BEFORE THE SECRETARY OF THE INTERIOR

PETITION TO LIST THE GREAT BASIN RAMSHORN (*Helisoma newberryi)* AS A THREATENED OR ENDANGERED SPECIES UNDER THE ENDANGERED SPECIES ACT

(Photo: David Richards)

CENTER FOR BIOLOGICAL DIVERSITY

March 21, 2024

Notice of Petition

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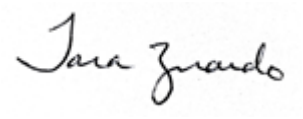
Pursuant to Section 4(b) of the Endangered Species Act ("ESA"), 16 U.S.C. §1533(b); section 553(e) of the Administrative Procedure Act (APA), 5 U.S.C. §553(e); and 50 C.F.R. §424.14(a), the Center for Biological Diversity ("Center") hereby petitions the Secretary of the Interior, through the U.S. Fish and Wildlife Service ("Service"), to protect the Great Basin Ramshorn (*Helisoma newberryi*) as a threatened or endangered species under the ESA.

The Service has jurisdiction over this petition. This petition sets in motion a specific process, placing definite response requirements on the Service. Specifically, the Service must issue an initial finding as to whether the petition "presents substantial scientific or commercial information indicating that the petitioned action may be warranted." 16 U.S.C. §1533 (b)(3)(A). The Service must make this initial finding "(t)o the maximum extent practicable, within 90 days after receiving the petition." Petitioner also requests that critical habitat be designated concurrently with the listing, pursuant to 16 U.S.C §1533(a)(3)(A) and 50 C.F.R. §424.12.

The Center is a non-profit, public interest environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law, supported by more than 1.7 million members and online activists. The Center works to secure a future for all species, great or small, hovering on the brink of extinction. We submit this petition on behalf of our staff and members who hold an interest in protecting the Great Basin Ramshorn

Submitted this 21 day of March, 2024



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Executive Summary

The Great Basin Ramshorn (*Helisoma newberryi*) ("Ramshorn") is classified as a G1, Critically Imperiled species. While the Ramshorn historically occurred in Idaho, Wyoming, Utah, Nevada, Oregon, and California, where it was generally confined to lake and large spring complexes on the periphery of the Great Basin, it is now Critically Imperiled in California, Oregon, and Wyoming, and Presumed Extirpated in Idaho, Nevada, and Utah (NatureServe, 2024). There are few remaining populations, and most have been located in the Upper Klamath Lake and Pit River drainages in northeastern California and south-central Oregon (*Id.*).

The Ramshorn faces a number of threats, including but not limited to the following:

- Springs in Upper Klamath Lake proper are badly affected by past dredging to facilitate log transport and by current severe nutrient enhancement and sedimentation.
- The species cannot occur where there are dense beds of macrophytes, such *as Myriophyhm* and *Elodea*, as well as eutrophication and periodic hypoxic episodes, present.
- Many springs in the Great Basin and Oregon Interior Basin are so heavily grazed as to completely extirpate or greatly reduce this species.
- Those springs connected to irrigation canal systems are subject to sedimentation and eutrophication, both of which can eliminate or greatly reduce this species.
- Channeling for these systems and log transport has also reduced habitat in the Upper Klamath Lake area, even when water quality remains excellent. Areas used for log transport or storage still have not regained populations of this species.
- Regulated water bodies – such as the Jackson Lake - have been modified several times to increase the impoundment area (*Id.*).

This petition seeks ESA protection for this imperiled species, based on the best scientific information and in the context of the five listing factors. This petition also seeks to have the lake and large spring complexes where the species occurs, and which contain the physical or biological features essential to the conservation of the species, designated as critical habitat, in light of the severity of threats facing the Ramshorn.

Introduction

Freshwater snails like the Ramshorn are not only important components of aquatic ecosystems, and often function as water-quality indicators, but are of global importance (Johnson, 2019, p.1). They are the principal grazers in these habitats and playing a pivotal role in nutrient cycling (Johnson et. al, 2013, p. 247). The Ramshorn – like other native snail populations – has a particular ecological niche and provides vital ecosystem functions in the lakes (Richards, 2022, p. 12). They are also an important food source for fish, turtles, and other wildlife, and graze on algae and detritus (Id.).

The loss of native mollusks results in dramatic ecosystem shifts - perhaps far greater than any other biological group - including the loss of native fishes, leading to a degraded, resistant ecosystem state (*Id.*). When water bodies lose their ecological integrity and are in poor health due to the loss of these native populations, their resilience to future perturbation is low, and their resistance to improvement (or restoration) is high (*Id.*).

H. newberryi has been widely extirpated from across its range, suffering from long-term, widespread population declines (NatureServe, 2024). Because of this restricted range, they are especially vulnerable to extinction (Johnson, 2019, p.4, NatureServe, 2024). A significant percentage of the remaining range in the Great Basin and periphery – including Idaho, Nevada, and Utah – are presumably extirpated (*Id.*). Recent surveys have indicated that there is a strong need to monitor the status of remaining populations in the western U.S., especially now that the region has endured prolonged droughts and reduced snowpack, as well as an increase in water diversions and groundwater extraction (*Id.*).

