BEFORE THE SECRETARY OF THE INTERIOR

PETITION TO LIST THE CINNAMON JUGA (*JUGA CANELLA*) AS A THREATENED OR ENDANGERED SPECIES UNDER THE ENDANGERED SPECIES ACT

Photo: *Juga canella* on submerged wood at Skookum Creek, OR (Strong et al., 2022)

CENTER FOR BIOLOGICAL DIVERSITY

March 21, 2024

Notice of Petition

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Dear Secretary Haaland, Director Williams, and Regional Directors,

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") herby petitions the Secretary of the Interior, through the United States Fish and Wildlife Service ("Service"), to protect the cinnamon juga (*juga canella*) as a threatened or endangered species under the ESA.

This petition requests listing of the cinnamon juga based on threats to its habitat from anthropogenic land and resource uses and climate change. 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 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."

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 cinnamon juga.

Submitted this 21 day of March, 2024

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Executive Summary

The cinnamon juga (*Juga canella*) is a critically imperiled freshwater snail found in a small number of streams in northern California and south-central Oregon. It was officially described as a distinct species as part of a revision of the *Juga* genus in 2022 (Strong et al., 2022).

The species is immediately threatened by destruction of its stream habitats caused by dams, pollution, agriculture, livestock grazing, urbanization, logging, and other factors. It is also threatened by warming stream temperatures caused by climate change. In combination with the cinnamon juga's naturally low dispersal capabilities, sensitivity to water temperature and chemistry, and limited number of sites, these threats put it in imminent danger of extinction and necessitate its protection under the Endangered Species Act ("ESA").

This petition seeks protection for the cinnamon juga under the ESA based on the best scientific information and in the context of the statute's five listing factors. 16 U.S.C. § 1533(a). This petition also seeks to designate the sites where the cinnamon juga is found as critical habitat in light of the severity of threats facing the species and lack of other protections.

I. Introduction

The cinnamon juga relies on freshwater ecosystems—the diversity of which have declined dramatically in recent decades and will continue to do so without targeted conservation efforts. Although these ecosystems make up only one percent of the world's habitats, they contain a disproportionately high percentage of biodiversity, making them a critical focus for conservation efforts (Frest & Johannes, 2005). In the Pacific Northwest and globally, freshwater mollusks like the cinnamon juga are among the species experiencing the highest rates of modern extinction (Strong et al., 2022). An estimated 10% of all freshwater snails are extinct and 64% are conservation targets—a rate of imperilment higher than nearly any other animal group in North America (Johnson, 2019).

Freshwater snails face threats from a myriad of anthropogenic factors and now increasingly, climate change. They have been impacted by dam construction and pollution, which have degraded the riparian habitat that freshwater snails like the cinnamon juga require. Climate change driven droughts also alter the availability of water to feed rivers and streams, presenting a serious threat to freshwater mollusk survival.

Springsnails like the cinnamon juga are important indicators of freshwater habitat quality and of permanent water sources (Frest & Johannes, 2005). They also play a critical role in freshwater ecology by providing food for many animals and grazing on algae and detritus. Springsnails are an important food source for ducks, fish, crayfish, and turtles. When their population numbers are healthy, they have a significant impact on nutrient exchange processes in freshwater ecosystems. Their diets control algae growth,

maintaining water quality and clean substrates for other bottom-dwelling animals (Johnson, 2019, p. 5).

Given its level of imperilment and lack of protection, the Center petitioned the cinnamon juga for federal listing under the ESA in 2008 as part of a petition to list 32 mollusk species (Center for Biological Diversity et al., 2008). The Service found that the petition submitted by the Center "presented substantial information to indicate that listing the cinnamon juga may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range resulting from water diversion and groundwater withdrawal, grazing, and logging activities." 76 Fed. Reg. 61826, 61833 (Oct. 5, 2011). However, the 12-month finding on the petition concluded that the species could not be listed without the necessary genetic comparisons to establish taxonomic validity. 77 Fed. Reg. 57922, 57925 (Sept. 18, 2012). Such genetic work has now been done and the cinnamon juga is recognized as a valid species (Strong et al., 2022, p. 48).

