

5-YEAR REVIEW

Short Form Summary

Species Reviewed: Bruneau hot springsnail (*Pyrgulopsis bruneauensis*)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

May 10, 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. 87 FR 28031.

Lead Region/Field Office:

Region 1/Idaho Fish and Wildlife Office, Boise, Idaho

Name of Reviewer(s):

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Methodology used to complete this 5-year review:

This review was conducted by staff of the Idaho Fish and Wildlife Office (IFWO) of the U.S. Fish and Wildlife Service (Service or USFWS), beginning on May 10, 2022. The review was based on a synthesis of current, available information since the last 5-year review for the Bruneau hot springsnail in 2018 (USFWS 2018, entire). Information considered includes: Endangered Species Act Section 7(a)(1) consultation documents, such as biological opinions and assessments, along with letters of concurrence; comments submitted in response to the May 10, 2022 Federal Register notice of initiation of 5-year status reviews (87 FR 28031-28034), and annual monitoring reports and other data collected by the IFWO. The evaluation conducted by IFWO biologists was reviewed by the Assistant State Supervisor for Endangered Species, and Deputy State Supervisor before submission to the Idaho State Supervisor for approval.

Background:

For information regarding the species listing history and other facts, please refer to the Service's Environmental Conservation On-line System (ECOS) database for threatened and endangered species (<https://ecos.fws.gov/ecp/>).

Review Analysis:

This 2023 5-year review considers new information and data collected after completion of the 2018 5-year review and focuses on pertinent updates that reflect the current status of the species starting in 2018.

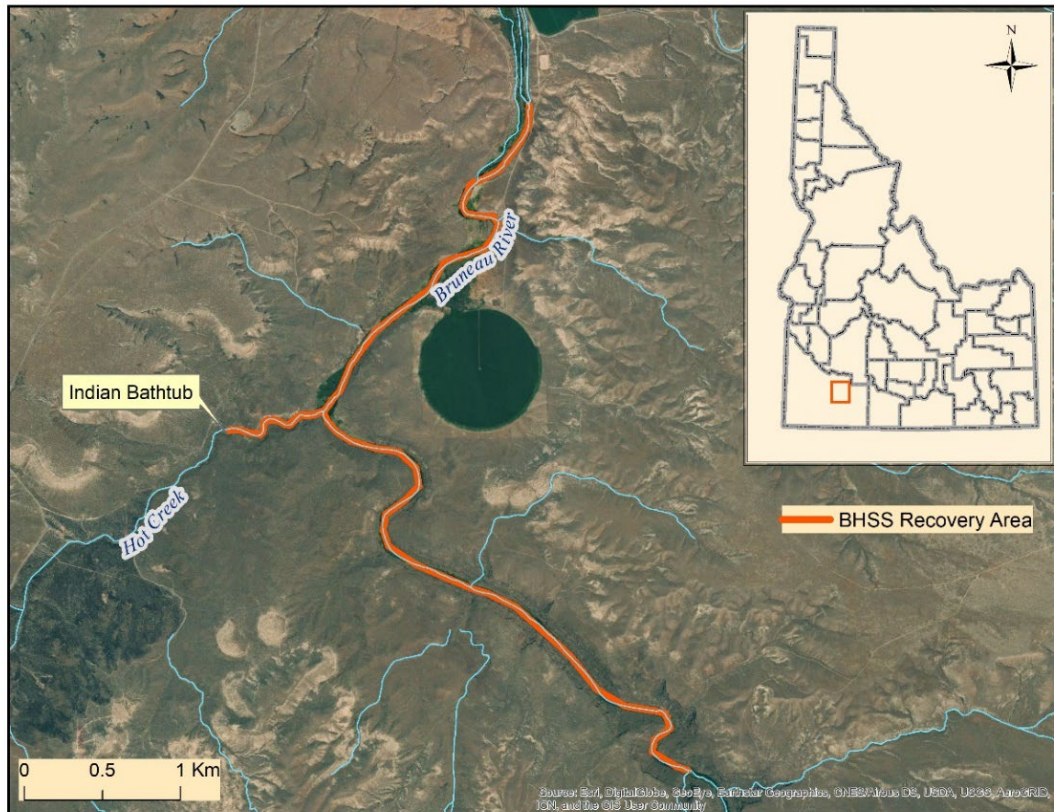


Figure 1. Recovery area and historical range (in orange) of the Bruneau hot springsnail in southwest Idaho. The species is no longer detected in an estimated 0.90-1.0 kilometers of its upstream range where historical hot springs have declined and/or disappeared. The species has also been extirpated from the upper 400 meter portion of Hot Creek, which no longer receives spring inputs from the local geothermal aquifer.