Biology

Taxonomy

The Great Basin Ramshorn (*Helisoma newberryi*) was first formally described in 1858. Although originally placed in the genus *Planorbis* when originally described, most experts referring to its occurrence placed it in the genus *Carnifex*. Chamberlin and Jones named the species "Newberry's snail" (Oliver, 2019, p. 121).

Freshwater gastropods are split into two main subclasses: Prosobranchia and Pulmonata. *Helisoma* spp. fall into the Pulmonata subclass of lung-breathing freshwater aquatic snails. Three subspecies of *Helisoma newberryi* have been cited: *Helisoma newberryi newberryi* (California, Oregon, Idaho, Nevada, Utah), *Helisoma newberryi jacksonensis* (Jackson Lake, Wyoming), and *Helisoma newberryi occidentale* (Eagle Lake, Lassen, California) (NatureServe, 2024). This petition seeks protection for the full species across its range, including all three subspecies, collectively or individually.

Species Description

Freshwater mollusks can be difficult to properly identify due to their small size, the presence of undescribed species at collection sites, and the variability between live and preserved specimens (Hietala-Henschell, 2019, p. 2). Experts have recommended that species be identified based on shell and body features (*Id.*).

Planorbids like the Ramshorn are reportedly diverse and can range in size from 2 to 30 mm, where species in the family Planorbidae can often only be identified by internal anatomy, as shell features may overlap between species (*Id.*). Planorbid snails reportedly have discoidal shells (coiled in one plane) and are mostly orb-shaped, wheel-shaped, or

disc-shaped (*Id.*). Their respiratory, excretory, and reproductive systems are "sinistral," or terminating on the left side (*Id.*).

The Great Basin Ramshorn *Helisoma newberryi* has what has been described as a stout shell, diameter approximately 13 mm; with whorls that do not increase rapidly in width, but body whorls that are larger, with simple aperture offset downwards at steep angles. Baker (1945) describes *H. newberryi*, under the name *Carnifex newberryi*, in detail as follows:

> Medium to large, ultradextral, body whorl angulated; spire depressed or elevated, the whorls terraced and angular; base funicular; last whorl broad at the periphery, rapidly attenuated below; aperture triangular, outer lip thin; inner lip with slight callus. When the spire of *Carinifex* becomes elongated the shell is dextral although anatomically the animal is sinistral like that of *Helisoma*.

(Hietala-Henschell, 2019, p. 2).

Life History

The individual life span of this species, and for planorbids in general, is unknown; however, 4–5-year life spans have been suggested (*Id.*). Typically, young and immature planorbids are more active than mature adults (*Id.*).

Members of the order Basommatophora like the Ramshorn are mostly simultaneous hermaphrodites, whereby the adults have both a working male system and a functioning female system (Ruppert, E.E., R.S. Fox and R.D. Barnes 2004, p. 333).

H. newberryi can also occur with *Pisidium ultramontanum*, *Lanx klamathensis*, *Juga acutifilosa*, *Fluminicola seminalis*, *Pyrgulopsis archimedis*, *Vorticifex klamathensis klamathensis*, or several other endemic mollusks (Hietala-Henschell, 2019, p.5).

Habitat Requirements

H. newberryi lives in cold, well-oxygenated water, including slow rivers, larger lakes, spring sources, and spring-fed creeks. Individuals in the Pulmonata subclass of lung-breathing freshwater aquatic snails are littoral, preferring shallow areas less than 2 m (~ 6.5 ft.) deep, but can be found in water up to 5 m (~ 16 ft.) deep (Hietala-Henschell, 2019, p.3). *H. newberryi* is unique in the Planorbidae family, as it is a detritivore (NatureServe, 2024). It prefers muddy substrates and is often found burrowed out of sight in soft mud (*Id.*).

Surveys done in the Upper Klamath Lake Drainage found *H. newberryi* specifically located at sites with the following characteristics:

- Large, cold spring complexes, creeks, and pools; local *Rorippa* (yellowcress); abundant *Myriophyllum* (watermilfoil), *Ceratophyllum* (hornwort), and *Elodea*

(waterweed) beds in deeper areas, some substantial *Chara* (stonewort) stands and dense epiphytic algae offshore; mostly mud substrate, with scattered gravel, basalt cobbles, boulders.

- Spring-fed deep channels with mud over peat substrate with some epiphytic algae, including mats.
- Large cold lakes with mud bottoms with scattered rare bedrock (red pumice, basalt) exposures and abundant epiphytic algae; common *Ceratophyllum*, *Elodea*, some *Lemna trisulca* (star duckweed); effectively a limnocrene.
- Narrow rocky ditches with patches of silt; no macrophytes; uncommon epiphytic algae.

