

CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Pyrgulopsis notidicola*

COMMON NAME: Elongate Mud Meadows springsnail

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: February 1, 2003

STATUS/ACTION:

New candidate

Continuing candidate

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: June 3, 2002

Candidate removal: Former LP: _____

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: Class Mollusca; Family Hydrobiidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Humboldt County, Nevada, endemic to Soldier Meadow

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Humboldt County, Nevada, endemic to Soldier Meadow

LEAD REGION CONTACT: Diane Elam (CNO), 916-414-6464; Scott McCarthy (RO), 503-231-6131

LEAD FIELD OFFICE CONTACT: Chad Mellison, 775-861-6300

BIOLOGICAL INFORMATION:

Pyrgulopsis notidicola is a member of the family Hydrobiidae, which consists of approximately about 100 species of small freshwater gastropods found in the western United States. Although few studies have been conducted on species within the genus *Pyrgulopsis* (springsnails) in the Great Basin, general knowledge about their natural history exists. *Pyrgulopsis* are small (usually less than 5 millimeters [0.2 inches (in)] high, are tightly linked with their aquatic habitat, and often are endemic to single bodies of water (particularly springs), or local drainage features (Hershler 1998). *Pyrgulopsis* are widespread within the Great Basin where they occur in a variety of relatively small, usually fishless, spring-fed water bodies. This genus also historically occurred in a few Great Basin lakes; none have been found in rivers. *Pyrgulopsis* springsnails only occupy permanent springs because they cannot survive outside an aquatic environment. Therefore, extant populations are in aquatic habitats that have persisted for long periods of geological time (Taylor 1985). It is uncommon for a spring to be occupied by more than one species of springsnail. *Pyrgulopsis* often decline dramatically in density downstream from spring sources, presumably reflecting their requirement for the well-known stable temperature, chemistry, and flow regime characterized by headsprings (Deacon and Minkley 1974). They feed on algae gleaned from the substrate and aquatic vegetation, and they occupy habitats with good water quality. Although they may occupy a number of different substrates, most species prefer either sand, gravel, or cobble. There have been no studies on the life history of the Great Basin species.

Pyrgulopsis notidicola was described by Hershler (1998) and is distinguished from three other species in the Soldier Meadow area by its more elongate shell with short spire; larger and more disjunct aperture; well-developed columellar shelf; smaller, globose bursa copulatrix; penis with larger terminal gland; and very weak ventral gland.

Pyrgulopsis notidicola is endemic to Soldier Meadow, which is located at the northern extreme of the western arm of the Black Rock Desert in the transition zone between the Basin and Range Physiographic Province and the Columbia Plateau Province, Humboldt County, Nevada. This region is characterized by cold, dry winters influenced primarily by cool, polar air masses, and by hot, dry summers influenced primarily by warm, tropical air masses (Nachlinger 1991). Soldier Meadow lies between the Calico Mountains to the west and the Black Rock Range to the east, and encompasses a province of approximately 50 thermal, connected and isolated springs in an alluvial basin at the northwestern terminus of the Black Rock Desert about 121 kilometers (km) (75 miles (mi)) north of Gerlach, Nevada and 16 km (10 mi) south of the Summit Lake Paiute Indian Reservation. The vegetation is broadly classified into four wetland communities and three upland communities, one of which is considered transitional. The wetland communities support a tremendous diversity of plants, with over 60 different species identified in the marshes, seeps, and meadows. Thermal springs occur in the area at elevations ranging from 1,320 and 1,393 m (4,330 and 4,570 ft) (Nachlinger 1991). Some of the springs provide the only known habitat for the desert dace (*Eremichthys acros*), a federally listed species endemic to approximately 20 springs in Soldier Meadow (Knight 1990).

The only ecological data compiled on this species were collected by Donald W. Sada (Associate Research Professor, Desert Research Institute, pers. obs., 1996) and Sada and Powell (2001).

This species occupies two basic habitat types. The first type is near the source of springs with temperatures greater than 45° Celsius (C) [113° Fahrenheit (F)]. In this habitat, the species occupies the splash zone on rocks and riparian grasses. It occupies habitats occurring only in wetted areas within 1 centimeter (0.4 in) of the water. In these high temperatures, it is semi-aquatic and not submerged. The second type of habitat occurs where the temperature decreases down stream from spring sources. In this habitat, the species disappears from the splash zone and becomes submerged, limiting itself to gravel substrate in riffles. It does not occupy sites with low current velocity or habitats with fine substrates. Total amount of occupied habitat includes one spring providing less than 300 meters (m) (984 feet (ft)) of habitat. Sada and Powell (2001) estimated that the density of snails per 25 square centimeters (cm²) (4 square inches (in²)) ranged from 0 to 27 [mean 2.7 to 13.0/25 cm² (4 in²)] in riffle habitats with gravel substrate. They were absent from ponded areas with fine substrate.

