

**Conservation Assessment
for
Fluminicola n. sp. 1
Klamath Pebblesnail**

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Preface:

Converting Survey and Manage Management Recommendations into Conservation Assessments

Much of the content in this document was included in previously transmitted Management Recommendations developed for use with Survey and Manage Standards and Guidelines. With the removal of those Standards and Guidelines, the Management Recommendations have been reconfigured into Conservation Assessments to fit Special Status/Sensitive Species Program (SSSSP) objectives and language. Changes include: the removal of terminology specific to Survey and Manage Standards and Guidelines, the addition of Oregon Natural Heritage Information Center ranks for the species, and the addition of USDA Forest Service and USDI Bureau of Land Management (BLM) Special Status/Sensitive Species status and policy. Habitat, range, and taxonomic information have also been updated to be current with data gathered since the Management Recommendations were initially issued.

The framework of the original document is maintained in order to expedite getting this information to field units. For this reason this document does not entirely conform to recently adopted standards for the Forest Service and BLM for Conservation Assessment development in Oregon and Washington.

Assumptions about site management

In the Final Supplemental Environmental Impact Statement (FSEIS) and Record of Decision (ROD) to Remove or Modify the Survey and Manage Standards and Guidelines (USDA and USDI 2004), assumptions were made as to how former Survey and Manage species would be managed under agency Special Status Species policies. Under the assumptions in the FSEIS, the ROD states “The assumption used in the Final SEIS for managing known sites under the Species Status Species Programs was that sites needed to prevent a listing under the Endangered Species Act would be managed. For species currently included in Survey and Manage Categories A, B, and E (which require management of all known sites), it is anticipated that only in rare cases would a site not be needed to prevent a listing...Authority to disturb special status species sites lies with the agency official who is responsible for authorizing the proposed habitat-disturbing activity.” This species was in Category A at the time of the signing of the ROD, and the above assumptions apply to this species’ management under the agencies’ SSSSP.

Management Considerations

Within the following Conservation Assessment, under the “Management in Species Habitat Areas” section, there is a discussion on “Management Considerations”. “Management Considerations” are actions and mitigations that the deciding official can utilize as a means of providing for the continued persistence of the species’ site. These considerations are not required and are intended as general information that field level personnel could utilize and apply to site-specific situations. Management of the species covered in this Conservation Assessment follows Forest Service 2670 Manual policy and BLM 6840 Manual direction. (Additional information, including species specific maps, is available on the Interagency Special Status and Sensitive Species website, www.or.blm.gov/issp.)

EXECUTIVE SUMMARY

Species: *Fluminicola* n. sp. 1 – undescribed, Klamath pebblesnail

Taxonomic Group: Mollusk (Phylum Mollusca; Class Gastropoda, Subclass Prosobranchia; Family Hydrobiidae)

Management Status: *Fluminicola* n. sp. 1 is a Bureau Sensitive Species for OR BLM, and a Forest Service Region 6 Sensitive Species. Oregon Natural Heritage Information Center ranks this as a List 1 species, with Global ranking G1, State ranking S1 (critically imperiled both within the state and globally because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation).

Range: In Oregon the Klamath pebblesnail occurs in Upper Klamath Lake and major spring-fed tributaries, Klamath County, Oregon, including sites in the Winema and Rogue River National Forests, and the Upper Klamath Lake National Wildlife Refuge. It also occurs sporadically in the middle and upper sections of the Klamath River, Siskiyou County, California and is suspected to occur in the Klamath Falls Resource Area of the Lakeview District BLM.

Specific Habitat: This species is generally found in bodies of water with gravel-boulder substrates and moderate flow. Like other *Fluminicola*, it prefers cold, oligotrophic water with high dissolved oxygen content. It is found rarely in springs and avoids areas with dense macrophyte beds.

Threats: At lake sites, threats include nutrient enrichment resulting in eutrophication especially of Upper Klamath Lake), disruption of bottom substrates (which disturbs snail populations and increases sedimentation), reduced oxygen levels (lowered lake levels which reduce the effects from lakeshore spring inputs), water pollution, decreases in water flow at spring and stream sites, sedimentation and eutrophication of springs resulting from nutrient and sediment runoff, heavy grazing, irrigation diversions, road construction, and others, and channelization of rivers and streams for irrigation systems and for log transport.

Management Considerations: Manage water quality conditions [e.g., high dissolved oxygen at or near saturation levels, low sediment, cool temperatures (i.e., below 18°C)] at known sites. Avoid activities that may impact these environmental conditions such as dredging, grazing, runoff from agricultural areas or roads, water pollution, decreased water flow as a result of irrigation or other activities, and construction activities (e.g., dams, roads). Maintain and/or restore riparian vegetation that aids in maintaining cool water temperatures by providing shade, reducing sedimentation impacts, and providing litter fall nutrients to energy pathways in aquatic ecosystems. Avoid disturbance to occupied substrates.