New Status Information:

For this status review, we assessed data from 2018 through 2022, and provide the data from 2017 to show how the status has changed over this time span. Since the 2018 5-year review, the number of springs present in the species' recovery area¹ and percentage of occupied springs have increased slightly (USFWS in litt. 2020, pp. 7-14; USFWS 2022, unpub. data) (Figures 2 and 3), but the geothermal aquifer upon which the species relies has continued to decline (Idaho Department of Water Resources (IDWR) in litt. 2023) (Figures 4a, b). Although data is collected throughout the range of the species, we have presented the portions of the range upstream and downstream of the confluence of Hot Creek separately. The upstream portion of the range is associated with a higher-gradient portion of the Bruneau River that flows through a canyon, while the downstream portion of the range is lower-gradient. Spring presence and springsnail occupancy differ in these two sections, and declining groundwater levels seem to be more strongly influencing springs in the upstream portion of the species' range.

¹ The recovery area is a designated focus area for recovery actions. The Bruneau hot springsnail recovery area is defined in the species' recovery plan (USFWS 2002, p. 22) and is the same as the known historical range (Figure 1).

Range-wide Spring Presence and Occupancy:

Annual surveys for Bliss Rapids snail include tracking the total number of springs found as well as number of occupied springs; annual variation in the number of springs found due to differences in river stage, spring flow, and vegetation growth, as well as changes to the riverbank from high winter flows. 2017 was identified as an abnormally low-count year for both total spring number and number of occupied springs; the majority of springs found in 2017 were not occupied. This is likely due to high flows in the Bruneau River, which can make it difficult for observers to find and access springs, reduce the searchable area of springs, and flush Bruneau hot springsnails from occupied springs. Since 2017, the total number of hot springs detected range-wide has increased by 18 percent, increasing from a low of 78 (2017) to 98 (2022). Of the 98 springs recorded in 2022, 50 percent (49 springs) were occupied by Bruneau hot springsnails. However, even though spring count has increased since 2017, all subsequent years have still recorded fewer springs than in any year prior to 2017 (Figure 2). The increase in the number of springs detected and number of occupied springs between 2017 and 2022 could be due to a number of factors, including inter-observer variation, changes in spring visibility due to annual variation in river stage or riparian vegetation over-growth, or reduced springflow causing historically large springs to split into multiple small springs. The documentation of a larger number of springs over the past few years, as illustrated in Figure 3, does not correspond to the more precise records of declining groundwater elevation (IDWR in litt. 2017, pp. 5-11; IDWR in litt. 2023; Figures 4a, b).

Springs occupied by Bruneau hot springsnails are classified each year as low, medium, or high density depending on the estimated highest density of snails found within that spring during that year's surveys. Low density is an estimated one to 1,618 snails per square meter, medium density is between 1,619 to 10,000 snail per square meter, and high density is over 10,000 snails per square meter. Springsnails are seldom distributed evenly within a spring and are often only found in a small portion of a spring. Snail densities are estimated based only on the occupied portion of the spring and extrapolated to approximate density per square meter. Therefore, while a reported medium or high density may suggest the presence of large numbers of snails in a spring, the occupied area within that spring may only cover several square centimeters and may represent actual snail numbers of less than 100 individuals. The density of springsnails in occupied springs is an important indicator of the species progress toward recovery; the Bruneau hot springsnail recovery plan recommends that medium and high-density springs should account for two-thirds of the total occupied springs. Currently, low density springs continue to account for most occupied springs; medium and high-density springs have never been abundant and have varied from year to year (Figure 2). While the number of medium-density springs increased in 2021 (9) and 2022 (8) from prior years, medium-density springs account for slightly less than 10 percent of total occupied springs. No high-density springs were detected in three of the last five years (Figure 2). Although there have been previous survey years with no detected high-density springs, the combined medium- and high-density spring count is far below the requisite two-thirds (66%) of total geothermal springs and 131 geothermal springs at medium- or high density needed for recovery.