II. Biology

a. Taxonomy

Freshwater snails like the cinnamon juga belong to a group of shelled animals called mollusks (Johnson, 2019). The cinnamon juga was previously known as *juga (Oreobasis) n. sp. 3* and was not considered officially described. The genus *Juga* has since been revised and the cinnamon juga is now known as *juga canella* (Strong & Whelan, 2019; Strong et al., 2022). The species belongs to the family Semisulcospiridae and order Caenogastropoda within the class Gastropoda and phylum Mollusca.

b. Description

Cinnamon juga snails have a conical shell that is 1.5 cm to 2.4 cm in length and is a black or dark purple to reddish cinnamon brown or tan color, occasionally with streaks of reddish purple. (Strong et al., 2022).

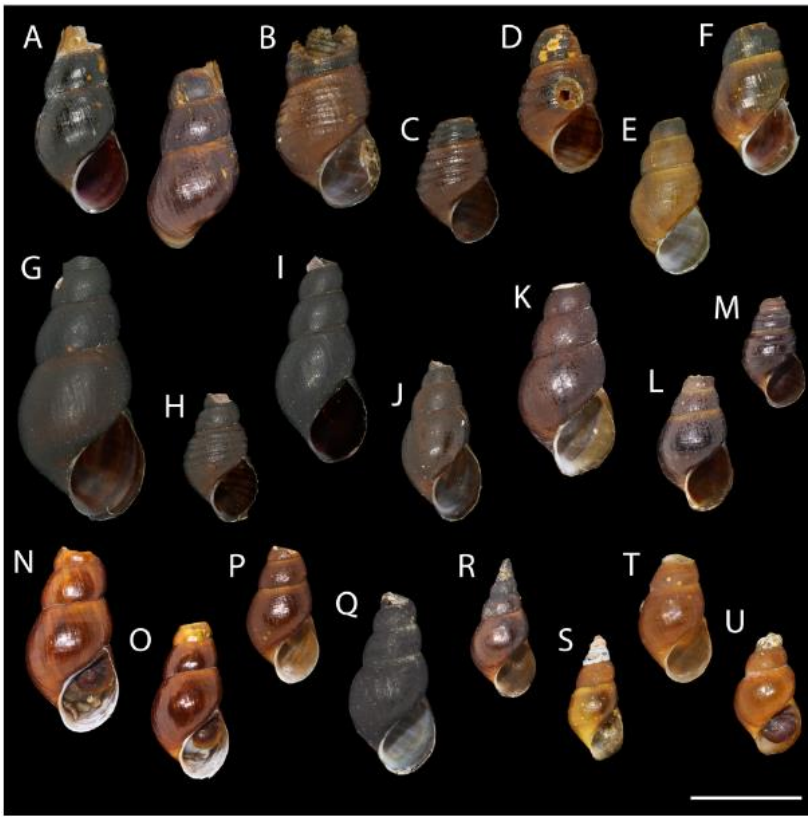

Figure 1: Shell morphology of *juga canella* (Strong et al., 2022, p. 47)

c. Life History & Diet

The Cinnamon juga may require up to three years to reach sexual maturity, with life spans of five to seven years on average (Strong & Whelan, 2019). Adult individuals of the genus *Juga* are dioecious (male and female reproductive organs in different individuals). Females are oviparous (reproduce by laying eggs) and lay eggs on hard substrates in a thick, gelatinous mass containing hundreds of eggs (Strong et al., 2022, p. 2). Most *Juga* species breed only once per year once they reach sexual maturity and tend to use the same locations for egg laying year after year if they are left undisturbed (ISSSSP, 2023). *Juga* snails tend to feed on algae and detritus such as dead leaves (ISSSSP, 2023).

d. Habitat Requirements

Members of the genus *Juga* generally prefer cold, oligotrophic, and well oxygenated waters (Strong et al., 2022). Preferred habitat of the cinnamon juga consists of cold springs and spring runs that have sand-cobble substrate or exposed basalt bedrock. The water in which it is found tends to be shallow and have a slow-moderate flow (Frest & Johannes, 1999). Surrounding vegetation is mixed pine-deciduous tree/shrub forest which makes these springs generally well-shaded and thereby cooler (Frest & Johannes, 1999).

e. Range & Population Status

The cinnamon juga is found primarily in approximately ten sites in springs and spring-fed creeks of northern California in the Shasta River watershed and adjacent parts of the upper Sacramento River watershed in Siskiyou and Shasta Counties. It is also found in south-central Oregon in the upper Klamath River watershed in Jackson County, including sites in the Cascade-Siskiyou National Monument (Strong et al., 2022). Populations may have once existed along the main stem of the Sacramento River but would have likely been extirpated by the Cantara Loop chemical spill in 1991 (Strong et al., 2022, p. 47). It is unlikely that there are significant undiscovered populations (USFS & BLM, 2007). Range expansion is also unlikely due to the proximity of cinnamon juga population sites to the Southern Union Pacific Railroad tracks (NatureServe, 2023).

