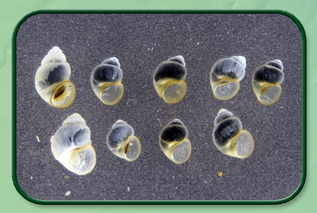


Gimme Shelter! Springsnails in an Arid Land

~ Jeff Jenness, Alek Mendoza, Brianna Mann, Larry Stevens, Jeri Ledbetter and Andrea Hazelton ~

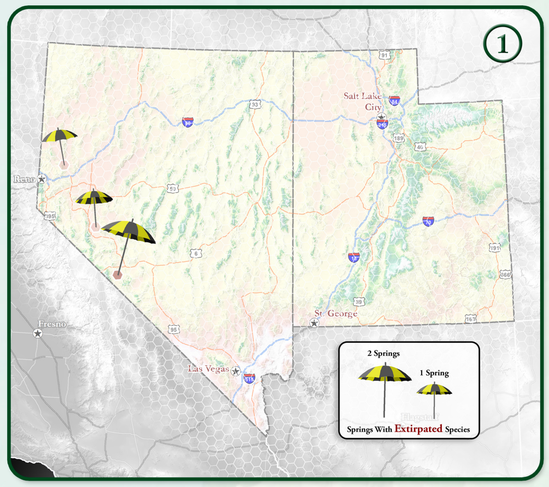
Springs Stewardship Institute
a Global Initiative of the Museum of Northern Arizona

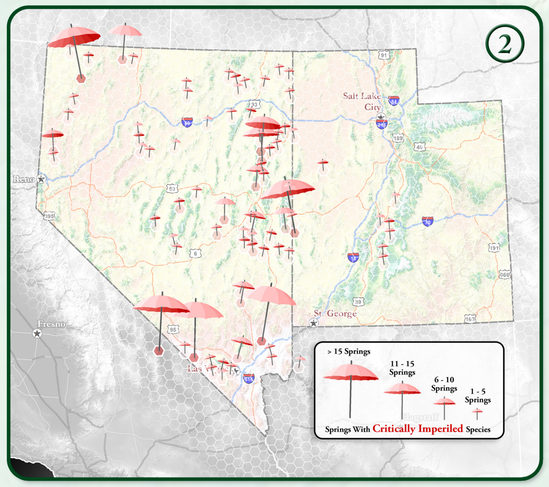
Background

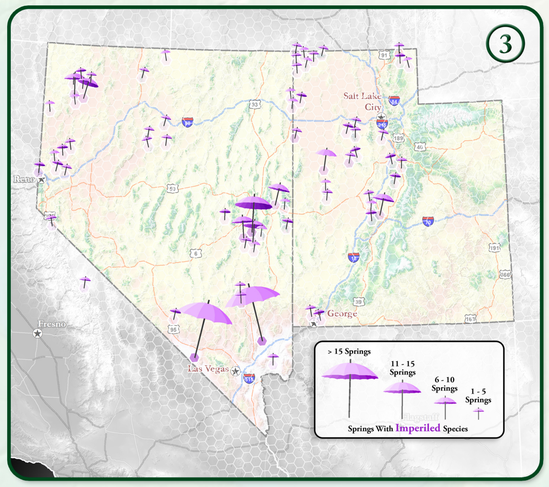
Springsnails are tiny, sometimes microscopic species that live in springs ecosystems. These springs ecosystems host a large number of endemic snails, organisms that evolved uniquely to live exclusively in a specific springs habitat or complex. In this way, springs support incredible diversity in arid land states like Nevada and Utah, and springsnails are an exemplary representation of the incredible biodiversity that springs provide.