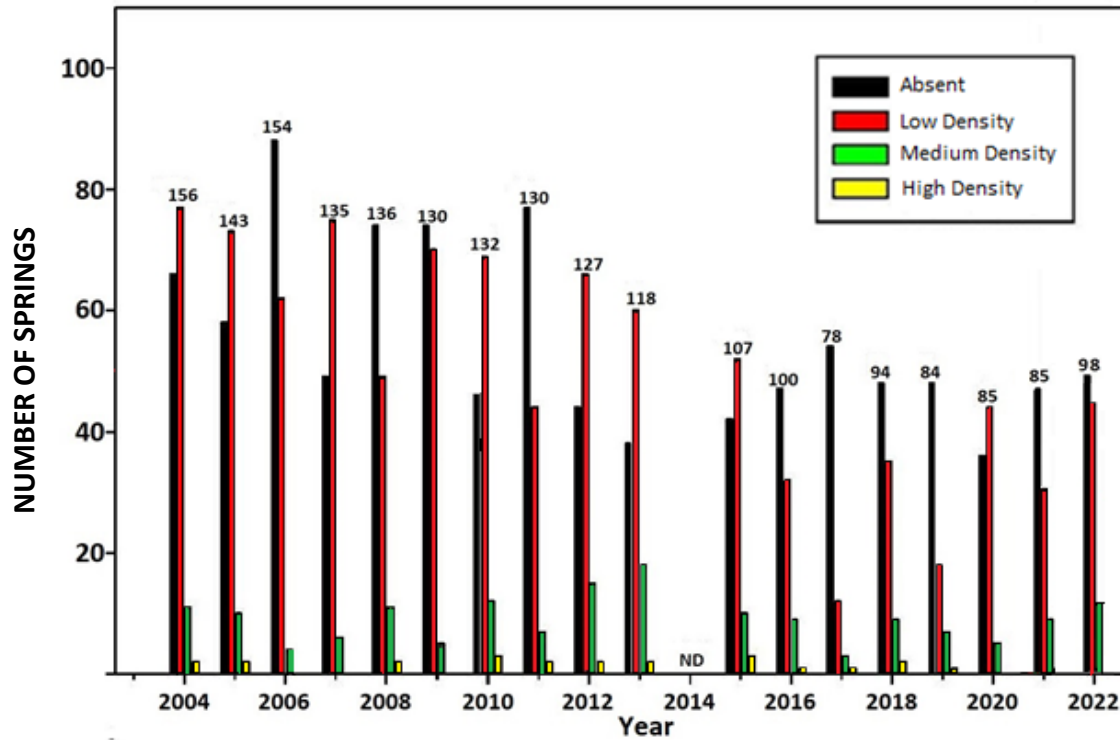


Figure 2. Bruneau hot springsnail presence and densities in geothermal springs within the recovery area along the Bruneau River from 2004 to 2022. The four occupancy categories (absent, low, medium, high) are organized from left to right for each year. The values above each series of columns are the total number of geothermal springs (occupied and unoccupied) recorded during each monitoring year. In 2014, only the river upstream of Hot Creek was sampled due to early flooding of the Bruneau River during the survey period.

Upstream Range and Occupancy:

The average number of geothermal springs in the upstream portion of the range (upstream of the Hot Creek and Bruneau River confluence, Figure 1) decreased by 29 percent between the 2007 and 2018 reviews but has changed little since the 2018 5-year review. Some of the variation in the yearly number of springs may have been influenced by annual differences in river conditions (e.g., elevated or reduced river stage, density of bank vegetation obscuring springs), but there has been a documented loss of the uppermost geothermal springs along the west side of the Bruneau River, leading to a 5% contraction of the species’ range since 2015 (USFWS in litt. 2020, p. 7).

