



Center for Biological Diversity

*Protecting and restoring endangered species and wild places of Western North America
and the Pacific through science, policy, education, and environmental law.*

April 11, 2002

Ms. Gale Norton
Secretary of the Interior
Office of the Secretary
Department of the Interior
18th and "C" Street, N.W.
Washington, D.C. 20240

**RE: 1. Appeal for Emergency Listing and Critical Habitat Designation for
the Page Springsnail**

**2. Petition to List the Page Springsnail as an Endangered Species
With Critical Habitat**

Ms. Norton,

Pursuant to Section 4 of the Endangered Species Act, (16 U.S.C. 1531 et seq.), pursuant to the U.S. Fish and Wildlife Service's regulations for listing (50 CFR 424.14) and for designating Critical Habitat (424.12), and pursuant to the Administrative Procedures Act (5 U.S.C. 553); this is a formal petition:

1. For listing of the isolated regional (locally-endemic) population of Page Springsnail (*Pyrgulopsis morrisoni*) in the Verde Valley of the Southwestern United States; and
2. For designation of the Critical Habitat inclusive of all extant and historic populations sufficient to recover the species within the Oak Creek Springs complex of the Verde Valley.

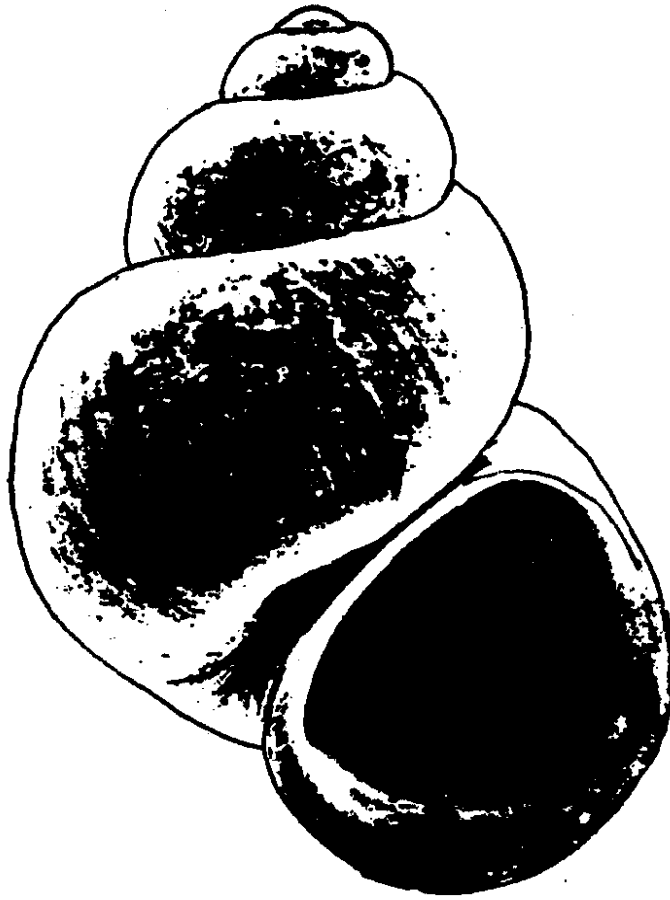
Please note: Due to significant ongoing and impending destruction of the remaining necessary habitat of the few surviving Page Springsnails, this is also an urgent appeal for emergency listing and for emergency designation of Critical Habitat. Emergency listing and emergency designation of Critical Habitat would be pursuant to Section 4(b)(7) of the Endangered Species Act and pursuant to 50 CFR 424.20.

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I. Photographs / Illustrations

A. Page Springsnail, illustration by Hershler and Landye, 1988



Hershler and Landye 1988

B. Bass House Springs Habitat Modifications



Bass House Springs, on Arizona Game and Fish (AGFD) property, former Page Springsnail habitat after undergoing recent modifications by AGFD. Note inundation of springhead, riprap, and lack of vegetation. (Photo by USFWS, 2001)

Bass House Springs, exterior of building over inundated springhead (see above). (Photo by USFWS, 2001)





Bass House Springs, cinderblock foundation and riprap inundate the springhead and hold water back from flowing into the Page Springs watercourse (note gap in understory where water previously flowed). (Photo by USFWS, 2001)

II. Figures

A. Page Springsnail Habitat Status

Spring	Owned By	Location	Modifications/Use	Page Springsnail Status
Shea (Tavaschi)	Phelps Dodge [†]	T16N, R3E Sections 15, 22 [†]	Once drained and managed for livestock forage; now provides recreation & habitat [†]	Extirpated [†]
Fry	Calvin Frey [†]	T16N, R4E Sections 15 [‡]	Spring runs to impoundment/pond*	Extirpated/ Unknown [#] Unsecured*
Turtle	Hugh Green [†]	T16N, R4E Sections 23 [‡]	Livestock watering [†]	Extirpated/ Unknown [#] Unsecured*
Lolomai	Lolomai Resort [†]	T16N, R4E Sections 14 [‡]	Ponded, human-created impoundments*; once used for recreational sport fishing [†]	Extirpated/ Unknown [#] Unsecured*
Bubbling	Arizona Game & Fish Department [†]	T16N, R4E Sections 23 [‡]	Ponded, human-created impoundments*; once used for agriculture, now fish production [†]	Most viable recent populations, current status unverified [†]
Page (Cave)	Arizona Game & Fish Department [†]	T16N, R4E Section 26 [‡]	Converted to an underground collection pool, no surface flow; once used for agriculture [†]	Extirpated [†]
Bass House	Arizona Game & Fish Department [†]	T16N, R4E Sections 23 [‡]	Covered, first with wooden shed, now corrugated metal & fencing, cobble in spring bed; once used for agriculture, now fish production [†]	Minimal or Extirpated. Only location was below outflow box, which was recently renovated [†]