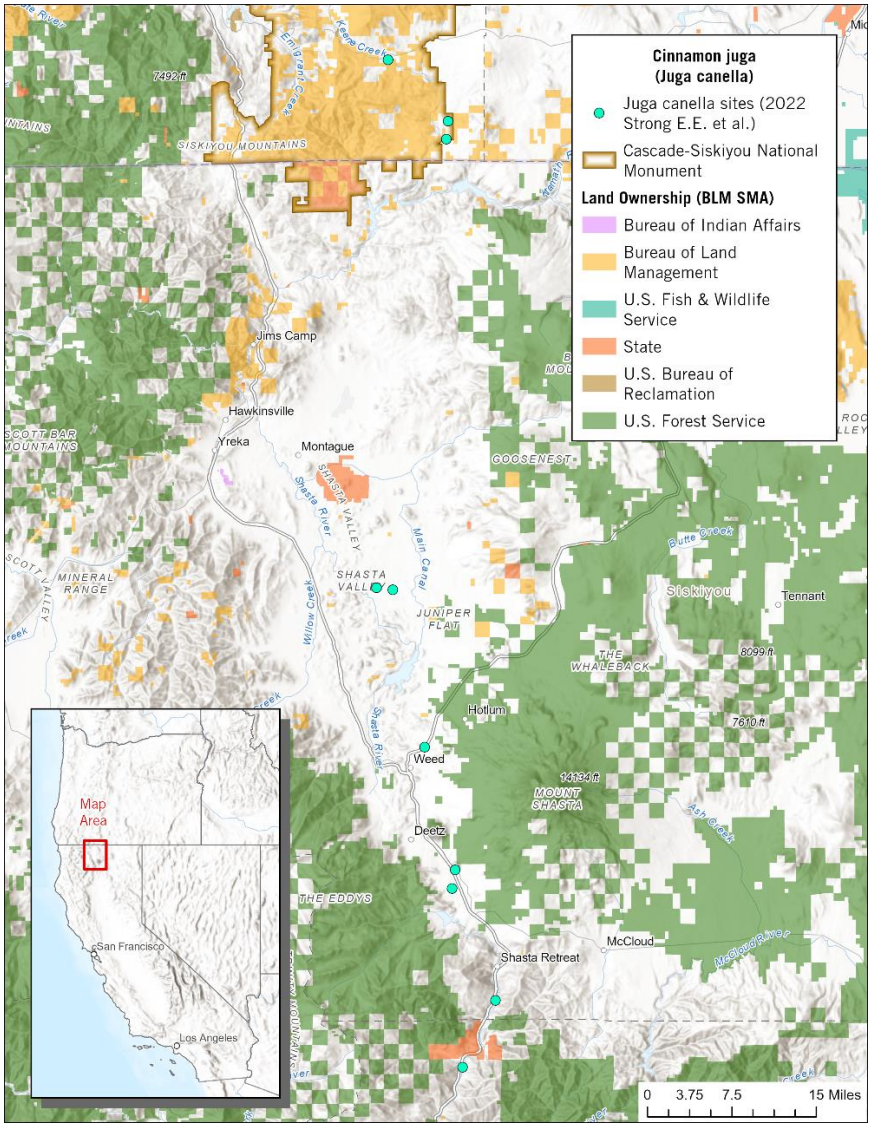

Figure 2: *Juga canella* Distribution Map (Location data from Strong et al., 2022; map by Kara Clauser, Center for Biological Diversity, February 2024)

Cinnamon juga populations exist in a very limited number of sites, making them highly vulnerable to catastrophic events. 76 Fed. Reg. 61826. Additionally, because of the extremely limited dispersal capabilities of springsnails, recolonization once a population is extirpated is unlikely (Hurt, 2004). Due to its rarity and narrow range, the loss of even a single site could result in numbers insufficient to support stable populations, making each threat to its habitat particularly concerning (USFS & BLM, 2007, p. 258.).