Downstream Range and Occupancy:

The number of springs in the downstream portion of the species’ range is higher than in the previous 5-year review and are similar to those in 2014-2016. The extent (river-miles of detection) of the downstream range has remained the same. However, although the number of springs seems to be stabilizing, many of the springs documented since 2020 have been small. Declining water quantity could be causing larger springs to split into multiple smaller channels before reaching the river, which may be counted by observers as multiple springs, obfuscating potential declines in available habitat. Bruneau hot

springsnails are extremely small and, due to their thermal restrictions, likely have limited capability to actively move between geothermal springs, especially to those springs that are more isolated. Although Bruneau hot springsnails have been observed to drift into the Bruneau River when disturbed (Myler 2006, p. 8), this type of passive dispersal is unlikely to result in successful colonization of more fragmented springs but may provide some level of immigration from upstream colonies. If springs are fragmenting, this is likely leading to smaller, more isolated populations throughout the downstream range of the species.

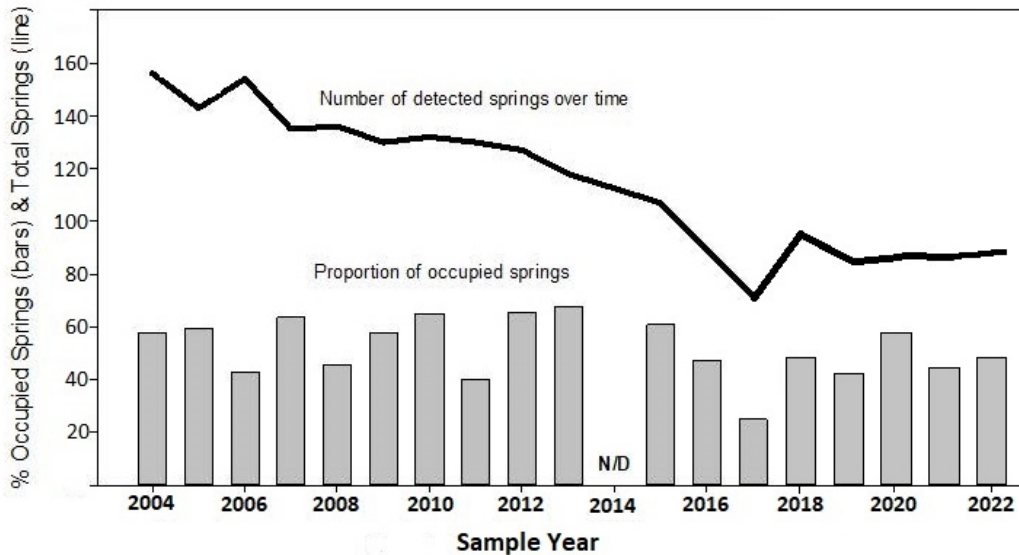


Figure 3. The percentage of occupied geothermal springs each year from 2004 through 2022 within the Bruneau hot springsnail recovery area along the Bruneau River. N/D: no data represents incomplete data set.

Groundwater Trends:

Bruneau hot springsnail habitat is primarily affected by the underlying geothermal aquifer and flows within the Bruneau River. IDWR manages a groundwater-level monitoring network within the Grand View-Bruneau Groundwater Management Area (GWMA) that encompasses the range of the Bruneau hot springsnail. An analysis of wells within the GWMA indicates that water levels in all wells exhibited a statistically significant downward trend over a 20-year (1998 – 2017) and 10-year time frame (2008–2017), with a 0.88 feet per year median decline from 2008–2017 (IDWR in litt. 2017, p. 12). Geothermal well depths within this monitoring network and at wells identified in the species recovery criteria have further declined since the last 5-year review (Figures 4a, b; IDWR in litt. 2023; Adkins and Bartolino 2012, p. 1), and reflect the continuing decline and potential fragmentation of geothermal spring habitat.

Geothermal springs within the Bruneau River can also be directly influenced by elevated river flows. High flows scour benthic habitat and dislodge snails, which can reduce Bruneau hot springsnail occupancy and densities (USFWS in litt. 2015, pp. 13–16). Our observations indicate that springsnail abundance and densities increase during normal and low-water years (free of scouring events), accounting for some of the observed

interannual variation (Figures 2, 3). Given that the occupied portion of the Bruneau River is unregulated (no water control devices, such as dams), seasonal and interannual variation in river flows will continue to affect the species and portions of its geothermal habitat.

