Appendix A: Nevada and Utah Springsnail Species Descriptions

Introduction

Appendix A presents summary reports of 103 Nevada and Utah sprignsnail species that are under consideration for conservation planning in the two states. Springsnails are small aquatic, fresh- or brackish-water gastropods in the order Neotaenioglossa and the superfamilies Truncatelloidea and Cerithioidea. Springsnails are found throughout the non-ice-dominated world (e.g., Miller et al. 2018). They are highly diverse, and often closely adapted to individual springs, and their conservation has become the subject of increasing conservation concern (Ledyeard et al. 2004, Hershler et al. 2014a, Johannes and Clark 2016). More than 180 species of springsnails have been described in North America, and they are particularly diverse in arid Nevada and Utah. These species typically occur in or very near springs sources, and tend to be locally endemic, in many cases occurring at only one or a few water sources. Springsnails often are closely adapted to the water quality and habitat conditions of their individual springs.

Increasing concern for the viability of springsnail populations and the habitats they occupy in Nevada, Utah and elsewhere has arisen due to intensive groundwater extraction and use, the widespread use of springs for domestic and agricultural purposes (Noss 2000, Hershler et al. 2014, Hershler and Liu 2017), and the limited availability of reliable information on the status of many populations. Two southwestern species recently were federally listed (e.g., *Pyrgulopsis trivialis*, and *P. bernardina*) in Arizona, and several southwestern species have reportedly gone extinct in the past few decades. The contemporary status of many populations and species remains unknown; however, Sada and Lutz (2016) reported that 83 percent of 2,256 springs inventoried in the Great Basin and Mojave deserts between the 1980s and 2013 were disturbed by human activities, results corroborated by Stevens et al. (2020) in the Nevada and Utah portions of the Colorado River basin. Declining health of springsnail populations and their habitats can lead the U.S. Fish and Wildlife Service, as well as state wildlife agencies to invoke protection of springsnails under the Endangered Species Act (ESA; 1973, as amended), or under state statutes.

The Conservation Agreement Strategy for Springsnails in Nevada and Utah presents an organizational framework and appendices of information for management objectives and prioritized conservation actions to reduce, remedy, or eliminate threats to springsnail populations and habitats in the two states. If effective, the Strategy will prevent population declines and stabilize or increase at-risk springsnail populations. Towards the purposes of the Strategy, this Appendix has been developed through an automated information compilation coding by the Museum of Northern Arizona's Springs Stewardship Institute, for the purpose of providing rapid, updatable conservation reporting. The springsnail conservation plan and tools, such as this automated reporting and others presented in the Strategy, are designed to improve the hydrologic and habitat functionality of springs at which springsnails occur. By protecting or improving springsnail population health and persistence, the Strategy will reduce or eliminate the need for federal or state listing of springsnails and other springs-associated biota. Over the long-term, implementation of the Strategy is expected to improve springs ecosystem integrity and springsnail population persistence.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N5: Secure
Global Status	G5: Secure
IUCN Status	0: No immediate threat to the survival of the species
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 1/2020, the USFWS did not list a status for this species.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**April 30, 1927** (*n = 1 survey in UT or NV*)

TAXONOMY

This species is sometimes cited as *A. limosus*. IUCN has reported this species in the Family *Amnicolidae*. *Amnicola limosa* has been assigned Invertebrate Taxon ID 15611 in the Springs Online database.

DISTRIBUTION

Canada (Alberta, Labrador, Manitoba, New Brunswick, Newfoundland I, Nova Scotia, Ontario, Prince Edward I., Quebec, Saskatchewan); United States (Massachusetts, Maryland, Maine, Louisiana, Kentucky, Kansas, Iowa, Indiana, Illinois, Connecticut, Colorado, Arkansas, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, Wisconsin, Wyoming, North Dakota, North Carolina, New York, New Mexico, New Jersey, New Hampshire, Nebraska, Montana, Missouri, Mississippi, Michigan, Alabama). May be extirpated from Utah and Canada.

Amnicola limosa has been classified with an endemism level of "regionally widely distributed" as reported in NatureServe. In the Springs Online Database, *A. limosa* has been reported at a single location. This species has been recorded at a single location in Utah County, Utah. One survey has observed this species, conducted on April 30, 1927. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

A. limosa has been extirpated from the western US and may warrant further attention. This species is found in permanent waters, including lakes and ponds, with aquatic vegetation (Burch 1989, O'Neal and Soulliere 2006).

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. This species has been recorded at a single elevation of 1,369 m (4,491 ft).

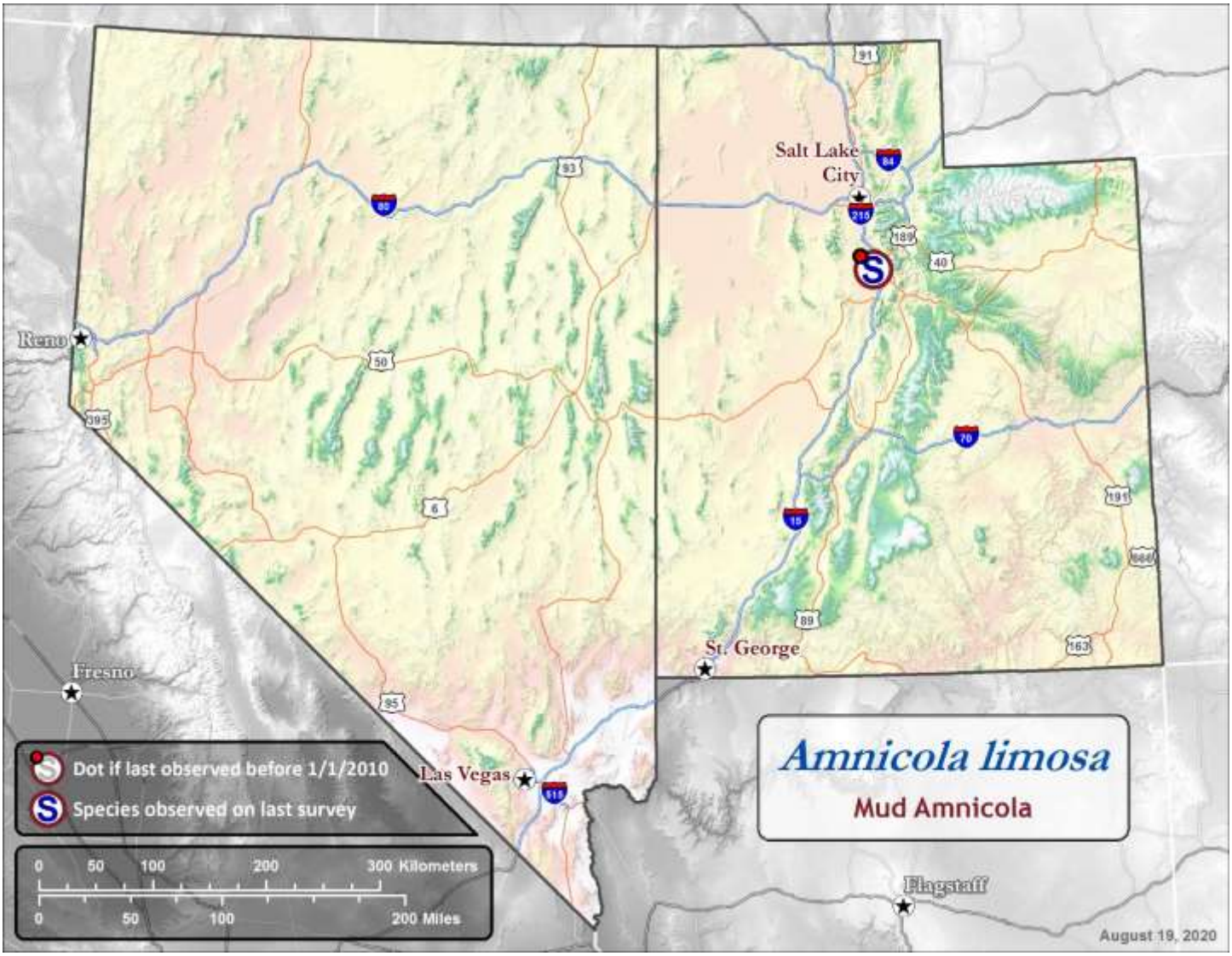
LAND MANAGEMENT

A. limosa were observed at a single location on **State** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

The only project that contributed data to this summary was a single survey conducted by the **UDWR** project.

RELATED LITERATURE

Turgeon, D. D., J. F. Quinn, Jr., A. E. Bogan, E. V. Coan, F. G. Hochberg, W. G. Lyons, et al. (1998) Common and scientific names of aquatic invertebrates from the United States and Canada: Mollusks, 2nd ed. American Fisheries Society Special Publication 26. 526.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 54 FR 554 579 (1989), 49 FR 21664 21675 (1984), 41 FR 17742 17747 (1976). As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**May 15, 2014** (*7 surveys total in UT or NV between 8/20/1997 and 5/15/2014*)

TAXONOMY

Assiminea infima is described by Hershler, R 1987 in Redescription of *Assiminea infima* Berry, 1947. *A. infima* has been assigned Invertebrate Taxon ID 13385 in the Springs Online database.

DISTRIBUTION

Badwater Snail occupies springs systems in Death Valley (Hershler, 1987). The type locality is located in Death Valley, California.

Assiminea infima has been classified with an endemism level of "20-100 discrete populations" as reported in NatureServe. In the Springs Online Database, *A. infima* has been reported at 66 sampling locations across its entire range [n = 62 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded at 64 locations in California (all in Inyo County) and 2 locations in Nevada (1 location in Nye County and 1 in Clark County). This species has been observed on 71 surveys between August 20, 1997 and May 15, 2014. The last survey at one of these locations did not record any observations of this species. At 65 of these locations [98%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Sada (2001) found springbrooks with high, steep, and overhanging banks were preferred *A. infima* habitat in permanent wetlands in Death Valley National Park.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 4 times at 2 locations for this species, with average flow-per-location ranging from 0.02 to 7.22 liters per second [mean = 3.62 l/s, median = 3.62 l/s]. Specific Conductance was measured 4 times at 2 locations, with average specific conductance-per-location ranging from 1,720 to 3,184 µS/cm [mean = 2,452 µS/cm, median = 2,452 µS/cm]. Spring pH was measured 4 times at 2 locations, with average pH-per-location ranging from 7.18 to 7.4 [mean = 7.29, median = 7.29]. Temperature was measured 4 times at 2 locations, with average temperature-per-location ranging from 30 to 31° Celsius [mean = 30°C, median = 30°C].

This species was observed in **limnocrene** [64%; n = 25] and **rheocrene** [36%; n = 14] springs. Elevations for this species range from -81 m (-266 ft) to 714 m (2,343 ft), with a mean of 29 m (94 ft) and median of 15 m (49 ft).

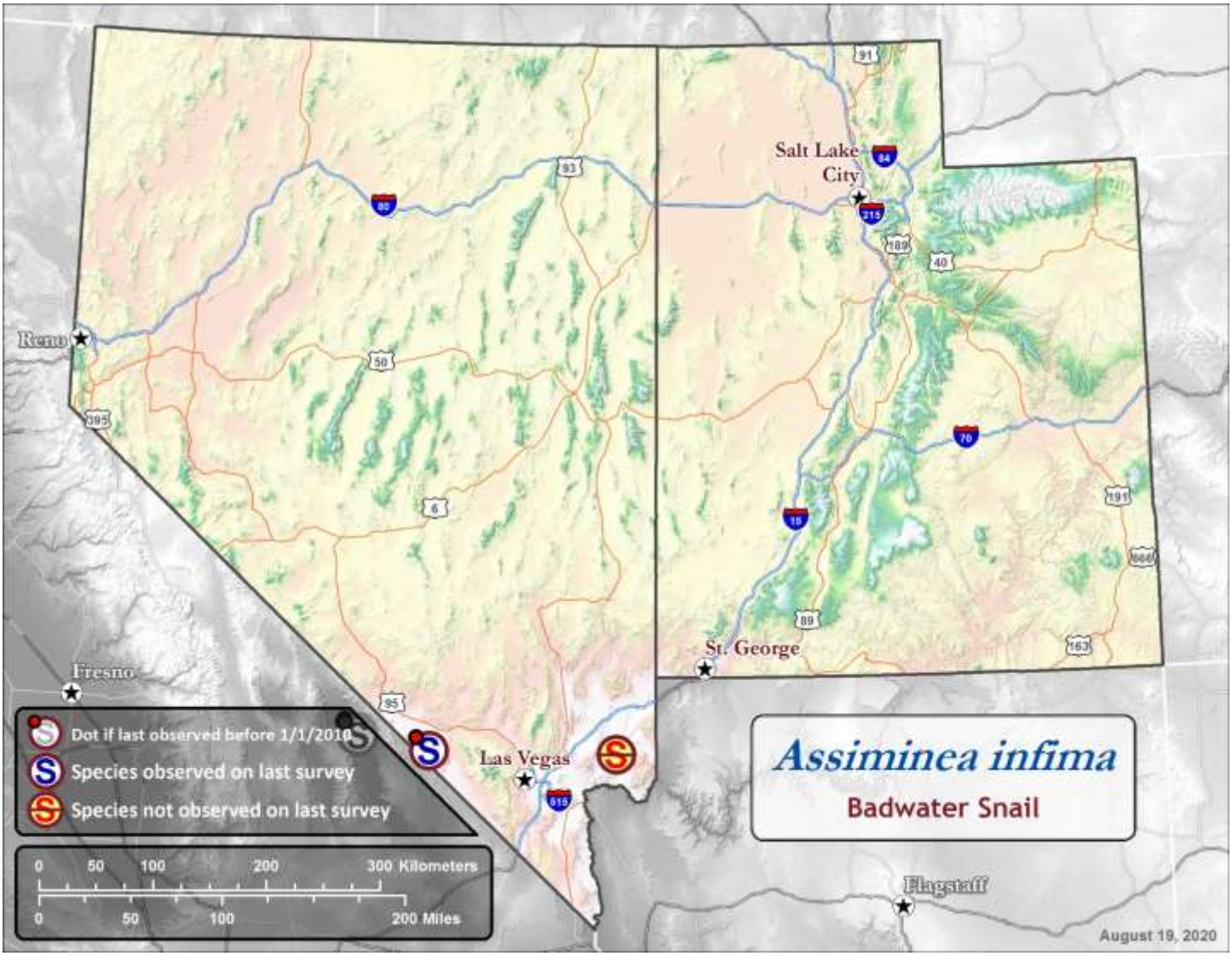
LAND MANAGEMENT

Of the 66 locations where *A. infima* were observed, 98% were located on **NPS** land (n = 65) and 2% on **BLM** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [99%; 70 surveys] and **Nevada Natural Heritage Data Import** [1%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. (1987) Redescription of Assiminea infima Berry, 1947, from Death Valley, California. The Veliger, 29: 274-288. Publication.

NatureServe (2019) NatureServe Explorer; Assiminea infima. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Assiminea+infima (Accessed 2019).

Sada, D.W. (2001) Demography and habitat use of the badwater snail (Assiminea infima), with observations on its conservation status, Death Valley National Park, California, U.S.A. Hydrobiologia 466:255-265. Publication.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	Unclassified
Global Status	G4: Apparently Secure
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**July 19, 1993** (*n = 1 survey in UT or NV*)

TAXONOMY

No taxonomic history specified. *Colligyrus greggi* has been assigned Invertebrate Taxon ID 13402 in the Springs Online database.

DISTRIBUTION

Bannock County: Heart Mtn. Spring, Marsh Valley, T 13 S, R. 39 E, NW % section 2, USNM 883881. Bear Lake County: spring. Right Fork Georgetown Canyon, Bear River drainage, T. 11 S, R. 44 E, NW 1/4 section 10, USNM 883522. Spring, Home Canyon, Bear River drainage, T. 12 S, R. 45 E, NW 1/4 section 32, USNM 883524. Caribou County: Harris Spring complex. Bear River drainage, T. 11 S, R. 41 E, NE 1/4 section 9, USNM 883394. Kackley Spring, Bear River drainage, T 10 S, R. 40 E, SW 1/4 section 21, USNM 883539. Spring, Kelly Park, Soda Springs, Bear River drainage, T 9 S, R. 42 E, NW 1/4 section 5, USNM 883523. Franklin County: spring, Cottonwood Creek, Bear River drainage, T. 12 S, R. 39 E, NE 1/4 section 25, USNM 883392. UTAH. Cache County: China Row Spring, Logan Canyon, Cache Valley, T 12 N, R. 3 E, NE 1/4 section 7, USNM 858288, USNM 883393. Spring, east of Porcupine Reservoir, Cache Valley, T. 9 N, R. 2 E, NW 1/4 section 17, USNM 883880. WYOMING. Lincoln County: spring, Sublette Creek, Bear River drainage, T. 24 N, R. 118 W, NW l^ section 8, USNM 883396. Spring, Salt Creek, Bear River drainage, T 29 N, R. 119 W SW 1/4 section 24, USNM 883395. Sublette County: spring. Cliff Creek, Snake River drainage, T 38 N, R. 114 W, NW VA section 23, USNM 883531.

Colligyrus greggi has been classified with an endemism level of "regionally widely distributed" as reported in NatureServe. In the Springs Online Database, *C. greggi* has been reported at a single location. This species has been recorded at a single location in Cache County, Utah. One survey has observed this species, conducted on July 19, 1993. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

According to Natureserve (2015), the species habitat includes Creek; Spring/Spring Brook: Benthic.

The water quality variables pH and Temperature were measured and recorded at sites where this species was observed. Spring pH was measured a single time at 8.2 for this species. Temperature was measured a single time at 5° Celsius for this species.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 1,626 m (5,335 ft).

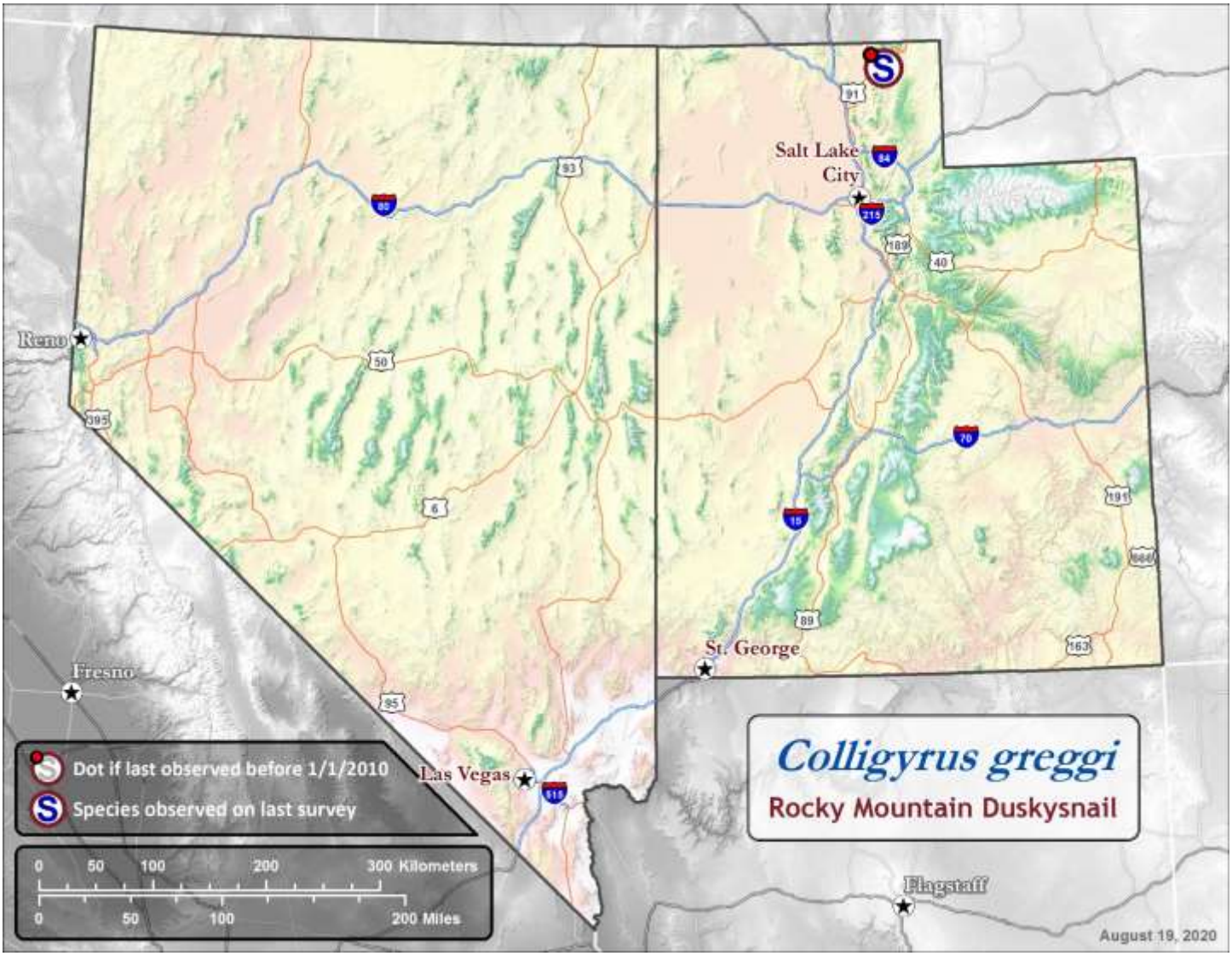
LAND MANAGEMENT

C. greggi were observed at a single location on **USFS** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

The only project that contributed data to this summary was a single survey conducted by the **Sada Import** project.

RELATED LITERATURE

Hershler, R. (1999) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) ofthe Great Basin, Western United States. Part II. Genera Colligyrus,Eremopyrgus, Fluminicola, Pristinicola, and Tryonia. Veliger 42:306-337. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	6 sampling locations reported in Utah or Nevada [n = 6 sites]
Most Recent Observation (restricted to UT and NV)	**June 14, 2012** (*8 surveys total in UT or NV between 9/1/1980 and 6/14/2012*)

TAXONOMY

Eremopyrgus eganensis is described in Hershler, 1999: 328, figs. 3C, 12, 13A-C. *E. eganensis* has been assigned Invertebrate Taxon ID 6539 in the Springs Online database.

DISTRIBUTION

Steptoe Hydrobe inhabits a group of warm springs in the southeast section of Steptoe Valley, Nevada (Hershler 1999). The type locality is a spring located northwest of Clark Spring, Steptoe Valley, White Pine County, Nevada. Holotype, USNM 874692; paratypes, USNM 860759 (Hershler and Liu 2017).

Eremopyrgus eganensis has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *E. eganensis* has been reported at 6 sites across its entire range. This species has been recorded at 6 locations in White Pine County, Nevada. This species has been observed on 8 surveys between September 1, 1980 and June 14, 2012. The last surveys at 2 of these locations did not record any observations of this species. At 5 of these locations [83%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Steptoe Hydrobe inhabits a group of warm springs in the southeast section of Steptoe Valley, Nevada (Hershler 1999).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 2 times at 1 site for this species, with an average flow of 1.32 liters per second. Specific Conductance was measured 3 times at 2 locations for this species, with average specific conductance-per-location ranging from 421 to 495 µS/cm [mean = 458 µS/cm, median = 458 µS/cm]. Spring pH was measured 2 times at 2 locations, with average pH-per-location ranging from 6.6 to 7.64 [mean = 7.12, median = 7.12]. Temperature was measured 3 times at 2 locations, with average temperature-per-location ranging from 19 to 20° Celsius [mean = 20°C, median = 20°C].

This species was observed in **helocrene** [50%; n = 1] and **rheocrene** [50%; n = 1] springs. Elevations for this species range from 1,843 m (6,047 ft) to 1,867 m (6,125 ft), with a mean of 1,859 m (6,097 ft) and median of 1,860 m (6,101 ft).