Distribution

Pyrgulopsis notidicola was first collected by J.J. Landye in Soldier Meadow during 1978 (Hershler 1998), and populations that he collected were extant during 1996 surveys by Sada (pers. obs. 1996). The absence of early distributional surveys make it impossible to determine how current distribution and abundance of *P. notidicola* compares with historical conditions. *Pyrgulopsis notidicola* is currently known from one unnamed spring in Soldier Meadow. Extensive surveys in the Soldier Meadow region have not recorded any observations outside its restricted range (D. Sada, pers. obs., 1996; Hershler 1998). Although several springs in the region are occupied by other *Pyrgulopsis* spp., *P. notidicola* has not been located in these. The type locality, and the only known location of the species, occurs is an unnamed spring in the Mud Meadow drainage within the Soldier Meadow complex. This area is the northernmost of a large series of thermal springs having broad outflows.

Pyrgulopsis notidicola occurs only in a stretch of thermal aquatic habitat that is approximately 300 m (984 ft) long and 2 m (6.7 ft) wide. Water depths in unaltered portions of the spring brook do not exceed 15 cm (6 in.), and substrate composition includes sand, gravel, and cobble. Current velocity varies from 0 (along the banks) to 40 cm/sec (16 in./sec) in mid-channel. All substrate in bathing impoundments along this spring brook is composed of silt and sand; water depth is usually greater than 50 cm (20 in.); and current velocity is 0 cm/sec. Riparian vegetation along the spring brook is dominated by sedges and rushes. Woody vegetation is absent. Water temperature decreases downstream from the spring source, and *P. notidicola* becomes decreasingly abundant where temperatures drop below 32° C (90° F) degrees.

THREATS:

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

The springs inhabited by *P. notidicola* are on public lands managed by the U.S Bureau of Land Management (BLM). The top four recreational uses of Soldier Meadow listed in order are: bathing in hot springs, camping, all-terrain vehicle travel, and four wheel driving. This area has some of the most desirable campsites in the entire Black Rock Desert National Conservation Area (NCA). People are drawn to the area by the hot springs, several of which are at an ideal

temperature for bathing, and the quiet and solitude of the area. Most visitors to the area have little or no knowledge of the occurrence of springsnails. The sites used for bathing are highly disturbed. Because the spring brook is relatively shallow, bathers have constructed impoundments to increase the depths to a point suitable for bathing (BLM 1998).

Dispersed recreational use increased 23-fold between 1990 and 1999, from about 1,200 visitors annually to over 28,000 (BLM 2002). Today, the area is becoming a well-known recreation area due to the highly popular Burning Man Festival held yearly about 48 km (30 mi) south of Soldier Meadow and drawing some 45,000 visitors from all over the world. The visibility of the area has also increased due to the designation of the Black Rock Desert NCA in 2000 (Roger Farschon, BLM, pers. comm., 2002). On Labor Day weekend, 2001, over 400 dispersed campers were observed within the vicinity of the spring occupied by *P. notidicola* (Mack Hedges, Ranch Manager, Soldier Meadows Ranch, pers. comm., 2002).

Sada and Powell (2001) found *P. notidicola* occurs only in shallow, flowing water on gravel substrate. The species does not occur in deep water (i.e., impoundments) where water velocity is low, gravel substrate is absent, and sediment levels are high. Deep-water habitats do not occur naturally in *P. notidicola* habitat. Examination of its habitat use along its 300 m (984 ft) range, showed that the species is absent from impoundments that have been constructed for recreational bathing. The fact that *P. notidicola* is found above and below these constructed impoundments suggests that their construction is eliminating habitat for this species and reducing its historic range. In the last 10 years, the number of impoundments has doubled to over a dozen. More studies are needed to determine the proportion of historic habitat that these impoundments impact. Bathers also adversely impact habitat by increasing sedimentation through stream bank trampling and removal of vegetation. The placement of various materials to increase the comfort of the bathers (e.g., carpet) in the spring brook and on its banks also adversely impacts *P. notidicola* and its habitat. Post-Burning Man event cleanup by BLM staff in 2000 resulted in the removal of impoundments, large pieces of carpet which had been placed on the banks and in the spring brook, and other various materials which had been left behind in the spring brook by recreationists (Laura Berglund, pers. obs., 2000). Concentrated, overnight use of the area, and the lack of sanitary facilities could also be resulting in impacts to water quality.