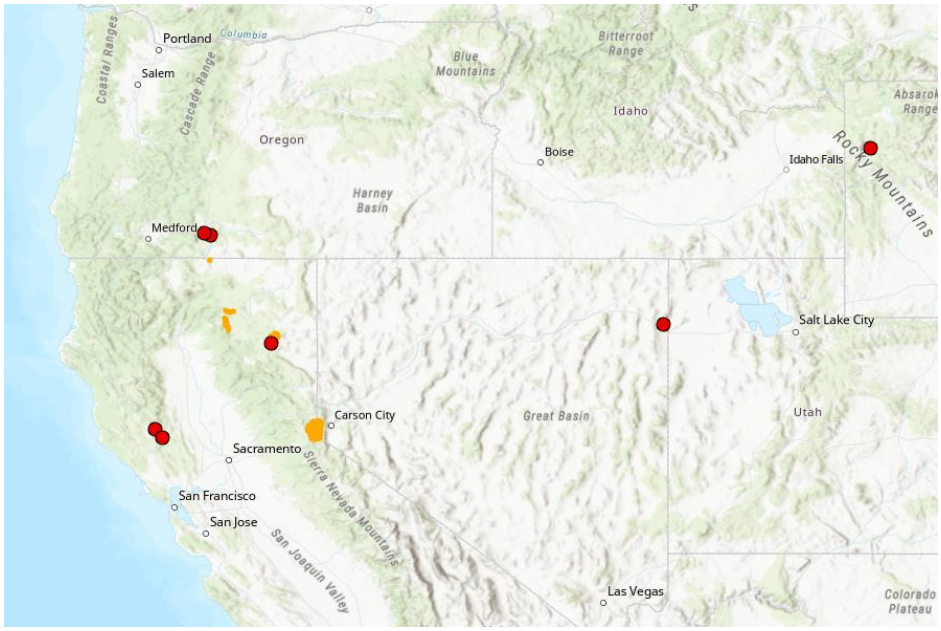
(Hietala-Henschell, 2019, p. 5-6).

Helisoma newberryi is a local endemic with very specialized and uncommon habitat. It requires well-oxygenated, clean, cold, flowing water, supported by larger spring sources and spring-fed pools, lakes, low gradient rivers, and creeks (NatureServe, 2018; ODFW, 2019).

In general, gastropods are highly susceptible to habitat loss and degradation, especially those restricted to a single spring or short stream reaches (Johnson, 2013, p. 247). High imperilment rates have also been linked to the introduction of nonindigenous species (*Id.* at 248).

Range and Population Status

Helisoma newberryi is ranked by NatureServe as a G1 critically imperiled species (NatureServe, 2024). Once abundant throughout California, Oregon, Idaho, Nevada, Wyoming, and Utah (especially in the Great Basin pluvial lakes), the species once enjoyed a broad range, but is now presumed extirpated in Idaho, Nevada, and Utah; primarily due to water management activities (*Id.*).



The distribution of *H. newberryi* populations is highly restricted (Hietala-Henschell, 2019, p. 3). This species is currently found in and around the periphery of the northern Great Basin in Douglas County, Nevada; El Dorado, Lassen, Placer, Shasta, and Siskiyou Counties, California; and Klamath and Lake Counties, Oregon (*Id.* at 4). The most recent survey efforts were focused on the Klamath Lake in Oregon and northern California's Pitt River watershed (*Id.*). A significant percentage of the remaining range in the Great Basin and periphery – including Idaho, Nevada, and Utah– are presumably extirpated (*Id*.).

H. newberryi populations in and near the Klamath River and Williamson River springs are likely extant, especially populations that occur on public lands. However, springs in the Upper Klamath Lake area have been negatively impacted by past dredging and increased eutrophication and sedimentation (Hietala-Henschell, 2019, p. 4). The adjacent occurrence records from Hagelstein Park represent the largest single site for *H. newberryi* (*Id.*). On BLM/Forest Service Land, *H. newberryi* has been found on the Fremont-Winema National Forest in Klamath County, however, specific abundance estimates are not available (*Id.*).

Mollusk surveys from 2007-2010 did not detect this species in Douglas County (Roseburg BLM District) or at additional sites in western Klamath County (Lakeview BLM District) (*Id.*). Additionally, *H. newberryi* is not suspected on Lakeview BLM District in Lake County due to a lack of suitable habitat on BLM land in Lake County (*Id*.).

Freshwater mussel surveys from 2001, 2005, and 2006 in the Lassen National Forest, CA, detected this species at low levels, typically one or two individuals (*Id.*). Experts suggest this species is uncommon, to very rare, regionally (*Id.*).

Recent surveys have also indicated that there is a strong need to monitor the status of remaining populations in the western U.S., especially now that the region has endured prolonged droughts and reduced snowpack, as well as an increase in water diversions and groundwater extraction (NatureServe, 2024).

Listing Factors

Freshwater gastropods have the highest modern extinction rate of any organism relative to their background extinction rate (Hietala-Henschell, 2019, p. 6). This is likely due, in part, to their high susceptibility to habitat loss and degradation and limited dispersal abilities (*Id.*).