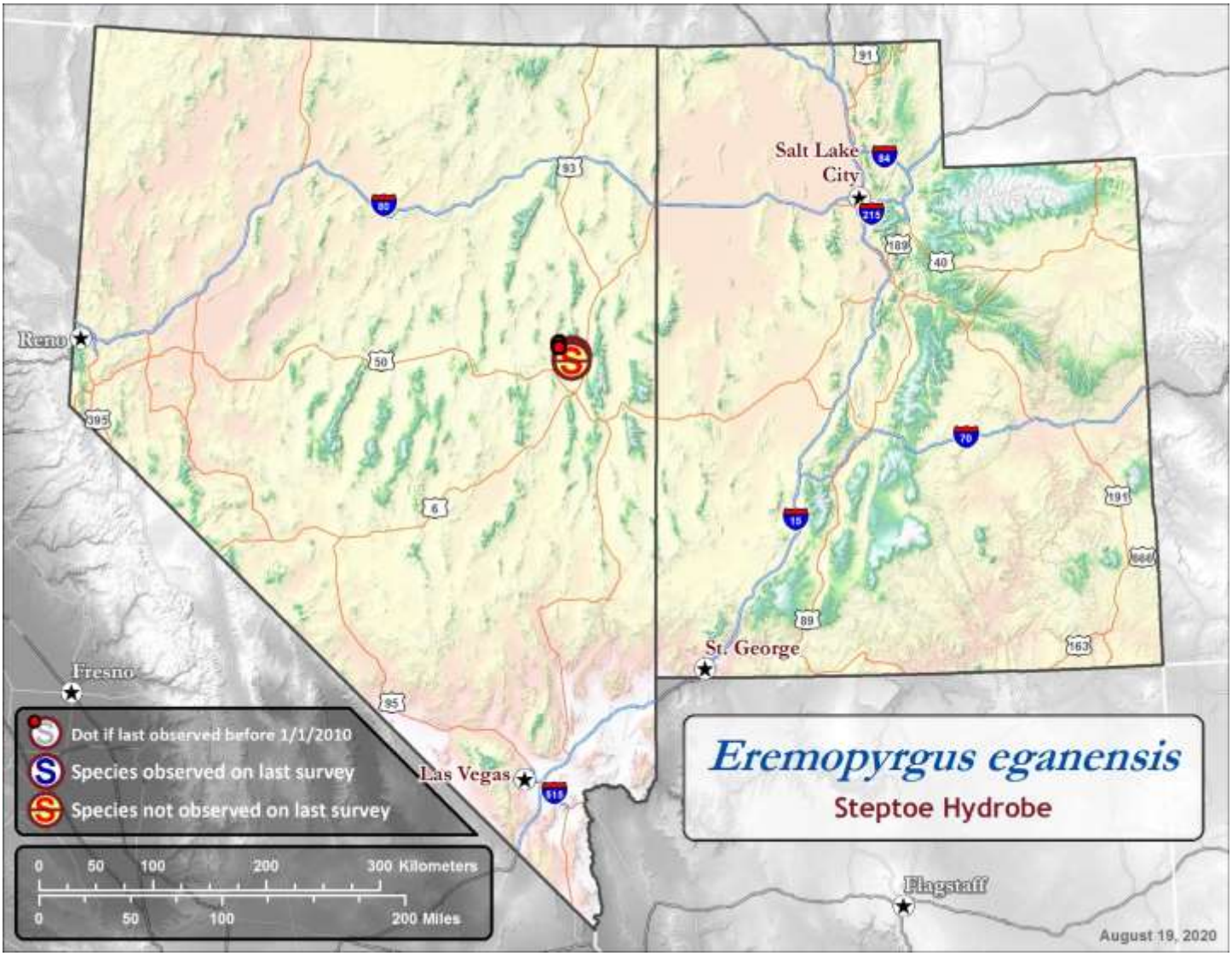
LAND MANAGEMENT

All 6 locations where *E. eganensis* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [63%; 5 surveys] and **Sada Import** [38%; 3 surveys] projects.

RELATED LITERATURE

Hershler, R. (1999) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) ofthe Great Basin, Western United States. Part II. Genera Colligyrus,Eremopyrgus, Fluminicola, Pristinicola, and Tryonia. Veliger 42:306-337. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Eremopyrgus eganensis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Eremopyrgus+eganensis (Accessed 2019).

Green River Pebblesnail *Neotaenioglossa Hydrobiidae Fluminicola coloradoensis*

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S2S3: Vulnerable - Imperiled
ESA Status	0: Not listed
National Status	N3: Vulnerable
Global Status	G3: Vulnerable
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	10 sampling locations reported in Utah or Nevada [n = 10 sites]
Most Recent Observation (restricted to UT and NV)	**July 14, 1994** (*10 surveys total in UT or NV between 1/1/1940 and 7/14/1994*)

TAXONOMY

Fluminicola coloradoensis is described in Morrison, 1940: 125-126. *F. coloradoensis* has been assigned Invertebrate Taxon ID 13413 in the Springs Online database.

DISTRIBUTION

This species is found in the Upper Green River and Bonneville basin in western Wyoming, Idaho, and northeastern Utah (Hershler and Liu 2017). It also extends into the upper Snake River basin and lower Salmon River of Idaho (Liu et al. 2013). The type locality is located near Green River, Wyoming. Holotype, USNM 526631; paratypes, USNM 526576 (Hershler and Liu 2017).

Fluminicola coloradoensis has been classified with an endemism level of "100-1000 discrete populations" as reported in NatureServe. In the Springs Online Database, *F. coloradoensis* has been reported at 11 sites across its entire range. Species observations have been recorded at 10 locations in Utah (3 locations in Cache County, 3 in Morgan County, 1 in Emery County, 1 in Utah County, 1 in Rich County and 1 in Salt Lake County) and 1 location in Wyoming (in Uinta County). This species has been observed on 11 surveys between January 1, 1940 and July 14, 1994. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Hershler (1999) indicates the species occurs in springs and rivers.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured 4 times at 4 locations for this species, with average specific conductance-per-location ranging from 380 to 940 µS/cm [mean = 658 µS/cm, median = 656 µS/cm]. Spring pH was measured 5 times at 5 locations, with average pH-per-location ranging from 7.8 to 8.8 [mean = 8.36, median = 8.5]. Temperature was measured 5 times at 5 locations, with average temperature-per-location ranging from 10 to 16° Celsius [mean = 13°C, median = 13°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,251 m (4,104 ft) to 2,024 m (6,640 ft), with a mean of 1,573 m (5,162 ft) and median of 1,453 m (4,767 ft).

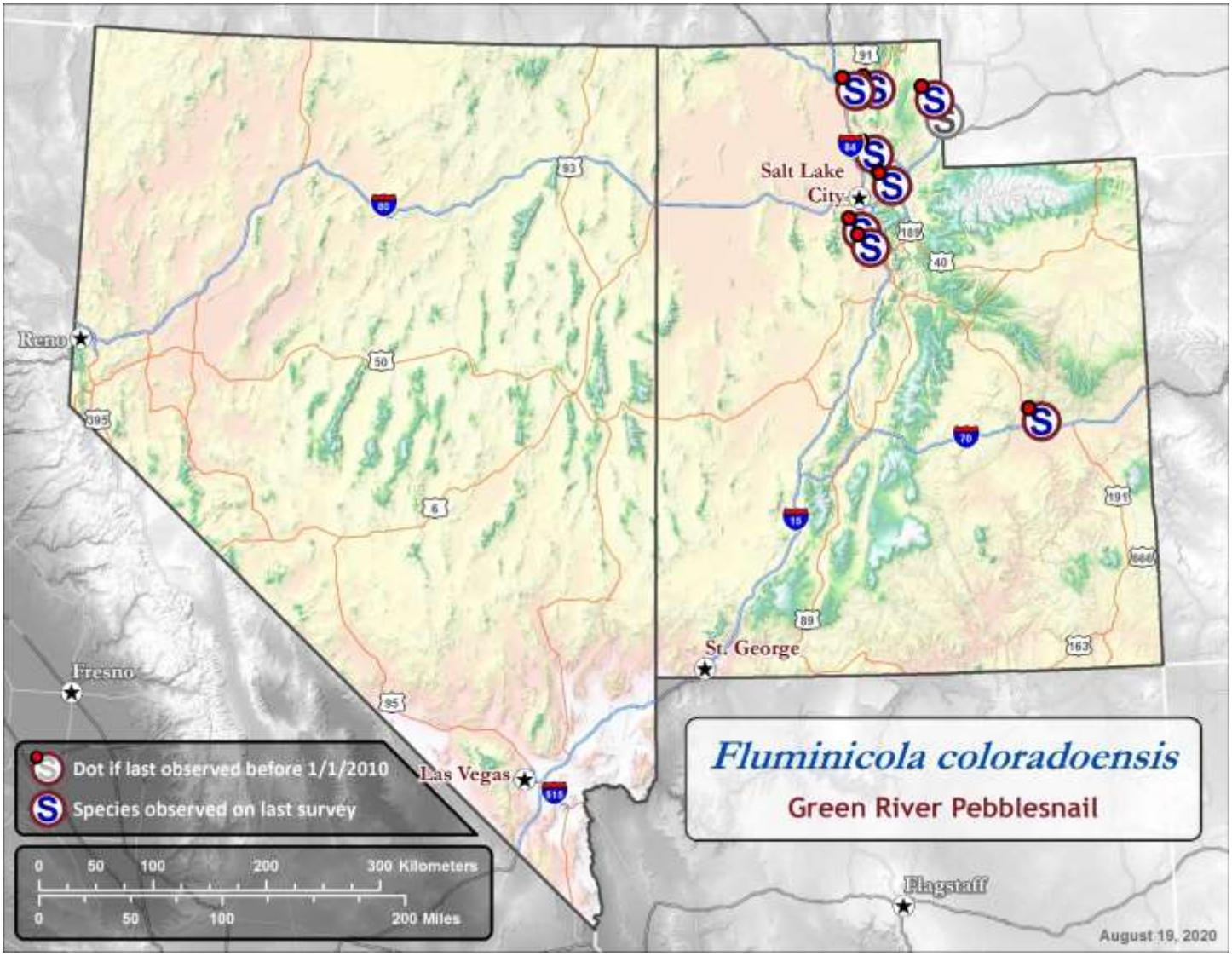
LAND MANAGEMENT

Of the 11 locations where *F. coloradoensis* were observed, 82% were located on **Private** land (n = 9) and 18% on **USFS** land (n = 2).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Utah CAS Import** [55%; 6 surveys] and **Sada Import** [45%; 5 surveys] projects.

RELATED LITERATURE

Hershler, R. (1999) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) ofthe Great Basin, Western United States. Part II. Genera Colligyrus,Eremopyrgus, Fluminicola, Pristinicola, and Tryonia. Veliger 42:306-337. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Morrison, J.P.E. (1940) A new species of Fluminicola with notes on "Colorado Desert" shells, and on the genus Clappia. Nautilus 53:124-127. Peer-reviewed article. Available at https://www.biodiversitylibrary.org/page/8516422#page/162/mode/1up.

NatureServe (2019) NatureServe Explorer; Fluminicola coloradoensis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Fluminicola+coloradoensis (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	6 sampling locations reported in Utah or Nevada [n = 6 sites]
Most Recent Observation (restricted to UT and NV)	**July 15, 2009** (*12 surveys total in UT or NV between 1/1/1992 and 7/15/2009*)

TAXONOMY

Amnicola dalli is described by Call, 1884: 21, 45-47, figs. 2-3, pl. VI: figs. 4-6. *Fluminicola dalli* has been assigned Invertebrate Taxon ID 6540 in the Springs Online database.

DISTRIBUTION

Pyramid Lake Pebblesnail occurrs in the northern portion of the Pyramid Lake basin, Nevada (Hershler and Frest 1996). The type locality is in a small tributary to Pyramid Lake, near the north end, at Symons Ranch [Nevada]. Lectotype, MCZ 2087; paralectotypes, MCZ 2088 (Hershler and Liu 2017).

Fluminicola dalli has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *F. dalli* has been reported at 6 sites across its entire range. This species has been recorded at 6 locations in Washoe County, Nevada. This species has been observed on 12 surveys between January 1, 1992 and July 15, 2009. The last survey at one of these locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Pyramid Lake Pebblesnail occurrs in the northern portion of the Pyramid Lake basin, Nevada (Hershler and Frest 1996).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 4 times at 4 locations for this species, with average flow-per-location ranging from 0.33 to 3.33 liters per second [mean = 1.13 l/s, median = 0.42 l/s]. Specific Conductance was measured 5 times at 4 locations, with average specific conductance-per-location ranging from 4 to 143 µS/cm [mean = 102 µS/cm, median = 130 µS/cm]. Spring pH was measured 5 times at 4 locations, with average pH-per-location ranging from 7.64 to 8.1 [mean = 7.87, median = 7.87]. Temperature was measured 6 times at 5 locations, with average temperature-per-location ranging from 13 to 18° Celsius [mean = 15°C, median = 14°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,232 m (4,042 ft) to 1,471 m (4,826 ft), with a mean of 1,390 m (4,560 ft) and median of 1,425 m (4,674 ft).

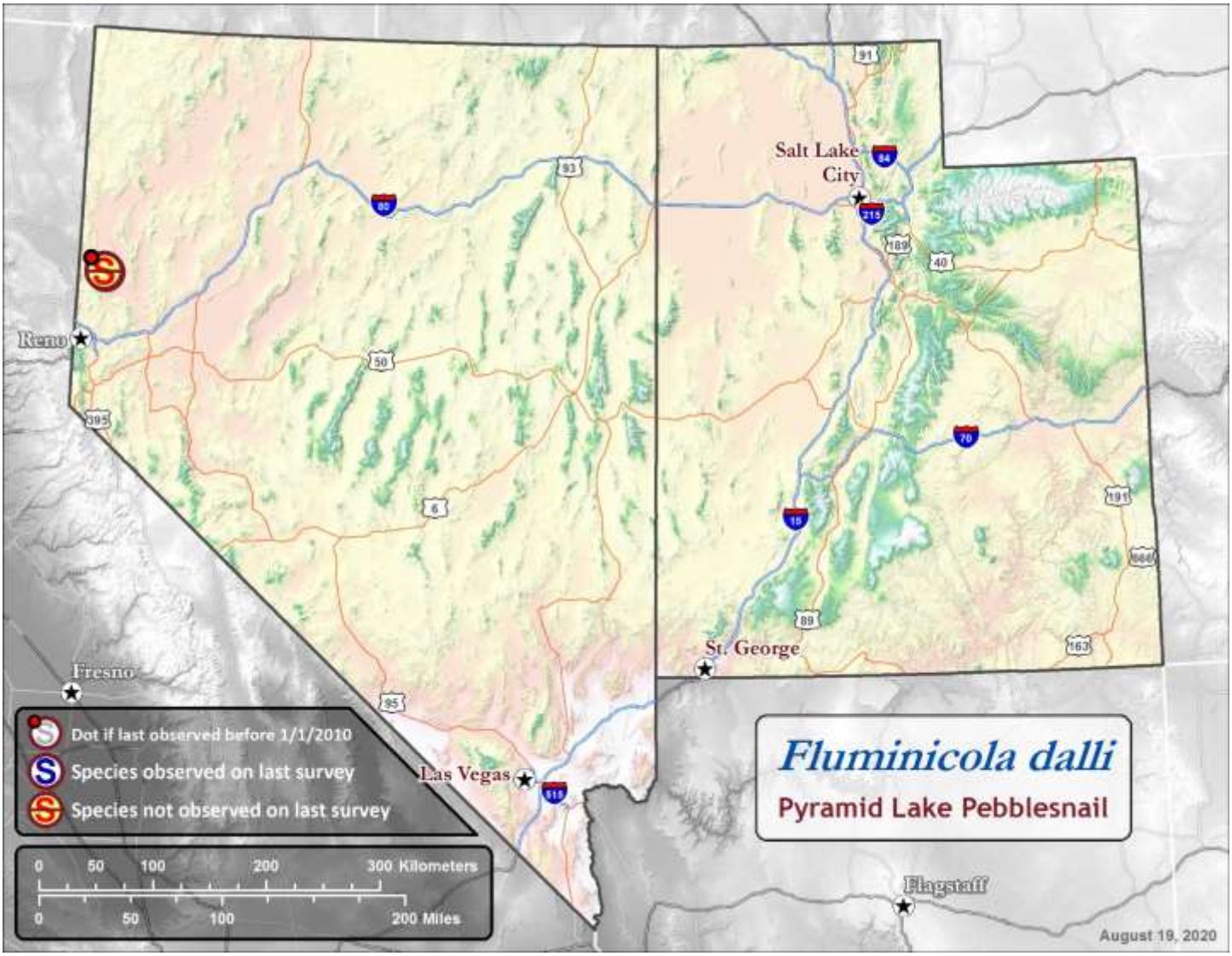
LAND MANAGEMENT

All 6 locations where *F. dalli* were observed were located on **BLM** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [50%; 6 surveys] and **Sada Import** [50%; 6 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., Frest, (1996) A review of the North American freshwater snail genus Fluminicola (Hydrobiidae). Smithsonian Contributions to Zoology 583:1-41. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/5527/SCtZ-0583-Lo_res.pdf?sequence=2&isAllowed=y.

NatureServe (2019) NatureServe Explorer; Fluminicola dalli. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Fluminicola+dalli (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S3: Vulnerable
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N3: Vulnerable
Global Status	G3: Vulnerable
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	25 sampling locations reported in Utah or Nevada [n = 25 sites]
Most Recent Observation (restricted to UT and NV)	**July 3, 2018** (*37 surveys total in UT or NV between 6/12/1991 and 7/3/2018*)

TAXONOMY

Amnicola turbiniformis is described by Tryon, 1865: 219, pl. 22: fig. 5. *Fluminicola turbiniformis* has been assigned Invertebrate Taxon ID 10699 in the Springs Online database.

DISTRIBUTION

Hershler and Liu, 2017, reported this species to be widely distributed throughout California, Nevada, and Oregon. The type locality is along the west side of Steens Mountains, Harney County, Oregon. Lectotype, ANSP 27779; paralectotypes, ANSP 398352 (Hershler and Liu 2017).

Fluminicola turbiniformis has been classified with an endemism level of "subcontinentally widely distributed" as reported in NatureServe. In the Springs Online Database, *F. turbiniformis* has been reported at 33 sites across its entire range. Species observations have been recorded at 25 locations in Nevada (15 locations in Washoe County, 8 in Humboldt County and 2 in Lyon County), 5 locations in Oregon (4 locations in Lake County and 1 in Harney County) and 3 locations in California (all in Lassen County). This species has been observed on 46 surveys between June 12, 1991 and July 3, 2018. The last survey at one of these locations did not record any observations of this species. At 29 of these locations [88%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Turban Pebblesnail has been reported at springs in Nevada, California, and Oregon at elevations ranging from 1,326 to 2,310 meters.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 16 times at 12 locations for this species, with average flow-per-location ranging from 0.03 to 33.33 liters per second [mean = 3.25 l/s, median = 0.38 l/s]. Specific Conductance was measured 30 times at 22 locations, with average specific conductance-per-location ranging from 10 to 355 µS/cm [mean = 125 µS/cm, median = 119 µS/cm]. Spring pH was measured 26 times at 19 locations, with average pH-per-location ranging from 6.87 to 8.1 [mean = 7.49, median = 7.5]. Temperature was measured 32 times at 24 locations, with average temperature-per-location ranging from 8 to 19° Celsius [mean = 13°C, median = 12°C].

This species was observed in **rheocrene** [96%; n = 25] and **helocrene** [4%; n = 1] springs. Elevations for this species range from 1,326 m (4,350 ft) to 2,310 m (7,579 ft), with a mean of 1,699 m (5,574 ft) and median of 1,699 m (5,574 ft).

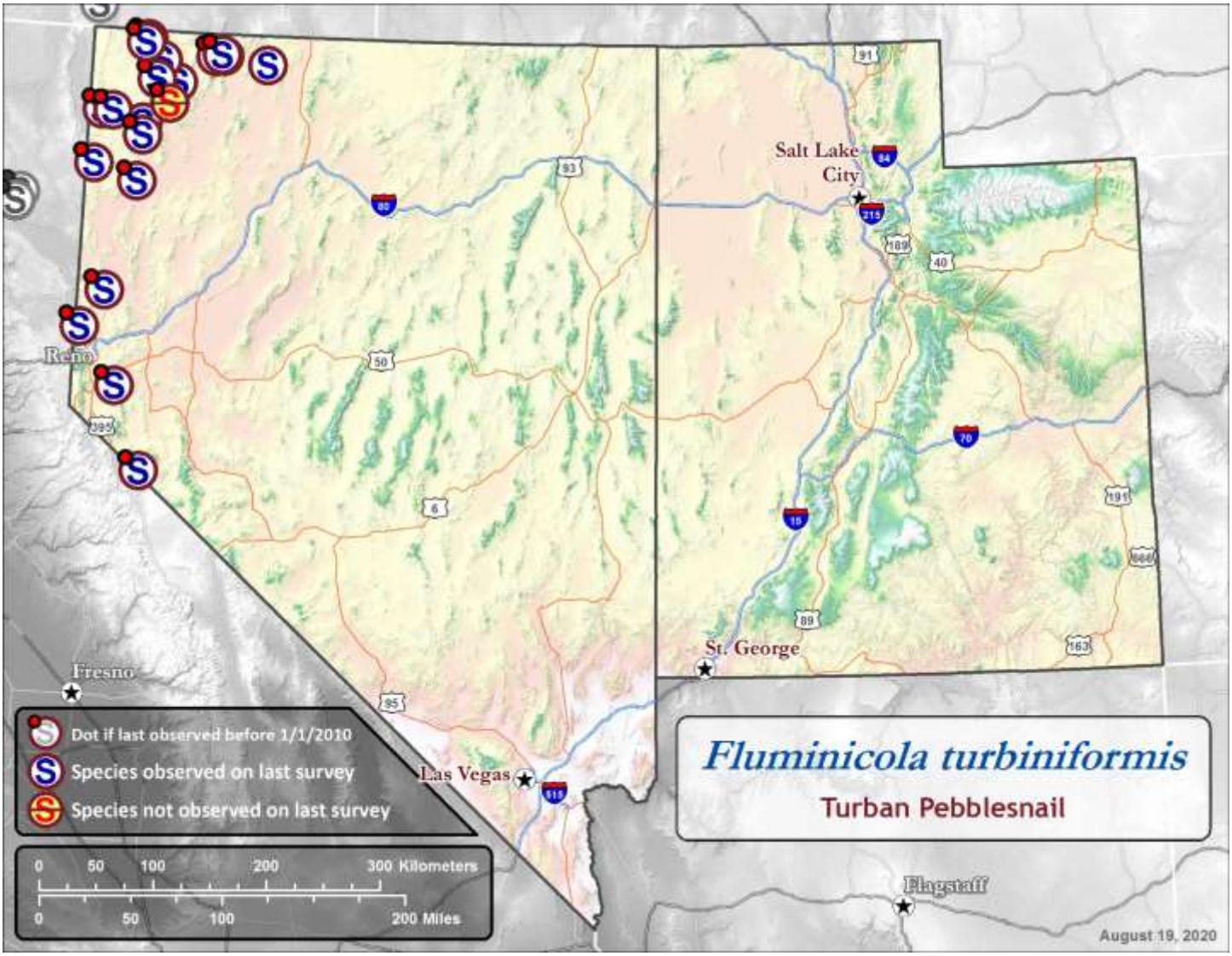
LAND MANAGEMENT

Of the 33 locations where *F. turbiniformis* were observed, 39% were located on **BLM** land (n = 13), 27% on **Private** land (n = 9), 21% on **FWS** land (n = 7) and 12% on **USFS** land (n = 4).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [72%; 33 surveys] and **Nevada Natural Heritage Data Import** [28%; 13 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., Frest, (1996) A review of the North American freshwater snail genus Fluminicola (Hydrobiidae). Smithsonian Contributions to Zoology 583:1-41. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/5527/SCtZ-0583-Lo_res.pdf?sequence=2&isAllowed=y.

NatureServe (2019) NatureServe Explorer; Fluminicola turbiniformis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Fluminicola+turbiniformis (Accessed 2019).

Virginia Mountains Pebblesnail *Neotaenioglossa Hydrobiidae Fluminicola virginius*

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	3 sampling locations reported in Utah or Nevada [n = 3 sites]
Most Recent Observation (restricted to UT and NV)	**April 22, 2001** (*5 surveys total in UT or NV between 8/11/1990 and 4/22/2001*)

TAXONOMY

Fluminicola virginius is described in Hershler, 1999: 323-324, figs. 8H, 10D-F, 11. *F. virginius* has been assigned Invertebrate Taxon ID 6541 in the Springs Online database.

DISTRIBUTION

According to Hershler, and Liu, 2017, the Virginia Mountains Pebblesnail is found only at the type locality, which is the source of Hardscrabble Creek, Pyramid Lake Basin, Nevada. This type locality was described as an unnamed (waterfall) spring, source of Hardscrabble Creek, Pyramid Lake basin, Washoe County, Nevada. Holotype, USNM 874902; paratypes, USNM 860758 (Hershler and Liu 2017).

Fluminicola virginius has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *F. virginius* has been reported at 3 sites across its entire range. This species has been recorded at 3 locations in Washoe County, Nevada. This species has been observed on 5 surveys between August 11, 1990 and April 22, 2001. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Virginia Mountains pebblesnail occurs at a spring described as a waterfall.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured a single time at 144 µS/cm for this species. Spring pH was measured a single time at 8.87 for this species. Temperature was measured a single time at 16° Celsius for this species.

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,648 m (5,407 ft) to 1,778 m (5,833 ft), with a mean of 1,710 m (5,609 ft) and median of 1,703 m (5,587 ft).