Information Needs: Conduct additional surveys to locate populations in areas with potential suitable habitat. Research is needed on habitat requirements of these species. Develop a collection of voucher specimens for appropriate administrative units within the range of these species and provide training opportunities for identifying mollusk species and conducting surveys within the appropriate administrative units. Monitor water temperatures and other environmental parameters at known sites.

I. NATURAL HISTORY

A. Taxonomic/Nomenclatural History

Fluminicola n. sp. 1 is a rare aquatic snail belonging to the family Hydrobiidae. The common name for this family is “spring snails,” which is an allusion to the type of habitat where they are primarily found. This is a polytypic family with many described and undescribed species.

The following discussion is after Frest and Johannes (1995). This species is within the subfamily *Lithoglyphinae*. North American snails within this subfamily closely resemble some foreign groups. Similarities in the male reproductive system and shell led Taylor (1966a, 1966b, 1981, 1985) to consider these snails as representatives of the European *Lithoglyphus*. However, Thompson (1984), after detailed studies, concluded that *Fluminicola* is likely distinct, but there is still a need for detailed anatomical and conchological examination.

Frest and Johannes (1996) noted that the malacofauna of the Upper Klamath Lake drainage can be divided into several groups: 1. those species common throughout much of North America, 2. those species that likely originated in Upper Klamath Lake and immediately adjacent drainages, and 3. those species that originated in or at least are largely confined to the Great Basin and peripheral internal drainages. Taylor (1985) noted similarities in the malacofauna of the Upper Klamath and the Pit River (and hence Sacramento drainage). However, he also noted several lake forms in Upper Klamath Lake that, for habitat reasons, have no parallel in the Sacramento drainage. Frest and Johannes (1996) also noted that the freshwater malacofauna of the Upper Klamath drainage is evidently quite distinct from that characteristic of most Pacific Northwest coastal streams. The high rates of endemism and the Great Basin element apparently have few close parallels.

B. Species Description

1. Morphology

Conch tall subglobose; adults with about 5.25-5.75 whorls; shell height usually between 8.0-10.2 mm; width 6.2-7.5 mm; H/W ratio 1.31; shell moderately thick; whitish; periostracum yellow, yellow-green, or yellowish tan; sculpture consists of very weak, slightly irregular growth lines only; protoconch generally with about 1.5 whorls; diameter *ca.* 0.31 mm; almost flat, small in relation to rest of shell; post-embryonic whorls coiled consistently; teleoconch whorls slightly flattened convex, with periphery central, not shouldered; suture deeply impressed; aperture large, height to 0.48 total shell height, broadly lunate, narrowed above; complete (thin glaze only across parietal wall) outer lip usually thin; parietal lip mostly thin (glaze) except for small area adjoining umbilicus; appressed, in contact with preceding whorl for full length; columellar swelling moderately thick, barely covering umbilicus; shelf does not continue basally; columellar ridge moderately developed; subparallel to columellar lip; extending almost full length of columellar lip; moderately wide, width equal to or less than width of

columellar callus; shell typically anomphalous; body as preserved with dark tentacles, anterior and posterior edge, and snout but light body; and penis sickle-shaped, moderately large.

This is a large (*i.e.*, > 5 mm height) *Fluminicola* species, often with yellow to yellowish-brown periostracum. Live specimens have the eye patches bright canary yellow; this fades completely within a few days in preserved material. The combination of a large, tall subglobose conch with slightly flattened whorls and sickle-shaped penis are distinctive in the Upper Klamath Lake region; other similar species have an alate penis, green periostracum, and/or completely pigmented (black) body (except for eye spots) (Frest and Johannes, 1999).

2. Reproductive Biology

Information on life history is very sparse, but *Fluminicola* n. sp. 1 is probably similar to other *Fluminicola* species that have been better studied. 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.

3. Ecology

All hydrobiid snails have gills that make them dependent upon dissolved oxygen in the water in which they live. Like most hydrobiid snails, this species is highly sensitive to oxygen deficits, elevated water temperatures, and sedimentation. Major predators include waterfowl, amphibians, turtles, sculpins, and trout. Typically, many individuals are infected with trematode parasites.

This species sometimes occurs with other endemic *Fluminicola* spp., *Lanx alta* or *Lanx klamathensis*, *Lyogyrus* spp., *Helisoma (Carinifex) newberryi*, or *Pisidium ultramontanum*. It is predominantly a perolithon grazer and lithophile (preferring rocky environments) (Frest and Johannes 1996).