*AGFD 1988

#USFWS 2001C

‡USFWS 1999 F

†USFWS 2001A

B. Map of Page Springsnail Locations – Oak Creek Springs Complex
(Courtesy of USFWS)

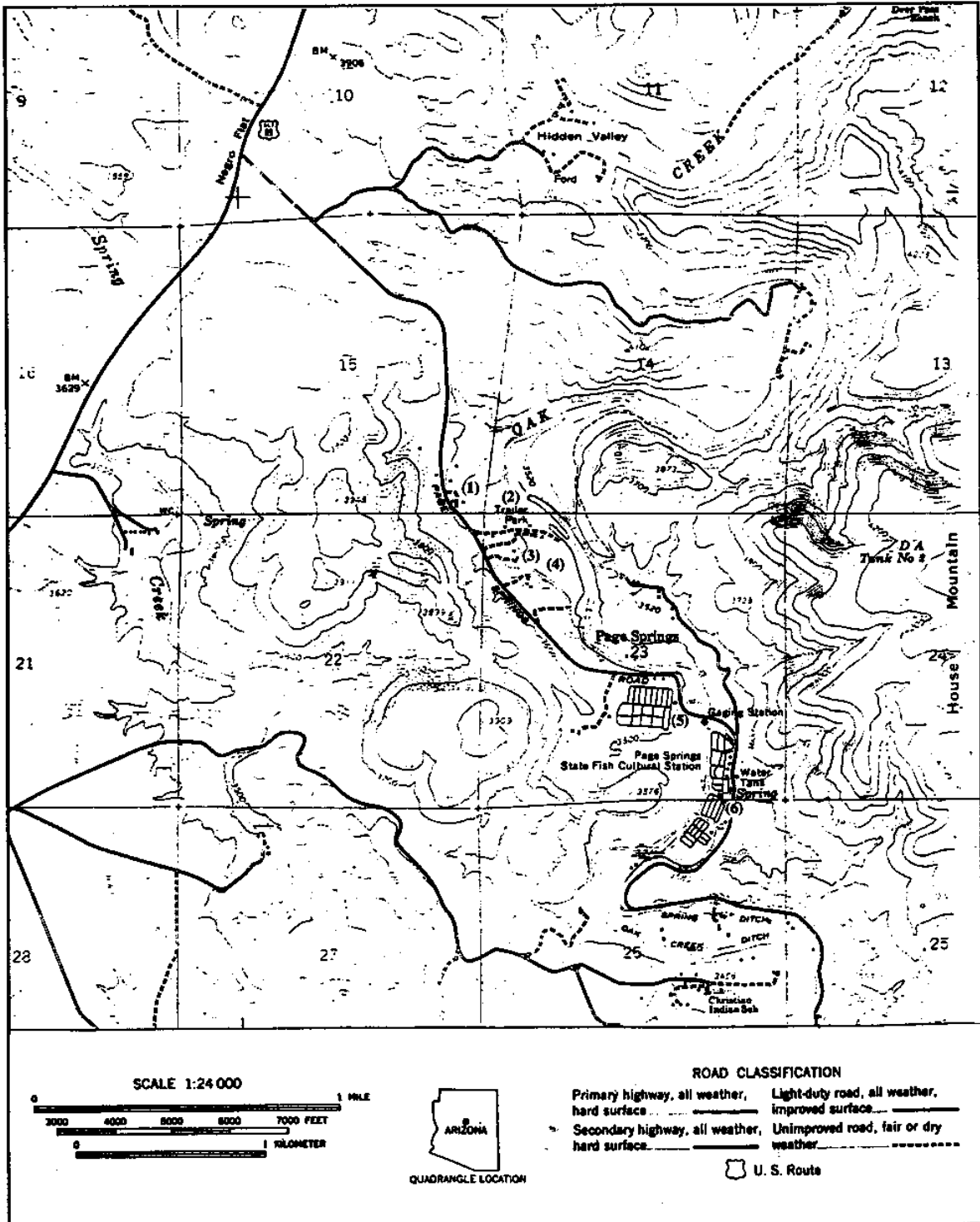


Figure 1. Approximate locations of springheads of the Oak Creek springs complex: (1) Fry Springs, (2) Lolomai Springs, (3) Bubbling Springs, (4) Turtle Springs, (5) Bass Springs, and (6) Page Springs. Adapted from U.S. Geological Survey map, Page Springs Quadrangle (T16N, R4E).

TABLE OF CONTENTS

I.	Photographs / Illustrations	
	A. Page Springsnail Illustration	p. 2
	B. Bass House Springs Habitat Modifications	p. 3
II.	Figures	
	A. Page Springsnail Habitat Status	p. 5
	B. Map of Page Springsnail Locations – Oak Creek Complex	p. 6
	C. Map of Page Springsnail Location – Shea Springs	p. 7
III.	Executive Summary	p. 9
IV.	Background, Current Status and Listing History	p. 10
V.	Taxonomy	p. 13
VI.	Description	p. 13
VII.	Population Distribution	p. 14
VIII.	Habitat	p. 14
IX.	Natural History, Population Trends and Current Status of Population	p. 15
X.	Current and Potential Threats—Summary of Factors for Consideration	
	A. Destruction, modification, or curtailment of habitat or range	p. 16
	B. Over utilization for commercial, recreational, scientific or educational purposes	p. 18
	C. Disease or predation	p. 18
	D. The inadequacy of existing regulatory mechanisms	p. 19
	E. Other natural or manmade factors affecting Page Springsnail continued existence.....	p. 19
XI.	Habitat Requirements—Critical Habitat	p. 23
XII.	Additional Concerns	p. 23
XIII.	Conclusion	p. 23
XIV.	Bibliography	p. 25

III. Executive Summary

The Page Springsnail (*Pyrgulopsis morrisoni*) is an aquatic snail locally endemic to the Verde Valley. (Hershler and Landye 1988, as cited in USFWS 2001A) This snail exists in as few as only one to six springs on earth (see chart, figure p. 5), within the Oak Creek Springs complex near Page Springs, Yavapai County (T16N, R4E, Sections 14, 15, 23, 26), Arizona (figure p. 6). The species is in imminent danger of extinction because:

- A. Page Springsnails appear to be reliant on springheads and outflow channels in the immediate vicinity of springheads for appropriate habitat. (Raisanen 1991)
- B. All springheads within the Oak Creek complex have been modified by humans (USFWS 2001A), including very recently (USFWS photos of AGFD managed springheads 2001, photos pp. 3 and 4).
- C. The species' habitat is threatened by overdraft groundwater pumping and diversions (Likens 2000, ADWR 2001, AGFD 2001), and adequate regulations for protection are absent.
- D. The species, as a local endemic, is particularly subject to catastrophic events. (USFWS 2001A)

Invertebrates are inherently important parts of our ecosystems. In the Page Springsnail we find a window to the health of the springs in the Oak Creek Springs complex:

“The vast majority of animals on earth are invertebrates. These microfauna play critical roles in energy flow and nutrient recycling in aquatic and terrestrial environments, and the sustainability of the earth's ecosystems depends upon their persistence. Springsnails in particular are excellent biological indicators of spring health and aquifer integrity and their presence provides valuable insight into the condition of water resources and aquatic ecosystems.” (USFWS 1999A)

The preferred habitat of the Page Springsnail is found at 1,070 meters in elevation. The greatest populations are found around permanent natural, free-flowing, shallow springheads and extend into the seeps, pools, marshes, and outflows. (Hershler and Land 1988, Raisanen 1991, as cited in USFWS 2001A) Only habitat immediately around the springhead is appropriate for supporting viable populations. (Raisanen 1991) The majority of springs that historically supported populations of Page Springsnails are currently maintained as inundated by man-made impoundments. *At least* one population has been extirpated and total habitat area has been significantly reduced and modified; Page Springsnail populations are declining due to habitat loss and modification. (USFWS 2001B, USFWS 1999B, Raisanen 1991)

Page Springsnail habitat lies within both private and public lands. Fry, Turtle and Lolomai Springs are on private lands, and the status of Page Springsnail populations at these sites is unknown and possibly extirpated. (USFWS 2001C) The population historically

present at Shea (Tavaschi) Springs (T16N, R3E, Sections 15 and 22; figure p. 7), owned by Phelps Dodge Corporation, has been extirpated. (USFWS 2001A) The Arizona Game and Fish Department (AGFD) owns property containing Bubbling Springs, Page (Cave) Springs and Bass House Springs. AGFD uses these springs for operation of its Page Springs Hatchery and Bubbling Ponds Hatchery. AGFD motivation for preservation of the Page Springsnail is clear: "The Bubbling Pond Hatchery supports the protection of the Page Springsnail to the extent that normal hatchery operations are not jeopardized." (AGFD 1999A) Ongoing modifications for operations at both hatcheries and hatchery management priorities continue to threaten Page Springsnail habitat.

The Oak Creek springs complex is threatened by groundwater pumping and stream diversions, further endangering the continued existence of the Page Springsnail. Water levels at Page (Cave) Springs has declined by one cubic foot per second between 1996 and 2000, reducing water available to the hatchery, and reducing habitat available for the Page Springsnail. (AGFD 2001B)

The critical importance of all surviving habitat, and the essential survival of the endemic Page Springsnail, allows little time to implement anything other than a complete moratorium on all destruction of remaining Page Springsnail habitat. U.S. Fish and Wildlife Service (USFWS) policy states that "...species should be considered for emergency listing when the immediacy of the threat is so great that a routine listing is not sufficient to prevent large losses or extinction."

Emergency listing and simultaneous emergency designation of Critical Habitat are both absolutely necessary to stop the ongoing modifications to springheads and the loss of viable Page Springsnail habitat. A proposed rule for listing the Page Springsnail and Critical Habitat has already been developed by USFWS. (USFWS 2001D)

IV. Background, Current Status and Listing History

Many freshwater mollusks are threatened or endangered by extinction in North America and globally. The Arizona Game and Fish Department's Commission Order 42 (Crustaceans and Mollusks), prohibits unauthorized collection of the Page Springsnail. (USFWS 2000A) However, this regulation does not protect habitat or the snail against other forms of removal or death.

The species is currently a candidate for listing pursuant to the Endangered Species Act (ESA) of 1973 as amended (16 U.S.C. 1531 et seq.). The Page Springsnail received Category 2 Candidate status in the Endangered and Threatened Wildlife and Plants; Annual Notice of Review on January 6, 1989 (USFWS 1989), until it was changed to Category 1 Candidate status on August 21, 1995. (USFWS 1996) The category was changed as information regarding biological threats and vulnerability supported issuance of a proposed rule to list the species as threatened or endangered. On December 5, 1996, a rule was finalized which discontinued the Category 2 Candidate status and renamed Category 1 Candidate status as simply Candidate status. When this rule was proposed in the February 28, 1996 USFWS Endangered and Threatened Wildlife and Plants Review of Plant and Animal Taxa, the Page Springsnail was included in the notice and was included again in the 1997 and 1999 USFWS reviews. According to recent

documentation: “The USFWS has sufficient information on biological vulnerability and threats on file to support issuance of a proposed rule to list the Page springsnail.” (USFWS 2001A)

A Candidate Conservation Agreement with Assurances (CCAA) has been in draft form since May 5, 2000 and a draft Conservation Assessment and Strategy was issued February 1999. No final documents have been issued to date.