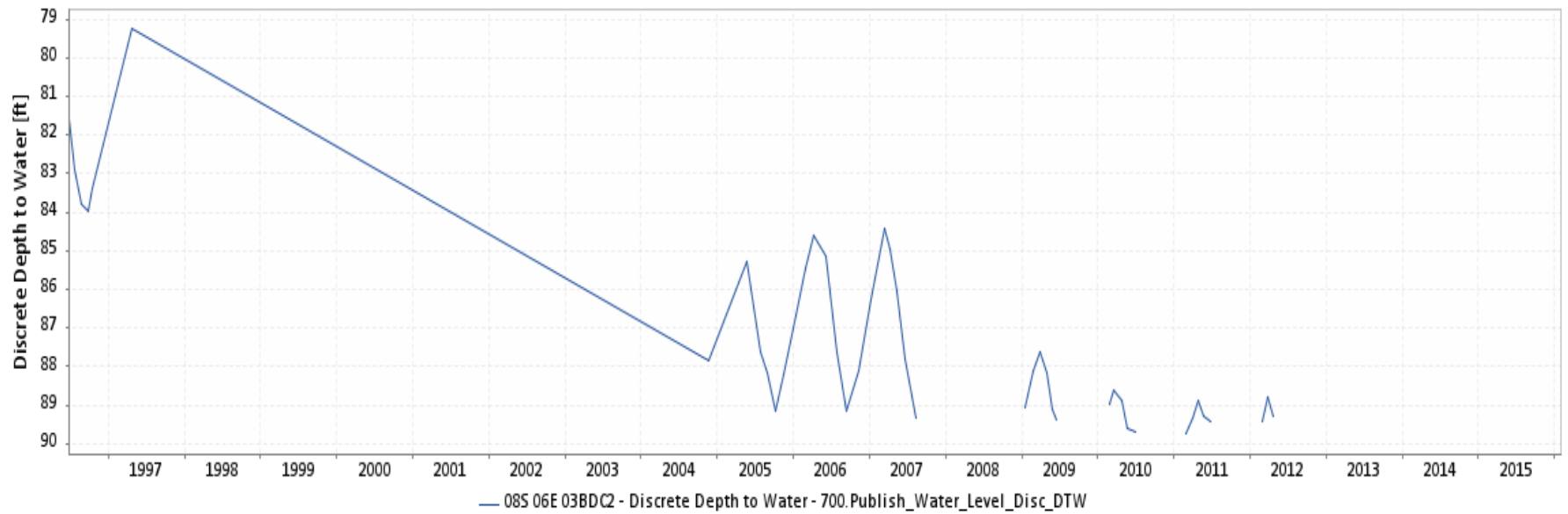
New and/or Updated Threats:

All previously identified threats to the Bruneau hot springsnail continue to impact the species (Table 1; USFWS 2007, pp. 21–27; USFWS 2018, pp. 12-16). The primary threat to the Bruneau hot springsnail continues to be springflow reduction due to groundwater withdrawal, which has resulted in the ongoing decline of geothermal habitat for the species. Current state regulations on groundwater withdrawal are inadequate to address this threat. Predation from nonnative fishes is considered a secondary threat, and livestock grazing, surface water diversions, and recreation are low level threats. New information about threats to the species since the previous 5-year review is presented below, where available. Information about the impact of nonnative fish predation, grazing, surface water diversions, and recreation are not provided because we do not have new information; however, these threats are still acting upon the species as discussed in the previous 5-year review. In addition, Table 1 provides an updated overview of all threats and summarized threat information.

Groundwater Withdrawal and Springflow Reduction:

Groundwater withdrawal from the geothermal aquifer continues to negatively affect the spatial extent and quality of geothermal springs on which Bruneau hot springsnails depend. IDWR regulates water development in the Grand View-Bruneau area, which encompasses the range of the Bruneau hot springsnail. The area was declared a GWMA in 1982 by IDWR due to projected and actual increases in groundwater withdrawal and declines in spring-flows from the geothermal aquifer system (IDWR 1982, entire). Present management and regulations that govern water use affecting the geothermal aquifer have not been adequate to reverse the declining trend of the geothermal aquifer. In recent years, rates of groundwater depletion appear to have increased in the Bruneau area (IDWR in litt 2017, p. 8-10; IDWR in litt. 2023). In the future, the potential for increased drought associated with climate change may cause an increased demand for water, including water withdrawn from the aquifer that feeds the Bruneau-area hot springs.