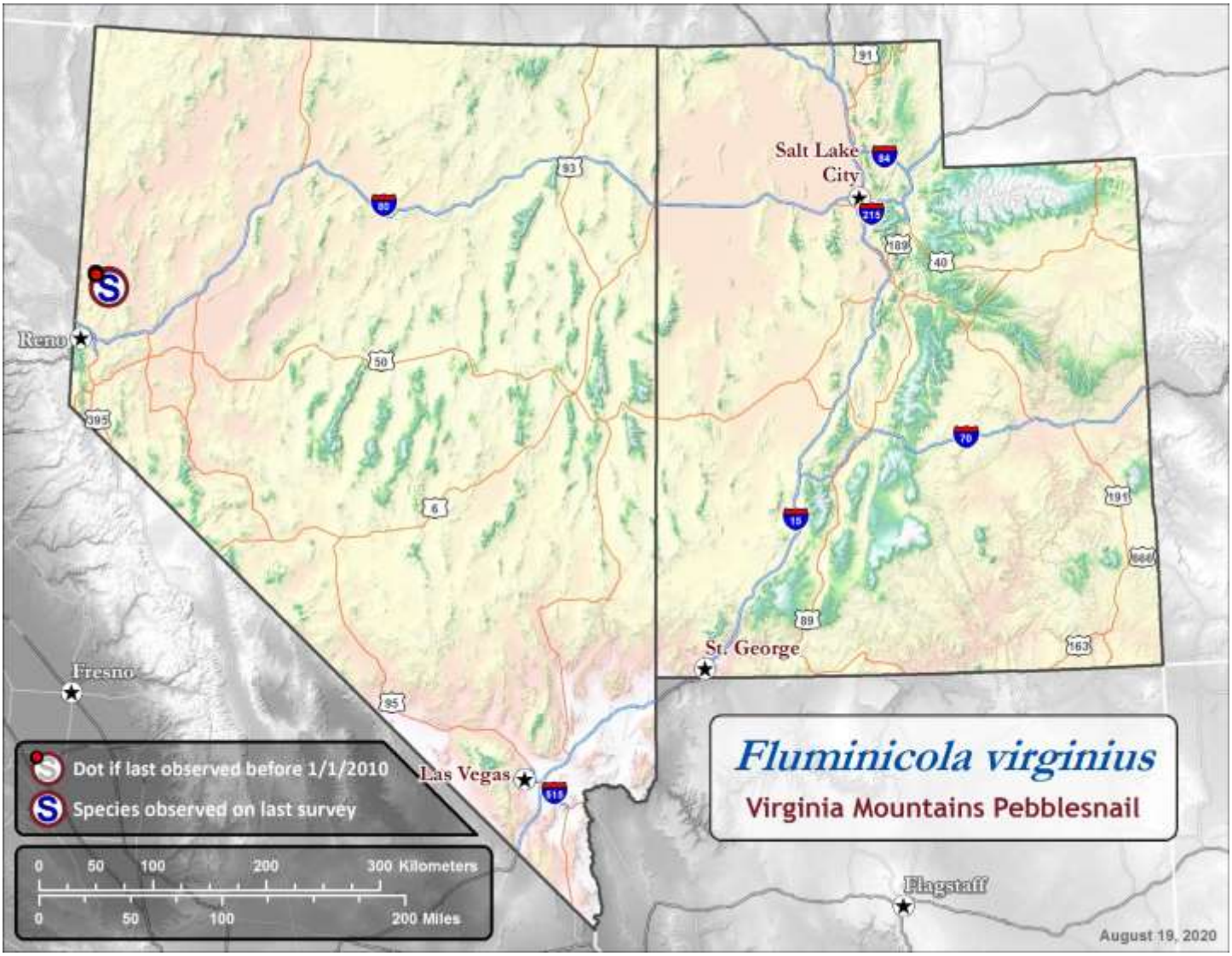
LAND MANAGEMENT

Of the 3 locations where *F. virginius* were observed, 67% were located on **BLM** land (n = 2) and 33% on **Private** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [80%; 4 surveys] and **Sada Import** [20%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. (1999) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) ofthe Great Basin, Western United States. Part II. Genera Colligyrus,Eremopyrgus, Fluminicola, Pristinicola, and Tryonia. Veliger 42:306-337. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Fluminicola virginius. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Fluminicola+virginius (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N2: Imperiled
Global Status	G2: Imperiled
IUCN Status	3: Faces a very high risk of extinction in the near future
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah.	
Number of Locations Reported (restricted to UT and NV)	3 sampling locations reported in Utah or Nevada [n = 3 sites]
Most Recent Observation (restricted to UT and NV)	**September 9, 2015** (*3 surveys total in UT or NV, ranging from 10/8/1959 to 9/9/2015, plus 1 survey with no date recorded*)

TAXONOMY

No taxonomic history specified. *Juga acutifilosa* has been assigned Invertebrate Taxon ID 13441 in the Springs Online database.

DISTRIBUTION

This species was reported from Divine and Boulder Springs, an unnamed spring west Home Camp in Long Valley, Washoe County, Nevada, as well as in springs in Grasshopper Valley, Lassen County, California.

Juga acutifilosa has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *J. acutifilosa* has been reported at 3 sites across its entire range. This species has been recorded at 3 locations in Washoe County, Nevada. This species has been observed on 3 surveys between October 8, 1959 and September 9, 2015, and also on 1 additional survey in which no date was recorded. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

According to Natureserve (2015) the species habitat is Creek; Spring/Spring Brook: Benthic. This genus was formerly in the family *Pleuroceridae*. Juga laurae (Goodrich 1944; SSI ID 6693) was described from specimens collected by Carl Hubbs in 1934 in Boulder Springs and at an unnamed spring west Home Camp in Long Valley, Washoe County, Nevada, as well as in springs in Grasshopper Valley, Lassen County, California. Juga interioris (Goodrich 1944; SSI ID 6692) was also reported in Washoe County, NV. These two species have been synonmized with *J. acutifilosa* (Stearns 1890).

The water quality variables Flow, Specific Conductance and Temperature were measured and recorded at sites where this species was observed. Flow was measured a single time at 0.33 liters per second for this species. Specific Conductance was measured a single time at 260 µS/cm for this species. Temperature was measured a single time at 19° Celsius for this species.

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,191 m (3,907 ft) to 1,991 m (6,532 ft), with a mean of 1,650 m (5,413 ft) and median of 1,768 m (5,801 ft).

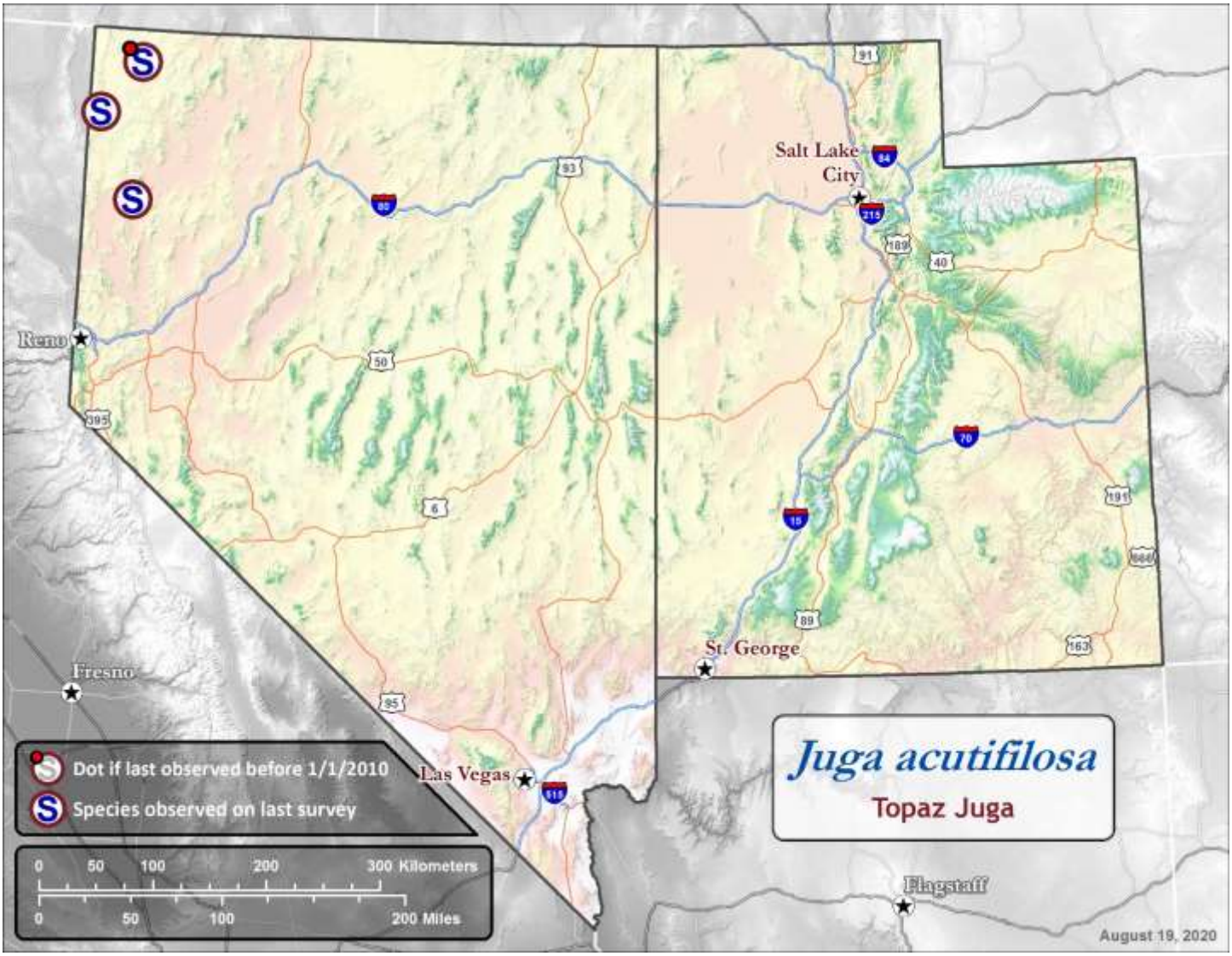
LAND MANAGEMENT

All 3 locations where *J. acutifilosa* were observed were located on **BLM** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [75%; 3 surveys] and **Sada Import** [25%; 1 survey] projects.

RELATED LITERATURE

Cordeiro, J. and K. Perez (2011) Pyrgulopsis amargosae. IUCN Red List of Threatened Species. Version 2013.2. Website. Available at http://www.iucnredlist.org/details/189691/0#http://www.iucnredlist.org/details/189691/0#.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	3: Faces a very high risk of extinction in the near future
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). This species had been proposed for review under the Center for Biodiversity (2009) petition; however, the USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition did not present substantial information indicating that the species should be listed.	
Number of Locations Reported (restricted to UT and NV)	6 sampling locations reported in Utah or Nevada [n = 6 sites]
Most Recent Observation (restricted to UT and NV)	**May 6, 2009** (*7 surveys total in UT or NV between 9/3/1973 and 5/6/2009*)

TAXONOMY

Pyrgulopsis aloba is described in Hershler, 1998: 60-62, figs. 7F, 19D-E, 33A-B. The type locality is a spring, northwest of Duckwater, Duckwater Valley, Nye County, Nevada. Holotype, USNM 883847; paratypes, USNM 860681. (Hershler and Liu 2017) *P. aloba* has been assigned Invertebrate Taxon ID 6544 in the Springs Online database.

DISTRIBUTION

According to Hershler, 1998, the Duckwater Pyrg is known from two unnamed springs northwest and southeast of Duckwater, Duckwater Valley (Railroad Valley) Nevada.

Pyrgulopsis aloba has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. aloba* has been reported at 6 sites across its entire range. This species has been recorded at 6 locations in Nye County, Nevada. This species has been observed on 7 surveys between September 3, 1973 and May 6, 2009. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

One of the springs where this species occurs is a small rheocrene, (Center for Biological Diversity 2009).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 3 times at 3 locations for this species, with average flow-per-location ranging from 0.03 to 6.67 liters per second [mean = 2.68 l/s, median = 1.33 l/s]. Specific Conductance was measured 3 times at 3 locations, with average specific conductance-per-location ranging from 619 to 625 µS/cm [mean = 621 µS/cm, median = 620 µS/cm]. Spring pH was measured 2 times at 2 locations, with average pH-per-location ranging from 6.9 to 7.7 [mean = 7.3, median = 7.3]. Temperature was measured 3 times at 3 locations, with average temperature-per-location ranging from 25 to 28° Celsius [mean = 27°C, median = 27°C].

This species was observed in **helocrene** [50%; n = 2] and **rheocrene** [50%; n = 2] springs. Elevations for this species range from 1,663 m (5,456 ft) to 1,685 m (5,528 ft), with a mean of 1,669 m (5,476 ft) and median of 1,667 m (5,468 ft).

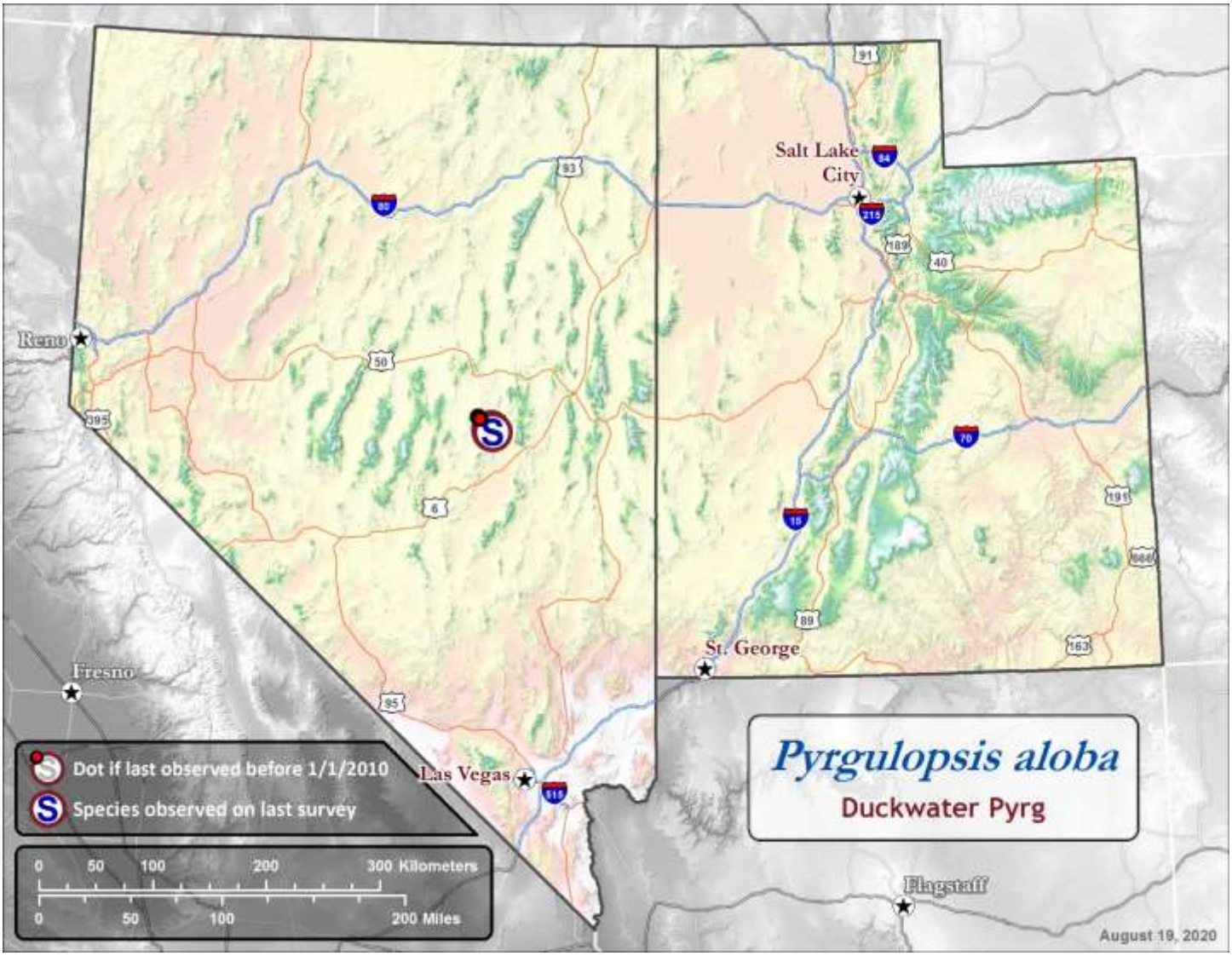
LAND MANAGEMENT

Of the 6 locations where *P. aloba* were observed, 83% were located on **Tribal** land (n = 5) and 17% on **Private** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [57%; 4 surveys] and **Sada Import** [43%; 3 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis aloba. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+aloba (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). Southern Duckwater pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition did not present substantial information indicating that the species should be listed.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**October 17, 2000** (*2 surveys total in UT or NV between 7/12/1994 and 10/17/2000*)

TAXONOMY

Pyrgulopsis anatina is described in Hershler, 1998: 63-64, figs. 7H, 19H-I, 33F-H. *P. anatina* has been assigned Invertebrate Taxon ID 6545 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis anatina has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. anatina* has been reported at a single location. This species has been recorded at a single location in Nye County, Nevada. This species has been observed on 2 surveys between July 12, 1994 and October 17, 2000. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This species occurs in a small rheocrene (Center for Biological Diversity, 2009).

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 1,635 m (5,364 ft).

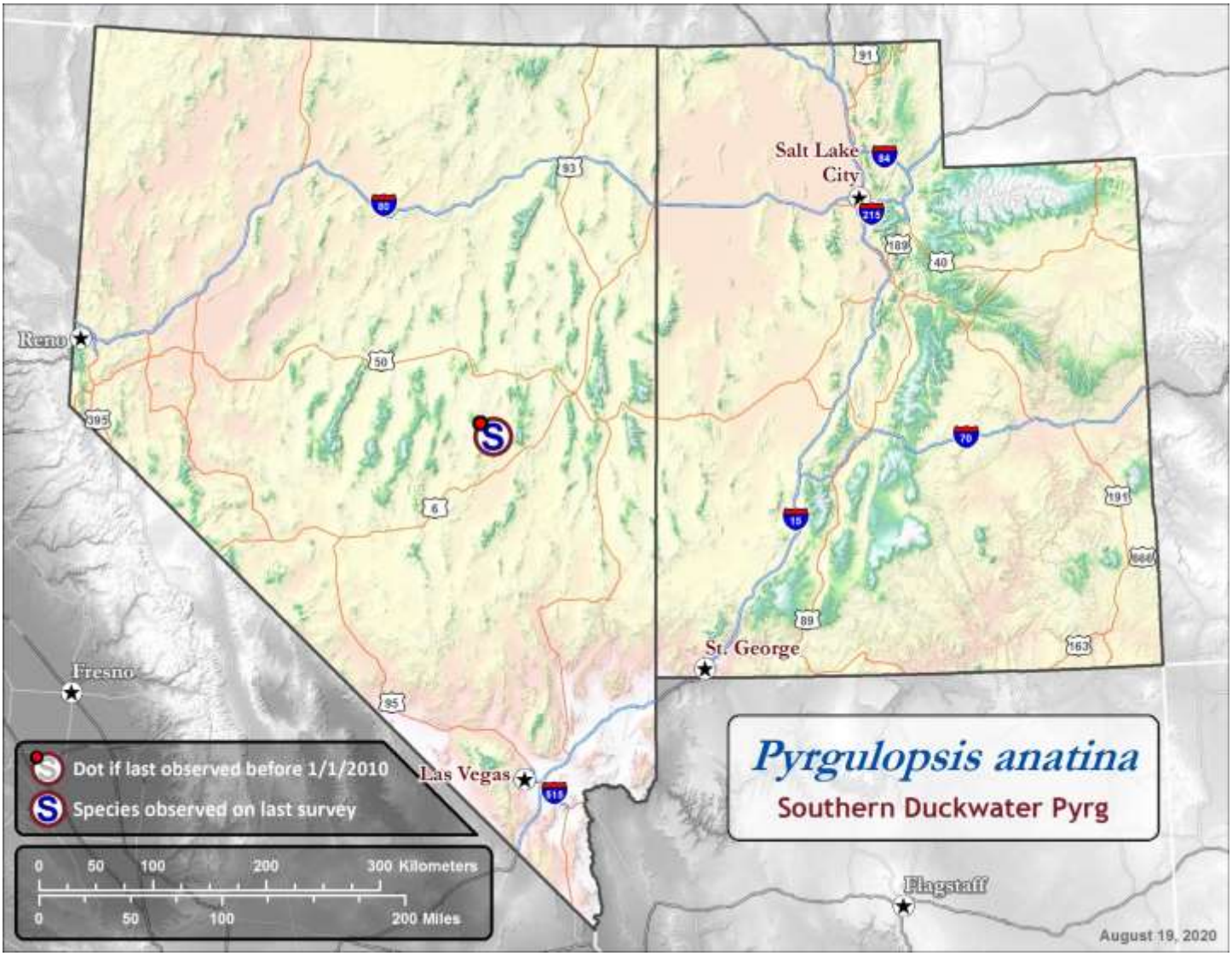
LAND MANAGEMENT

P. anatina were observed at a single location on **Tribal** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Both surveys that contributed data to this summary were conducted by the **Nevada Natural Heritage Data Import** project.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis anatina. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+anatina (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species is recognized in the Federal Register: 74 FR 41649 41662 (2009) and 74 FR 46965 46966 (2009). This species was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS Partial 90-Day Finding on a Petition To List 206 Species in the Midwest and Western United States as Threatened or Endangered with Critical Habitat (2009) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	20 sampling locations reported in Utah or Nevada [n = 10 sites]
Most Recent Observation (restricted to UT and NV)	**May 22, 2019** (*46 surveys total in UT or NV between 6/23/1992 and 5/22/2019*)

TAXONOMY

Pyrgulopsis anguina is described in Hershler 1998: 110-111, figs. 9K, 23H-J, 44A-E. *P. anguina* has been assigned Invertebrate Taxon ID 5749 in the Springs Online database.

DISTRIBUTION

The Longitudinal Gland Pyrg occurs in Big Springs, along the southeast base of the Snake Range, in the Southern Snake Valley, White Pine County, Nevada and in Clay Spring in Millard County, Utah (Hershler 1998). In 2011 the Southern Nevada Water Authority reported three additional populations from Stateline Springs in Millard County, Utah (identity confirmed by Dr. Robert Hershler). The type locality is Big Springs, Snake Valley, White Pine County, Nevada. Holotype, USNM 874678; paratypes, USNM 860725 (Hershler and Liu, 2017).

Pyrgulopsis anguina has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. anguina* has been reported at 20 sampling locations across its entire range [n = 10 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded at 17 locations in Utah (all in Millard County) and 3 locations in Nevada (all in White Pine County). This species has been observed on 46 surveys between June 23, 1992 and May 22, 2019. The last surveys at 3 of these locations did not record any observations of this species. At 2 of these locations [10%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Hershler (1994) described the habitat of this species as warm, flowing springs with intermediate conductivity. One of the springs is a shallow 4 m wide rheocrene (Center for Biological Diversity 2009).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 19 times at 19 locations for this species, with average flow-per-location ranging from 0.03 to 66.67 liters per second [mean = 3.82 l/s, median = 0.25 l/s]. Specific Conductance was measured 21 times at 18 locations, with average specific conductance-per-location ranging from 260 to 458 µS/cm [mean = 333 µS/cm, median = 321 µS/cm]. Spring pH was measured 2 times at 2 locations, with average pH-per-location ranging from 7.6 to 7.9 [mean = 7.75, median = 7.75]. Temperature was measured 21 times at 18 locations, with average temperature-per-location ranging from 13 to 17° Celsius [mean = 15°C, median = 15°C].

This species was observed in **helocrene** [78%; n = 14] and **rheocrene** [22%; n = 4] springs. Elevations for this species range from 1,653 m (5,423 ft) to 1,702 m (5,584 ft), with a mean of 1,660 m (5,447 ft) and median of 1,653 m (5,423 ft).