C. Range, Known Sites

The current range in Oregon includes: Upper Klamath Lake and major spring-fed tributaries, Klamath County, Oregon, including sites in the Winema and Rogue River National Forests; Upper Klamath Lake National Wildlife Refuge; and the Klamath Falls Resource Area of the Lakeview District. This species also occurs in California in the Klamath River, Siskiyou County. According to Frest and Johannes, it was apparently more widespread in the past. Its distribution in the middle and upper Klamath River is now very sporadic because it is absent from impoundments and polluted stretches. Frest

and Johannes collected this undescribed species at 14 sites in the Upper Klamath Drainage of Oregon in 1996. There are currently 51 records at 25 known sites for the species in the regional species database (GeoBOB), including multiple visits to the same sites.

D. Habitat Characteristics and Species Abundance

This species generally occurs on gravel-boulder substrates in areas with spring influx, and some flow (Frest and Johannes 1996). Like most *Fluminicola*, it prefers clear, cold, oligotrophic, flowing water with high dissolved oxygen. It is found only rarely in springs, and avoids areas with dense macrophytes such as *Myriophyllum* and *Elodea*. It also avoids areas subject to eutrophication or periodic hypoxic (low oxygen levels) episodes. Populations are generally large where they occur, with several hundred individuals. Random grid surveys across the Northwest Forest Plan area in Oregon and Washington, conducted under the Survey and Manage program, did not locate this species in any of 498 plots searched.

II. CURRENT SPECIES SITUATION

A. Status History

This undescribed species is locally endemic within its range (i.e., it occurs in small, isolated areas). Partially because of the high degree of endemism associated with this species, the FEMAT analysis concluded this species has low likelihood of attaining stable, well distributed populations under the preferred alternative (Option 9) (USDA, Forest Service and USDI, Bureau of Land Management 1994).

This species was considered to be a rare species and was placed in Survey and Manage Category A, based on the low number of occurrences, its low detection rate in suitable habitat and its small range. It is listed on the Oregon Natural Heritage Information Center List 1; with Global ranking G1, State ranking S1 (critically imperiled both within the state and globally because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation). In 2004, both Region 6 of the Forest Service and OR BLM classified this species as Sensitive.

B. Major Habitat and Viability Considerations

The major viability considerations for this species include loss of populations due to factors such as nutrient enrichment, resulting in eutrophication, sedimentation, reduced water flow and volume, and water pollution. Examples of impacts likely include grazing, development of irrigation systems, chemical spills, dredging of lake bottom substrates, construction of roads, railroads, and dams, and substrate disruption by mining operations or other activities.

It has been collected in localized areas of Upper Klamath Lake with spring influx or influence. Other springs in its range have been adversely affected by heavy grazing and

development of irrigation systems, resulting in sedimentation and eutrophication that have eliminated or greatly reduced this species. Its historic distribution was apparently more widespread than what is currently observed (Frest and Johannes 1996).

Much of Upper Klamath Lake is strongly eutrophied, so that live populations of this species are restricted to areas with spring influx or influence, even though dredged shells indicate high abundance and wide distribution in the lake (Frest and Johannes 1996). The species does not occur in areas subject to periodic hypoxic episodes. Springs in the lake bottom proper are badly affected by past dredging to facilitate log transport and by current severe nutrient enhancement and sedimentation. Many springs and their outflows are heavily grazed, channelized, or connected to irrigation canal systems. Sedimentation and eutrophication either eliminates or greatly reduces the abundance of this species.

C. Threats to the Species

- Nutrient enrichment from agricultural run-off resulting in eutrophication, especially of Upper Klamath Lake.
- Disruption of bottom substrates of Upper Klamath Lake due to highway construction, sucker spawning enhancement, or other mechanical means (which disturbs snail populations and increases sedimentation).
- Reduced oxygen levels of Upper Klamath Lake at periodic intervals, resulting from decaying organic matter.
- Water pollution.
- Decreases in water flow resulting from lowered water tables or diversions.
- Sedimentation and eutrophication of springs, resulting from such factors as nutrient and sediment runoff, heavy grazing, irrigation diversions, road construction and others.
- Channeling for irrigation systems and for log transport.

D. Distribution Relative to Land Allocations

Some known occurrences of this species are within or near the Late-Successional Reserves (R0227, R0228, and R0229) on the west side of Upper Klamath Lake. It also possibly occurs in administratively withdrawn sites along the Klamath River. One known site occurs within the riparian reserve in Matrix allocation of the Winema National Forest. Sites on the Klamath Falls Resource Area of the Lakeview BLM District are included in Late- Successional Reserves.