A groundwater management plan for the Grand View – Bruneau GWMA has recently been developed to slow or reverse groundwater depletion, but it is too early to determine if actions associated with this plan will accomplish the stated goals (Grand View - Bruneau Ground Water Management Area Advisory Committee 2023, entire). Due to the continuing decline of the geothermal aquifer and the resulting negative impact to geothermal spring habitat, we consider this threat to be continuing since the last 5-year review.



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Figure 4a. Declining trend in geothermal well, 03BDC2 from June 1996 to February 2016 when data collection at this well was ceased (IDWR in litt. 2023). Stable water levels at this well is part of recovery criteria for Bruneau hot springsnail.

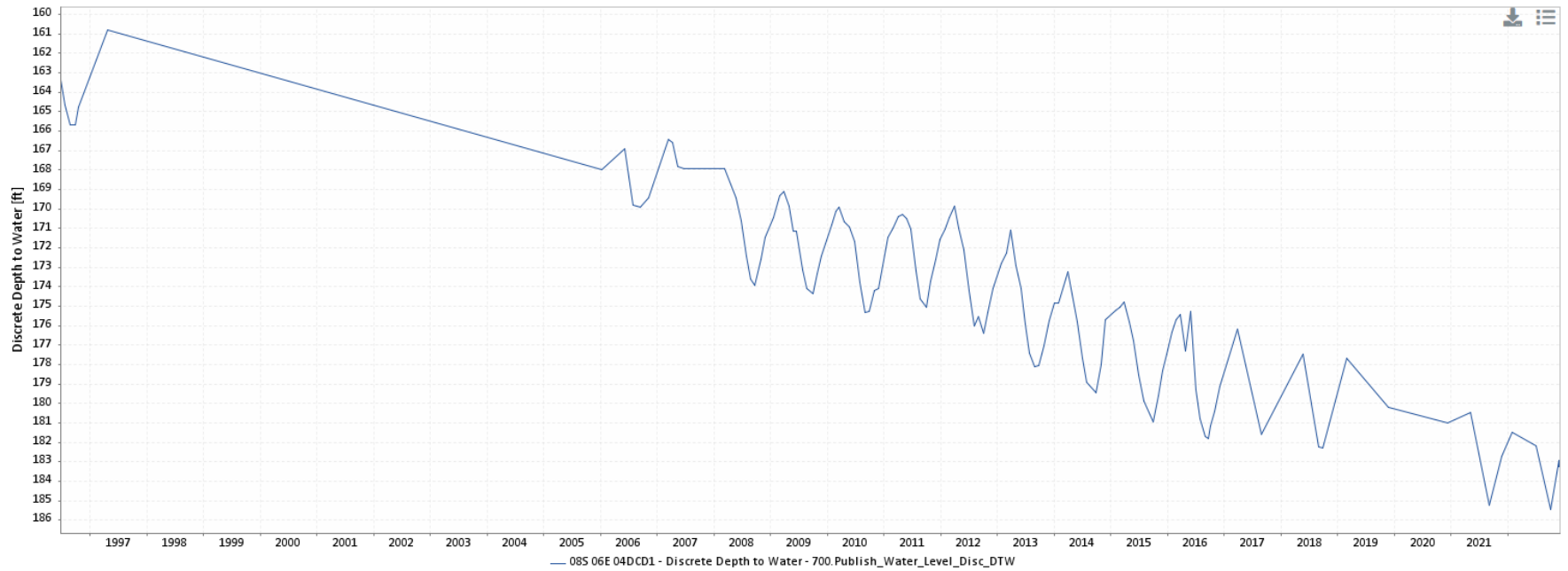


Figure 4b. Declining trend in geothermal well, 04DCD1 from June 1996 to November 2022 (IDWR in litt. 2023). Stable water levels at this well is part of recovery criteria for Bruneau hot springsnail.

Invasive Species:

Hydrilla (*Hydrilla verticillata*), an invasive aquatic plant typically found in the southern United States, forms dense monocultures that can restrict water flow, degrade water quality, impede recreation, and outcompete native species (Haller and Sutton 1975 in Idaho State Department of Agriculture (ISDA) 2021, p. 1). It was first identified in the Bruneau River in 2007 (ISDA 2021, p. 1) and covered an approximately 12-mile stretch of the Bruneau River downstream of Hot Creek, including the downstream section of the Bruneau hot springsnail recovery area. Within this area, it is largely restricted to areas of geothermal influence (ISDA 2021, p. 3).