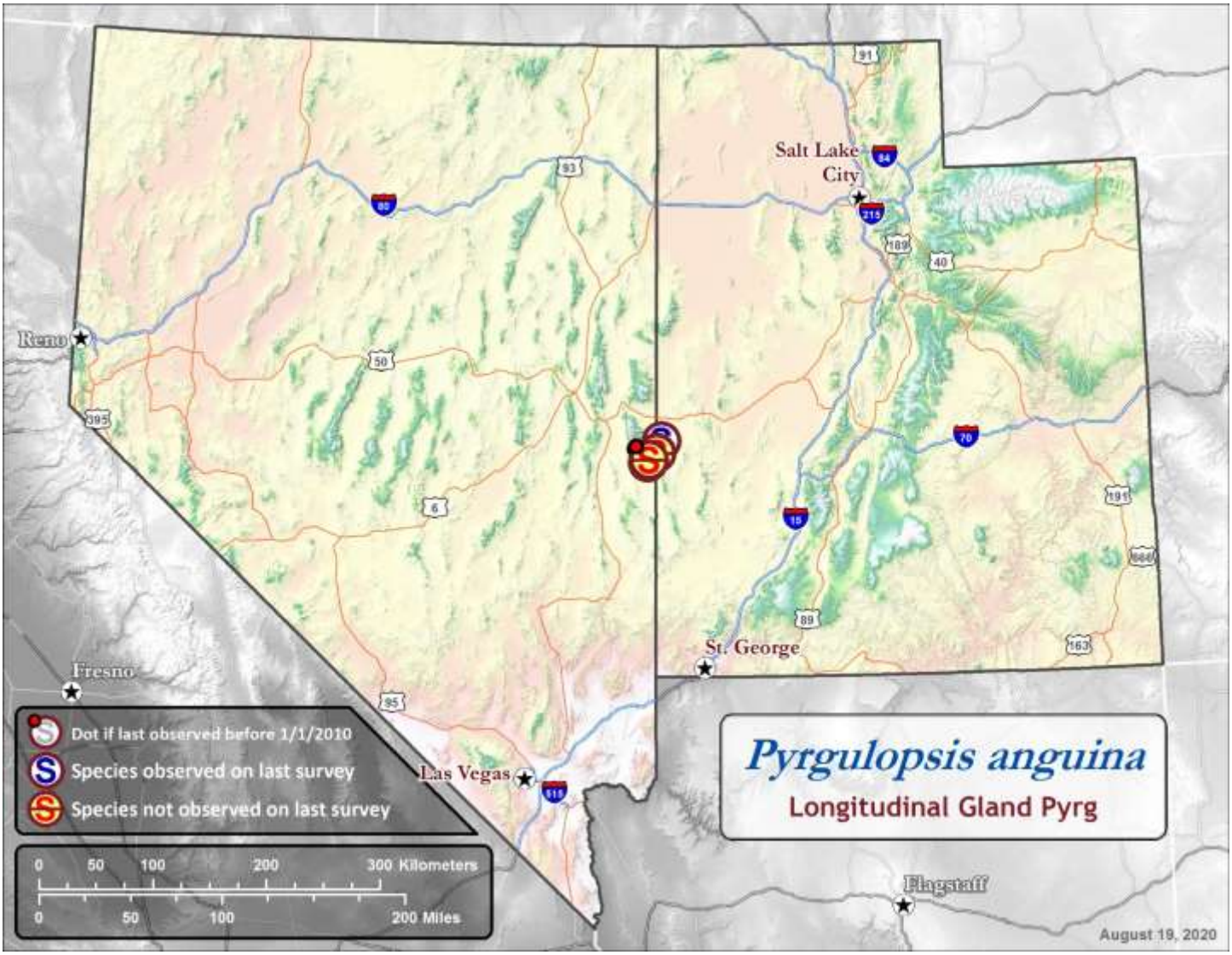
LAND MANAGEMENT

All 20 locations where *P. anguina* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import 2017** [37%; 17 surveys], **UDWR** [33%; 15 surveys], **Sada Import** [13%; 6 surveys], **Utah CAS Import** [9%; 4 surveys] and **Nevada Natural Heritage Data Import** [9%; 4 surveys] projects.

RELATED LITERATURE

Hershler, R. (1994) A review of the North American freshwater snail genus Pyrgulopsis (Hydrobiidae). Smithsonian Contributions to Zoology 554:1-115. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/5139/SCtZ-0554-Lo_res.pdf?sequence=2&isAllowed=y.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis anguina. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+anguina (Accessed 2019).

Sada, Donald W. (2017) Environmental and Biological Factors Influencing Great Basin and Surrounding Areas Springsnail (Gastropoda: Rissooidea) Abundance and Distribution. Division of Hydrologic Sciences, Reno, NV.

US Fish and Wildlife Service (2009) Partial 90-Day Finding on a Petition To List 206 Species in the Midwest and Western United States as Threatened or Endangered With Critical Habitat; Correction. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2009-09-14/pdf/E9-21995.pdf#page=1.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**October 13, 2001** (*2 surveys total in UT or NV between 9/10/1991 and 10/13/2001*)

TAXONOMY

Pyrgulopsis augustae is described in Hershler, 1998: 89, figs. 9B, 22A, 40A-B. *P. augustae* has been assigned Invertebrate Taxon ID 6549 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis augustae has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. augustae* has been reported at a single location. This species has been recorded at a single location in Lander County, Nevada. This species has been observed on 2 surveys between September 10, 1991 and October 13, 2001. The last survey at this site did not record any observations of this species. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Elongate Cain Spring pyrg is only found at Cain Springs, located on private land.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured a single time at 0.33 liters per second for this species. Specific Conductance was measured a single time at 560 µS/cm for this species. Spring pH was measured a single time at 7.9 for this species. Temperature was measured a single time at 17° Celsius for this species.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 1,658 m (5,440 ft).

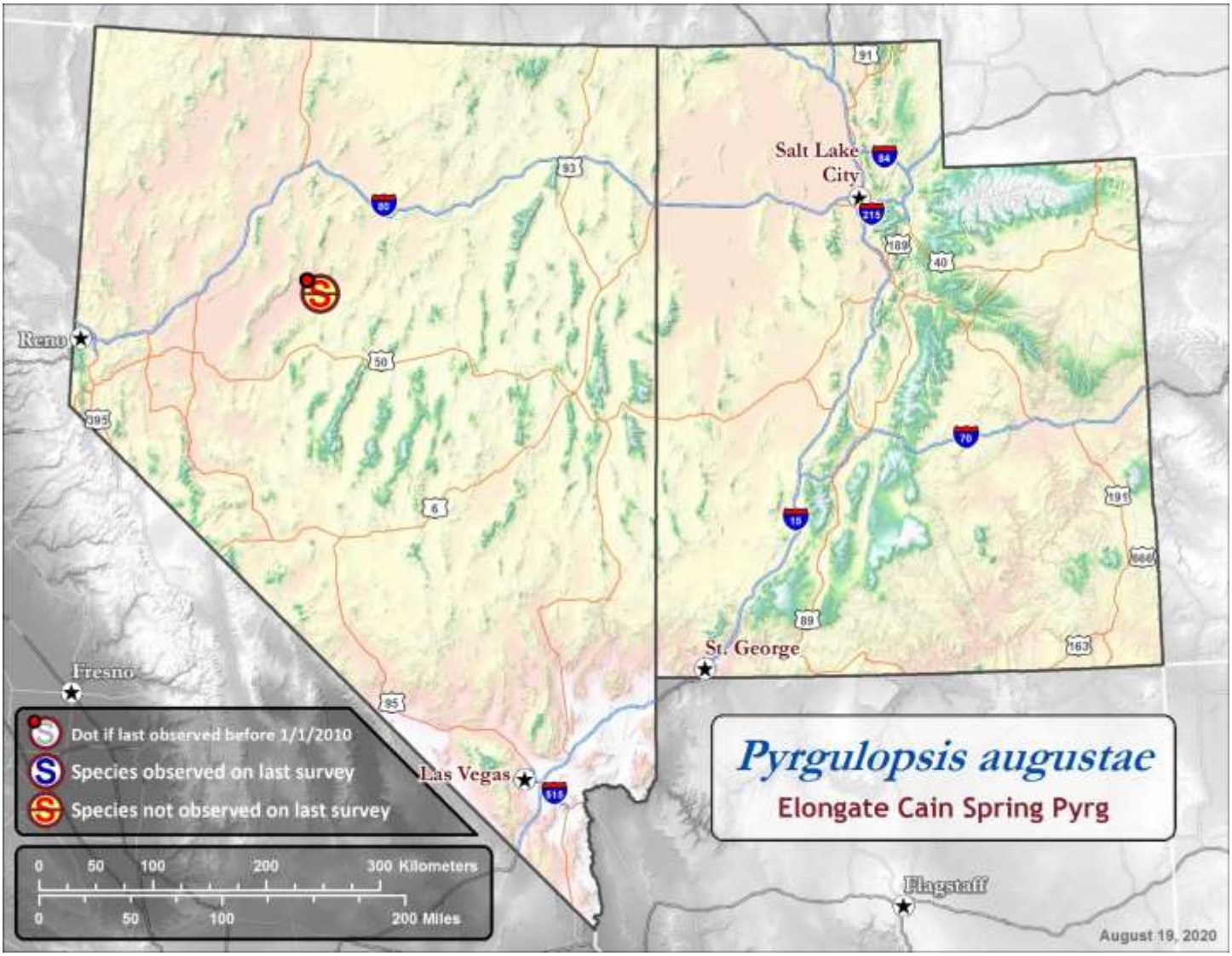
LAND MANAGEMENT

P. augustae were observed at a single location on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [50%; 1 survey] and **Sada Import** [50%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis augustae. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+augustae (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	4 sampling locations reported in Utah or Nevada [n = 4 sites]
Most Recent Observation (restricted to UT and NV)	**September 16, 2008** (*5 surveys total in UT or NV between 9/7/1991 and 9/16/2008*)

TAXONOMY

Pyrgulopsis aurata is described in Hershler, 1998: 74-75, figs. 8E, 20K-L, 36E-G. *P. aurata* has been assigned Invertebrate Taxon ID 6550 in the Springs Online database.

DISTRIBUTION

According to Hershler and Liu, 2017, Pleasant Valley Pyrg. is only found at the type locality - Coyote Spring, Pershing County, Nevada. Holotype, USNM 874393; paratypes, USNM 860696.

Pyrgulopsis aurata has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. aurata* has been reported at 4 sites across its entire range. This species has been recorded at 4 locations in Pershing County, Nevada. This species has been observed on 5 surveys between September 7, 1991 and September 16, 2008. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 3 times at 3 locations for this species, with average flow-per-location ranging from 0.02 to 3.33 liters per second [mean = 1.12 l/s, median = 0.02 l/s]. Specific Conductance was measured 3 times at 3 locations, with average specific conductance-per-location ranging from 700 to 999 µS/cm [mean = 891 µS/cm, median = 975 µS/cm]. Spring pH was measured 3 times at 3 locations, with average pH-per-location ranging from 7.5 to 8.1 [mean = 7.7, median = 7.5]. Temperature was measured 3 times at 3 locations, with average temperature-per-location ranging from 15 to 21° Celsius [mean = 19°C, median = 21°C].

This species was observed in **rheocrene** [67%; n = 2] and **limnocrene** [33%; n = 1] springs. Elevations for this species range from 1,287 m (4,222 ft) to 1,436 m (4,711 ft), with a mean of 1,398 m (4,587 ft) and median of 1,435 m (4,706 ft).

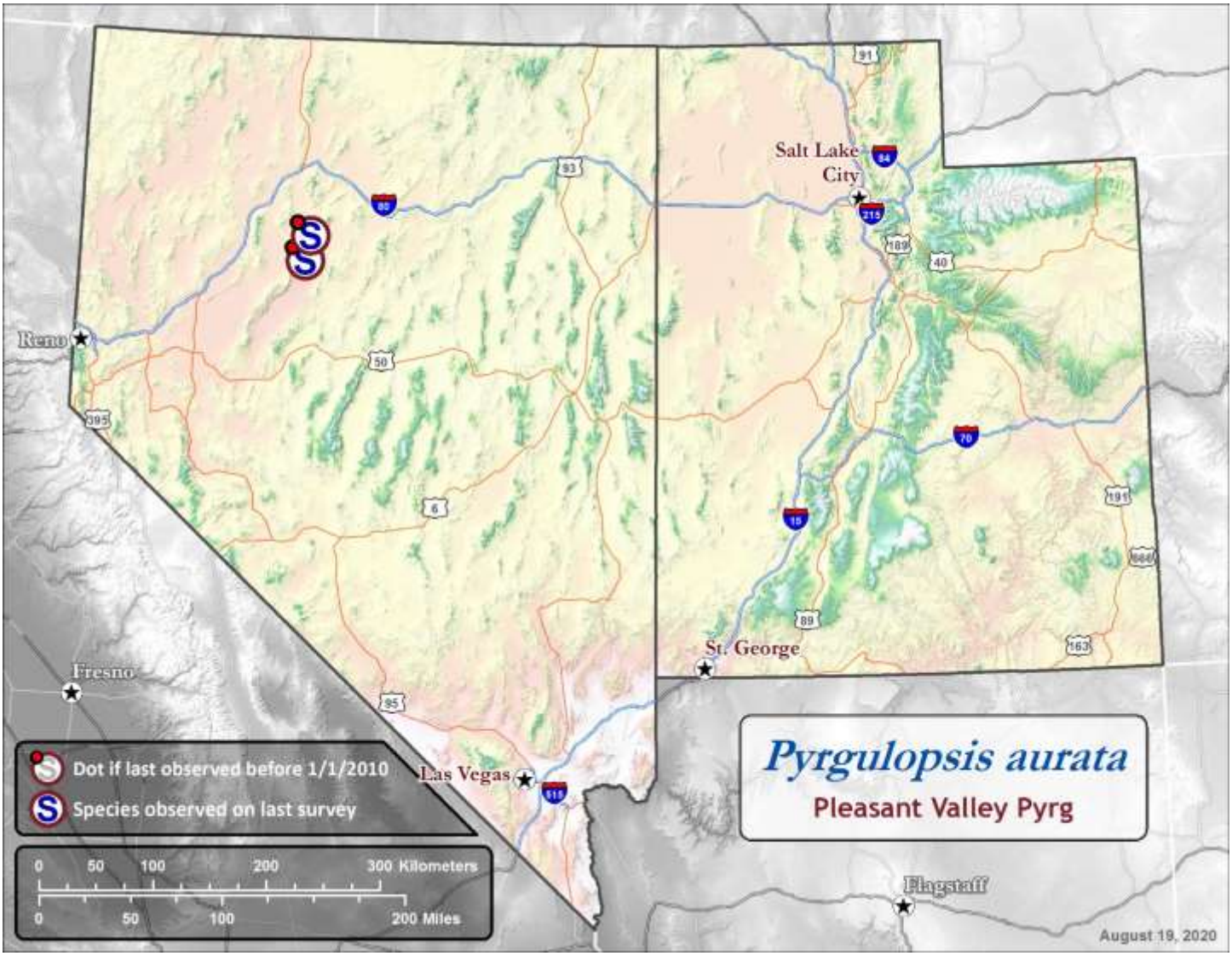
LAND MANAGEMENT

All 4 locations where *P. aurata* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [60%; 3 surveys] and **Nevada Natural Heritage Data Import** [40%; 2 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis aurata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+aurata (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1S2: Critically Imperiled/Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N2: Imperiled
Global Status	G1G2: Critically Imperiled/Imperiled
IUCN Status	2: Faces a high risk of extinction in the medium-term
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. Moapa pebblesnail was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	27 sampling locations reported in Utah or Nevada [n = 16 sites]
Most Recent Observation (restricted to UT and NV)	**June 4, 2016** (*63 surveys total in UT or NV between 1/1/1973 and 6/4/2016*)

TAXONOMY

Fluminicola avernalis is described in Pilsbry, 1935: 92-93, fig. 1. *Pyrgulopsis avernalis* has been assigned Invertebrate Taxon ID 6245 in the Springs Online database.

DISTRIBUTION

This springsnail occurs in the Muddy River watershed in Clark County, Nevada, in the Moapa Valley at Moapa Springs, Apcar Springs, Cardy Lamb Spring, Muddy Spring, and springs west of Muddy Spring (Hershler 1998). Springs and springbrooks that they occupy are on the Moapa Valley National Wildlife Refuge (MVNWR), and land owned by the Southern Nevada Water Authority (SNWA) and the Mormon Church. All of these springs are also inhabited by the grated Tryonia (*Tryonia clathrata*) (Hershler 1998, 2001) and a number of other endemic fishes and benthic macroinvertebrates (BMIs) (e.g., Scoppettone 1993, Sada and Herbst 1995). *P. avernalis* occur throughout the upper Muddy River system, but that their abundance and distribution has varied primarily in response to restoration, impoundment, and diversion. The type locality is in the Colorado Desert [probably in error as there are no other reliable records for this species from the Colorado Desert; Hershler 1994]. Lectotype, ANSP 27784; paralectotypes, ANSP 375737 (mixed with *Pyrgulopsis carinifera*).

Pyrgulopsis avernalis has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. avernalis* has been reported at 27 sampling locations across its entire range [n = 16 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. This species has been recorded at 27 locations in Clark County, Nevada. This species has been observed on 63 surveys between January 1, 1973 and June 4, 2016. The last surveys at 2 of these locations did not record any observations of this species. At 9 of these locations [33%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Sada (2008) conducted detailed analyses of the habitat at Warm Springs. He determined that *P. avernalis* was more associated with gravel substrate, higher current velocities, and warmer water temperatures than other snail species at Warm Springs.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 37 times at 23 locations for this species, with average flow-per-location ranging from 0.25 to 166.67 liters per second [mean = 10.62 l/s, median = 2.25 l/s]. Specific Conductance was measured 42 times at 24 locations, with average specific conductance-per-location ranging from 825 to 1,163 µS/cm [mean = 1,042 µS/cm, median = 1,049 µS/cm]. Spring pH was measured 25 times at 18 locations, with average pH-per-location ranging from 7.4 to 7.8 [mean = 7.51, median = 7.45]. Temperature was measured 42 times at 24 locations, with average temperature-per-location ranging from 31 to 32° Celsius [mean = 32°C, median = 32°C].

This species was observed in **rheocrene** [95%; n = 18] and **limnocrene** [5%; n = 1] springs. Elevations for this species range from 536 m (1,759 ft) to 561 m (1,841 ft), with a mean of 552 m (1,811 ft) and median of 555 m (1,821 ft).

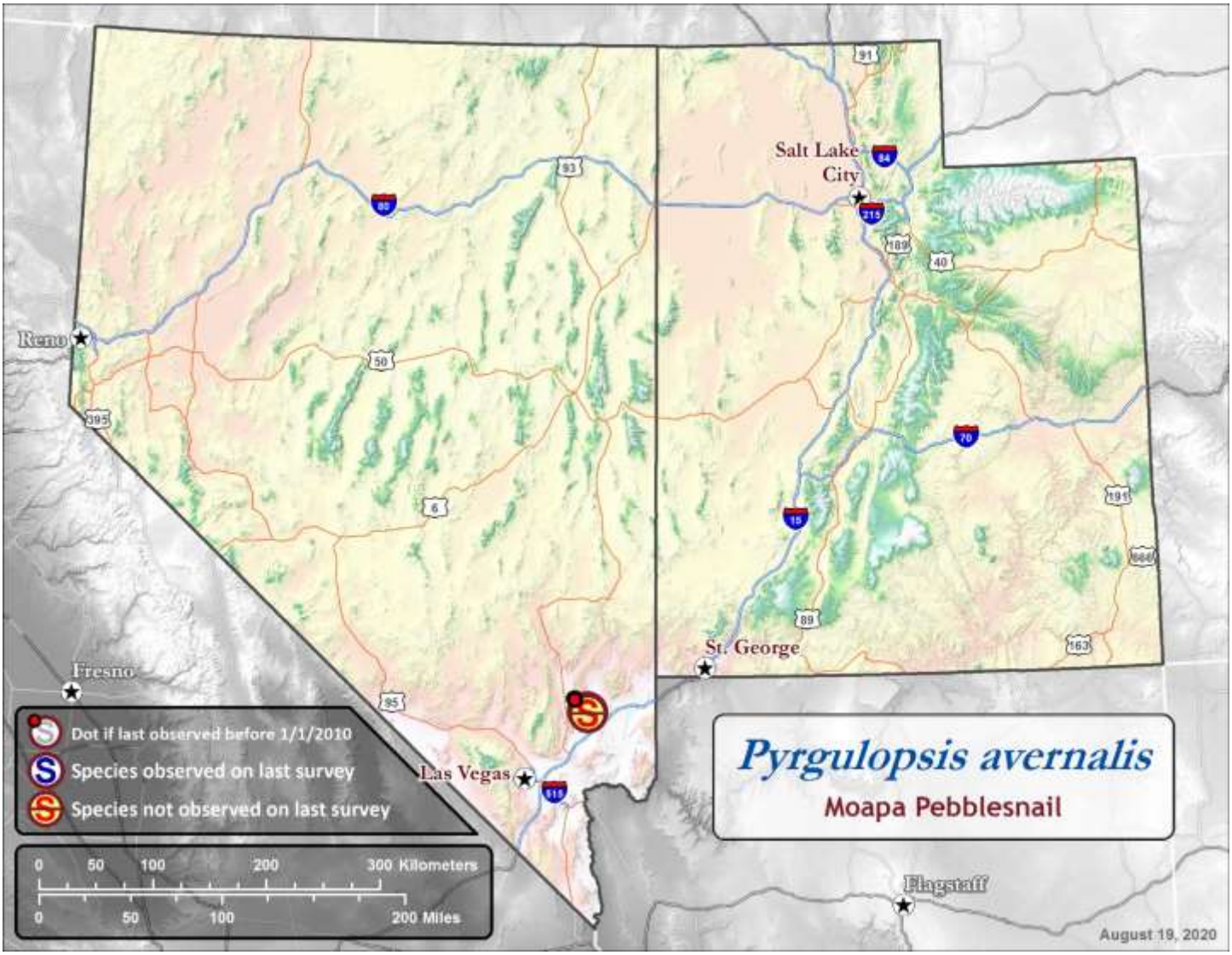
LAND MANAGEMENT

Of the 27 locations where *P. avernalis* were observed, 67% were located on **FWS** land (n = 18), 19% on **Private** land (n = 5), 11% on **BLM** land (n = 3) and 4% on **BOR** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [40%; 25 surveys], **Nevada Natural Heritage Data Import** [30%; 19 surveys], **Sada Import 2017** [29%; 18 surveys] and **SDS** [2%; 1 survey] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO.

Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis avernalis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+avernalis (Accessed 2019).

Sada DW. Herbst DB (1999) Habitat use by rare aquatic macroinvertebrates in spring brooks on the upper Muddy River, Clark County, Nevada. The Nature Conservancy, Las Vegas, NV. Report.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	2: Faces a high risk of extinction in the medium-term
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 74 FR 66866 66905 (2009), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 54 FR 554 579 (1989). Grand Wash Springsnail was proposed for review under the USFWS 90-Day Finding on a Petition to List 475 Species in the Southwestern United States as Threatened or Endangered With Critical Habitat; Proposed Rule (2009). As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**March 31, 2017** (*n = 1 survey in UT or NV*)

TAXONOMY

Pyrgulopsis bacchus is described in Hershler and Landye, 1988: 21, figs. 10d, 11e-g, 12d-f, 14b, 15. *P. bacchus* has been assigned Invertebrate Taxon ID 6552 in the Springs Online database.

DISTRIBUTION

According to Hershler and Lui, 2017, Grand Wash Springsnail is only known at two closely proximal springs in Grand Wash, lower Colorado River basin, Arizona. The type locality is Grapevine Spring, Mohave County, Arizona. Holotype, USNM 859037; paratypes, USNM 859038 (Hershler and Liu 2017).

Pyrgulopsis bacchus has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. bacchus* has been reported at 2 sites across its entire range. Species observations have been recorded at 1 location in Arizona (in Mohave County) and 1 location in Nevada (in Clark County). This species has been observed on 2 surveys between May 6, 2004 and March 31, 2017. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Grand Wash Springsnail only occurs at two small springs in Grand Wash, in the Lower Colorado River Basin.

The water quality variables Flow, Specific Conductance and Temperature were measured and recorded at sites where this species was observed. Flow was measured a single time at 8.33 liters per second for this species. Specific Conductance was measured a single time at 550 µS/cm for this species. Temperature was measured a single time at 25° Celsius for this species.

No spring types recorded in database. Elevations for this species range from 469 m (1,539 ft) to 1,121 m (3,678 ft), with a mean of 795 m (2,608 ft) and median of 795 m (2,608 ft).

