

## Heritage Rank Status Factors

**Elcode** IMGASG3390  
**Gname** FLUMINICOLA SP 16  
**Gcomname** SHASTA SPRINGS PEBBLESNAIL

### Number of Occurrences

A = 1 - 5  
B = 6 - 20

**Comments** Three sites so far, possibly a few more to be discovered (Frest and Johannes, 1999). Furnish et al. (1997) cite 16 sites.

### Number of Occurrences with Good Viability

B = Very few (1-3) occurrences with good viability

**Comments** Rank unknown, but based on a few sites.

### Population Size

U = Unknown

**Comments**

### Range Extent

A = <100 km<sup>2</sup> (less than about 40 square miles)

**Comments** Upper Sacramento River, Shasta County, California (Frest and Johannes, 1999; Furnish et al., 1997; Furnish and Monthey, 1999).

### Area of Occupancy

A = <0.4 km<sup>2</sup> (less than about 100 acres)  
B = 0.4-4 km<sup>2</sup> (about 100-1,000 acres)

LA = <4 km (less than about 2.5 miles)  
LB = 4-40 km (about 2.5-25 miles)

**Comments** Known from two springs in adjacent creeks in the Klamath River drainage in southwestern Oregon (Frest and Johannes, 1999). It is an Upper Sacramento River endemic and is only found in the Shasta Springs area. Frest and Johannes (1993a, 1995c) collected it from 19 sites, none of which are on federal land. Confined to a couple of spring complexes along the upper Sacramento River, Shasta County, California, at 11 sites (Furnish and Monthey, 1999).

### Long-term Trend in Population Size, Extent of Occurrence, Area of Occupancy, and/or Number or Condition of Occurrences

U = Unknown. Long-term trend in population, range, area occupied, or number or condition of occurrences unknown

**Comments** Unknown

## Short-term Trend in Population Size, Extent of Occurrence, Area of Occupancy, and/or Number or Condition of Occurrences

U = Unknown. Short-term trend in population, range, area occupied, and number and condition of occurrences unknown.

Comments Unknown

## Threats

A = Substantial, imminent threat. Threat is moderate to severe and imminent for most (> 60%) of the population, occurrences, or area. Ecological community occurrences are directly impacted over a widespread area, either causing irreversible damage or requiring long term recovery

Scope High Severity High Immediacy High

Comments Threats include: Chemical spills and other forms of water pollution (e.g., livestock use of springs and channel bottoms) resulting in effects such as: (1) direct mortality of species as evidenced by the recent (1991) Cantara Spill on the Upper Sacramento River, and (2) deleterious habitat alterations resulting from factors such as eutrophication caused by excessive fertilization, reduced dissolved oxygen levels, or elevated water temperatures. Dam construction that submerges cold springs, slows current velocities, lowers the availability of oxygen, and allows fine sediments to accumulate. Existing dams on the Sacramento River (e.g., Shasta Dam, Whiskeytown Reservoir, and Siskiyou Lake) and the Pit River have already caused extensive destruction of potentially suitable habitat. Reductions in water flow by water diversions, road construction, or pumping of aquifers results in elimination or reduction of aquatic habitat for snails. Excessive sedimentation from a variety of activities such as logging, mining, road and railroad grade construction, and grazing may smother substrates preferred by these species and may impair egg-laying or survivorship of eggs or young (Frest and Johannes, 1999; Furnish and Monthey, 1999).

## Number of Appropriately Protected and Managed Occurrences

A = None. No occurrences appropriately protected and managed

Comments There are no known protected sites. No sites on Federal land (Furnish et al., 1997; Furnish and Monthey, 1999).

## Intrinsic Vulnerability

A = Highly Vulnerable. Species is slow to mature, reproduces infrequently, and/or has low fecundity such that populations are very slow (> 20 years or 5 generations) to recover from decreases in abundance; or species has low dispersal capability such that extirpated populations are unlikely to become reestablished through natural recolonization (unaided by humans). Ecological community occurrences are highly susceptible to changes in composition and structure that rarely if ever are reversed through natural processes even over substantial time periods (> 100 years).

Comments Typically, members of the genus are dioecious (i.e., have separate sexes) and semelparous (i.e., breed only once in their lifetime and then die). Individuals have a life span of one year, with 90 percent or more of the population turning over annually. Surviving individuals are generally those that do not breed during their first year. Eggs are laid in the spring and hatch in approximately 2-4 weeks. Sexual maturity is reached by late summer, after a few months of growth. Individuals overwinter as adults and do not disperse widely, so populations remain very localized in their distribution (Furnish and Monthey, 1999).

## Environmental Specificity

B = Narrow. Specialist or community with key requirements common.

Comments Generally occurs in lower portions of larger cold springs, among Rorippa beds and on cobbles and pebbles. May be associated with other endemic Fluminicola species, or with Juga (O.) n. sp. 3. Seemingly an obligate crenocole (i.e., it only occurs in springs), found only in large spring complexes. The species has been found at sites

ranging from 744-890 meters (2440-2920 feet) in elevation. It has 3 co-occurrences with the Disjunct pebblesnail at Shasta Springs and Rock Spring. It has 3 co-occurrences with Juga (O.) n. sp. 3; 2 at springs near Cantara Bend and one at Shasta Springs (Frest and Johannes, 1999).

## Other Considerations

NRANK: N1. All sites occupied by these snails should be protected. Cited as Fluminicola n. sp. 4 in Frest and Johannes (1993b; 1995a).

<b>Edition</b>	11/27/2002	<b>Edauthor</b>	Cordeiro, J.
<b>Grank</b>	G1	<b>Grank Date</b>	11/27/2002

## Greasons

Limited number of occurrences, with restricted range. There are no known protected sites.

## BCD Sources

## New Sources

Frest, T.J. and E.J. Johannes. 1993a. Mollusc species of special concern within the range of the northern spotted owl. Final report for the Forest Ecosystem Management Working Group. Deixis Consultants, Seattle, Washington. 39 pp.

Frest, T.J. and E.J. Johannes. 1993b. Freshwater mollusks of the Upper Sacramento System, California, with particular reference to the Cantara Spill. 1992 yearly report to California Department of Fish and Game, Deixis Consultants, Seattle, Washington. 1-1 pp.

Frest, T.J. and E.J. Johannes. 1995a. Freshwater mollusks of the Upper Sacramento System, California, with particular reference to the Cantara Spill. 1995 final report to the California Department of Fish and Game, Deixis Consultants, Seattle, Washington. 88 pp.

Frest, T.J. and E.J. Johannes. 1995c. Interior Columbia Basin mollusk species of special concern. Report to Interior Columbia Basin Ecosystem Management Project. 274 pp.

Frest, T.J. and E.J. Johannes. 1999. Field Guide to Survey and Manage Freshwater Mollusk Species. Bureau of Land Management, Oregon State Office, Portland, Oregon. 117 pp.

Furnish, J., R. Monthey, and J. Applegarth. 1997. Survey protocol for terrestrial mollusk species from the Northwest Forest Plan. Version 2.0. Report to the USDI Bureau of Land Management, Salem, Oregon, October 29, 1997. Unpaginated.

Furnish, J.L. and R. Monthey. 1999. Management recommendations for aquatic mollusks. Ver. 2.0. Report submitted to USDI Bureau of Land Management, Salem, Oregon, December 1998. Unpaginated.