III. ESA Listing Factors

Under the ESA, a species must be listed where it is threatened or endangered because of any one of five enumerated factors. 16 U.S.C. § 1533(a). Of these, the cinnamon juga is threatened by the present destruction, modification and curtailment of its habitat and range, the inadequacy of existing regulatory mechanisms, and other manmade factors affecting its continued existence.

a. Destruction, modification, or curtailment of its habitat or range

The cinnamon juga faces historic and continued threats from habitat loss and degradation (Strong & Whelan, 2019). As a gilled snail, the species is sensitive to oxygen deficits, fine sediments in water, and alterations in water chemistry and temperature (Furnish & Monthey, 1998). Grazing and logging near its habitat cause increased temperature and alter sedimentation, bacteria, and nutrient levels of the water, making affected areas unsuitable for these sensitive snails. Its habitat is most significantly compromised by pollution, nutrient runoff, trampling by cattle, siltation from logging, and water diversions and impoundments. Past railroad construction and ongoing trackside herbicide spraying also affect the availability of suitable habitat.

Grazing presents an especially serious threat to riparian ecosystems in the western U.S, including to cinnamon juga habitat (Frest & Johannes, 2005). Livestock left to graze tend to seek out riparian areas for shade and forage, trampling and overgrazing these areas in the process. Grazing causes soil compaction and reduced infiltration rates. Streamside grazing also degrades water quality by increasing runoff and erosion, bacterial counts, sediment loads, and excess nutrients (Brim Box & Mossa, 1999, p. 104; Kauffman & Krueger 1984, p. 430). In the portion of the cinnamon juga's range that is managed by the Bureau of Land Management ("BLM"), rangeland health standards have not been met due to livestock grazing impacts.