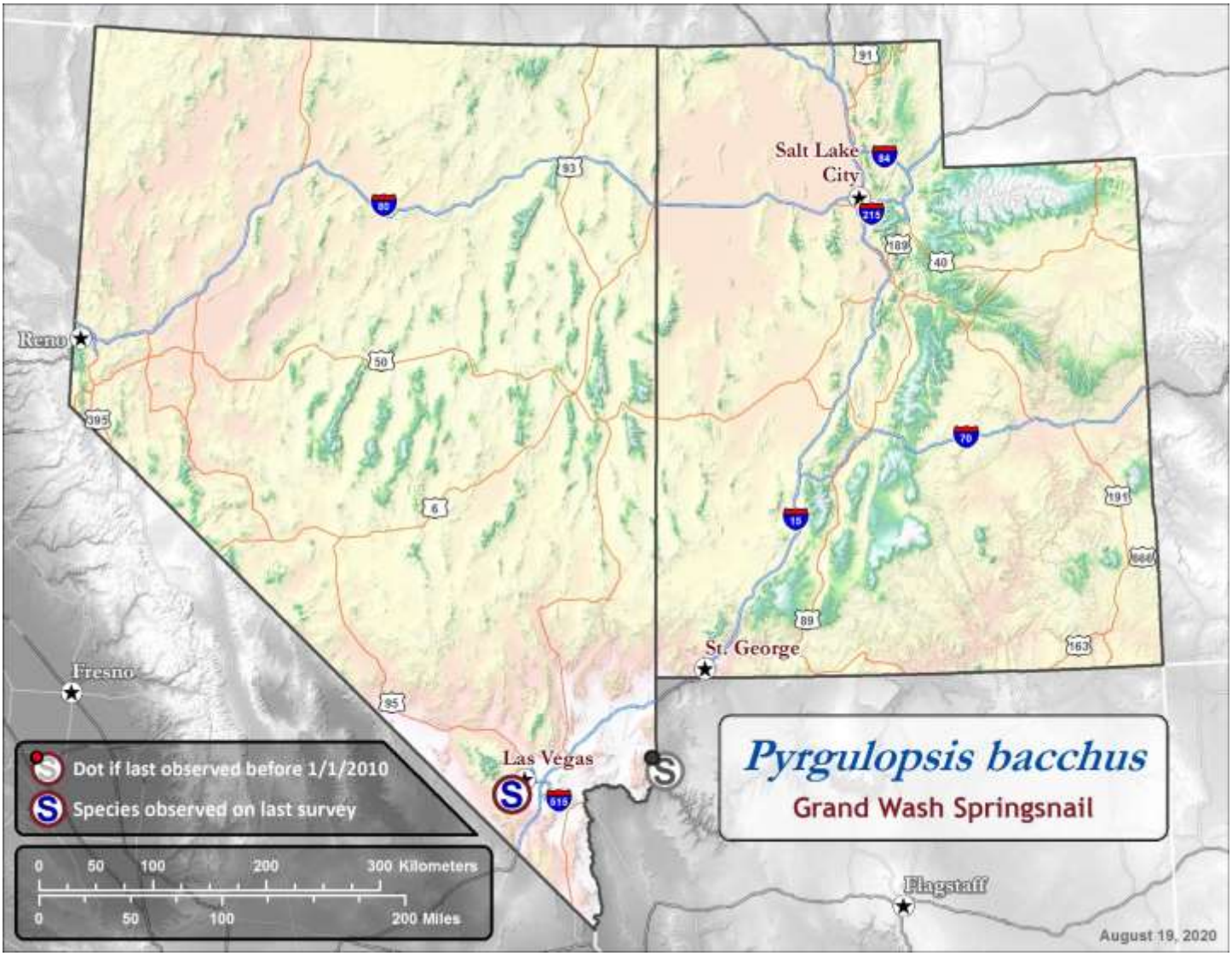
LAND MANAGEMENT

Of the 2 locations where *P. bacchus* were observed, 50% were located on **NPS** land (n = 1) and 50% on **State** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [50%; 1 survey] and **Nevada Natural Heritage Data Import** [50%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis bacchus. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+bacchus (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	3 sampling locations reported in Utah or Nevada [n = 3 sites]
Most Recent Observation (restricted to UT and NV)	**June 24, 2009** (*6 surveys total in UT or NV between 7/24/1991 and 6/24/2009*)

TAXONOMY

Pyrgulopsis basiglans is described in Hershler, 1998: 91-93, figs. 9D, 13D, 22D, 40F-H. *P. basiglans* has been assigned Invertebrate Taxon ID 6553 in the Springs Online database.

DISTRIBUTION

According to Hershler and Liu, 2017, Large Gland Carico occurs at two springs along Cooks Creek, Carico Lake Basin, Lander County, Nevada. The type locality is a spring, Cooks Creek, Carico Lake Basin, Lander County, Nevada. Holotype, USNM 874280; paratypes, USNM 860692 (Hershler and Liu 2017).

Pyrgulopsis basiglans has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. basiglans* has been reported at 3 sites across its entire range. This species has been recorded at 3 locations in Lander County, Nevada. This species has been observed on 6 surveys between July 24, 1991 and June 24, 2009. The last survey at one of these locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Large Gland Carico pyrg only occurs at two springs along Crooks Creek, Carico Lake Basin in Lander County, Nevada.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 2 times at 2 locations for this species, with average flow-per-location ranging from 0.67 to 1.83 liters per second [mean = 1.25 l/s, median = 1.25 l/s]. Specific Conductance was measured 4 times at 2 locations, with average specific conductance-per-location ranging from 287 to 663 µS/cm [mean = 475 µS/cm, median = 475 µS/cm]. Spring pH was measured 2 times at 2 locations, with average pH-per-location ranging from 6.7 to 7.7 [mean = 7.2, median = 7.2]. Temperature was measured 4 times at 2 locations, with average temperature-per-location ranging from 18 to 22° Celsius [mean = 20°C, median = 20°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,555 m (5,102 ft) to 1,634 m (5,361 ft), with a mean of 1,581 m (5,188 ft) and median of 1,555 m (5,102 ft).

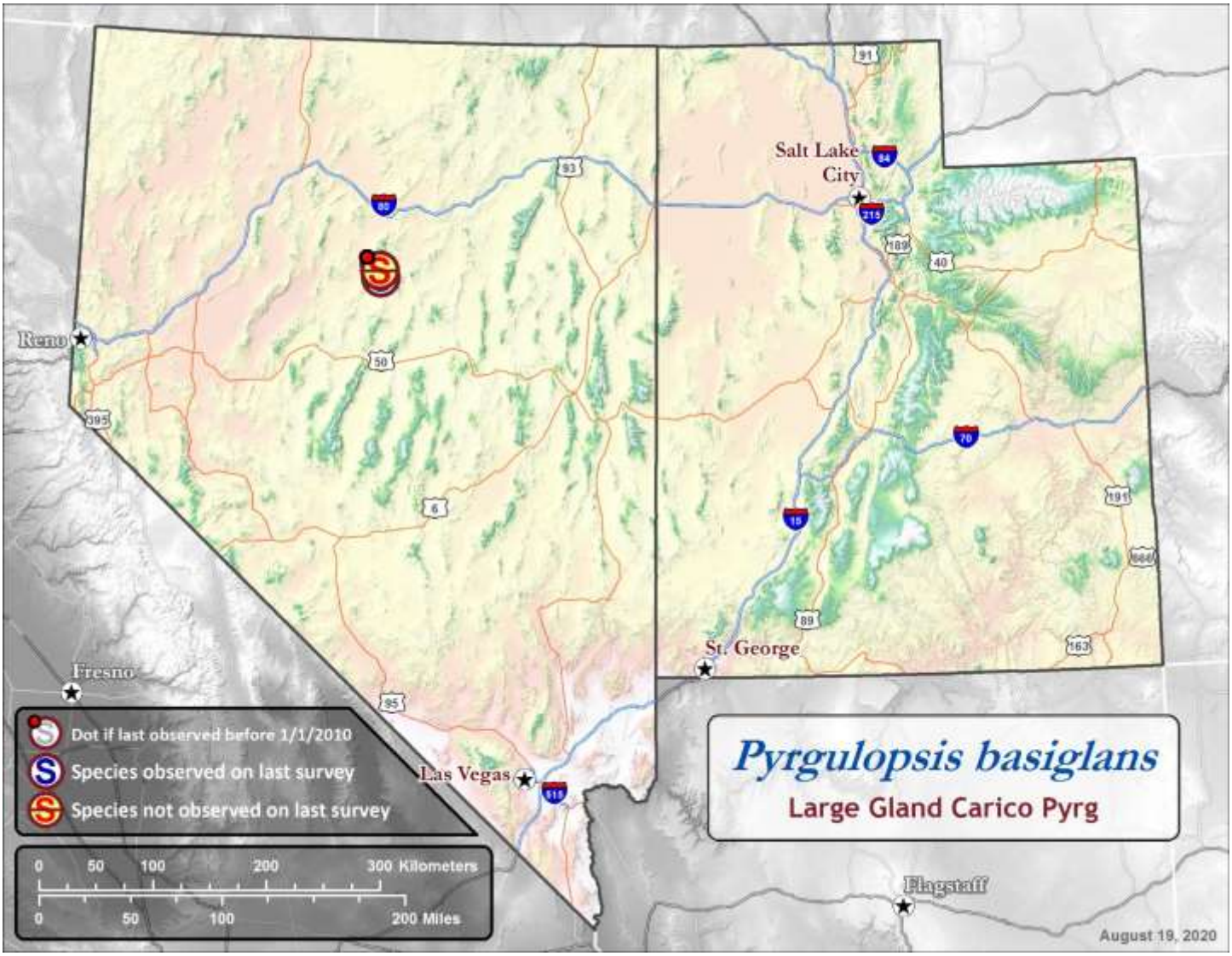
LAND MANAGEMENT

All 3 locations where *P. basiglans* were observed were located on **BLM** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [67%; 4 surveys] and **Nevada Natural Heritage Data Import** [33%; 2 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis basiglans. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+basiglans (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**October 17, 2000** (*3 surveys total in UT or NV between 7/24/1991 and 10/17/2000*)

TAXONOMY

Pyrgulopsis bifurcata is described in Hershler, 1998: 93-94, figs. 9E, 22E, 41A-C. *P. bifurcata* has been assigned Invertebrate Taxon ID 6555 in the Springs Online database.

DISTRIBUTION

According to Hershler and Liu, 2017, Small Gland Carico Pyrg occurs at springs west of Carico Lake, Carico Lake Basin, Lander County, Nevada. The type locality is Springs west of Carico Lake, Carico Lake Basin, Lander County, Nevada. Holotype, USNM 874306; paratypes, USNM 860693 (Hershler and Liu 2017).

Pyrgulopsis bifurcata has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. bifurcata* has been reported at a single location. This species has been recorded at a single location in Lander County, Nevada. This species has been observed on 3 surveys between July 24, 1991 and October 17, 2000. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Small Gland Carico Pyrg occurs at springs west of Carico Lake, Carico Lake Basin, Lander County, Nevada.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured a single time at 381 µS/cm for this species. Spring pH was measured a single time at 7.3 for this species. Temperature was measured a single time at 24° Celsius for this species.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 1,561 m (5,121 ft).

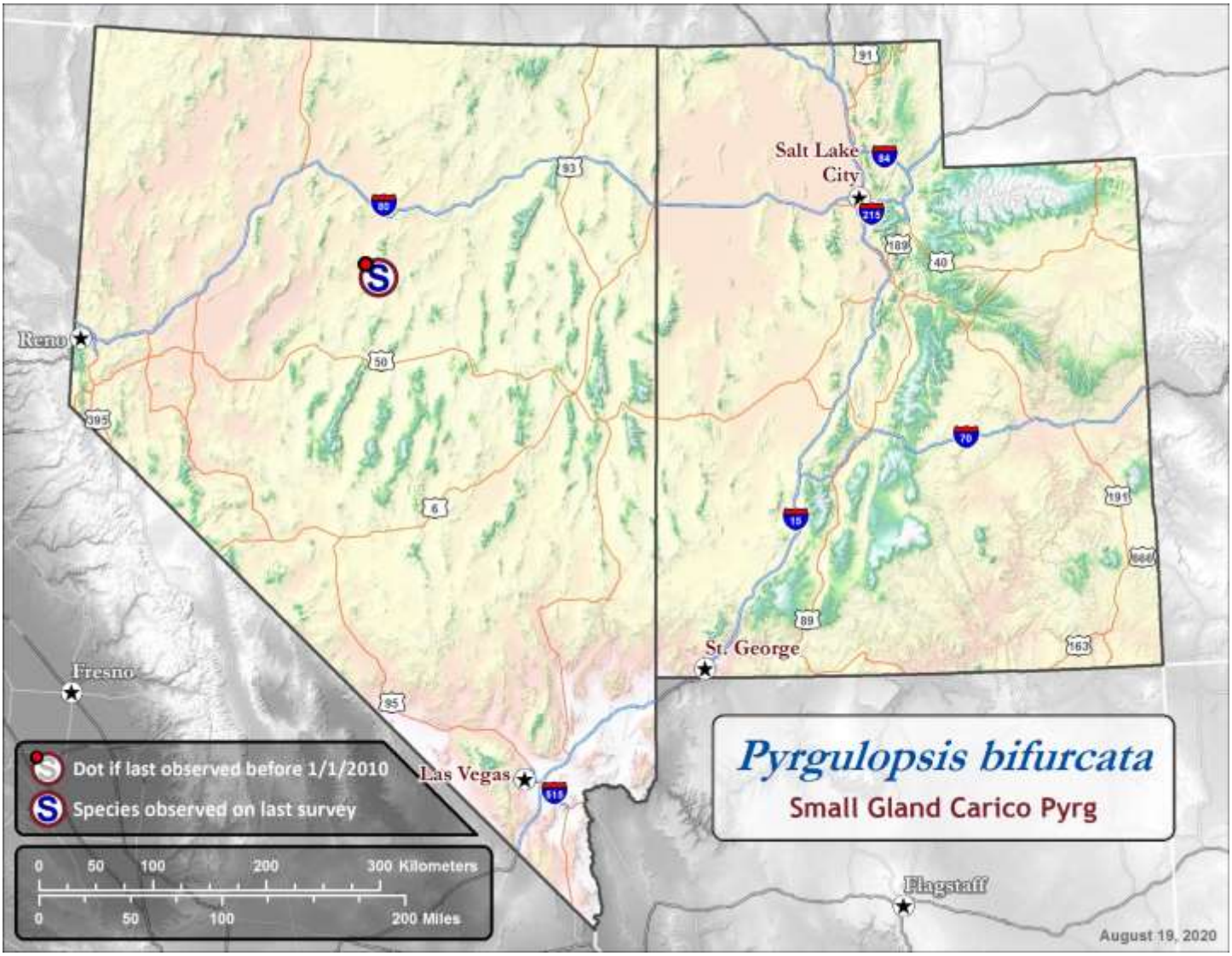
LAND MANAGEMENT

P. bifurcata were observed at a single location on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [67%; 2 surveys] and **Sada Import** [33%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011) and 82 FR 46618 46645 (2017). Flag Pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	5 sampling locations reported in Utah or Nevada [n = 4 sites]
Most Recent Observation (restricted to UT and NV)	**July 2, 2016** (*20 surveys total in UT or NV between 5/28/1972 and 7/2/2016*)

TAXONOMY

Pyrgulopsis breviloba is described in Hershler, 1998: 39, 41, figs. 6G, 11C, 14D-F, 17L-M, 28D-F. *P. breviloba* has been assigned Invertebrate Taxon ID 6556 in the Springs Online database.

DISTRIBUTION

According to Hershler, 1998, Flag Pyrg is found at Meloy Spring in Dry Lake Valley in Lincoln County, and at Flag Springs in the White River Valley in Nye County. Although *P. breviloba* and *P. sathos* co-occur in Flag Springs, *P. breviloba* is the only species in Meloy Spring. The Flag Springs are in near reference condition, and Meloy Spring has been altered by diversion and impoundment, but its condition has stabilized and not changed since the first springsnail surveys in the 1990s. The type locality is Flag Springs (the middle of three), White River Valley, Nye County, Nevada. Holotype, USNM 873174; paratypes, USNM 860689 (Hershler and Liu, 2017).

Pyrgulopsis breviloba has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. breviloba* has been reported at 5 sampling locations across its entire range [n = 4 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded in two counties in Nevada, including 4 locations in Nye County and 1 in Lincoln County. This species has been observed on 20 surveys between May 28, 1972 and July 2, 2016.

HABITAT CHARACTERISTICS

Three of the springs where Flag pyrg occur are listed as rheocrene and 1 is listed as a limnocrene.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 6 times at 4 locations for this species, with average flow-per-location ranging from 1 to 37.5 liters per second [mean = 23.79 l/s, median = 28.33 l/s]. Specific Conductance was measured 8 times at 5 locations, with average specific conductance-per-location ranging from 341 to 482 µS/cm [mean = 412 µS/cm, median = 397 µS/cm]. Spring pH was measured 5 times at 5 locations, with average pH-per-location ranging from 7.4 to 8.4 [mean = 7.73, median = 7.63]. Temperature was measured 8 times at 5 locations, with average temperature-per-location ranging from 14 to 22° Celsius [mean = 18°C, median = 17°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,605 m (5,266 ft) to 1,865 m (6,119 ft), with a mean of 1,662 m (5,451 ft) and median of 1,614 m (5,295 ft).

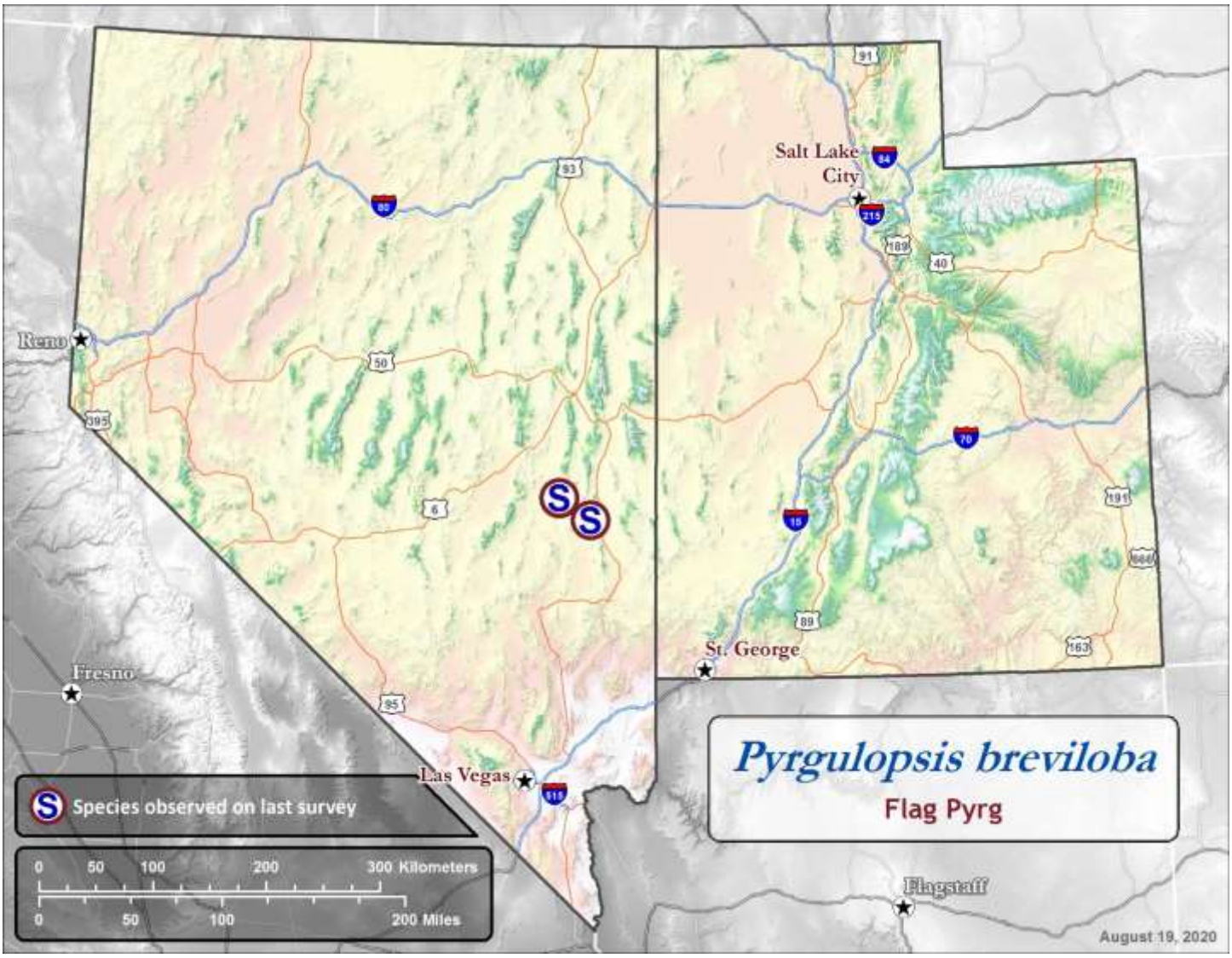
LAND MANAGEMENT

Of the 5 locations where *P. breviloba* were observed, 60% were located on **State** land (n = 3), 20% on **BLM** land (n = 1) and 20% on **Private** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [60%; 12 surveys], **Sada Import** [25%; 5 surveys] and **Sada Import 2017** [15%; 3 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis breviloba. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+breviloba (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**September 20, 1997** (*4 surveys total in UT or NV between 2/8/1997 and 9/20/1997*)

TAXONOMY

Pyrgulopsis bruesi is described in Hershler and Sada, 2000: 367-368, 370-372, figs. 1-4. *P. bruesi* has been assigned Invertebrate Taxon ID 6557 in the Springs Online database.

DISTRIBUTION

According to Hershler and Sada, 2000, Fly Ranch Pyrg is only known from a small stream that enters Fly Reservoir, north-northeast of Gerlach, Washoe County, Nevada. This is the type locality, about 23 airline-km north-northeast of Gerlach, Washoe County, Nevada. Holotype, USNM 892079; paratypes, USNM 860868 (Hershler and Liu 2017).

Pyrgulopsis bruesi has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. bruesi* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in Washoe County, Nevada. This species has been observed on 4 surveys between February 8, 1997 and September 20, 1997. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

NatureServe lists the habitat as a thermal spring.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured a single time at 1,760 µS/cm for this species. Spring pH was measured a single time at 8.2 for this species. Temperature was measured a single time at 27° Celsius for this species.

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,223 m (4,012 ft) to 1,224 m (4,016 ft), with a mean of 1,224 m (4,014 ft) and median of 1,224 m (4,014 ft).

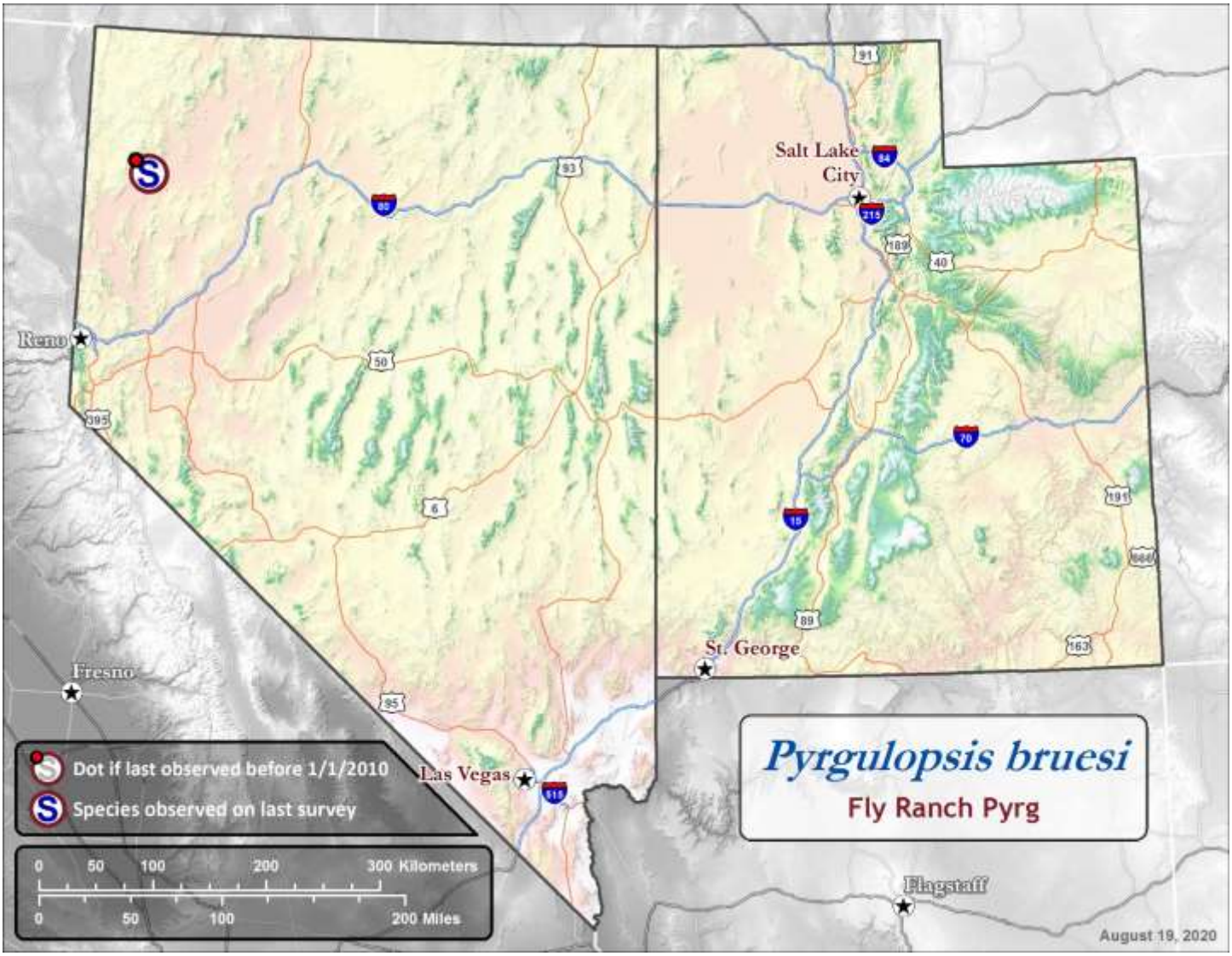
LAND MANAGEMENT

Both locations where *P. bruesi* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [75%; 3 surveys] and **Sada Import** [25%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R.Sada, D.W. (2000) A new species of hydrobiid snail of the genus Pyrgulopsis from northwestern Nevada. Veliger 43:367-375. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/11320/iz_HershlerSada2000.pdf.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis bruesi. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+bruesi (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**July 28, 2008** (*6 surveys total in UT or NV between 1/1/1912 and 7/28/2008*)

TAXONOMY

Fluminicola nevadensi was described in Walker, 1916: 6-7, unlabeled figure. *Pyrgulopsis bryantwalkeri* was described in Hershler, 1994: 23. Replacement name for *Fluminicola nevadensi*s Walker, 1916; preoccupied in Pyrgulopsis by *Pyrgula nevadensis* Stearns, 1883 (Hershler and Liu 2017). *P. bryantwalkeri* has been assigned Invertebrate Taxon ID 6559 in the Springs Online database.