The Soldier Meadow area was subject to intensive geothermal exploration in the 1970s. The maximum temperature of the aquifer was deemed insufficient to support economic development at that time; however, future exploration and resource development of this type could affect the groundwater system supplying the thermal spring habitat that supports the *P. basaltica* (Service 1997). Soldier Meadow is designated as a Known Geothermal Resource Area and its springs are vulnerable to development of its ground water resources for energy development. Although there are no pending permits for new projects, increased interest in geothermal resources for their energy potential indicates that all species occupying thermal springs in Soldier Meadow are vulnerable to impacts of reduced spring discharge. Some portions of the species' habitat are protected from exploration and development activities through the ACEC/RNA designation for the desert dace (Service 1997).

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

Not known to be a threat to *P. notidicola* at this time.

C. Disease or predation.

Not known to be a threat to *P. notidicola* at this time.

D. The inadequacy of existing regulatory mechanisms.

Approximately 124 hectares (307 acres) of public land surrounding some of the habitat of the desert dace (*Eremichthys acros*) has been designated by the BLM as the Soldier Meadow Desert Dace Area of Critical Environmental Concern (ACEC). It is also designated as BLM Research Natural Area (RNA). The ACEC was designated to highlight the area where special management attention is needed to protect and prevent irreparable damage to important biological, cultural, and historic resources. An RNA is an area which contains natural resource values of scientific interest and is managed primarily for research and educational purposes.

In 1998, BLM completed the Soldier Meadow Activity Plan and Environmental Assessment (Plan). The preferred alternative within the Plan is designed to: 1) address impacts to special status species and cultural resources from increased recreation, livestock, wild horse and burro grazing, and potential geothermal and mineral development; 2) implement management actions to provide favorable habitat conditions for desert dace that will enable the Service to de-list the species; 3) implement management actions to protect habitat for Soldier Meadow cinquefoil (*Potentilla basaltica*), a rare plant species known only from Soldier Meadow and an area in northeast California, so the Service will not need to list the species; and 4) implement management actions to protect cultural resources in the area from further degradation. Specific actions identified in the Plan include: monitoring area use, increasing law enforcement, designating visitor use areas, designating specific bathing pools with walk-in access, limiting camping, limiting vehicle parking and camping within 61 m (200 ft) of the spring brook, developing interpretive signs, and dismantling impoundments in non-designated bathing areas. These actions could help conserve the species and its habitat.

Some portions of this Plan have been implemented including increased recreational area use monitoring and enforcement. This occurs mainly during holiday weekends or major events, such as the Burning Man Festival. However, limited resources and the remote nature of the site have made it difficult to implement most of the specific actions. Almost five years have passed since the Plan was finalized, yet visitor use bathing areas have not been designated, allowing for continued dispersed use of the area which negatively impacts *P. notidicola* and its habitat.

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

Spring-dwelling species in the western U.S. are vulnerable to unpredictable events, which have caused decline and extirpation of many populations (Sada and Vinyard 2002). Habitats occupied by springsnails are often small, unique, habitats where environmental conditions are predictable and stochastic events are rare. However, the small size of their habitats and their limited range (many are endemic) makes them highly susceptible to any factors that negatively impact their habitat. Other spring-dwelling species have been particularly vulnerable to habitat alteration by

diversion and to introduction of predaceous and competitive non-native species (Williams et al. 1985; Sada and Vinyard 2002).

Because of its extremely limited range [less than 300 m (984 ft) of spring brook], *P. notidicola* is highly susceptible to extinction if factors in its environment become unfavorable. *Pyrgulopsis notidicola* cannot withstand dessication for more than a few hours and does not have the ability to migrate to other suitable habitats. Its inability to withstand dessication also means that any impacts, such as water diversions that would result in drying of its habitat, could result in extinction. This is possible even if the impact is temporary.