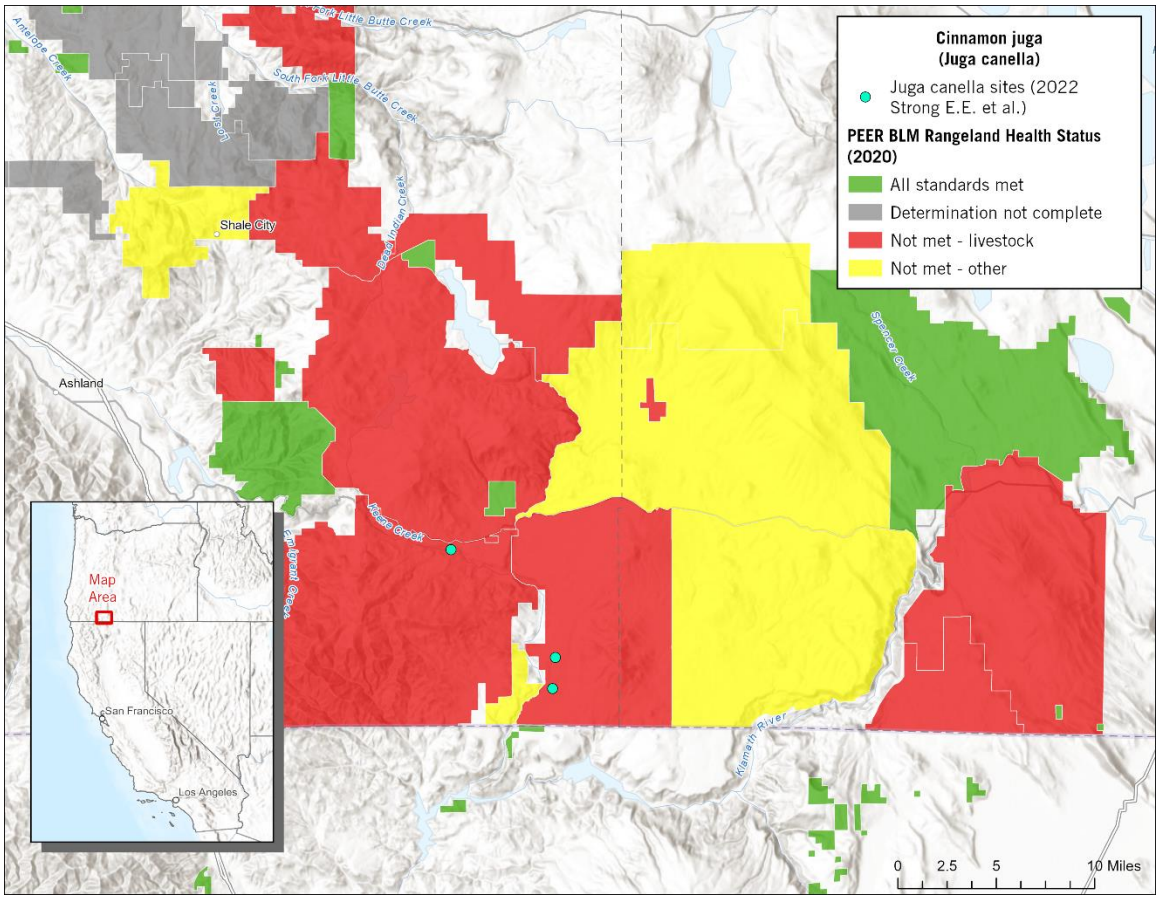

Figure 3. BLM Rangeland Health Status for *Juga Canella* Sites on Public Land (Location data from Strong et al., 2022; BLM rangeland health status from PEER, 2020; map by Kara Clauser, Center for Biological Diversity, February 2024)

Dams and impoundments of water for human use have caused extensive destruction of suitable habitat for the cinnamon juga (Furnish & Monthey, 1998). In 1945, construction of one of California's largest dams, the Shasta Dam, destroyed much of the area's riparian ecosystems. In recent years, multiple efforts have been made to enlarge the dam, which would further restrict water flows and lead to a greater loss of riparian habitat (American Rivers, 2016). One such effort to enlarge the dam is ongoing, posing an imminent threat to the cinnamon juga's habitat (Friends of the River, 2023).

Construction of the Southern Union Pacific Railroad tracks also considerably modified the lower part of springs that the species uses for habitat. Trackside herbicide spraying to control vegetation along railways has also impacted known sites (Frest & Johannes, 1999, p. 90). The Cantara Loop chemical spill from the railroad significantly affected many species in the upper Sacramento River, including the cinnamon juga (Strong et al. 2022, p. 47).

The species is also affected by water quantity since the existence of springs as habitat depends on the presence of groundwater. In arid regions such as the western U.S., humans pump more water from aquifers for agriculture and domestic uses, which can cause springs, aquifers, and small streams to dry up and freshwater species to become extinct (Strayer, 2006, p. 281). In the Sacramento River watershed, water levels have decreased, on average, by 900,000 acre-feet per year, due in large part to significant increases in groundwater pumping in the Sacramento valley (Austin, 2018). In the Klamath River watershed, groundwater pumping for agriculture was incentivized by the federal government beginning in 2001, leading to a severe water crisis and the drying up of springs in the watershed (Fu, 2021).

Ongoing logging near cinnamon juga habitat also threatens its habitat. Among other negative impacts, logging changes water quality by leading to higher sediment levels due to erosion of exposed soils and increases water temperatures due to removed shade. Logging also reduces the amount of nutrients entering the riparian zone because of the removal of vegetation that otherwise provided leaves and woody debris to the ecosystem (Woodcock et al., 2015, p. 426–427). The U.S. Forest Service ("USFS") has proposed over 8,000 acres of commercial logging close to Siskiyou Lake in a project known as the "South Fork Sacramento Public Safety & Forest Restoration Project." (USFS, 2023; Baker, 2023). The project would drastically affect riparian areas and species sensitive to disturbances and water quality degradation associated with logging (Baker, 2023).

b. Inadequacy of Existing Regulatory Mechanisms

Aside from the sites in Cascade-Siskiyou National Monument ("Monument"), none of the sites containing cinnamon juga populations occur on federal land. 76 Fed. Reg. 61826. Therefore, many populations do not benefit from the Aquatic Conservation Strategy of the Northwest Forest Plan. *Id*. Similarly, although the cinnamon juga was designated as a "Survey and Manage" species as part of the Northwest Forest Plan, this status does not benefit the majority of populations that exist outside federal land because, as of 2018, the BLM in Oregon is no longer implementing Survey and Manage standards and guidelines (USFS REO n.d.).