DISTRIBUTION

According to Hershler (1994) this species is only known for the type locality: a spring in the Cortez foot-hills, Humboldt Valley, Elko County, Nevada. Lectotype, UMMZ 118012; paralectotypes, ANSP 115948, MCZ 31450.

Pyrgulopsis bryantwalkeri has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. bryantwalkeri* has been reported at a single location. This species has been recorded at a single location in Elko County, Nevada. This species has been observed on 6 surveys between January 1, 1912 and July 28, 2008. The last survey at this site did not record any observations of this species. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Cortez Hills Pebblesnail only occurs at a warm spring in the Cortez foothills in Elko County, Nevada.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured a single time at 25 liters per second for this species. Specific Conductance was measured 3 times at 1 site for this species, with an average specific conductance of 414 µS/cm. Spring pH was measured 2 times at 1 site for this species, with an average pH of 8.4. Temperature was measured 3 times at 1 site for this species, with an average temperature of 22° Celsius.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 1,524 m (5,000 ft).

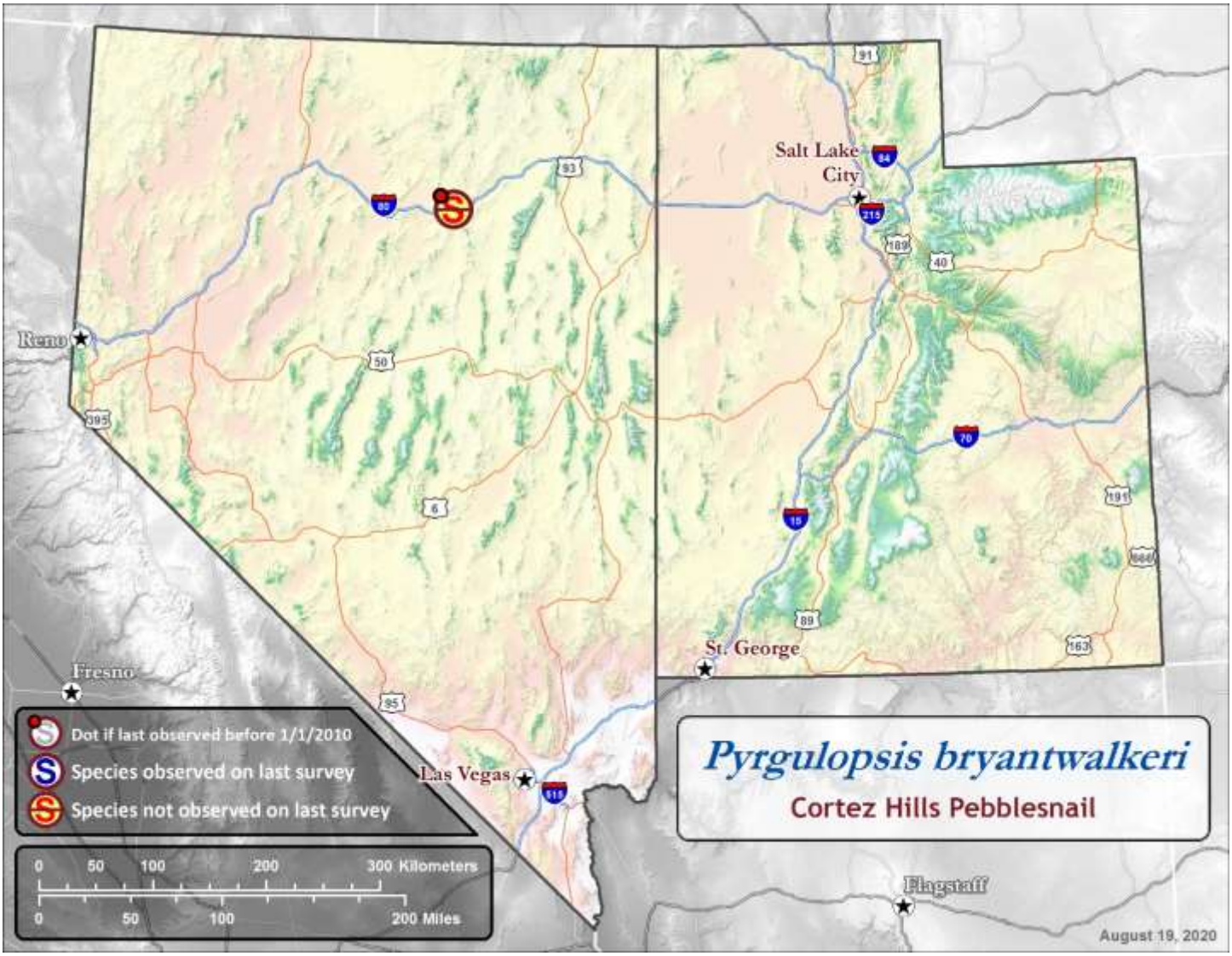
LAND MANAGEMENT

P. bryantwalkeri were observed at a single location on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [50%; 3 surveys] and **Nevada Natural Heritage Data Import** [50%; 3 surveys] projects.

RELATED LITERATURE

Hershler, R. (1994) A review of the North American freshwater snail genus Pyrgulopsis (Hydrobiidae). Smithsonian Contributions to Zoology 554:1-115. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/5139/SCtZ-0554-Lo_res.pdf?sequence=2&isAllowed=y.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis bryantwalkeri. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+bryantwalkeri (Accessed 2019).

Walker-Newcomb Expedition of the University of Michigan (1916) The Mollusca Collected in Northeastern Nevada. Occational Papers of the Museum of Zoology, University of Michigan 29:1-8. Peer-reviewed article. Available at https://deepblue.lib.umich.edu/bitstream/handle/2027.42/56468/OP029.pdf?sequence=1&isAllowed=y.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	6: Extinct or extirpated from the U.S.
National Status	NX: Presumed Extirpated
Global Status	GX: Presumed Extinct or Eliminated
IUCN Status	6: Extinct or presumed extinct
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. It is presumed extinct.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**May 5, 2009** (*5 surveys total in UT or NV between 10/5/1992 and 5/5/2009*)

TAXONOMY

This species was described by Hershler (1998). *Pyrgulopsis carinata* has been assigned Invertebrate Taxon ID 6561 in the Springs Online database.

DISTRIBUTION

The Carinate Duckwater Pyrg only occurred at springs on Duckwater Tribal land.

Pyrgulopsis carinata has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. carinata* has been reported at a single location. This species has been recorded at a single location in Nye County, Nevada. This species has been observed on 5 surveys between October 5, 1992 and May 5, 2009. The last survey at this site did not record any observations of this species. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

According to Natureserve (2016) this springsnail is endemic to Duckwater area springs.

The water quality variables pH and Temperature were measured and recorded at sites where this species was observed. Spring pH was measured a single time at 7.6 for this species. Temperature was measured a single time at 30° Celsius for this species.

The single site where this species occurred was a **limnocrene** spring. This species has been recorded at a single elevation of 1,708 m (5,604 ft).

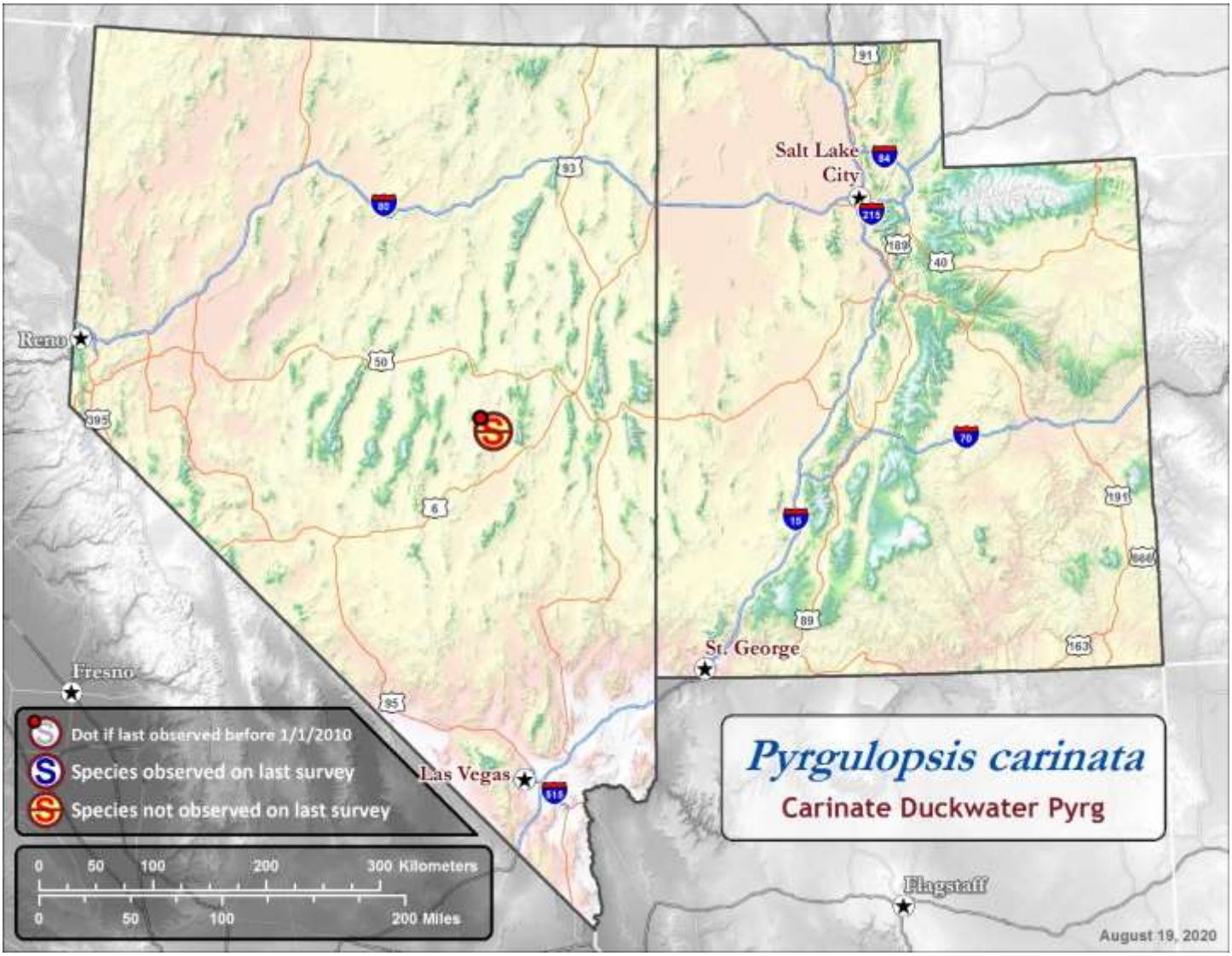
LAND MANAGEMENT

P. carinata were observed at a single location on **Tribal** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [80%; 4 surveys] and **Sada Import** [20%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	4: Faces an extremely high risk of extinction in the immediate future
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. Moapa Valley Pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	28 sampling locations reported in Utah or Nevada [n = 17 sites]
Most Recent Observation (restricted to UT and NV)	**June 4, 2016** (*61 surveys total in UT or NV between 8/31/1973 and 6/4/2016*)

TAXONOMY

Fluminicola avernalis carinifera is described in Pilsbry, 1935: 93, fig. 3. *Pyrgulopsis carinifera* has been assigned Invertebrate Taxon ID 6562 in the Springs Online database.

DISTRIBUTION

The Moapa Valley Pyrg occurs in Clark County, Nevada, in the Upper Muddy River watershed at Apcar Springs, Muddy Spring, springs west of Muddy Spring, and at a spring in Moapa Valley National Wildlife Refuge. Springs and springbrooks that they occupy are on land owned by the Southern Nevada Water Authority (SNWA) and the Mormon Church (Center for Biological Diversity 2009). All of these springs are also inhabited by the grated Tryonia (*Tryonia clathrata*) (Hershler 1998, 2001) and a number of other endemic fishes and benthic macroinvertebrates (BMIs). The reported type locality is in the Colorado Desert [in error, probably Moapa Valley, Nevada; Hershler 1994]. Lectotype, ANSP 164091; paralectotypes, ANSP 375736 (Hershler and Liu 2017).

Pyrgulopsis carinifera has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. carinifera* has been reported at 28 sampling locations across its entire range [n = 17 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. This species has been recorded at 28 locations in Clark County, Nevada. This species has been observed on 61 surveys between August 31, 1973 and June 4, 2016. The last surveys at 2 of these locations did not record any observations of this species. At 9 of these locations [32%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Sada and Herbst (1999) and Sada (2008) conducted detailed analyses on the habitat of this species at Warm Springs and found that similar to *P. avernalis*, the species *P. carinifera* was more associated with gravel substrate and warmer water temperatures than other snail species at Warm Springs.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 37 times at 23 locations for this species, with average flow-per-location ranging from 0.25 to 166.67 liters per second [mean = 10.62 l/s, median = 2.25 l/s]. Specific Conductance was measured 43 times at 25 locations, with average specific conductance-per-location ranging from 432 to 1,163 µS/cm [mean = 1,018 µS/cm, median = 1,048 µS/cm]. Spring pH was measured 26 times at 19 locations, with average pH-per-location ranging from 7.4 to 7.8 [mean = 7.52, median = 7.5]. Temperature was measured 43 times at 25 locations, with average temperature-per-location ranging from 28 to 32° Celsius [mean = 32°C, median = 32°C].

This species was observed in **rheocrene** [95%; n = 19] and **limnocrene** [5%; n = 1] springs. Elevations for this species range from 427 m (1,401 ft) to 561 m (1,841 ft), with a mean of 548 m (1,797 ft) and median of 555 m (1,821 ft).

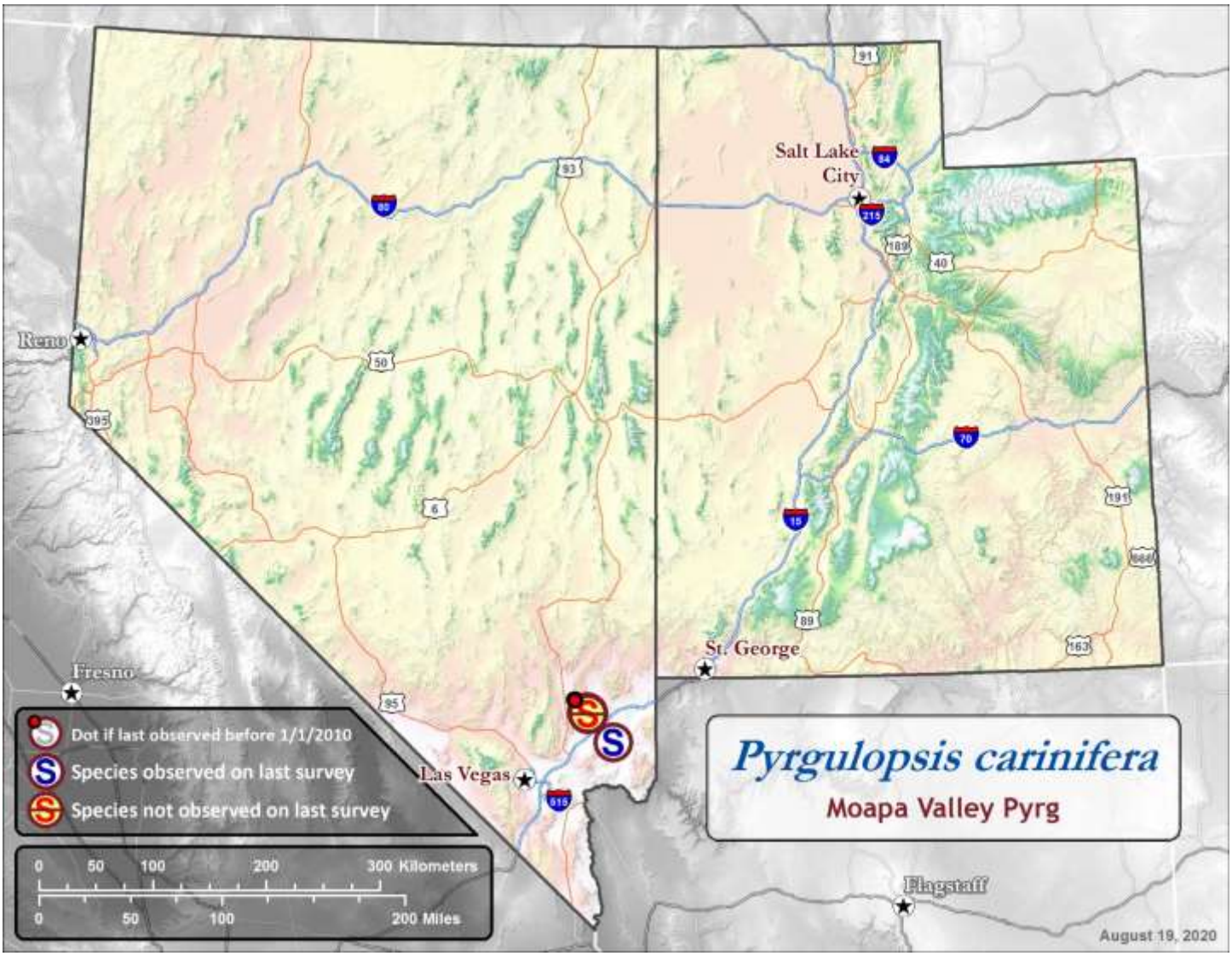
LAND MANAGEMENT

Of the 28 locations where *P. carinifera* were observed, 64% were located on **FWS** land (n = 18), 18% on **Private** land (n = 5), 14% on **BLM** land (n = 4) and 4% on **BOR** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [41%; 25 surveys], **Sada Import 2017** [30%; 18 surveys], **Nevada Natural Heritage Data Import** [26%; 16 surveys], **BLM Nevada** [2%; 1 survey] and **SDS** [2%; 1 survey] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO.

Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis carinifera. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+carinifera (Accessed 2019).

Sada DW. Herbst DB (1999) Habitat use by rare aquatic macroinvertebrates in spring brooks on the upper Muddy River, Clark County, Nevada. The Nature Conservancy, Las Vegas, NV. Report.

Sada, D.W. (2008) Synecology of a springsnail (Caenogastropoda: Hydrobiidae) assemblage in a Western U.S. thermal spring province. Veliger 50(2):59–71. Peer-reviewed article.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	4 sampling locations reported in Utah or Nevada [n = 4 sites]
Most Recent Observation (restricted to UT and NV)	**September 4, 2019** (*4 surveys total in UT or NV between 7/15/1993 and 9/4/2019*)

TAXONOMY

Pyrgulopsis chamberlini is described in Hershler, 1998: 122-124, figs. 10G, 25A-C, 47D-G. *P. chamberlini* has been assigned Invertebrate Taxon ID 10728 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis chamberlini has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. chamberlini* has been reported at 4 sites across its entire range. This species has been recorded at 4 locations in Sevier County, Utah. This species has been observed on 4 surveys between July 15, 1993 and September 4, 2019. At 2 of these locations [50%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This species has been reported at springs in Utah between 1,666 and 1,689 meters.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured 2 times at 2 locations for this species, with average specific conductance-per-location ranging from 283 to 308 µS/cm [mean = 296 µS/cm, median = 296 µS/cm]. Spring pH was measured a single time at 8.2 for this species. Temperature was measured 2 times at 2 locations, with average temperature-per-location ranging from 16 to 16° Celsius [mean = 16°C, median = 16°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,666 m (5,466 ft) to 1,689 m (5,541 ft), with a mean of 1,678 m (5,504 ft) and median of 1,678 m (5,505 ft).

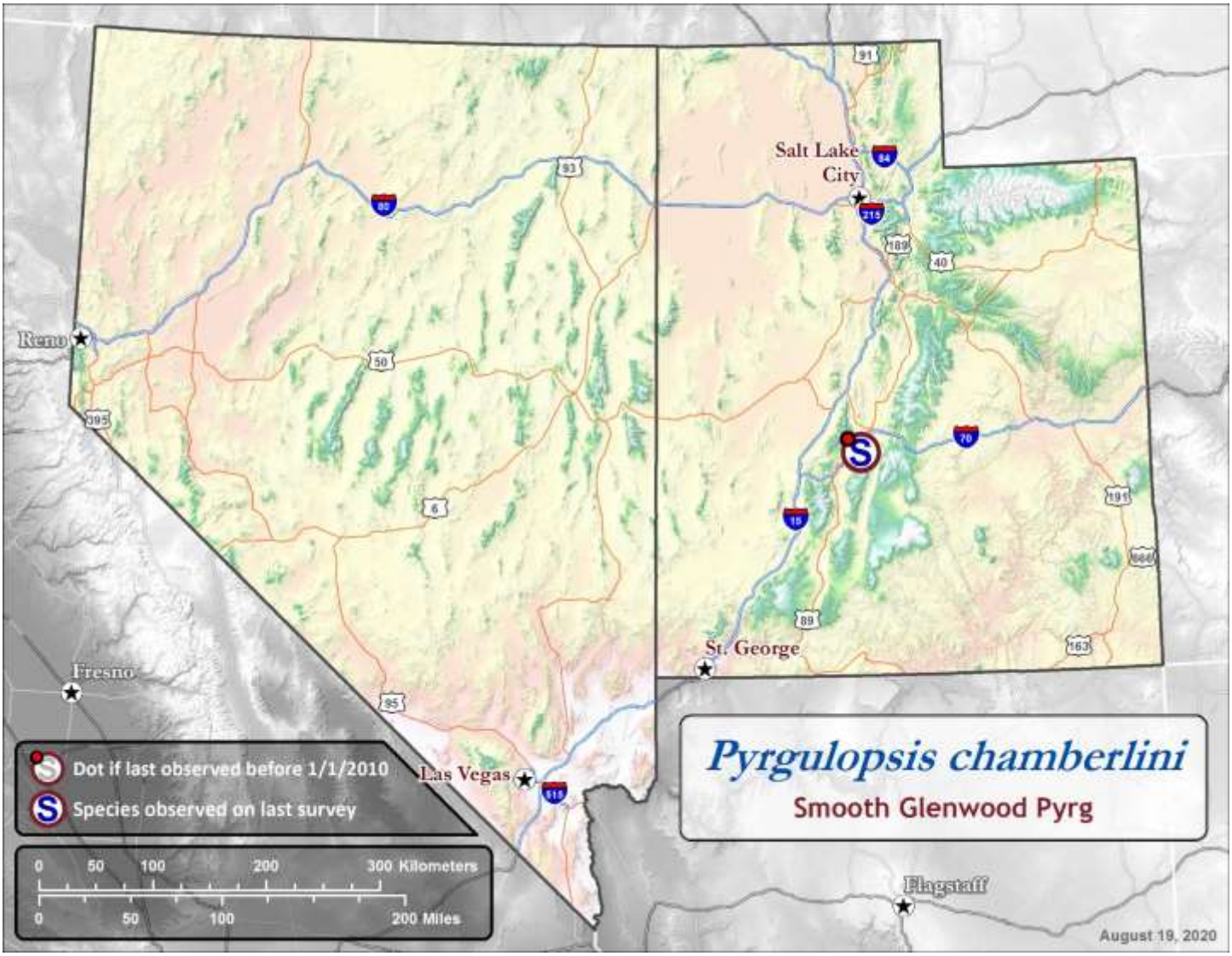
LAND MANAGEMENT

Of the 4 locations where *P. chamberlini* were observed, 75% were located on **Private** land (n = 3) and 25% on **State** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **UDWR** [50%; 2 surveys], **Utah CAS Import** [25%; 1 survey] and **Sada Import** [25%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis chamberlini. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+chamberlini (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011) and 82 FR 46618 46645 (2017). Blue Point Pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**January 19, 2019** (*15 surveys total in UT or NV between 7/24/1988 and 1/19/2019*)

TAXONOMY

Pyrgulopsis coloradensis is described in Hershler 1998 29, figs. 6C, 17D, 27A-B. *P. coloradensis* has been assigned Invertebrate Taxon ID 6243 in the Springs Online database.