The Ramshorn faces threats to its continued existence under three of the five factors and warrants protection under the ESA as an endangered or threatened species. The overall threat level for this species is high, with an estimated long-term trend of declining 70-90% (NatureServe, 2024). Specifically, the Ramshorn is especially threatened by habitat loss and pollution via water management activities (*Id.*).

Present or threatened destruction, curtailment, or modification of habitat or range:

Habitat loss and pollution are major threats to *H. newberryi* populations, and this includes changes in the amount and quality of water at sites, as well as the physical alteration of a site by water diversion and other activities (ODFW, 2019). Additionally, land use practices, such as dredging, mining, road construction, and others, can cause sedimentation and nutrient inputs that may smother substrates or reduce egg survival (*Id.*).

Pollution & Grazing

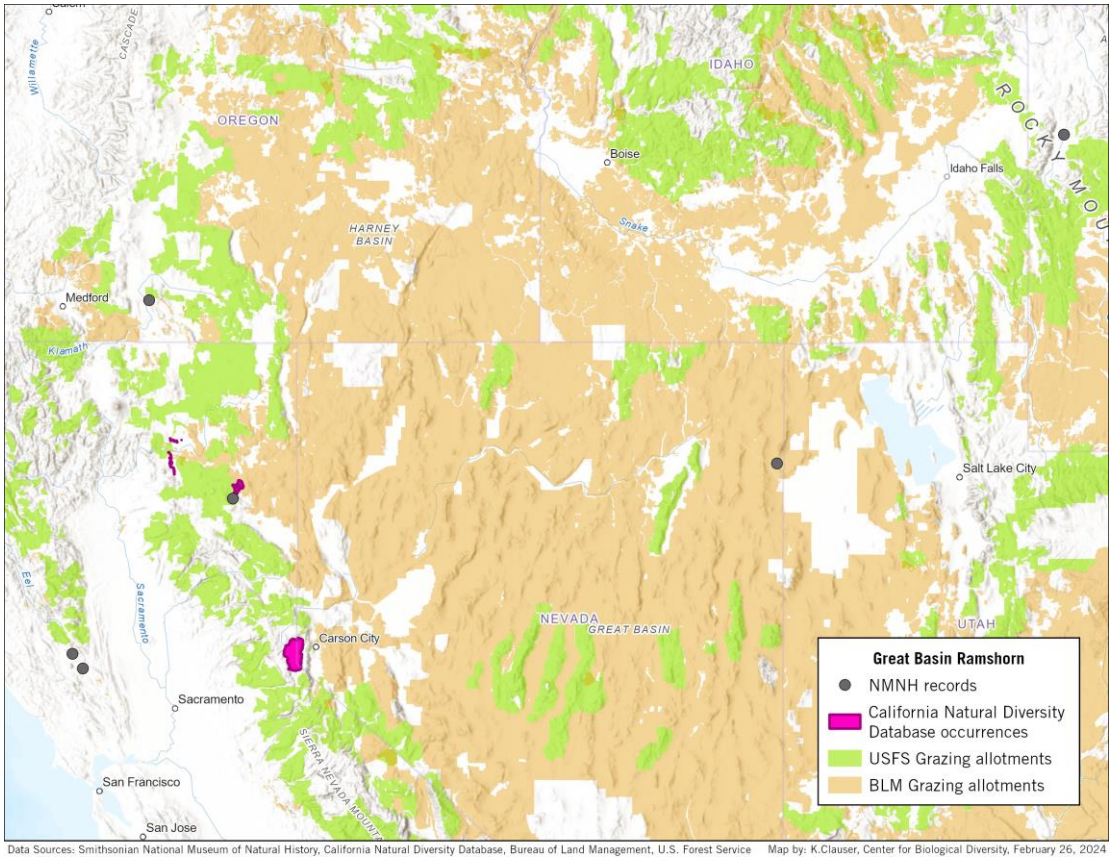
Given the broad former distribution of the snail and the few remaining occurrences, it is likely that many populations have already been extirpated from pollution impacts and surviving populations are vulnerable to ongoing pollution.