III. MANAGEMENT GOALS AND OBJECTIVES

Management for this species follows Forest Service Region 6 Sensitive Species (SS) policy, and/or BLM Oregon and Washington Special Status Species (SSS) policy.

For Oregon and Washington Bureau of Land Management administered lands, SSS policy details the need to manage for species conservation. For Region 6 of the Forest Service, Sensitive Species policy requires the agency to maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands. Management “must not result in a loss of species viability or create significant trends toward federal listing” for any identified SS (Forest Service Manual 2670.32).

IV. HABITAT MANAGEMENT

A. Lessons from History

Historically, the Oregon geographic area occupied by this species has been generally impacted by agriculture, logging, and grazing activities. These activities likely contributed to the specific degradation of water quality (e.g., elevated water temperatures, eutrophication, lowered dissolved oxygen, increased sedimentation) and suitable habitat important to this species. Reservoir and hydroelectric development (thereby increasing water temperatures and sedimentation) on the Klamath River has extirpated the species from some of its historic geographic range, especially in California.

B. Identification of Species Habitat Areas

All known sites on federal lands administered by the Forest Service and/or BLM in Oregon and Washington are identified as areas where the information presented in this Conservation Assessment could be applied.

A species habitat area is defined as the suitable habitat occupied by a known population plus the surrounding habitat needed to support the species at the site. For this species, the species habitat area would include the immediate area around known site locations, including the organic and physical habitat elements and substrates used by the species during its annual lifecycle, and also the body of water in which the site is located which provides the aquatic water quality at the site.

C. Management Within Species Habitat Areas

The objective of species habitat areas is to maintain habitat conditions such that species viability will be maintained at an appropriate scale, in accordance with agency policies. Within identified Species Habitat Areas, consider applying the following:

1. Generally, maintain and restore productivity and resiliency of riparian and aquatic ecosystems in order to achieve the Aquatic Conservation Strategy objectives.

2. Maintain water temperatures below 65°F (or 18°C) to avoid thermal stress and ensure adequate availability of oxygen. (65° represents the critical threshold for trout and, in the absence of specific data for this species, is used here.)
3. Maintain and/or restore native riparian vegetation that aids in maintaining cool water temperatures by providing shade, reducing sedimentation impacts, and providing litter fall nutrients to energy pathways in aquatic ecosystems.
4. Avoid activities that contribute to eutrophication.
5. Avoid harmful grazing activities (e.g., trampling of stream bottoms, water diversions).
6. Avoid dredging or disturbance of lake and stream bottom substrates.
7. Avoid or mitigate for management activities that generally increase sedimentation (e.g., road construction).
8. Avoid water diversions (irrigation systems) or other activities that may reduce discharge, lake levels, water temperature, or habitat quality.
9. Avoid the construction of additional dams or locate so as to minimize further impacts (such as elevated water temperatures, sedimentation) to existing populations.

D. Other Management Issues and Considerations

Should reestablishment be considered for this species, relatively pure colonies should be reintroduced and in fairly large numbers [i.e., in the range of several hundred to several thousand individuals per reintroduction site as recommended by Frest and Johannes (1995) for a similar species]. *Fluminicola* n. sp. 1 should be located in areas with suitable rock substrate; spring-influenced sites would be optimal.

Sucker spawning habitat improvement projects undertaken at known sites for this species should consider project mitigation to ensure continued occupation of the site by this species.

V. RESEARCH, INVENTORY, AND MONITORING NEEDS

A. Data Gaps and Information Needs

- Conduct surveys to locate new populations of *Fluminicola* n. sp. 1 in areas identified as potential suitable habitat. Prioritize surveys in areas where management treatments or projects are scheduled or proposed.

- Conduct monitoring or research on habitat requirements of this species.
- Develop a collection of voucher specimens for appropriate administrative units within the range of this species.
- A formal description and type locality (as defined in the scientific literature) is needed for this currently undescribed species.
- Monitor water temperatures at or in the vicinity of occupied sites using continuous reading thermometers, or at least maximum-minimum thermometers, to assure compliance.
- Monitor other environmental parameters (e.g., sedimentation, dissolved oxygen) that potentially affect this species.

B. Research Questions

What is the condition of existing populations with regard to absolute size and density?

What are the dispersal mechanisms and annual movement patterns of this species?

What are the specific habitat requirements of this species?

How does this species respond to changes in water quality conditions?

What implications, if any, does management for this species have on other species?

C. Monitoring Needs and Recommendations

Monitoring of presently known populations is needed to document population trends. At a minimum, variables that should be monitored to track habitat quality include: 1. water temperature, 2. dissolved oxygen, 3. embeddedness of coarse substrates in finer sediments, and 4. discharge at springs and creeks, or current velocity at river sites.

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