Three sites containing cinnamon juga populations occur within the Monument, which is managed by the BLM. These populations may benefit from some federal protections to their habitat, but any such protections fall far short of ensuring the species' survival. The Resource Management Plan ("RMP") for the Monument was published in 2008 and is currently being revised (BLM, 2008). The revision process includes the development of an "Analysis of the Management Situation" ("AMS"), which details current resource conditions within the Monument. Neither the 2008 RPM nor the 2023 AMS mention any species of *Juga* snails as ones being managed at the species level. The AMS explains that aquatic and riparian habitats within the Monument are managed under the Aquatic Conservation Strategy carried forward from the Northwest Forest Plan (BLM, 2023), which provides management objectives for maintenance and restoration of watersheds (BLM, 2023). However, the Aquatic Conservation Strategy has not been sufficient to

prevent degradation of riparian habitat within the Monument. The transfer of large amounts of water out of the watershed and prolonged drought have led to reduced stream flows and reservoir levels, exacerbating high stream temperatures and reducing the amount of aquatic habitat in the watershed (BLM, 2023, p. 84). Historic grazing practices have also caused reduced riparian vegetation, changes in stream shape and position, and increased erosion and sediment deposition (BLM, 2023, p. 87). While grazing has been limited over the last two decades, trespassing cattle still impact streams in the Monument and restoration efforts to date have not undone the damage. As displayed in Figure 3, the portions of the Monument where cinnamon juga are found are not meeting rangeland health standards due to livestock activity.

The cinnamon juga also does not benefit from state protections. California does not specifically mention the cinnamon juga in its California State Wildlife Action Plan, nor is it one of species targeted under the Oregon Conservation Strategy or Oregon's Sensitive Species List.

The majority of cinnamon juga sites are on land without strict requirements for aquatic habitat conservation. For the small federally managed portion of its range, some general efforts towards aquatic and riparian habitat conservation are worth noting but are unlikely to ensure the species' survival because these efforts have not been enough to restore habitat degraded by livestock or address depletion of streams and reservoirs and are not specific to the species' recovery. Listing the species under the ESA would provide the cinnamon juga with a recovery plan, surveys of occurrences, and the targeted conservation efforts that it needs to survive the threats it faces on both public and private land.

c. Other natural or manmade factors

Global climate change poses a serious threat to mollusk species as they tend to have narrow temperature and dissolved oxygen tolerances (Frest & Johannes, 1995). 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 is likely to depend on their ability to disperse and seek out habitats with suitable conditions (Peters & Darling, 1985, p. 710). Aquatic snails like cinnamon juga have extremely limited dispersal ability and are unlikely to successfully adjust their range as their current habitat becomes unsuitable (Frest & Johannes, 1995).

Climate change is causing increasingly severe and frequent droughts, with the western U.S. experiencing some of its driest conditions on record (USGS, 2023). Higher air temperatures and changes in the amount, form, and timing of precipitation cause reduced snowpack, substantially decreasing summer stream flows and dissolved oxygen for aquatic species (Parson et al., 2001, p. 262; Field et al., 2007).

Wildfires associated with climate change will also impact freshwater mollusks as they occur with greater frequency and intensity and consume more area (Field et al., 2007). California has experienced a 320% increase in burned area between 1996 to 2021 due in large part to climate change (NOAA, 2023). These fires can destroy snail habitat, leaving it unsuitable for decades and "effectively sterilize[ing] large areas of snails" (Frest & Johannes, 1993, p. 5; Burke, 1999, p. 21).

IV. Request for Critical Habitat Designation

The Center requests and strongly recommends that known sites with cinnamon juga populations be designated as critical habitat concurrent with the species' listing.

The ESA requires the Secretary to designate critical habitat concurrent with a determination that a species is threatened or endangered. 16 U.S.C. § 1533(a)(3)(A). 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) 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).

V. Conclusion

The cinnamon juga is a critically imperiled species that plays a crucial role in the riparian ecosystems in which it is found. The snails manage nutrient levels by consuming algae and detritus, keeping streams clear in the process. They also provide food for other important freshwater species. The cinnamon juga has a very small range and is found in just a few sites in northern California and southern Oregon, where it faces threats associated with logging, grazing, and water diversions. Climate change also significantly threatens its habitat as warming air and water temperatures, droughts, and severe wildfires are already wreaking havoc on wildlife habitat in the western U.S. The best available science about the cinnamon juga and freshwater snails generally indicates that they are unlikely to disperse or recolonize following habitat loss or catastrophic events. Accordingly, the cinnamon juga is in dire need of ESA protection to limit the possibility of extinction in the face of habitat destruction, climate change, and a highly restricted range. We urge the Service to propose the cinnamon juga for listing as threatened or endangered and to designate critical habitat in an effort to preserve the species.

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