DISTRIBUTION

Blue Point pyrg is described by Hershler (1998), and is known only from Blue Point Spring on Lake Mead National Recreation Area, Clark County, Nevada. It has always been scarce (Hershler 1998), and was not found during a 2016 survey conducted by Don Sada. The type locality is Blue Point Spring, Colorado River drainage, Clark County, Nevada. Holotype, USNM 854621; paratypes, USNM 860677 (Hershler and Liu 2017).

Pyrgulopsis coloradensis has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. coloradensis* has been reported at a single location. This species has been recorded at a single location in Clark County, Nevada. This species has been observed on 15 surveys between July 24, 1988 and January 19, 2019. The last survey at this site did not record any observations of this species.

HABITAT CHARACTERISTICS

Blue Point Pyrg is known only from a small thermal, rheocrene spring (Hershler 1998).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 3 times at 1 site for this species, with an average flow of 5.94 liters per second. Specific Conductance was measured 4 times at 1 site for this species, with an average specific conductance of 2,409 µS/cm. Spring pH was measured 3 times at 1 site for this species, with an average pH of 7.18. Temperature was measured 4 times at 1 site for this species, with an average temperature of 30° Celsius.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 471 m (1,545 ft).

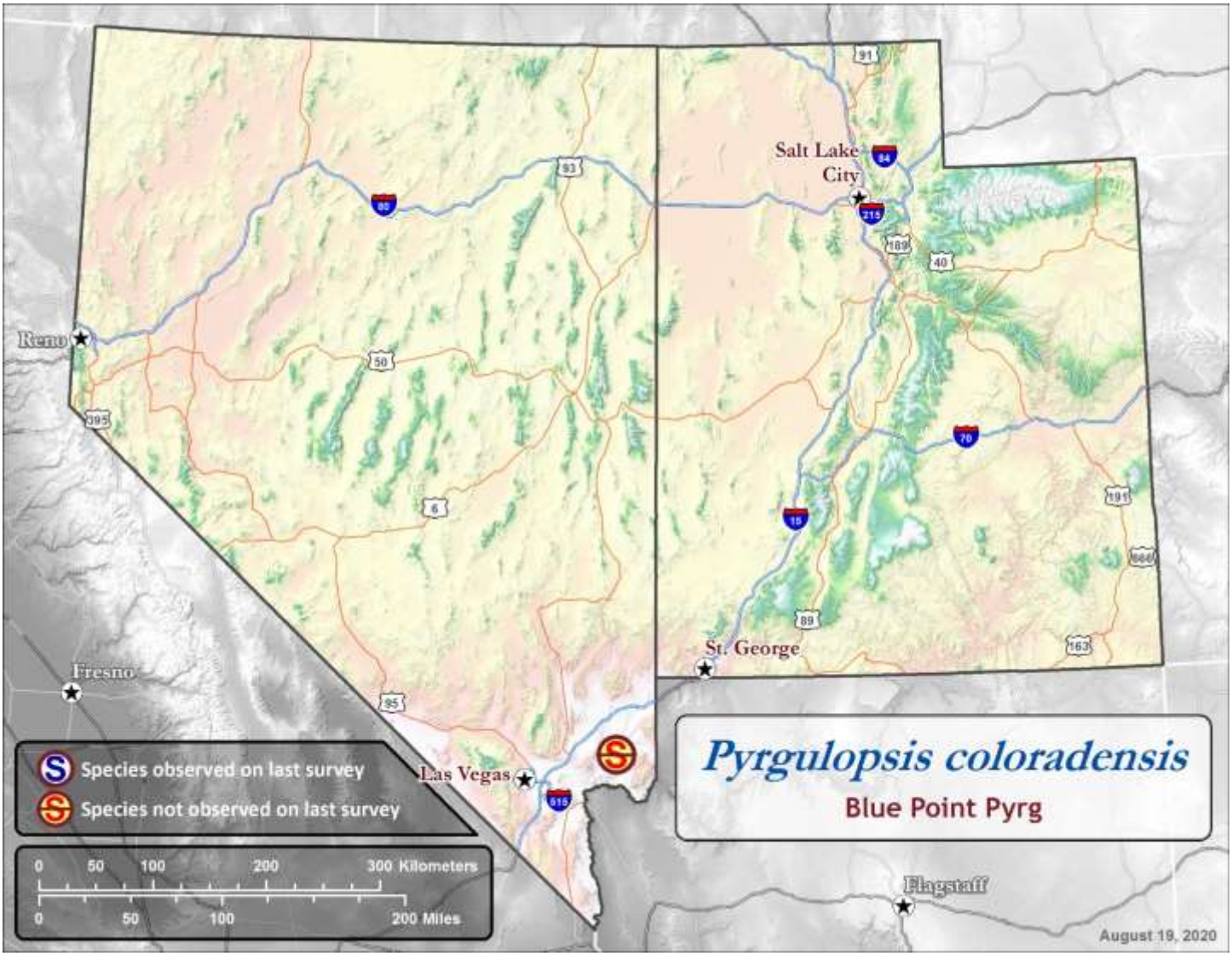
LAND MANAGEMENT

P. coloradensis were observed at a single location on **NPS** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [47%; 7 surveys], **Sada Import** [40%; 6 surveys], **Sada Import 2017** [7%; 1 survey] and **NDOW- Southern Region** [7%; 1 survey] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis coloradensis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+coloradensis (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	3: Faces a very high risk of extinction in the near future
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	6 sampling locations reported in Utah or Nevada [n = 6 sites]
Most Recent Observation (restricted to UT and NV)	**June 15, 2010** (*12 surveys total in UT or NV between 9/29/1989 and 6/15/2010*)

TAXONOMY

Pyrgulopsis cruciglans is described in Hershler, 1998: 72, figs. 8C, 20F-H, 36A-B. *P. cruciglans* has been assigned Invertebrate Taxon ID 6565 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis cruciglans has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. cruciglans* has been reported at 6 sites across its entire range. Species observations have been recorded in two counties in Nevada, including 3 locations in White Pine County and 3 in Elko County. This species has been observed on 12 surveys between September 29, 1989 and June 15, 2010. The last surveys at 3 of these locations did not record any observations of this species. At 5 of these locations [83%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Transverse Gland Pyrg occurs in several springs in Steptoe Valley and adjacent basins, eastern Nevada.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 3 times at 3 locations for this species, with average flow-per-location ranging from 0.03 to 0.58 liters per second [mean = 0.26 l/s, median = 0.17 l/s]. Specific Conductance was measured 7 times at 6 locations, with average specific conductance-per-location ranging from 203 to 470 µS/cm [mean = 345 µS/cm, median = 336 µS/cm]. Spring pH was measured 6 times at 6 locations, with average pH-per-location ranging from 7.4 to 8.3 [mean = 7.83, median = 7.75]. Temperature was measured 7 times at 6 locations, with average temperature-per-location ranging from 14 to 17° Celsius [mean = 15°C, median = 15°C].

This species was observed in **rheocrene** [75%; n = 3] and **helocrene** [25%; n = 1] springs. Elevations for this species range from 1,728 m (5,669 ft) to 2,002 m (6,568 ft), with a mean of 1,923 m (6,310 ft) and median of 1,974 m (6,476 ft).

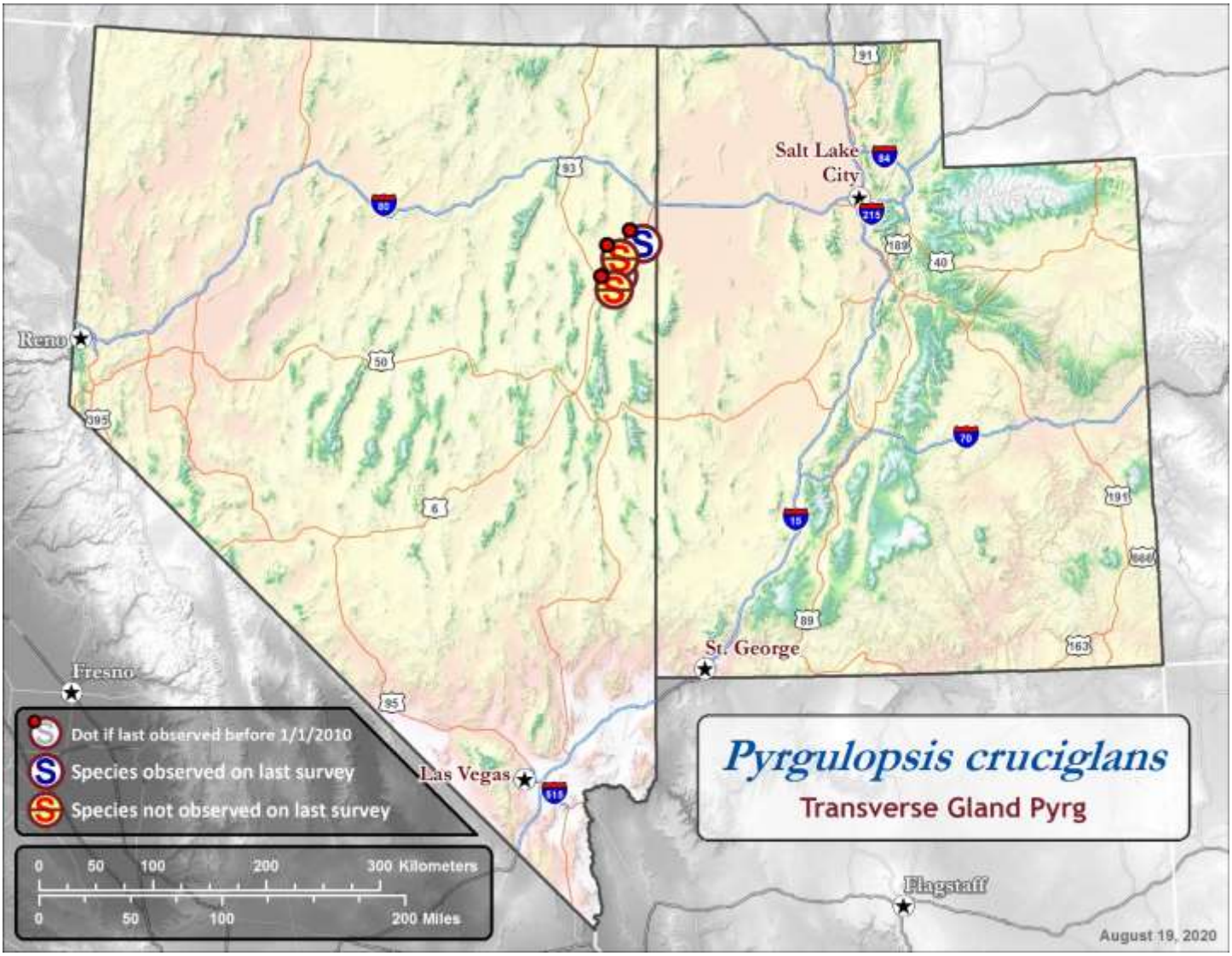
LAND MANAGEMENT

Of the 6 locations where *P. cruciglans* were observed, 50% were located on **BLM** land (n = 3) and 50% on **Private** land (n = 3).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [58%; 7 surveys] and **Nevada Natural Heritage Data Import** [42%; 5 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis cruciglans. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+cruciglans (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991) and 54 FR 554 579 (1989). This species was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**April 25, 2008** (*6 surveys total in UT or NV between 6/25/1972 and 4/25/2008*)

TAXONOMY

Pyrgulopsis crystalis is described in Hershler and Sada 1987: 797, 799-802, figs. 8c,f,i, 18c, 23d, 24b, 28. *P. crystalis* has been assigned Invertebrate Taxon ID 5752 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis crystalis has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. crystalis* has been reported at a single location. This species has been recorded at a single location in Nye County, Nevada. This species has been observed on 6 surveys between June 25, 1972 and April 25, 2008. The last survey at this site did not record any observations of this species. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The type locality, Crystal Spring, is a large, low-elevation spring where this species is only found clinging to travertine walls of chasm-like orifices in the deepest (greater than 4m) part of the spring (Hershler and Sada 1987, p. 802).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured a single time at 83.33 liters per second for this species. Specific Conductance was measured 2 times at 1 site for this species, with an average specific conductance of 1,325 µS/cm. Spring pH was measured a single time at 7.4 for this species. Temperature was measured 2 times at 1 site for this species, with an average temperature of 29° Celsius.

The single site where this species occurred was a **limnocrene** spring. This species has been recorded at a single elevation of 670 m (2,198 ft).

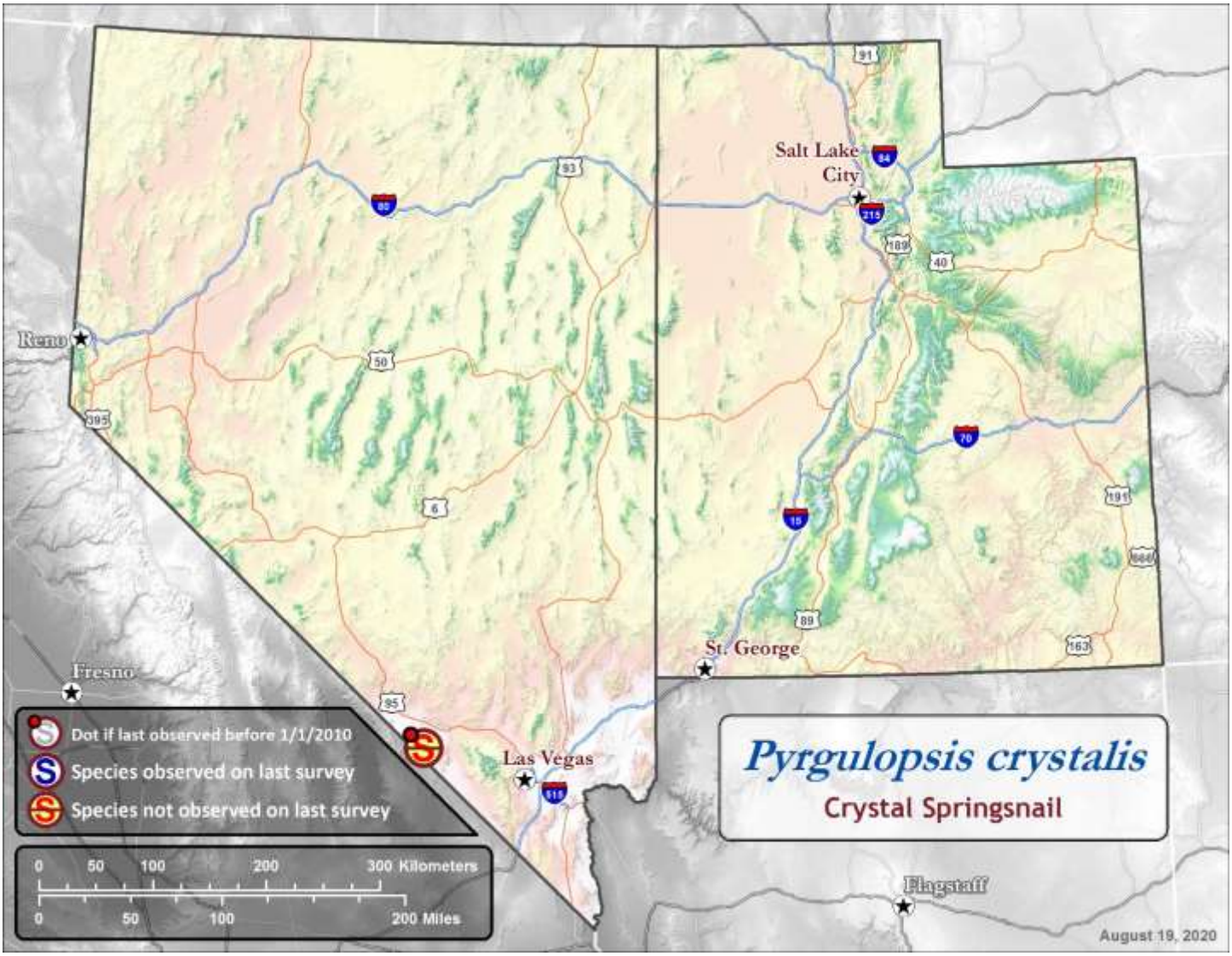
LAND MANAGEMENT

P. crystalis were observed at a single location on **FWS** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [67%; 4 surveys] and **Sada Import** [33%; 2 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1994) A review of the North American freshwater snail genus Pyrgulopsis (Hydrobiidae). Smithsonian Contributions to Zoology 554:1-115. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/5139/SCtZ-0554-Lo_res.pdf?sequence=2&isAllowed=y.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., Sada, D.W. (1987) Springsnails (Gastropoda: Hydrobiidae) of Ash Meadows, Amargosa basin, California-Nevada. Proceedings of the Biological Society of Washington: Pg 776-843. Publication. Available at https://repository.si.edu/handle/10088/11319.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	Unclassified
National Status	Unclassified
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**November 1, 2010** (*2 surveys total in UT or NV between 6/2/2009 and 11/1/2010*)

TAXONOMY

This species has also been called Goddess Pyrg. *Pyrgulopsis cybele* has been assigned Invertebrate Taxon ID 13875 in the Springs Online database.

DISTRIBUTION

This species occurs on the South Fork Owyhee River, Elko County, Nevada.

Pyrgulopsis cybele has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. cybele* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in Elko County, Nevada. This species has been observed on 2 surveys between June 2, 2009 and November 1, 2010. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This species is extant but is often overlooked.

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. Elevations for this species range from 1,403 m (4,603 ft) to 1,422 m (4,665 ft), with a mean of 1,413 m (4,634 ft) and median of 1,413 m (4,634 ft).

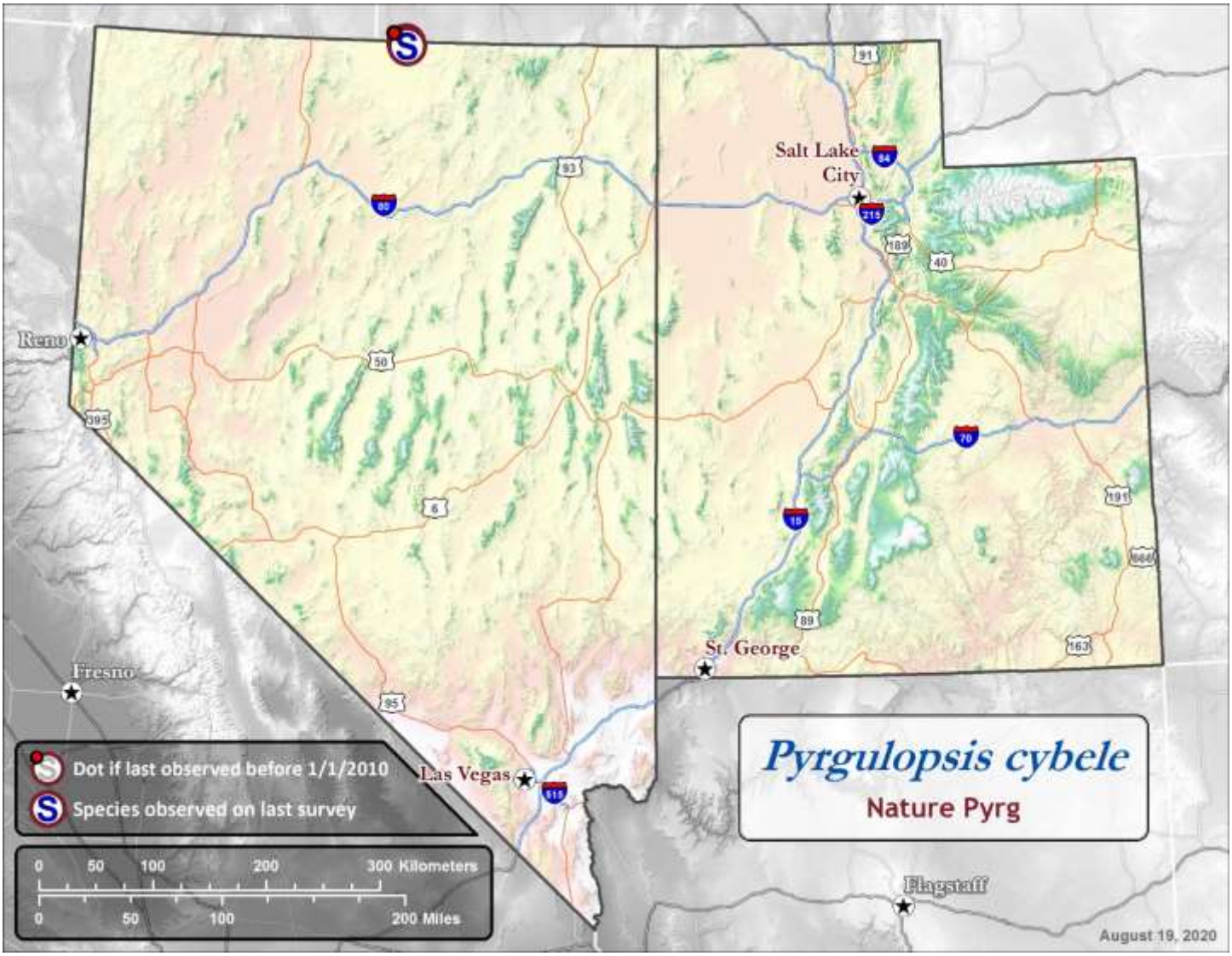
LAND MANAGEMENT

Both locations where *P. cybele* were observed were located on **BLM** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Both surveys that contributed data to this summary were conducted by the **Nevada Natural Heritage Data Import** project.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. It is a covered species in the Clark County Multi Species Habitat Conservation Plan, and is a BLM Nevada Sensitive Species. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011 and 82 FR 46618 46645 (2017). This species was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	14 sampling locations reported in Utah or Nevada [n = 14 sites]
Most Recent Observation (restricted to UT and NV)	**May 12, 2016** (*46 surveys total in UT or NV between 1/1/1975 and 5/12/2016*)

TAXONOMY

Pyrgulopsis deaconi is described in Hershler, 1998: 23, 25, figs. 6B, 11A, 17B-C, 26D-G. *P. deaconi* has been assigned Invertebrate Taxon ID 4920 in the Springs Online database.

DISTRIBUTION

This species is restricted to the Spring Mountains of Nevada in drainages of Las Vegas and Pahrump Valleys in Clark and Nye Counties. According to Hershler, 1998, Spring Mountains Pyrg is historically known from four springs: Red Spring, Willow Spring, Kiup Spring and Manse Ranch. However, it was extirpated from Manse Spring in the early 1970s when the spring was dried by nearby groundwater pumping. The Clark County Multi Species Habitat Conservation Plan (2000) reports that there are two extant and one extirpated populations of this snail. The type locality is Red Spring, Red Rock Canyon Recreation Lands [Red Rock Canyon National Conservation Area], Las Vegas Valley, Clark County, Nevada. Holotype, USNM P874454; paratypes, USNM 860676 (Hershler and Liu 2017).

Pyrgulopsis deaconi has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. deaconi* has been reported at 14 sites across its entire range. Species observations have been recorded in two counties in Nevada, including 11 locations in Clark County and 3 in Nye County. This species has been observed on 46 surveys between January 1, 1975 and May 12, 2016. The last surveys at 4 of these locations did not record any observations of this species. At 4 of these locations [29%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Spring Mountains Pyrg depends on artesian spring ecosystems with permanent flowing, unpolluted, highly oxygenated waters with high mineral content (USDI 2000, cited in Center for Biological Diversity 2009). The type locality for this species is a small rheocrene (Hershler 1998, cited in Center for Biological Diversity 2009).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 17 times at 7 locations for this species, with average flow-per-location ranging from 0.04 to 1.92 liters per second [mean = 0.78 l/s, median = 0.6 l/s]. Specific Conductance was measured 21 times at 8 locations, with average specific conductance-per-location ranging from 242 to 652 µS/cm [mean = 461 µS/cm, median = 448 µS/cm]. Spring pH was measured 16 times at 8 locations, with average pH-per-

location ranging from 6.32 to 7.9 [mean = 7.29, median = 7.49]. Temperature was measured 22 times at 8 locations, with average temperature-per-location ranging from 16 to 20° Celsius [mean = 18°C, median = 18°C].

This species was observed in **rheocrene** [59%; n = 10], **hillslope** [18%; n = 3], **cave** [6%; n = 1], **helocrene** [6%; n = 1], **mound-form** [6%; n = 1] and **gushet** [6%; n = 1] springs. Elevations for this species range from 848 m (2,782 ft) to 1,668 m (5,472 ft), with a mean of 1,464 m (4,802 ft) and median of 1,541 m (5,054 ft).