In response to the revised draft CCAA issued by AGFD October 6, 2000, USFWS commented that, as written, the document was insufficient to protect or restore the Page Springsnail:

“We believe the current CCAA standards, or conservation criteria, are inadequate for the Service to make the required determination that the benefits of the specific conservation measures to be implemented, when combined with those benefits that would be achieved if it is assumed that the conservation measures were also implemented on other necessary properties, would preclude or remove the need to list the Page Springsnail. As currently written, only one population of the snail would be reestablished within its historic range. Restoration of modified habitats to their natural condition and replacement of habitats that were entirely eliminated need to be part of the CCAA standard.” (USFWS 2000B)

USFWS has been expressive that the draft CCAA fails to sufficiently protect the species:

“I just wanted to make sure that you understand that I personally continue to have serious reservations about the conservation strategy and the approach the agreement takes to address removal of threats. These concerns have been relayed time and again.” (USFWS 2001E)

Problems with the draft CCAA are multiple and include (as compared to USFWS draft Candidate Species Guidance Handbook, November 1994, p. 13-21, handbook guidelines listed as quote followed by petitioner comments):

- A.** Habitat should be “under control of one or a few land managers, all of whom are involved in the conservation efforts...” The draft CCAA for the Page Springsnail has still not incorporated commitments by landowners other than AGFD and Phelps Dodge Corporation. At least one landowner, Calvin Frey, has refused participation. USFWS further states in its Candidate and Listing Priority Assignment Form for the Page Springsnail: “The inability to secure conservation commitments may require a listing action.” (USFWS 2001B)
- B.** Habitat should be “relatively intact in its ability to continue to support the species...” Habitat has already been modified throughout the species’ range. Continued and ongoing alterations to habitat by AGFD are causing less of the original habitat to be viable (see photos pages 3 and 4 of riprap and metal shed).

- C. “[C]onservation actions involve refraining from or curtailment of some planned or ongoing activity that degrades or destroys habitat for the species...” AGFD continues to modify habitat without consulting cooperators including USFWS.
- D. “[C]onservation actions modify some activity that constitutes a principle threat to a species...” Springhead inundation and habitat modifications continue by AGFD and landowners. Hatchery operations continue to be conducted at the peril of the Page Springsnail.
- E. “[S]taff and funding are readily available to carry out the provisions of the CA...” Funding for the conservation measures and provisions of the CCAA has yet to be established, and a grant for funding research was denied by AGFD Heritage Fund. (AGFD 2000B)
- F. Additional guidelines for the CA detail that the document “should contain explicit milestones for accomplishment of recovery objectives...” As expressed by USFWS (USFWS 2000B), the draft CCAA for the Page Springsnail does not contain clear, tangible actions for implementation as conservation measures. The draft CCAA is clearly deficient in this regard.
- G. “A signed Conservation Agreement should be reviewed at least annually.” In almost two years of composition, no final CCAA has been issued, and actions by AGFD that further destroy Page Springsnail habitat continue.

The establishment of a Conservation Agreement should not be considered in and of itself adequate to preclude the listing of a species. In Save Our Springs Alliance v. Babbitt, MO-96-CA-168 (Judgment Order, March 25, 1997), it was concluded that “...the Secretary placed the continued existence of a species, found only one place in the natural world, in the hands of state agencies and a Conservation Agreement with no proven track record for success. It may well come to pass that the Conservation Agreement passes with flying colors in its intended effect of eliminating the risk to the species and is the best possible way to accomplish that aim. However, absent some historical data to back the decision that the Conservation Agreement is sufficient to adequately protect the species, it is arbitrary and capricious to conclude that at this time.”

Within the Findings of Fact for this case, the Order states that the very restricted range of the Barton Springs Salamander made it especially vulnerable to any adverse conditions, including groundwater contamination. The Page Springsnail, in turn, is similarly restricted in range and highly vulnerable to adverse conditions, such as groundwater depletion and habitat modifications.

The Conservation Agreement for the Barton Springs Salamander listed numerous conservation actions, however the court found that none of the actions significantly reduced the immediate threats to the species. The Findings state: “...the terms and phrases ‘identify,’ ‘evaluate,’ ‘review,’ ‘develop,’ ‘work with’ and ‘establish’ used in the Conservation Agreement... do not take any tangible steps to reduce the immediate threat to the species.”

Such terms make up the majority of the conservation measures listed in the CCAA for the Page Springsnail. For example, “Establish and Implement an Informal Workgroup,” “Identify Funding Sources...,” “Develop a Springsnail and Hydrological Monitoring Programs,” “Evaluate the Integrity and Connectiveness of the Aquifer Supplying the Springs Supporting Page Springsnail Habitat,” “Identify and Evaluate Opportunities to Create New Habitat or Restore Springheads to Historic Condition,” and “Identify Source Population(s) for Re-establishment Efforts.” In fact, only two measures indicate potentially tangible steps to reduce threats: “Translocate Page Springsnails to Suitable Habitats” and “Prevent Future Detrimental Habitat Modification at Known Localities.” The latter prevention, however, only requests that cooperators of the agreement notify USFWS 30 days in advance, “when appropriate and feasible,” of modifications likely to negatively impact Page Springsnails.

Within the Conclusions of Law in the Barton Springs case, the Order states that “(t)he Secretary cannot use promises of proposed future actions as an excuse for not making a determination based on the existing record.”

In addition, “(a)ny listing decision that considers the Conservation Agreement will be deemed by this Court to be arbitrary and capricious until sufficient time has elapsed to permit the Secretary to determine its effectiveness in protecting the species. This Court considers a sufficient track record to be two years.”

