springsnail has been subjected to a limited number of scientific studies aimed at determining taxonomic and distributional status. However, these studies have occurred on a small scale and are not believed to have had discernible effects on any population. The springsnail is not utilized for commercial or recreational purposes.

C. Disease or predation.

Non-native crayfish (*Oronectes viriles*) have invaded several spring heads within Three Forks Springs and they are known to directly prey upon aquatic invertebrates such as springsnails. Crayfish are also known to consume aquatic macrophytes and algae that springsnails rely on for grazing and egg laying. Due to its geographic isolation, the Three Forks springsnail is not evolutionarily adapted to cope with crayfish, perhaps making the species particularly susceptible to crayfish predation.

In May 2000, field investigations at Three Forks Springs revealed that the Three Forks springsnail is entirely absent from at least two boxed spring heads within which it was previously abundant. The extirpation of the species from these spring boxes seems to

coincide with the invasion of crayfish. Though definitive effects of crayfish on springsnail populations is unknown, we believe an intensive crayfish trapping program may serve to reduce unnatural predatory pressure on the Three Forks springsnail. Crayfish do not occur in large numbers at Boneyard Springs.

D. The inadequacy of existing regulatory mechanisms.

The Three Forks springsnail is currently not protected by any Federal statutes or regulations. The springsnail is listed under Arizona Game and Fish Commission Order 42 which establishes no open season for the species. This order prohibits direct taking of the species but does not prohibit spring modification or habitat destruction.

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

The North Fork East Fork Black River watershed is a popular area for public recreation such as fishing, hiking, hunting, and wildlife viewing. Recreation affects springsnails through habitat vandalism, introduction of pollutants or other contaminants, and introduction and spread of non-native aquatic organisms. Three Forks Springs is particularly susceptible because it is adjacent to a major Forest Service road and the North Fork East Fork of the Black River, which provides good fishing opportunities. The spread of crayfish at Three Forks Springs is primarily due to "bait bucket" releases by anglers. Additionally, campers and day hikers have been known to wash dishes and other camping equipment at Three Forks Springs resulting in the introduction of detergents, bleach, and other pollutants that can impair essential physiological processes of springsnails. Boneyard Springs is less susceptible to these threats because it is more isolated with access only possible by hiking from a 4-wheel drive road.

Lastly, endemic springsnails whose populations exhibit a high degree of geographic isolation are extremely susceptible to stochastic extinction resulting from catastrophic natural disasters such as fires, floods, or changes in spring water chemistry.

BRIEF SUMMARY OF REASONS FOR REMOVAL OR LISTING PRIORITY CHANGE: n/a

FOR RECYCLED PETITIONS: n/a

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):

The entire range of the species is within lands managed by the Apache/Sitgreaves National Forests.

PRELISTING (Describe status of conservation agreements or other conservation activities):

We are currently working with the Forest Service, Arizona Game and Fish Department, and Nature Conservancy to develop a candidate conservation agreement for the Three Forks springsnail.

A standardized monitoring protocol was developed by interagency cooperators in the summer of 2001 and refined in the summer of 2002. An intensive crayfish control and eradication effort at Three Forks started in the Summer of 2002. The AGFD has at least 3 staff biologists working on conservation and monitoring of the Three Forks springsnail. Initial funding for AGFD to manage this mollusk was provided from a Section 6 grant, Arizona Heritage Funds, and Nongame Wildlife Checkoff Donations. Recently, AGFD has secured a State Wildlife Grant for the conservation and management of mollusks of greatest conservation need in Arizona—which will include the Three Forks springsnail.

REFERENCES (Identify primary sources of information (e.g., status reports, petitions, journal publications, unpublished data from species experts) using formal citation format):


Arizona Game and Fish Department. 2003. Letter to Steven L. Spangle, Field Supervisor, from Duane L. Shroufe, Director. January 21, 2003.

Cochran, W.G. 1977. Sampling techniques. Third edition. John Wiley and Sons, New York, N.Y. 428pp.

Fernandez, P.J. and P.C. Rosen. 1996. Effects of the introduced crayfish *Oronectes virilis* on native aquatic herpetonfauna in Arizona. Final Report to Heritage Program, Arizona Game and Fish Department. 70 p.

Hershler, R. and J.J. Landye. 1988. Arizona Hydrobiidae (Prosobranchia: Rissoacea). Smithsonian Contributions to Zoology. No. 459. 63 p.

Hershler, R. 1994. A review of the North American freshwater snail genus *Pyrgulopsis* (Hydrobiidae). Smithonian Contributions to Zoology, Number 554. Smithsonian Institution Press. Washington D.C. 52 p.

Landye, J.J. 1973. Status of inland aquatic and semi-aquatic mollusks of the American southwest. USDI Fish and Wildlife Service (Bureau of Sport Fisheries and Wildlife), Washington, D.C. 60 p.

Landye, J.J. 1981. Current status of endangered, threatened, and/or rare mollusks of New Mexico and Arizona. USDI Fish and Wildlife Service (Bureau of Sport Fisheries and Wildlife), Albuquerque, NM. 35 p.

Martinez, M.A. and T.L. Myers. 2002. Preliminary analysis of substrate influence on density of Three Forks springsnail, based on data collected during the summer of 2001. Short report presented at the Three Forks Springsnail Workgroup Meeting, February 4, 2002.

Nelson, C.B., J.A. Sorensen, and A.K. Jontz. 2002. Three Forks springsnail monitoring interim progress report. Nongame and Endangered Wildlife Program, Arizona Game and Fish Department, Phoenix, Arizona.

Seber, G.A.F. 1982. The estimation of animal abundance and related parameters. Second edition. Macmillan Publishing Co, Inc. New York, N.Y. 653pp.

Taylor, D.W. 1987. Fresh-water molluscs from New Mexico and vicinity. New Mexico Bureau of Mines and Mineral Resources. Bulletin 116. Socorro, New Mexico. p 30-32.

LISTING PRIORITY (place * after number)

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:* The threats of elk and crayfish are currently being evaluated by an interagency team of cooperators. Crayfish trapping has been implemented at Three Forks springs to help alleviate any potential predatory pressure. However, efforts to exclude access by elk to springs occupied by snails have not been realized and funding to continue crayfish trapping may cease.

*Imminence:* In the absence of a management strategy to effectively address the threat from both elk and crayfish in a long-term fashion, we believe the immediacy of threats to be imminent.

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: Feb. 2003

Conducted by: Mike Martinez

Comments: _____
_____
_____

(rev. 7/02)