Introductions of non-native species result from intended management actions or accidental introduction by fisherman and recreational bathers. The red-rimmed thiara (*Melanoides tuberculata*) and New Zealand mudsnail (*Potamopyrgus antipodarum*) are two species in western Nevada and eastern California that may be introduced into Soldier Meadow in the future. Both of these species are hardy, tolerant of surviving dry conditions of extended periods, and both have been transported in moist clothing or footwear. Hershler and Sada (1987) observed decreased springsnail abundance in habitats occupied by the thiara in other areas, and the mudsnail was recently established in nearby California where it has rapidly dominated the macroinvertebrate community. Continued use of *P. notidicola* habitat by bathers provides a continuing threat that these species may be accidentally introduced.

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: All habitat is on public lands under the management authority of BLM.

PRELISTING: The Recovery Plan for the Rare Species of Soldier Meadows (Service 1997) and BLM Soldier Meadow Activity Plan describe management actions that would provide conservation benefits to the species. To date, few of these actions have been undertaken because of limited resources and remote nature of the site that have made it difficult to implement most of the specific actions.

REFERENCES:

Bureau of Land Management. 2002. Draft Resource Management Plan and Environmental Impact Statement for the Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area (NCA) and associated Wilderness, and other contiguous lands in Nevada. Winnemucca Field Office, Winnemucca, Nevada.

Deacon, J. E. and W. L. Minckley. 1974. Desert fishes. Pp. 385-487 in G. W. Brown, Jr. (ed.), in Desert Biology. Special Topics on the Physical and Biological Aspects of Arid

Regions. Volume II. Academic Press: New York.

- Hershler, R. 1998. A systematic review of the hydrobiid snails (Gastropoda: Rissoidea) of the Great Basin, western United States. Part I. Genus *Pyrgulopsis*. *The Veliger* 41:1-132.
- Hershler, R. and D.W. Sada. 1987. Springsnails (Gastropoda: Hydrobiidae) of Ash Meadows, Amargosa basin, California-Nevada. *Proceedings of the Biological Society of Washington*, 100:776-843.
- Knight, T.A. 1990. Status report: *Potentilla basaltica* Tiehm and Ertter. Unpublished report prepared for the U.S. Fish and Wildlife Service, Reno, Nevada. 25 pp.
- Nachlinger, J. 1991. Ecological survey of Soldier Meadow, Humboldt County, Nevada. Unpublished report prepared for the Bureau of Land Management, Winnemucca, Nevada. 26 pp.
- Sada, D.W. and H. Powell. 2001. Distribution, abundance, and habitat use of Soldier Meadow springsnails (Family Hydrobiidae). Unpublished report to U.S. Bureau of Land Management, Winnemucca, NV.
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- Taylor, D. W. 1985. Evolution of freshwater drainages and molluscs in Western North America. Pages 265-321 *in*, C.J. Hocutt and A.B. Leviton (eds.). *Late Cenozoic History of the Pacific Northwest*. American Association for the Advancement of Science and California Academy of Science, San Francisco.
- U.S. Bureau of Land Management. 1998. Soldier Meadow Activity Plan and Environmental Assessment. Bureau of Land Management, Winnemucca District, Winnemucca, Nevada.
- U.S. Fish and Wildlife Service. 1997. Recovery Plan for the Rare Species of Soldier Meadows. Portland, Oregon. 50 pp.
- Williams, J.E., D.B. Bowman, J.E. Brooks, A.A. Echelle, R.J. Edwards, D.A. Hendrickson, and J.J. Landye. 1985. Endangered aquatic ecosystems of North American deserts with a list of vanishing fishes of the region. *Arizona-Nevada Academy of Science* 20:1-62.

LISTING PRIORITY (* 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: Although this species is being considered in the Environmental Impact Statement for the Black Rock Natural Recreation Area, at this time the BLM does not have a recreational use plan for this area. Therefore, use is dispersed and unregulated. Recreational use is sporadic but tends to increase during the cooler times of the year (e.g. spring and fall). For example, as many as 50 vehicles/campers were observed within the vicinity of the springsnails' habitat during the opening weekend for the hunting season in 2001. Additionally, there have been reports of people using Clorox to disinfect some of the pools. If Clorox is increasingly used by bathers, the potential for adverse impacts to the species is high. High demand for limited thermal resources results in communal use and the construction of additional dams to create more soaking pools. Given the lack of regulations guiding the use of this area, we believe the magnitude of the threats is high.

Imminence: Threats to *P. notidicola* from dispersed recreation and associated land uses are of an immediate nature, and the likelihood for these types of activities to increase in frequency and duration is high, as the area grows in popularity as a place of interest.

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: Steve Thompson _____ March 6, 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: _____

Comments: _____