An aggressive eradication program was initiated in 2008 by the ISDA. This program was developed through a collaborative stakeholder and agency effort including the ISDA, Idaho Department of Environmental Quality, Idaho Office of Species Conservation, USFWS, Bureau of Land Management, US Department of Agriculture, and private landowners (ISDA 2017, p. 5). Due to control efforts, hydrilla was not detected within the Bruneau River in 2021 or 2022, although it is still present at reduced levels in one of three monitored and treated canals adjacent to the Bruneau River (ISDA 2022 p. 5-13).

Effects of hydrilla on Bruneau hot springsnails are unknown but have the potential to affect the springsnail and its habitat. While the quick response and control of this infestation has been largely successful, additional hydrilla monitoring and control will be required to keep this invasive species from reestablishing in the future. Suction dredging has been used to control hydrilla in portions of the Bruneau River (ISDA 2022, p. 6). This method of control should only be considered in extreme instances of hydrilla invasion because it has the potential to harm populations of Bruneau hot springsnail through the crushing of individual snails, dislodging springsnails from suitable habitat, and depositing them on land with dredge material. As of this review, we do not consider hydrilla to be a current threat to the Bruneau hot springsnail, but it should continue to be monitored and assessed.

Table 1. Threats to Bruneau hot springsnail (*Pyrgulopsis bruneauensis*) at the time of listing (1993), 2007 and 2018 5-year status reviews, and this review. X denotes a threat.

Threats	Listing Factor ²	1993 (Time of Listing)	2007 5-Year Status Review	2018 5-Year Status Review	2023 5-Year Status Review	Summary
Groundwater withdrawal and springflow reduction	A	X	X	X	X	Increasing threat –no reduction of groundwater withdrawals resulting in continued aquifer depletion and springflow reductions.
Livestock grazing	A	X	X	X	X	Determined a low-ranking threat in 2007 5-year review. Continues to be a low-ranking threat.
Surface water diversion	A	X	X	X	X	Determined a low-ranking threat in 2007 5-year review for the downstream portion of the range. Continues to be a low-ranking threat.
Recreation	A	X	X	X	X	Determined a low-ranking threat in 2007 5-year review. Continues to be a low-ranking threat.
Overcollection	B	X				Determined a potential threat at the time of listing, but not regarded as such since the 2007 5-year review.
Predation from introduced fishes	C	X	X	X	X	Continued threat
Inadequate state regulations	D	X	X	X	X	Continued threat; extant GMWA and associated 2023 groundwater management plan, but too early to determine efficacy
Flash flood sedimentation	E	X				No longer considered a threat.

² The listing agencies consider the following factors, as set forth in the ESA, in deciding whether to list a species:

- A. the present or threatened destruction of habitat;
- B. overutilization of the species for commercial, recreational or other purposes;
- C. disease or predation;
- D. inadequacy of existing regulatory mechanisms; and
- E. other natural or manmade factors affecting the continued existence of the species.

Synthesis:

Since the last 5-year review (2018), surveys for Bruneau hot springsnails and their geothermal spring habitat have been conducted every year. Over time, declines in the geothermal aquifer have led to the continuing loss and fragmentation of geothermal spring habitat, which has had a direct, negative impact on springsnail populations. At the time of the last 5-year review, the number of occupied springs and springsnail abundance were at their lowest recorded. This may have been due to the heavy snow fall of 2016-17 and resulting high river discharge in excess of 5,000 cubic feet per second during the spring of 2017 (USGS in litt. 2023), scouring and flushing springsnail habitat along the Bruneau River. Since then, the number of springs, occupied springs, and springsnail relative abundance have seen a slight increase (USFWS 2020, pp. 9-14; USFWS 2022, unpublished data). However, the number of occupied springs is still much lower than when annual surveys began in 2002 and is insufficient to achieve recovery based on recovery criteria.

At the time of listing, threats to Bruneau hot springsnails were identified as groundwater withdrawal and spring-flow reduction; livestock grazing; surface water diversion; recreation; over collection; predation from introduced fishes; inadequate state regulations; and flash flood sedimentation (Hot Creek). Overcollection and flash flood sedimentation are no longer considered threats.