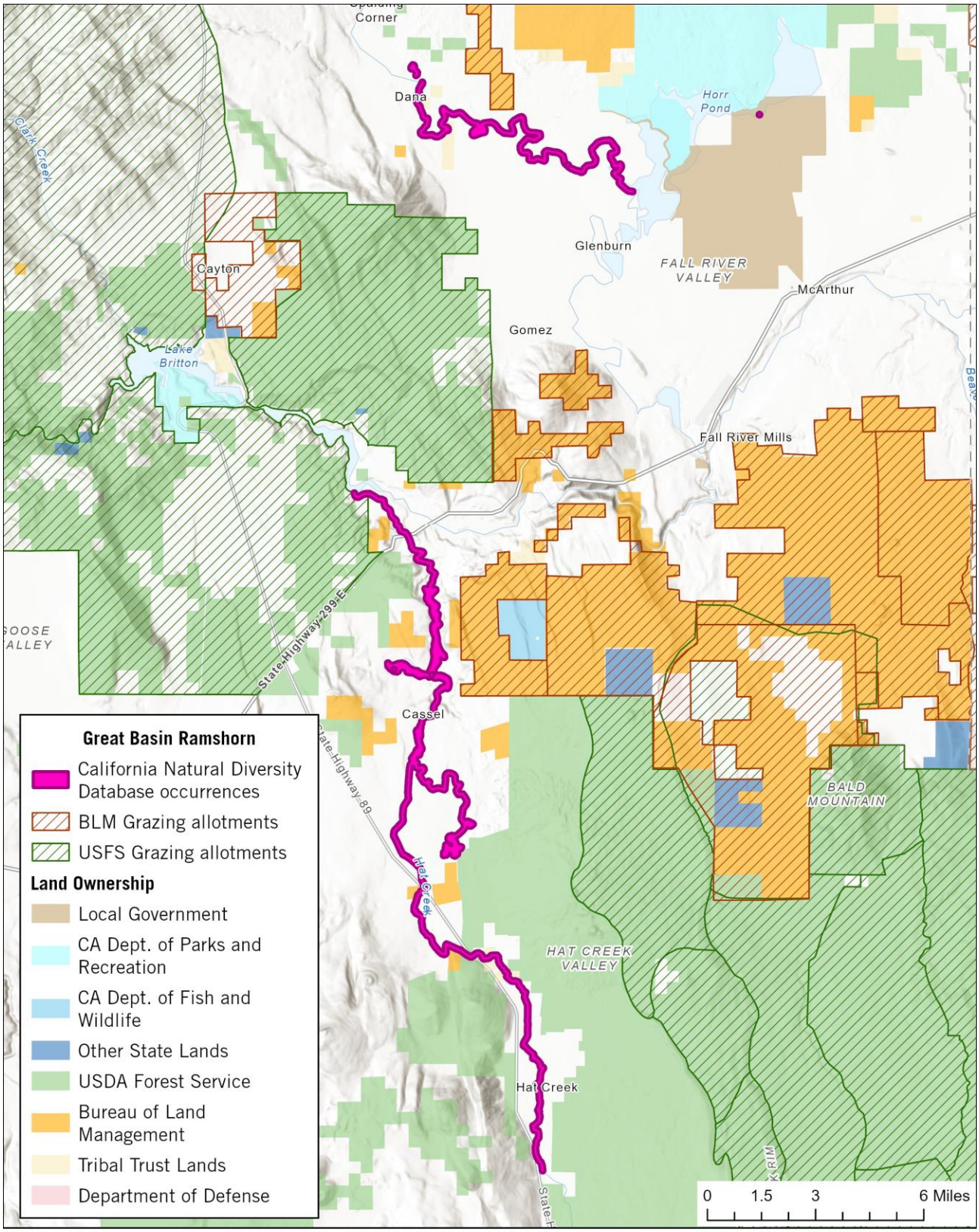
Lakes with high water quality, typically where spring pools and spring-fed creeks are still present, are capable of supporting the species. Remaining sites are threatened by eutrophication, pollution from urban, agricultural, and industrial use, and habitat modification (NatureServe, 2024). Areas with eutrophication or hypoxic events in particular will not support this species; *H. newberryi* does not occur in areas with dense beds of macrophytes, such as *Myriophyllum* and *Elodea* (*Id.*).

Extensive human modification to rather specialized habitat is an ongoing threat to *H. newberryi*. Water quality, nutrient concentration, sedimentation, eutrophication, grazing, and habitat loss by conversion of springs for livestock and domestic usage are all threats to this species (Hietala-Henschell, 2019, p. 6). Grazing and habitat loss by conversion of springs for livestock and domestic usage in particular are especially problematic because cattle grazing near water sources may pollute sites with feces and urine (*Id.*). Many

springs in the Great Basin and Oregon Interior Basin are so heavily grazed as to completely extirpate or greatly reduce nearby sensitive species (*Id.*).

number of the surviving Ramshorn populations occur on private lands, where they do not receive protections and are likely subject to impacts from grazing, agriculture, and development. The maps below document known occurrences of the Ramshorn in California and Oregon, as well as known BLM and USFS grazing allotments surrounding these occurrences. Uplands grazing can cause harm and trespassing livestock is a constant problem wherever there is water in the arid west. Land use activities that involve ground disturbance near riparian areas negatively impact water quality through sediment disturbance and transport (Mebane, 2001, p. 293-322). Grazing specifically can have significant detrimental effects on riparian ecosystems because it impacts water quality and quantity, soil health, instream and streambank vegetation, and aquatic wildlife (Belsky et al., 1999, p. 1). Because grazing compacts soil, it can reduce groundwater infiltration rates and contribute to increased runoff and erosion (Teague, 2020, p. 1). Species richness of native plant types has been documented as lower at springs in proximity of high grazing intensity, as compared to springs with limited or no grazing (Nielson, 2019, p. 1).