V. Taxonomy

The Page Springsnail was fully described by R. Hershler and J. J. Landye in 1988 as *Pyrgulopsis morrisoni*, (Prosobranchia: Rissoacea) and is one of approximately 170 Hydrobiids in the United States. (USFWS 2000A) Prior to this, Landye described the snail as a new species of *Fontelicella* in 1973 and 1981. Specimens for the classifications were taken from Page Springs, Yavapai County, Arizona, and are housed in the United States National Museum collection in the National Museum of Natural History, Smithsonian Institution. (Raisanen 1991)

VI. Description

The Page Springsnail is a medium-sized hydrobiid with an ovate to ovate-conical shell measuring 1.8 to 2.9 mm. The shell has 3.75 to 4.5 slightly convex whorls showing fine growth lines and an amber operculum. The inner lip of the shell is thin and usually adnate to the body whorl. The aperture measures less than half of the body whorl height and the umbilicus is open. Sexual dimorphism was significant in one of the two populations studied (females larger than males). (Hershler and Landye 1988)

Pigmentation is either absent or consists of light to moderate dusting throughout the head and foot, except the tentacles. The penile filament is also either unpigmented or pigmented, sometimes darkly, along the entire length. The ctenidial filaments, or gills, number between 15 and 19. The radula is distinguished by numerous cusps on the central and inner marginal teeth. The most distinctive characteristic is the elongate penis of

moderate size, with a slender filament of medium length that rarely extends beyond the relatively large penile lobe. A single glandular ridge is located near the tip of the penile lobe on the ventral surface. The testis fills 46-54% of the body length, and the seminal receptacle measures 88-105% of the bursa length. (Hershler and Landye 1988)

VII. Population Distribution

The Page Springsnail is a locally endemic species confined (since being extirpated from Shea Springs, T16N, R3E) to the Oak Springs complex of springs within the Verde Valley, Yavapai County (T16N, R4E, Sections 14, 15, 23, 26). Located along the east and west sides of Oak Creek, the 1.5 kilometer complex includes Lolomai, Fry, Turtle, Bubbling, Page and Bass House Springs.

Populations at three of the privately held springs, Fry, Turtle and Lolomai, are not currently documented and may be extirpated. Populations at Shea Springs, owned by Phelps Dodge Corporation, are known to be extirpated. (USFWS 2001C)

The Arizona Game and Fish Department owns property containing Bubbling Springs, Page Springs and Bass House Springs, and operates both the cold water Page Springs Hatchery and the warm water Bubbling Ponds Hatchery. Bubbling Springs has historically been reported to support the largest population of springsnails and is critical to the species' survival. Page Springs has been converted to an underground water collection gallery beneath the hatchery parking lot and no longer exists as surface flow. Bass House Springs, as shown in photos on pages 3 and 4, has been significantly altered by AGFD, and does not currently support a significant population of springsnails. (USFWS 2001A)

VIII. Habitat

Habitat for the Page Springsnail is permanently saturated, spring-fed aquatic climax communities, also referred to as ciénegas, located at an elevation of approximately 1,070 meters. Historic habitat at Shea Springs, approximately nine (9) miles from current habitat, has an elevation of approximately 1,005 meters. Free-flowing springs of moderate current with firm substrates, woody debris, rocks, cobble and aquatic vegetation to which the snails can attach themselves is preferred habitat. This habitat supports the production of periphytic diatoms, the primary diet of Page Springsnails. Populations are usually restricted to springheads and the upper section of outflow. (USFWS 2001A, Raisanen 1991)

Associated aquatic vegetation includes:

“... watercress (*Nasturtium officinale*), duckweed (*Lemna minor*), water parsnip (*Berula erecta*), water pennywort (*Hydrocotyl venicillata*), water speedwell (*Veronica anagalli aquatica*) and dock (*Rumex verticillatus*). Prominent aquatic macrophytes found in Bubbling Springs and Lolomai Springs include: waterweed (*Elodea occidentalis*), pondweed (*Potamogeton gramineus*), and algae (*Rhizoclonium hieroglyphicum* and

Oscillatoria rubesens). Dominant riparian vegetation along Oak Creek and the springs includes: velvet ash (*Fraxinus velutina*), Fremont cottonwood (*Populus fremontii*), Arizona sycamore (*Plantanus wrightii*), willow (*Salix* spp.), mesquite (*Prosopsis* spp.) and berry bush (*Rubus* spp.).” (USFWS 2001A)

Associated native fauna includes:

“... amphipods (*Crangonyx gracilis* and *Hyaella azteca*), caddiesflies (*Protophila balmorhea* and *Metrichia volada*), other snails (*Physella virgata* and *Planorbella duiyi*), and an endemic species of leech (*Motobdella suddenness*) at Bubbling Springs pond (Govedich and others 1998).” (USFWS 2001A)

Aquatic vegetation in Shea Springs, historic Page Springsnail habitat, includes:

“... cattails (*Typha* spp.), bulrush (*Scirpus* spp.), and sedge (*Carex* spp.). Surrounding the marsh are cottonwood, willow, and mesquite trees.” (USFWS 2001A)

Possible limiting factors to the viability of otherwise appropriate habitat may be levels of dissolved CO₂ and alkalinity, however the roles of these factors has not been thoroughly researched:

“As spring water moves away from the orifice, dissolved CO₂ levels decrease, perhaps limiting springsnail dispersal. ...It is unclear whether CO₂ levels are influencing Page Springsnail density and distribution or if dissolved CO₂ limits predators and/or competitors (e.g. non-native fish, non-native snails, other invertebrates).” (USFWS 2001A)

IX. Natural History, Population Trends and Current Status of Population

The largest population has been reported to reside in Bubbling Springs, which is the site presumed most essential to the long term survival of the species. (USFWS 2001A, Raisanen 1991) Page Springs, Bass House Springs, Lolomai Springs, Fry Springs, and Turtle Springs have each historically supported one to several sites of the springsnails. However, populations at Lolomai, Fry and Turtle Springs may be extirpated. (USFWS 2001C) Shea Springs is determined to have historically supported Page Springsnails, but that population has been extirpated. (USFWS 2001A)

According to biologist and taxonomist Jerry Landye, the Page Springsnail populations had been reduced in part because of chemical and physical treatments at the AGFD hatcheries to reduce the incidence of disease and parasites in the fish:

“These treatments have reduced the populations of the endemic gastropods, but have not extirpated them.” (Landye 1981)

Landye further recommended that AGFD set aside certain areas as natural areas for preservation of this native species. However, no set-asides of natural, unmodified habitat has occurred, and attempts to restore habitat has been largely unsuccessful. (USFWS 2001B)