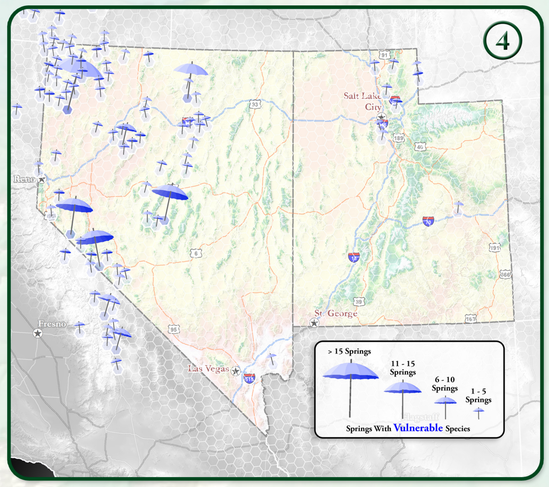
There are over 98 known species of springsnails in the states of Utah and Nevada alone, over 178 in the general Southwest, and likely more to be discovered. Springsnails serve an important role in their environment, recycling nutrients in the water. In this way, they are integral organisms within spring ecosystems; in addition, they serve as indicator species. Their presence often indicates that the conditions of the water quality and spring structure are ideal to support life.

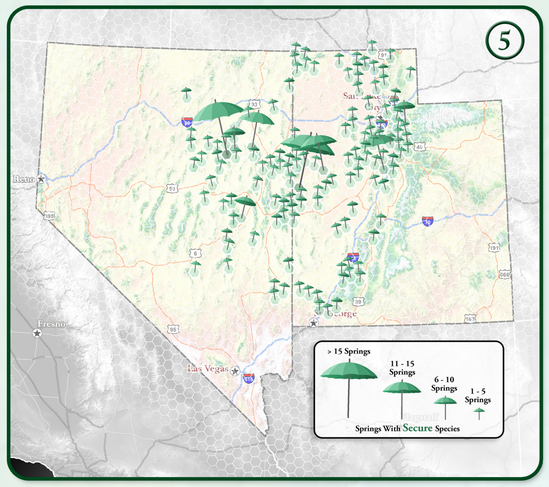
Perhaps most importantly, springsnails are umbrella species. In states like Nevada and Utah, drought, global climate change, and growing population demands have led to profound threats to natural aquatic ecosystems. Ground pumping and climate change deplete an already limited resource. In these states, springs are essential sources of freshwater for people, plants, and wildlife. Protection of springsnails is protection of springs and the incredible wealth of life that they sustain. In this way, efforts to protect these species, spearheaded by The Springsnail Conservation Strategy, a collaborative multi-species conservation plan, provide shelter not only for these incredible icons of diversity, but for all species, including those not yet known to science, that live in springs.

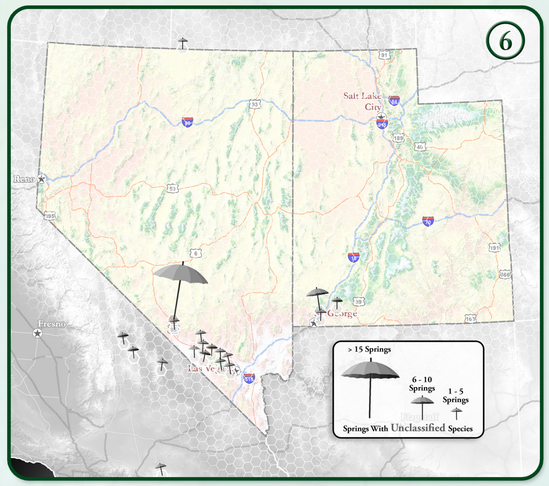












Discussion

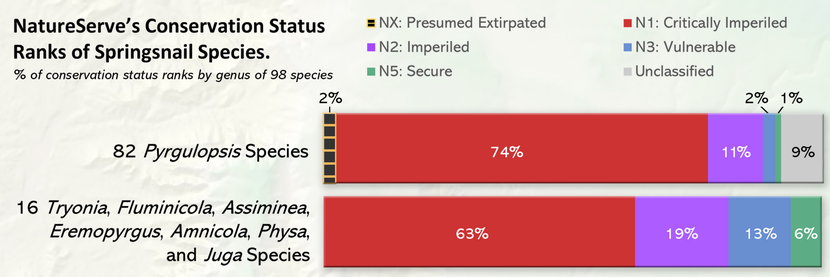
Perennial springs ecosystems are at high risk of disappearing from the landscape, because of increasing human demands for water, habitat alteration, and climate change, but until then they continue to provide irreplaceable habitat to aquatic life. The decline of valuable springs habitat has led the US Fish and Wildlife Service, state wildlife agencies, and other NGOs to invoke protection of some species of springsnails under the Endangered Species Act and state statutes. In 2018, the Springs Stewardship Institute (SSI) collaborated with Nevada Department of Wildlife to initiate the development of the Springsnail Conservation Strategy for states of Nevada and Utah, to better manage and protect 98 springsnail species and their ecosystems. We compiled existing research, published literature, and additional datasets in our Springs Online database to build a comprehensive dataset of population distribution, habitat conditions, conservation status and survey history of each species. According to Springs Online, over 90 researchers have contributed to this robust dataset (SSI 2020).