Data Sources: California Natural Diversity Database, California Department of Forestry & Fire Protection, Bureau of Land Management, U.S. Forest Service

Map by: K.Clauser, Center for Biological Diversity
February 26, 2024

Livestock and human-caused trampling near streams and springs increases turbidity (Utah State University, 2023). Increased turbidity in turn influences water temperature and can impact the ability of photosynthetic organisms to produce oxygen. In addition, eutrophication resulting from defecation of cattle near streams can contribute to a proliferation of algae that impacts oxygen availability. The resulting decrease in dissolved oxygen in spring ecosystems negatively impacts sensitive aquatic organisms (EPA, 2021).

Freshwater gastropods are highly sensitive to contaminants, and the impacts of certain metals, fertilizers, and pesticides are well-documented, and can be lethal to them in even small amounts (Id. at 7). Toxic compounds are often transported into species' habitats via soil sediments washed into streams during storm events, or otherwise brought by human use of the area (Id.). This is especially true for salts and metals, (including Cu, Hg, and Zn), untreated sewage that often accompanies campgrounds, and agricultural runoff (Johnson, 2013, p. 249). Because the petitioned species is extremely limited in its range and in its ability to adapt to ecological disturbance, these threats poses a significant risk.

Drought & Water Diversions

The few remaining Ramshorn populations have been found in the Upper Klamath Lake and Pit River drainages in south central Oregon and northeastern California (NatureServe, 2024).

The Upper Klamath has for years been used to support the federal Klamath Project for irrigation by local farmers for a century. However, federal officials have paused releases from the lake into the irrigation water project when there are extremely low water levels, as in 2021 (OPB, 2021). Between 2001 and 2022, due to dry springs experienced in the Upper Klamath Lake Basin, an executive order was issued declaring a state of drought emergency in Klamath County; in part due to low snowpack, low reservoir levels, and low streamflow (USGS, 2014; Oregon.gov, 2022). Still, emergency groundwater use drought permits are continually approved in the basin (*Id.*).

Pit River is used extensively for irrigation and hydroelectric purposes. There are 63 jurisdictional dams and reservoirs in the watershed that seasonally store rainfall and snowmelt, and then release that water for irrigation use through the summer season. Dams on the mainstem of the Pit River are also used to store and divert water for agricultural use during the irrigation season (Sacriver.org, 2024). As of 2004, the annual generation from main stem powerhouses provided approximately 13 percent of California's total hydropower (CA Energyalmanac, 2015) and, at one time, diversions took up to 95 percent of Pit River summer flows (California Trout, 2011). In 2011, the relicensing of several PG&E hydroelectric facilities on the river required the power company to increase minimum flow on the river reaches below Dams 3, 4, and 5.

Land Use Practices & Recreation

Most of the large springs along the periphery of Upper Klamath Lake were specifically modified for log transport and are now part of irrigation projects, which also impact Ramshorn' habitat, even when water quality remains excellent (USGS, 2017). Additionally, other land use practices, such as dredging, mining, road construction, and others, can cause sedimentation and nutrient inputs that may smother substrates or reduce egg survival (ODFW, 2019).

The Pit River is also a well-known trout stream in California and a popular destination for fishing, hiking, and sightseeing (Danielsson, 2006). In addition, the BLM operates the following recreation sites on the Upper Klamath River: Spring Island Day Use Site, Klamath River Campground, Turtle Primitive Camp, and Stateline Campground (Recreation.gov, 2024). There are numerous ways recreationists can cause physical and chemical damage to these areas, including by trampling, degrading water quality by introducing sunscreen, insect repellent, personal care products and detergents, and human waste. Recreation threatens the Ramshorn because it can cause trampling, soil erosion, disturbance to vegetation, water pollution, and other disturbances (Monz et al., 2021, p.631-643). Habitat conditions are also often harmed when dogs enter the river and/or introduce flea and tick treatment residues and animal waste. People cleaning fish also sometimes dispose of unused bait and fish residues in water sources near these areas. Visitors also frequently move rocks and debris in water sources in recreational areas, which impacts flow and substrate.

Inadequacy of existing regulatory mechanisms:

State

Although California has designated the Ramshorn as an S1/S2 species "special status species," there are no regulations in place to protect the species in either California or Oregon.

Federal

There are no documented conservation efforts aimed at protecting this species. Although the Ramshorn is included as a Forest Service Sensitive Species in Region 5 (the Pacific Southwest), and a "Special Status Species" by the Bureau of Land Management (BLM), there are currently no regulations protecting the species from threats. As previously discussed, the petitioned species is vulnerable to trampling and other grazing impacts. The species does not receive direct management attention by the BLM, and if the BLM is unable to adequately manage cattle in this area, it could have detrimental effects on the habitat of the petitioned species that could lead to extirpation and extinction.