Population numbers of Page Springsnail tend to dramatically decrease around the month of January, possibly due to life span and reproductive cycles. Samplings taken in January revealing only the presence of juveniles led researchers to hypothesize:

“...adults lay eggs in December and die in January when the eggs hatch or ...that there is a decrease in food and shelter as the *Rhizoclonium* algal mats decrease in size in January.” (Raisanen 1991)

According to researchers:

“No species specific information is available on the reproductive biology of the Page Springsnail, and little exists for other hydrobiids. Most springsnails appear to have direct development, but a few estuary or brackish water taxa have a pelagic (i.e. free-swimming) larval stage (Hersler and Ponder 1998). Some hydrobiids deposit small egg capsules singly, rarely in strips, on submerged substrate. Other species brood shelled young internally, perhaps explaining why female Page Springsnails are larger than males, at least in one population. Natality and mortality rates are not known, however the typical life span of aquatic gastropods is nine to 15 months (Pennak 1978).” (USFWS 2001A)

X. Current and Potential Threats—Summary of Factors for Consideration

Under Section 4(a) of the Endangered Species Act (16 U.S.C. 1531 et seq.), the Secretary of the Interior is directed to determine whether a species is threatened or endangered based on the following five factors:

A. Destruction, modification, or curtailment of habitat or range

The greatest influence on Page Springsnail population declines or extirpation is the destruction, modification and curtailment of habitat and range. According to the USFWS Candidate and Listing Priority Assignment Form dated February 26, 2001:

“The destruction, modification, and curtailment of habitat and range has had the greatest influence on the decline of the species. Many of the springs where the Page Springsnail occurs have been subjected to some level of modification to meet domestic, agricultural, ranching, fish hatchery, and recreational needs.

“Impoundments and outflow restrictions have inundated Fry Springs, Lolomai Springs, Bubbling Springs, Turtle

Springs, and Shea Springs thus resulting in habitat conditions largely unsuitable for the species. Bass Springs has been covered with a large wooden box that eliminates sunlight and limits productivity. Page Springs have been converted to an underground water collection gallery and no longer exists as surface flow. Lolomai Springs, Bubbling Springs, Turtle Springs, and Bass Springs are subjected to physical and mechanical removal of aquatic macrophytes and algae.

“Regional groundwater declines have been detected and a groundwater well has been drilled in the watershed east of, and adjacent to, the watershed containing the Oak Creek springs complex. Pumping of the regional aquifer in excess of natural recharge could result in elimination of habitat occupied by the Page Springsnail.

“Potential habitat degradation is likely from trespass cattle and the possible modification of spring heads to meet the needs of a commercial water bottling company.” (USFWS 2001B)

All seven of the major springs where the Page Springsnail has been identified to currently exist or previously exist (collected at Shea Springs on October 2, 1973, Raisanen 1991, though since extirpated) have been modified by humans. Springhead inundation is a common modification, which is shown to reduce snail productivity. (Landye 1981, USFWS 2001A) Privately owned springs Lolomai, Fry and Turtle have been modified by impoundments and outflow restrictions. Springs managed by AGFD have been modified for fish production. AGFD recently built a cinder block, cyclone fencing and aluminum structure with riprap around an inundated springhead at Bass House Springs. This “improvement” project was not coordinated with USFWS, and the department expressed deep concern about the structure and modifications made at this site (photos pp. 3 and 4). (USFWS 2001F)

Impoundments and springhead inundation have also occurred at Bubbling Springs on AGFD property. Page (Cave) Springs has been substantially modified for fish production at the Page Springs Fish Hatchery. A renovation project in 1992 diverted springhead flow to an underground collection gallery that now lies beneath a parking lot. Significant habitat loss resulted. (USFWS 2000A, AGFD 1991, Raisanen 1991)

According to an email from AGFD to USFWS, springsnails were no longer found at Bubbling Ponds Spring, previously determined to be crucial to springsnail survival, possibly because of juvenile exotic fish. “We also found springsnails at all other know localities on Department property, except Bubbling Ponds Spring. We tentatively identified springsnails there as well, but because of the presence of juvenile exotics, I am hesitant to ‘bet my life’ on it...” (AGFD 2001A) This statement raises grave concerns about the

management and future of the Page Springsnail on AGFD property without federal intervention.

Natural and manmade habitat modifications have occurred at Shea Springs, resulting in the extirpation of the species at that location, though viable habitat may still exist, and projects have been proposed to re-establish a population at this site. (USFWS 1999C) Springhead inundation (Landye 1981), dredging and increased spring flow velocity (Raisanen 1991) are probable factors for extirpation.

Removal of aquatic vegetation and algae has occurred at both Lolomai Springs and at Bubbling Springs for recreational and increased water flow respectively. (Raisanen 1991, USFWS 2001A) Non-native vegetation is degrading habitat at Lolomai Springs. “However, removal of native or non-native aquatic vegetation and organic debris, can also result in snail mortality and habitat loss. These activities can result in the crushing, removal, and desiccation of individuals (or their life stages), disruption of feeding, sheltering, or reproductive behavior; increased suspended sediments and water turbidity; and removal of habitat.” (USFWS 2001A)

Trespass livestock pose a potential and past problem in terms of habitat degradation when achieving access to springheads. Livestock are present near the Page Springsnail habitat and are deemed a likely threat by USFWS. (USFWS 2001A, USFWS 2001B)

B. Over utilization for commercial, recreational, scientific, or educational purposes

No over utilization of Page Springsnails has thus far been documented. The snail’s shell is small and indistinct and so is not known to be collected recreationally or for commercial purposes. It cannot yet be determined whether or not the notoriety or rarity of this species will make it vulnerable of collection or vandalism. Scientific studies and monitoring do involve some snail mortality, but causes no long-term population decreases when conducted responsibly. (USFWS 2001A) Poorly timed studies could pose a problem as the species suffers a significant crash in populations around January after breeding and egg laying. (Raisenan 1991) Past studies are not known to have affected viability. (USFWS 2001A)

C. Disease or predation

Page Springsnail predators include fish, waterfowl and other invertebrates. This species’ shell remnants have been found in analyzed mosquitofish (*Gambusia affinis*) stomachs. Numerous predatory fish species have access to Shea Springs. Waterfowl are known to use Lolomai Springs and Tavasci Marsh, contiguous to Shea Springs. Exotic mollusks appear to have little or no effect on Page Springsnail. Juvenile exotic fish at the hatcheries are potential threats as predators in ponds where springsnail are found. (AGFD 2001A) No information is available regarding Page Springsnail diseases. (USFWS 2001B)

D. Inadequacy of existing regulatory mechanisms

The Page Springsnail is a candidate for listing under the Endangered Species Act (ESA), but is not currently afforded any federal legal protections.