Drawing from the data in Springs Online, we mapped the distribution of 98 springsnails species across the states of Nevada and Utah. These species occur at 1,186 springs locations out of roughly 40,000 springs in Nevada and Utah (3% of springs in these two states). A few springsnail species, such as *Pyrgulopsis gibba* and *P. kolobensis*, are widely distributed across the southwest, while 33 springsnail species are restricted to only one or two spring locations and thus are highly vulnerable to habitat degradation or loss (Map 7). Sixteen of these 33 species were last observed and recorded in a survey prior to 2001.

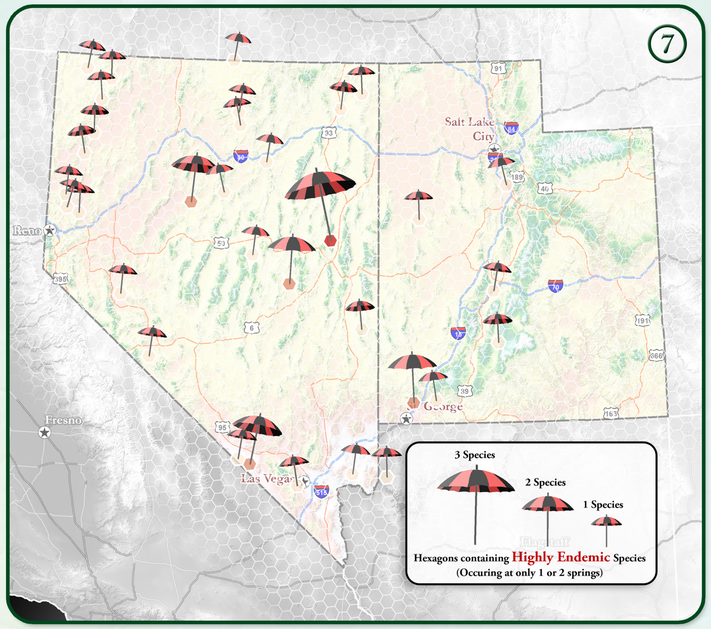
Using NatureServe's Conservation Risk Calculator (NatureServe 2020), we determined the national conservation status for each of the 98 species. The conservation status is summarized as a series of ranks at a national level on a six-point scale from Extirpated (NX), then from Critically imperiled (N1) to Secure (N5) (Maps 1 - 5). The current conservation status of 7 of the target 98 springsnail species remains unclassified (Map 6). The genus *Pyrgulopsis* makes up for 82 of 98 species, while the remaining 16 species are divided into 7 different genera: *Tryonia, Fluminicola, Assiminea, Eremopyrgus, Amnicola, Physa,* and *Juga*.

NatureServe's Conservation Status Ranks of Springsnail Species.

% of conservation status ranks by genus of 98 species



To date we have compiled extensive data on these 98 springsnail species and future work will further broaden our knowledge to provide a protective framework to improve the management and understanding of the springs ecosystems they inhabit. This is an ongoing collaborative effort aiming to preserve all springs across the arid southwest and the world.



Citations

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Utah Division of Wildlife Resources, Nevada Department of Wildlife, Nevada Natural Heritage Program, The Nature Conservancy, U.S. Fish and Wildlife Service, Region 8, U.S. Fish and Wildlife Service, Region 6, U.S. Bureau of Land Management (Utah), U.S. Bureau of Land Management (Nevada), U.S. Forest Service, Intermountain Region, U.S. Forest Service Dixie, Fishlake and Humboldt Toiyabe National Forests, USDA Natural Resources Conservation Service, National Park Service Pacific West Region, National Park Service Intermountain Region, and Department of Energy Nevada National Security Site. 2017. Conservation Agreement for Springsnails in Nevada and Utah.

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