Although the U.S. Fish and Wildlife Service is responsible for protecting and maintaining populations of both the Lost River sucker and shortnose sucker – federally listed species in the Upper Klamath whose populations have fallen sharply due to decline in water

quality – and the government has reportedly abandoned some planned dredging projects in the area that would further damage water quality, as discussed below, these efforts at conserving other listed species may actually negatively impact the Ramshorn by altering the substrate conditions it needs to survive.

Because existing regulatory mechanisms do not adequately address threats to the habitat of the petitioned species and there are no conservation efforts targeting this species, protection under the ESA is necessary. Listing under the ESA would provide the Ramshorn with a recovery plan and the long-term funding of conservation efforts called for by scientists and necessary for the species to have any chance of survival. Conservation measures needed include surveys mapping occurrences, maintaining appropriate water flow and quality, preventing and mitigating for water diversions, dredging, and other activities that could increase sediment or nutrient levels, protecting and restoring their habitat to prevent further destruction, monitoring the species and the effects of habitat change on the species, and assessing activities on the Ramshorn and associated effects on its habitat, as well as the effects of minimizing or eliminating conversion of their habitat for other uses.

Other natural or manmade factors affecting the continued existence of the species:

Due to its restrictive habitat requirements, the Ramshorn is also threatened by additional factors such as climate change, small population size, stochastic events, and invasive species.

Global climate change poses a serious threat to mollusk species because they tend to have narrow temperature and dissolved oxygen tolerances. Anthropogenically-induced climate change exacerbates threats to groundwater availability by increasing the likelihood and severity of drought. Specifically, the average temperature of the Northwest has risen nearly 2 degrees Fahrenheit since 1900, and is expected to rise by 4.7 degrees by 2080 (Swanson, 2023). Stream temperatures are expected to follow suit, as water temperatures could rise by up to 10.5 degrees Fahrenheit by 2100 in parts of the Northwest due to rising air temperatures and loss of snowpack (Walther, 2021).

The ability of affected species to survive these dramatic changes in temperature will likely depend upon their ability to disperse and seek out habitats with suitable conditions (Peters and Darling, 1985, p. 710). However, mollusks like the Ramshorn have extremely limited dispersal ability and are unlikely to successfully adjust their range as their current habitat becomes unsuitable. In addition, even one severe wildfire in the petitioned species' range – a risk that is increased by climate change - could catastrophically impact the population due to its small size and limited range.

The Pit River Watershed is also infested with invasive plants and noxious weeds, such as Scotch thistle (*Onopordum acanthium*) and Perennial Pepperweed (*Lepidium latifolium*), which are negatively affecting the watershed condition of the area (Pit River Alliance, 2024).

In addition, as previously mentioned, the U.S. Fish and Wildlife Service is responsible for protecting and maintaining populations of both the Lost River sucker and shortnose sucker – federally listed species whose populations have fallen sharply due to decline in water quality. However, mitigation efforts for sucker species - such as adding spawning gravels - may harm this species by smothering soft mud habitats (USDA, 2007).

As discussed above, the range of the Ramshorn is extremely limited, and there is limited data on population size for the species. Small populations are at-risk demographically due to limited genetic diversity and limited gene flow (Lacy, 1987). Because of their small population size, they are also vulnerable to events including fire and drought.

Request for Critical Habitat:

We request and strongly recommend that the Upper Klamath Lake and Pit River drainages be designated as critical habitat concurrent with the Ramshorn's listing. As required by the Endangered Species Act, the Secretary shall designate critical habitat concurrent with determination that a species is endangered or threatened (16 U.S.C. §1533(a)(3A)). Critical habitat is defined by Section 3 of the ESA as:

> (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 1533 of this title, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
>
> (ii) (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 1533 of this title, upon a determination by the Secretary that such areas are essential for the conservation of the species.

16 U.S.C. §1532(5).

As part of designating critical habitat, suggested conservation measures for the Ramshorn include fencing off habitat areas, installing water monitors, surveys, maintaining appropriate water flow and quality, preventing and mitigating for water diversions, dredging, and other activities that could increase sediment or nutrient levels, protecting and restoring their habitat to prevent further destruction, monitoring the species and the effects of habitat change on the species, and assessing activities on the Ramshorn and associated effects on its habitat, as well as the effects of minimizing or eliminating conversion of their habitat for other uses.

Conclusion:

The Ramshorn is a critically imperiled freshwater gastropod that now can only likely be found in the Upper Klamath Lake and Pit River drainages in south central Oregon and

northeastern California. In the context of the five listing factors, the Ramshorn warrants ESA protection because it is at risk of extinction due to the threats it faces and due to its small population size and highly restricted range. While the Ramshorn historically occurred in Idaho, Wyoming, Utah, Nevada, Oregon, and California, where it was generally confined to lake and large spring complexes on the periphery of the Great Basin, it is now Critically Imperiled in California, Oregon, and Wyoming, and Presumed Extirpated in Idaho, Nevada, and Utah. There are few remaining populations, and most have been located in the Upper Klamath Lake and Pit River drainages in northeastern California and south-central Oregon. There are currently no existing regulatory mechanisms that alleviate the threats facing the Ramshorn, and without ESA protection, it remains vulnerable to extinction. We urge the Service to propose the Ramshorn for listing and to designate critical habitat to ensure that it survives for future generations.