The species was added to Arizona Game and Fish Commission Order 42: Crustaceans and Mollusks, providing a closed season prohibiting unauthorized collection and harvest of the snails. This “protection” does not guard against habitat modification. AGFD management plans for Page Springs and Bubbling Ponds fish hatcheries are reported to include protections for the snail (USFWS 2001A), but these protections are not sufficient to preserve current habitat, create sufficient amounts of additional viable habitat, or recover the snail. Additionally, the actions (past and recent modifications of habitat) and comments by AGFD (“The Bubbling Pond Hatchery supports the protection of the Page Springsnail to the extent that normal hatchery operations are not jeopardized.” (AGFD 1999A)) indicate that protection of the species is not a priority for the department, and will not be observed where it conflicts with “normal hatchery operations.” (AGFD 1999A, AGFD 2000C)

As noted in a Status Information report acquired from USFWS under the Freedom of Information Act, “Arizona State regulations regarding environmental protection are inadequate to protect the snail against actions of the Game and Fish Department, as evidenced by the destruction of large amounts of habitat at Page Springs.” (USFWS undated) No provisions exist to protect this species on privately held property.

The Environmental Assessment for the Page Springs Hatchery Renovation project promised habitat restoration or replacement and monitoring. These commitments have been largely unsuccessful and/or not honored. (USFWS 2001B) Habitat modifications at the hatchery prove current regulations do not exist to adequately protect the species.

Page Springsnail habitat is threatened by overdraft groundwater pumping. The Verde watershed aquifer is the source of the spring flows that support the species’ habitat. The Arizona Department of Water Resources (ADWR) manages both surface water at the springs and groundwater hydrologically connected to the springs. Arizona state law fails to recognize the connectivity between the groundwater and surface water. No regulations currently exist to protect the habitat of the Page Springsnail against overdraft groundwater pumping from continuing to diminish the springs.

E. Other natural or manmade factors affecting its continued existence

Isolated endemic species are particularly susceptible to extirpation and extinction due to catastrophic events. Events that potentially threaten the continued existence of the Page Springsnail include, but are not limited to: groundwater pumping/depletion, drought, floods, water quality degradation, habitat degradation, non-native flora or fauna species, livestock grazing, and

climate change. (USFWS 2001A) A discussion of the threats of habitat degradation on AGFD properties and the potential for degradation from overdraft groundwater pumping follows.

1. AGFD Hatchery Management

Of possibly gravest concern are the stated objectives of AGFD hatchery management priorities and activities killing the Page Springsnail. Departmental memos state, “The Bubbling Pond Hatchery supports the protection of the Page Springsnail *to the extent that normal hatchery operations are not jeopardized.*” (AGFD 1999A, emphasis added) The hatchery program supervisor for AGFD, also expressed concern about the effects of the Page Springsnail on hatchery operations in another memo dated January 25, 2000 listing concerns about minimum operational flow needs:

“It is imperative that displaced snails which may temporarily reside in facility production features not interfere with operations. We need to maintain the ability to raise and lower water elevations on production ponds, use chemicals for fish health and vegetation control, and drain ponds...

“Ensure that range extensions of snails not restrict hatchery operations. The concern is that a new discovery would stop operations.

“All snail habitat modification, enhancements and maintenance activities be consistent with the above concerns.

“This list is not inclusive and should be refined when the snail population locations are identified.” (AGFD 2000C)

In an interoffice memo response to a USFWS Pre-Proposal Notification and Information Request (10-4-99(01)), the AGFD Fisheries Branch Chief agreed that the adequacy of existing regulatory mechanisms is inadequate for the Page Springsnail. (AGFD 1999B) He further states that the only way the USFWS:

“... can affect the conservation of the Page Springsnails if listed is through us [AGFD]. To affect conservation on private lands or to attempt to influence groundwater development would be through development of HCPs and Section 10 permits for take. I suspect that this can only be accomplished with the threat of enforcement of take under Section 9 – a situation I would assume to be unlikely. Hence, to attempt to leverage

conservation actions, I assume action will focus on the Department. The point is that eventual conservation action will be dependent upon the Department regardless of actions to list. ...I certainly wouldn't reflect all of this in our comments to the Service..." (AGFD 1999B)

2. Overdraft Groundwater Pumping

Of ongoing concern is overdraft groundwater pumping in the Oak Creek springs complex and Verde Watershed. According to the draft CCAA (USFWS 2001A):

"Some recommended actions may not be feasible in light of existing permitted usage (i.e. diversions and pumping), and are subject to valid and existing water rights.

"If threats are identified, the USFWS... will reevaluate the effectiveness of the conservation strategy and determine if the effects of groundwater pumping can be ameliorated through the Conservation Agreement process."