The 2002 recovery plan for the endangered Bruneau hot springsnail provides objective and measurable downlisting and delisting criteria (USFWS 2002, entire). To date, none of these downlisting or delisting criteria have been met, and the status of the species is further from recovery objectives than at the time of listing (1993). Furthermore, as Bruneau hot springsnail habitat and populations continue to decline, the species is subject to reduced resiliency (ability of the species to withstand random disturbances, e.g. trampling, recreational use of geothermal springs) and redundancy (ability of the species to withstand catastrophic events, e.g. flash floods, high river flows) inherent in small populations.

Based on the long-term downward trend of Bruneau hot springsnail density, spring occupancy, and spring availability, as well the increasing or continuing threats of habitat loss due to groundwater withdrawal from the declining aquifer, predation by nonnative fishes, livestock grazing, and recreational use of geothermal springs, we recommend that the species remains endangered under the Endangered Species Act.

Recommendations for Future Actions:

1. Continue monitoring Bruneau hot springsnail to further track population trends and spring presence.
2. In the long term, stabilization of the geothermal aquifer is needed to conserve Bruneau hot springsnails. Adkins and Bartolino (2012, p. 23) indicated that decreasing geothermal aquifer pumping closer to the geothermal reach of the

Bruneau River occupied by Bruneau hot springsnails would be the most effective groundwater conservation effort. We recommend elevated emphasis by regulators and users on strategically conserving geothermal groundwater. Efforts toward this goal would not only benefit the species and these unique habitats but would help sustain the local aquifers for their long-term use and continued economic contribution to the community.

3. Investigate possible habitat management actions, such as the removal of nonnative fishes and beaver from Hot Creek, to rehabilitate extant historically occupied springs. Beaver activity in Hot Creek provides ideal habitat for nonnative fish species; as long as nonnative fish species thrive in Hot Creek, it will not be able to support a robust population of Bruneau hot springsnail.
4. Investigate assisted migration to unoccupied secure hot spring habitats elsewhere in the Bruneau River watershed.
5. Complete an updated thermal imagery survey to better understand geothermal habitat availability for the species.
6. Revise Bruneau hot springsnail monitoring methods to better quantify and assess changes in population abundance and spring size over time and reduce inter-observer variation.
7. Continue monitoring for invasive aquatic plant presence and control as necessary.

References:

Adkins, C.B. and J.R. Bartolino. 2012. Historical and potential groundwater drawdown in the Bruneau area, Owyhee County, southwestern Idaho: U.S. Geological Survey Scientific Investigations Report 2012-5119, 26 pp.

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In litteris:

[IDWR] Idaho Department of Water Resources, in litt. 2017. Summary of groundwater levels in the Grand View-Bruneau Groundwater monitoring network – 2017 update. 17 pp.

IDWR, in litt. 2023. IDWR Online Data Access: Water Data: Groundwater Levels: <https://idwr.idaho.gov/water-data/groundwater-levels/>

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<https://waterdata.usgs.gov/nwis/sw>

[USFWS] U.S. Fish and Wildlife Service. 2015. Bruneau hot springsnail (*Pyrgulopsis bruneauensis*) 2014 limited surveys. Boise, Idaho. 14 pp.

USFWS. 2017. Bruneau hot springsnail (*Pyrgulopsis bruneauensis*) 2017 range-wide surveys. Boise, Idaho. 15 pp.

USFWS. 2020. Bruneau hot springsnail (*Pyrgulopsis bruneauensis*) 2020 range-wide surveys. Boise, Idaho. 19 pp. and one appendix.

USFWS. 2021. Bruneau hot springsnail (*Pyrgulopsis bruneauensis*) 2021 range-wide surveys. Boise, Idaho. 19 pp. and one appendix.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of Bruneau hot springsnail (*Pyrgulopsis
bruneauensis*)

Current Classification: Endangered

Pre-1996 DPS listing still considered a listable entity? N/A

Recovery Priority Number (no change needed): 2C

Recommendation resulting from the 5-year review:

- Delisting
- Reclassify from Endangered to Threatened status
- Reclassify from Threatened to Endangered status
- No Change in listing status

FIELD OFFICE APPROVAL
State Supervisor, Idaho Fish and Wildlife Office

_____ Date 8/21/2023