References:

Belsky, A.J. (1999). Survey of livestock influences on stream and riparian ecosystems in the western United States. Journal of Soil and Water Conservation, 54 (1) 419-431.

Bureau of Land Management. (2021). Final State Director's Special Status Species List: Permanent Instruction Memorandum. https://www.blm.gov/policy/or-p-im-2021-004. Accessed 12 Mar 2024.

Bureau of Land Management. (2021). Regional 6 Regional Forester and OR/WA State Director Special Status Species List. https://www.blm.gov/sites/default/files/docs/2021-08/OR-P-IM-2021-004-att1.pdf.

Bureau of Land Management. (2024). *Recreation.gov: Upper Klamath Wild and Scenic River.* https://www.recreation.gov/camping/gateways/16831. Accessed 12 Mar 2024.

California Natural Diversity Database. (2024). Special Animals List. California Department of Fish and Wildlife. Sacramento, CA.

Dillemuth, H. (2021). OPB, https://www.opb.org/article/2021/06/02/irrigators-say-they-plan-to-force-open-klamath-headgates-and-release-water/#. Accessed 12 Mar 2024.

Hietala-Henschell, K., T., Stone, R. H. (2019). Interagency Special Status/Sensitive Species Program (ISSSSP) Species Fact Sheet: Helisoma newberryi. USDA Forest Service Region 6 and USDI Bureau of Land Management Oregon State Office. 18 pp. Available at: https://www.fs.fed.us/r6/sfpnw/issssp/species-index/fauna-invertebrates.shtml. Accessed 12 Mar 2024.

Mebane, C.A. (2001). Testing bioassessment metrics: macroinvertebrate, sculpin, and salmonid responses to stream habitat, sediment, and metals. Environmental Monitoring and Assessment 67: 293-322.

Miller, R., Sytsma, M. (2013). Aquatic Invasive Species Surveys of Upper Klamath Lake, Fourmile Lake, and Lake of the Woods, OR During 2012. *Center for Lakes and Reservoirs Publications and Presentations.* 46.

NatureServe Explorer. (2024). *Helisoma newberryi.* https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.106615/Helisoma_newberryi. Accessed 12 Mar 2024.

Nielson, K. (2019). Spring ecosystems: vulnerable ecological islands where environmental conditions, life history traits, and human disturbance facilitate non-native plant invasions. Biological Invasions, 21 (9).

Oliver, G.V., Bosworth, III, W.R., State of Utah Department of Nature Resources. (1999). Rare, Imperiled, and Recently Extinct or Extirpated Mollusks of Utah: A Literature Review. *Utah Regional Depository*. Paper 531.

Oregon Water Resources Department. (2018). Klamath Basin Water Distribution Update. https://www.oregon.gov/OWRD/programs/regulation/KlamathRegulation/Pages/default.aspx. Accessed 12 Mar 2024.

Peters and Darling 1985: Peters, R.L., Darling, J.D.S. (985). The Greenhouse Effect and Nature Reserves. Bioscience 35(11):909-717.

Richards, D. (2022). The Health and Integrity of Utah Lake 2022: A Brief Ecological Evaluation. *OreoHelix Ecological.* DOI: 10.13140/RG.2.2.27281.10087.

Ruppert, E.E., Fox, R.S., Barnes, R.D. (2004). Invertebrate Zoology. A functional evolutionary approach. 7th Ed. Brooks/Cole, Thomson Learning, Inc. 990 p.

Sacramento River Watershed Program. (2024). https://sacriver.org/explore-watersheds/northeast-subregion/pit-river-watershed/upper-pit-river-watershed/#. Accessed 14 Mar 2024.

Swanson, C. (2023). What the National Climate Report says about the Pacific Northwest. The Seattle Times. https://www.seattletimes.com/seattle-news/environment/what-the-national-climate-report-says-about-the-pacific-northwest-5-takeaways/. Accessed Mar 14 2024.

Teague, R. (2020). Managing Grazing to Restore Soil Health, Ecosystem Function, and Ecosystem Services. Frontiers in Sustainable Food Systems: (4) 534187. 13 pp.

The Oregon Conservation Strategy. (2016). Great Basin Ramshorn. Oregon Department of Fish and Wildlife, Salem, Oregon. https://www.oregonconservationstrategy.org/strategy-species/great-basin-ramshorn/. Accessed 12 Mar 2024.

USDA Forest Service. (2007). Guide to Sensitive Aquatic Mollusks of the U.S. Forest Service Pacific Southwest Region. Pacific Southwest Region. https://relicensing.pcwa.net/documents/Library/PCWA-L%20568.pdf.

Walther, K. (2021). Rising Water Temperatures Could Be A Death Sentence for Pacific Salmon. Columbia Climate School. https://news.climate.columbia.edu/2021/02/10/rising-temperatures-pacific-salmon/. Accessed Mar 14 2024.