In truth, this threat has already been identified. AGFD expressed concern to the Yavapai County Planning and Zoning Commission that water pumping associated with a new development reduced flow to their Page Springs Fish Hatchery. In addition to this well, an additional well was identified that could also affect spring flows that had been dropping significantly over the previous year. A flow gauge on the Page Springs shows that flow was down 10% by May 2000. (Likens 2000) According to the article appearing in The Arizona Republic last year:

"(I)f declining spring flows endanger the snails, it could trigger government action that would affect land use in the area." (Likens 2000)

This decline in spring flow at Page Springs was also identified in the draft CCAA (USFWS 2001A). As stated in the USFWS February 26, 2001 Candidate and Listing Priority Assignment Form:

"Regional groundwater declines have been detected and a groundwater well has been drilled in the watershed east of, and adjacent to, the watershed containing the Oak Creek Springs complex. Pumping of the regional aquifer in excess of natural recharge could result in elimination of habitat occupied by the Page Springsnail." (USFWS 2001B)

Groundwater pumping *is* having an impact of concern in this area at this time. This concern is leading AGFD to discuss hydrological studies at Page (Cave) Springs with ADWR. (AGFD 2001B, ADWR 2001) Current drought conditions are potentially responsible for some of the declines, but groundwater pumping is a present threat that is beyond current regulation.

According to a Proposed Hydrological Study for the Page Springs Hatchery:

“Discharge measurements obtained at Cave Spring, a primary source of water for operations at the Commission-owned Page Springs Hatchery, indicate a decline of flow of about 1 cubic foot per second (cfs) between 1996 and 2000. It was suspected that the documented reduction in flow at Cave Spring was the direct result of the drilling of additional wells on properties previously known as the Dancing Apache Ranch...

“...The Arizona Department of Water Resources (ADWR) has recommended long-term aquifer tests to establish if a connection exists between the reduction of water available for Page Springs Hatchery operations and wells located on the property formerly known as the Dancing Apache Ranch, which includes the B-Cross Ranch property...” (AGFD 2001B)

Although AGFD states that the “hydrological study could provide information to insure adequate resources to maintain current fish production levels and to maintain or enhance habitat for the Page Springsnail in the future,” it is clear that their priority is to protect normal operations at the hatchery:

“Potential reductions in current or future water availability could impact production at the Page Springs Hatchery, the largest hatchery operated in the State of Arizona. This hatchery produces 58% of the trout produced annually throughout the state of Arizona... Fish produced at the Page Springs Hatchery in 1999 was responsible for creating 1.1 million angler use days, generating approximately \$76.9 million for the State of Arizona’s economy...

“...It is anticipated that such a study would benefit the Department’s sport fish restoration programs and associated angling recreational opportunities through the analysis of water available for current and future

hatchery operations. The study would also likely benefit special status species (Page Springsnail) as current and future water availability for sensitive species habitat would also be estimated.” (AGFD 2001B)

XI. Habitat Requirements—Critical Habitat

All extant populations of the Page Springsnail are known to reside in the Oak Creek springs complex near Page Springs, Yavapai County (T16N, R4E, Sections 14, 15, 23, 26), Arizona. A population was recorded at Shea (Tavaschi) Springs, east of Clarkdale, in Yavapai County (T16N, R3E, Sections 15 and 22), Arizona, but has since been extirpated. (Hershler and Landye 1988) Because of the extremely limited size and scope of viable and current habitat for the Page Springsnail, all current sites must be preserved and included in the designation of Critical Habitat. In addition, a population should be reintroduced to Shea Springs and also included in Critical Habitat designation.

XII. Additional Concerns

The draft Candidate Conservation Agreement with Assurances was initiated in 1999. It has never been finalized. The goal of the agreement was to provide “strategies to ameliorate its candidate status, remove biological threats and vulnerability, bolster population numbers, and maintain, enhance, and restore current and historic populations habitats when feasible.” (USFWS 2000A) USFWS has attempted to work with the Phoenix Zoo to “establish a springsnail propagation facility or refugium.” (USFWS 2001G) USFWS believed, “Such a program would be consistent with the currently proposed CCAA which identifies the establishment of a captive population for the purpose of providing stock for wild population reintroduction efforts.” (USFWS 2001H) AGFD, the lead in drafting the CCAA and manager of much of the land on which Page Springsnail habitat is found, declined assistance from the Phoenix Zoo in providing a population for re-initiation into previously inhabited springs. (USFWS 2001H)

XIII. Conclusion

Section 4(a) of the Endangered Species Act (16 U.S.C. 1531 et seq.), directs the Secretary of the Interior to determine whether a species is threatened or endangered based on any current and potential threats to its existence as specified in 4(a)(1)(A, B, C, D, E). This petition presents compelling evidence demonstrating that the Page Springsnail’s habitat has historically been and continues to be significantly destroyed, modified and curtailed. Existing state and federal regulatory mechanisms are inadequate.

Springhead inundation, vegetation removal, construction and modifications threaten the species’ habitat. Arizona Game and Fish Department hatchery operations, including overt anti-springsnail hostility by hatchery management personnel, directly threaten the continued existence of the Page Springsnail. The existing regulatory mechanisms within the Arizona Game and Fish Department and its management guidelines for both Page Springs and Bubbling Ponds fish hatcheries have proved inadequate to protect the Page Springsnail in its isolated habitats.

Arizona Department of Water Resources continues to permit wells drilled in close proximity to the springs which intercept water from the springs. Groundwater pumping has already reduced the availability of water to the springs. Groundwater pumping will suck dry springs upon which the species depends. Arizona Department of Water Resources proves itself unable and unwilling to sufficiently protect groundwater or surface waters within its jurisdiction.

The conservation trust mandate of the U.S. Fish and Wildlife Service is very clear. The Endangered Species Act design for the preservation of biodiversity is also very clear. It appears now that only faithful compliance by the U.S. Fish and Wildlife Service with these fundamental principles will make the difference between survival and extinction for the isolated endemic population of the Page Springsnail. Emergency listing as endangered and designation of Critical Habitat is imperative if the Page Springsnail is to survive.

If you have further questions, please respond to Ms. Michelle Harrington or Dr. Robin Silver, P.O. Box 39629, Phoenix, AZ 85069, phone: (602) 246-4170, FAX (602) 249-2576.

Yours very sincerely,



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