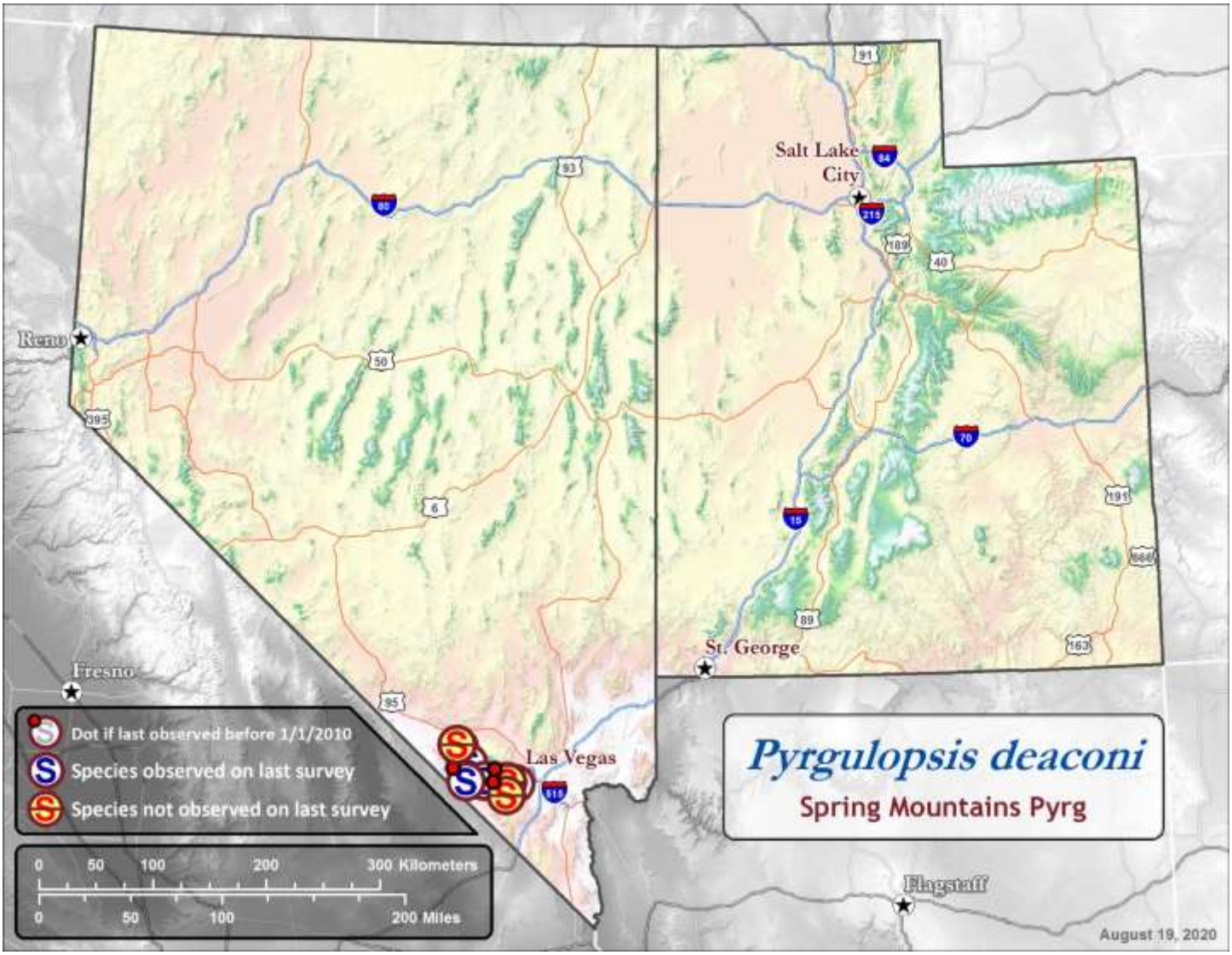
LAND MANAGEMENT

Of the 14 locations where *P. deaconi* were observed, 50% were located on **BLM** land (n = 7), 36% on **USFS** land (n = 5) and 14% on **Private** land (n = 2).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [37%; 17 surveys], **Sada Import** [30%; 14 surveys], **Sada Import 2017** [13%; 6 surveys], **SDS** [11%; 5 surveys], **Spring Mountains** [4%; 2 surveys] and **BLM Nevada** [4%; 2 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis deaconi. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+deaconi (Accessed 2019).

Sada, D.W. (2002) Clark county spring surveys 1999-2000. Desert Research Institute, Reno. Report.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S5: Secure
ESA Status	0: Not listed
National Status	N2: Imperiled
Global Status	G2: Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 54 FR 554 579 (1989), 49 FR 21664 21675 (1984), 41 FR 17742 17747 (1976). As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	5 sampling locations reported in Utah or Nevada [n = 5 sites]
Most Recent Observation (restricted to UT and NV)	**April 9, 2014** (*8 surveys total in UT or NV between 8/30/1973 and 4/9/2014*)

TAXONOMY

Amnicola deserta is described in Pilsbry, 1916: 111. Washington County, Utah. Lectotype, ANSP 12112; paralectotypes, ANSP 396958. *Pyrgulopsis deserta* has been assigned Invertebrate Taxon ID 6569 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis deserta has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. deserta* has been reported at 5 sites across its entire range. This species has been recorded at 5 locations in Washington County, Utah. This species has been observed on 8 surveys between August 30, 1973 and April 9, 2014. At 3 of these locations [60%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This species occurs in springs along the Virgin River in southwestern Utah and northwestern Arizona.

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. Elevations for this species range from 868 m (2,848 ft) to 901 m (2,956 ft), with a mean of 881 m (2,890 ft) and median of 878 m (2,881 ft).

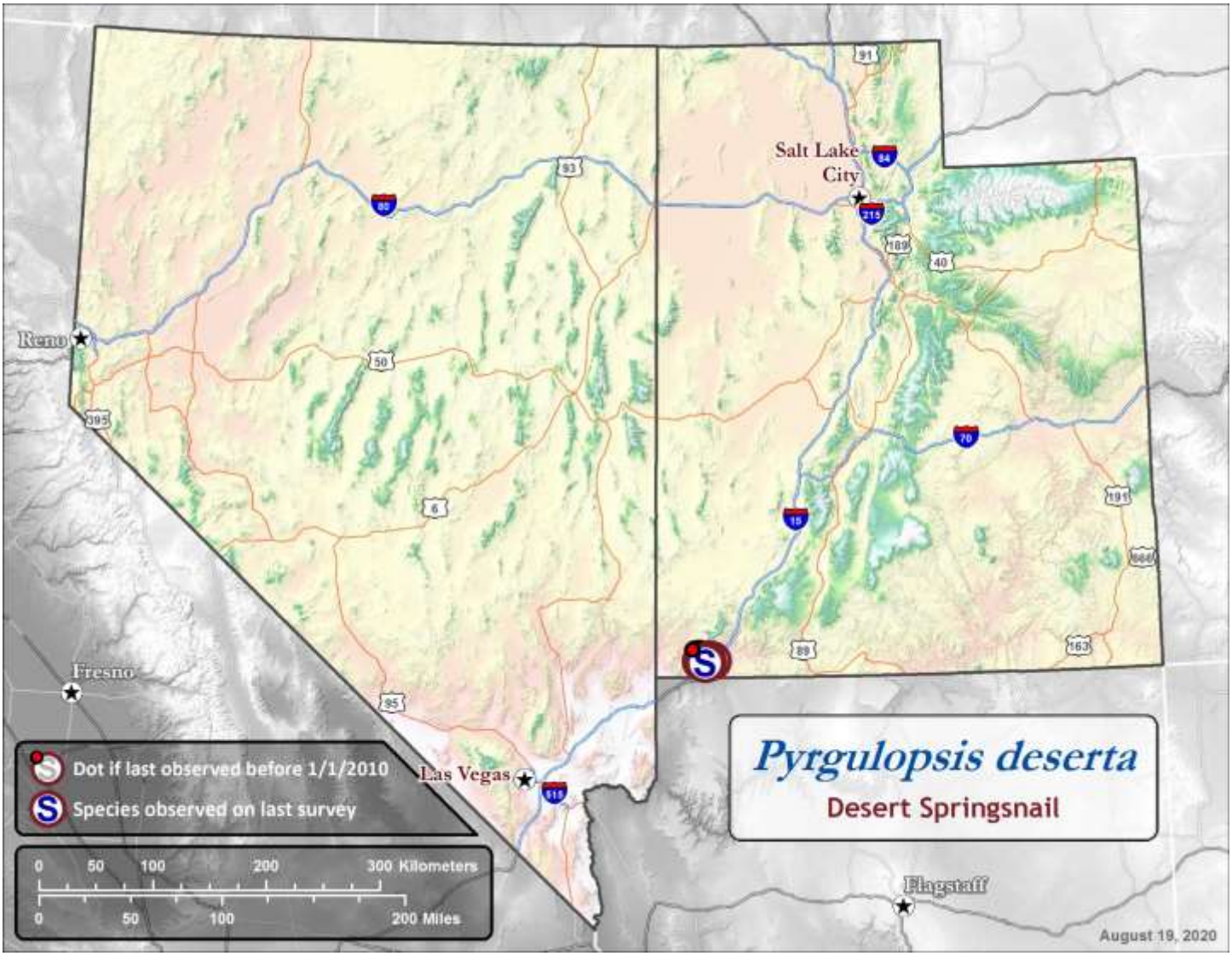
LAND MANAGEMENT

All 5 locations where *P. deserta* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Utah CAS Import** [75%; 6 surveys] and **UDWR** [25%; 2 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis deserta. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+deserta (Accessed 2019).

Pilsbry, H.A. (1916) New species of Amnicola from New Mexico and Utah. Nautilus 29:111-112. Peer-reviewed article. Available at https://geoinfo.nmt.edu/publications/monographs/bulletins/downloads/116/B116.pdf.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	3 sampling locations reported in Utah or Nevada [n = 3 sites]
Most Recent Observation (restricted to UT and NV)	**September 16, 2008** (*5 surveys total in UT or NV between 9/8/1991 and 9/16/2008*)

TAXONOMY

Pyrgulopsis dixensis is described in Hershler, 1998: 73-74, figs. 8D, 13C, 20I-J, 36C-D. *P. dixensis* has been assigned Invertebrate Taxon ID 6571 in the Springs Online database.

DISTRIBUTION

According to Hershler and Liu, 2017, the Dixie Valley Pyrg is only known from springs west southwest of Hot Springs in Dixie Valley, Pershing County, Nevada. The type locality is springs west-southwest of Hot Springs, Dixie Valley, Pershing County, Nevada. Holotype, USNM 874391; paratypes, USNM 860688 (Hershler and Liu 2017).

Pyrgulopsis dixensis has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. dixensis* has been reported at 3 sites across its entire range. This species has been recorded at 3 locations in Pershing County, Nevada. This species has been observed on 5 surveys between September 8, 1991 and September 16, 2008. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Dixie Valley Pyrg is only known from springs west southwest of Hot Springs in Dixie Valley, Pershing County, Nevada.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 2 times at 2 locations for this species, with average flow-per-location ranging from 0.02 to 0.03 liters per second [mean = 0.03 l/s, median = 0.03 l/s]. Specific Conductance was measured 2 times at 2 locations, with average specific conductance-per-location ranging from 953 to 1,090 µS/cm [mean = 1,022 µS/cm, median = 1,022 µS/cm]. Spring pH was measured 2 times at 2 locations, with average pH-per-location ranging from 7.7 to 7.7 [mean = 7.7, median = 7.7]. Temperature was measured 2 times at 2 locations, with average temperature-per-location ranging from 14 to 23° Celsius [mean = 19°C, median = 19°C].

This species was observed in **rheocrene** [67%; n = 2] and **helocrene** [33%; n = 1] springs. Elevations for this species range from 1,140 m (3,740 ft) to 1,207 m (3,960 ft), with a mean of 1,185 m (3,887 ft) and median of 1,207 m (3,960 ft).

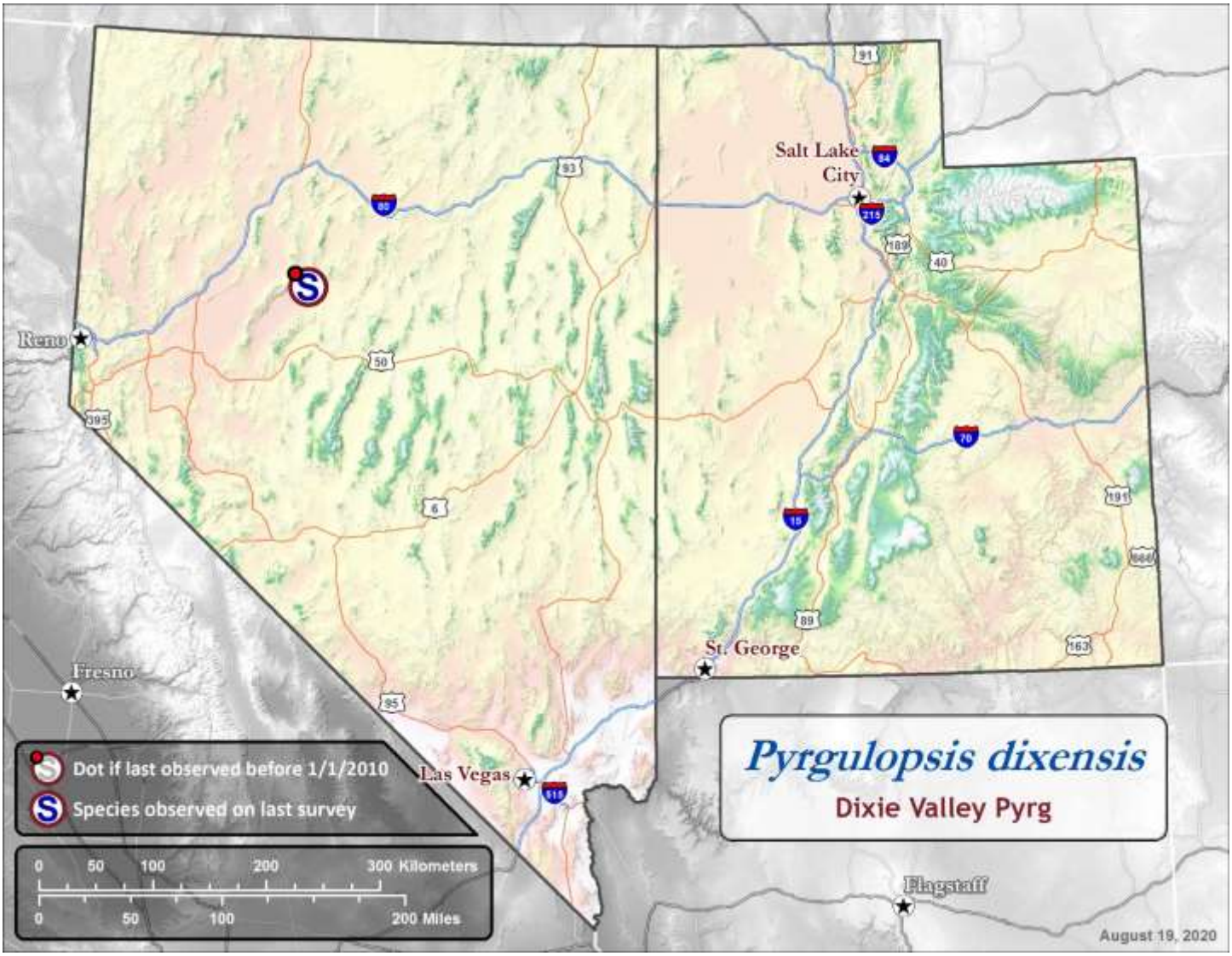
LAND MANAGEMENT

All 3 locations where *P. dixensis* were observed were located on **BLM** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [60%; 3 surveys] and **Sada Import** [40%; 2 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Ash Meadows Pebblesnail *Neotaenioglossa Hydrobiidae Pyrgulopsis erythropoma*

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	4: Faces an extremely high risk of extinction in the immediate future
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 566309 (2011), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 41 FR 17742 17747 (1976). The Ash Meadows Pebblesnail was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	9 sampling locations reported in Utah or Nevada [n = 8 sites]
Most Recent Observation (restricted to UT and NV)	**May 6, 2012** (*24 surveys total in UT or NV between 1/1/1891 and 5/6/2012*)

TAXONOMY

Pyrgulopsis erythropoma is described in Pilsbry 1899: 125-126. *P. erythropoma* has been assigned Invertebrate Taxon ID 5753 in the Springs Online database.

DISTRIBUTION

This species occurs at six springs that are within 0.5 km of each another, (NatureServe; *P. erythropoma* 2019). The Ash Meadows Pebblesnail is restricted to the Ash Meadows area of Nye County, Nevada, Upper Amargosa watershed, including Kings Pool and Point of Rocks Springs (Center for Biological Diversity 2009). The type locality is Ash Meadows, Nye County, Nevada [Probably Kings Pool at Point of Rocks; Hershler and Sada 1987]. Lectotype, ANSP 73607; paralectotypes, ANSP 396951 (Hershler and Liu 2017).

Pyrgulopsis erythropoma has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. erythropoma* has been reported at 9 sampling locations across its entire range [n = 8 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. This species has been recorded at 9 locations in Nye County, Nevada. This species has been observed on 24 surveys between January 1, 1891 and May 6, 2012. The last survey at one of these locations did not record any observations of this species. At 8 of these locations [89%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Sada (1990) describes this species habitat as rocky substrate in flowing thermal water. Hershler and Sada (1987) report that this species is found on stones and travertine in swift currents.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 8 times at 7 locations for this species, with average flow-per-location ranging from 0.33 to 20.83 liters per second [mean = 3.55 l/s, median = 0.5 l/s]. Specific Conductance was measured 14 times at 9 locations, with average specific conductance-per-location ranging from 680 to 1,710 µS/cm [mean = 1,306 µS/cm, median = 1,301 µS/cm]. Spring pH was measured 8 times at 7 locations, with average pH-per-location ranging from 7.45 to 7.8 [mean = 7.56, median = 7.5]. Temperature was measured 14 times at 9 locations, with average temperature-per-location ranging from 30 to 33° Celsius [mean = 31°C, median = 30°C].

This species was observed in **rheocrene** [78%; n = 7], **helocrene** [11%; n = 1] and **limnocrene** [11%; n = 1] springs. Elevations for this species range from 707 m (2,320 ft) to 715 m (2,346 ft), with a mean of 711 m (2,331 ft) and median of 710 m (2,329 ft).

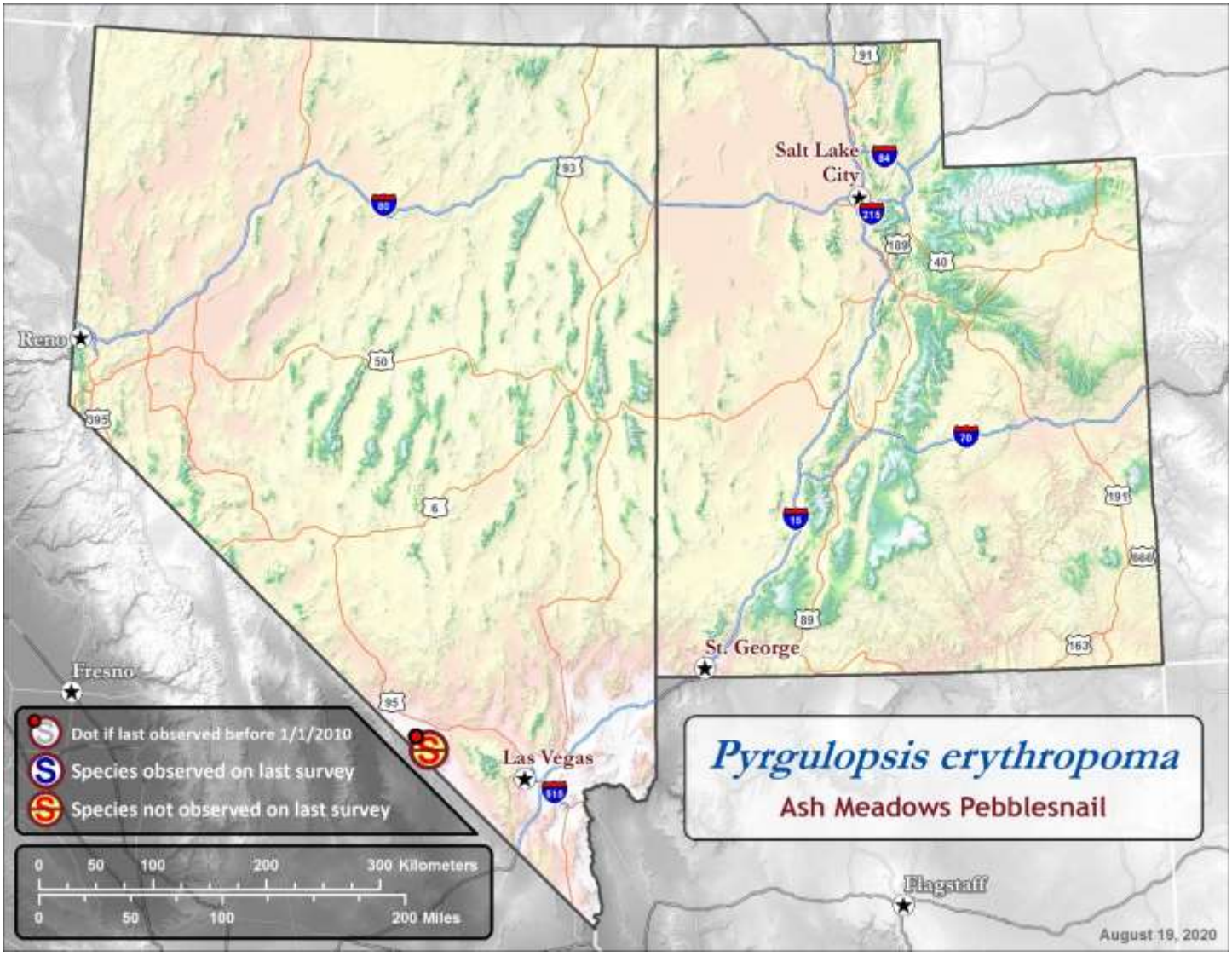
LAND MANAGEMENT

Of the 9 locations where *P. erythropoma* were observed, 89% were located on **FWS** land (n = 8) and 11% on **BLM** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [58%; 14 surveys] and **Nevada Natural Heritage Data Import** [42%; 10 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Cordeiro, J. and K. Perez (2012) Pyrgulopsis erythropoma. IUCN Red List of Threatened Species. Version 2013.2. Website. Available at http://www.iucnredlist.org/details/18966/0#http://www.iucnredlist.org/details/18966/0#.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., Liu, H. (2009) New species and records of Pyrgulopsis (Gastropoda: Hydrobiidae) from the Snake River basin, southeastern Oregon: further delineation of a highly imperiled fauna. Zootaxa 2006:1-22. Publication.

Hershler, R., Sada, D.W. (1987) Springsnails (Gastropoda: Hydrobiidae) of Ash Meadows, Amargosa basin, California-Nevada. Proceedings of the Biological Society of Washington: Pg 776-843. Publication. Available at https://repository.si.edu/handle/10088/11319.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis erythropoma. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+erythropoma (Accessed 2019).

Sada, D.W. (1990) Recovery Plan for the Endangered and Threatened Species of Ash Meadows, Nevada. U.S. Fish and Wildlife Service, Portalnd, Oregon. 130 pp. Report. Available at http://ecos.fws.gov/docs/recovery_plan/900928d.pdf##.

U.S. Fish & Wildlife Service (2014) Ash Meadows pebblesnail (Pyrgulopsis erythropoma). U.S. Fish & Wildlife Service, Washington, D.C. Website. Available at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G00I&ftb_embed=true#http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G00I&ftb_embed=true#.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species had been proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019 the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**June 29, 2000** (*4 surveys total in UT or NV between 2/24/1978 and 6/29/2000*)

TAXONOMY

Pyrgulopsis fairbanksensis is described in Hershler and Sada, 1987: 796-797, figs. 8d,g, 18a-b, 19a, 24d, 26-27. *P. fairbanksensis* has been assigned Invertebrate Taxon ID 5754 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis fairbanksensis has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. fairbanksensis* has been reported at a single location. This species has been recorded at a single location in Nye County, Nevada. This species has been observed on 4 surveys between February 24, 1978 and June 29, 2000. The last survey at this site did not record any observations of this species. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Sada (1990) reports this species habitat to be soft substrates in thermal springs. Hershler and Sada (1987) report that the snail is found in a large, low elevation spring on travertine at the spring orifice.

The water quality variables Specific Conductance and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured a single time at 700 µS/cm for this species. Temperature was measured a single time at 27° Celsius for this species.

The single site where this species occurred was a **limnocrene** spring. This species has been recorded at a single elevation of 689 m (2,260 ft).

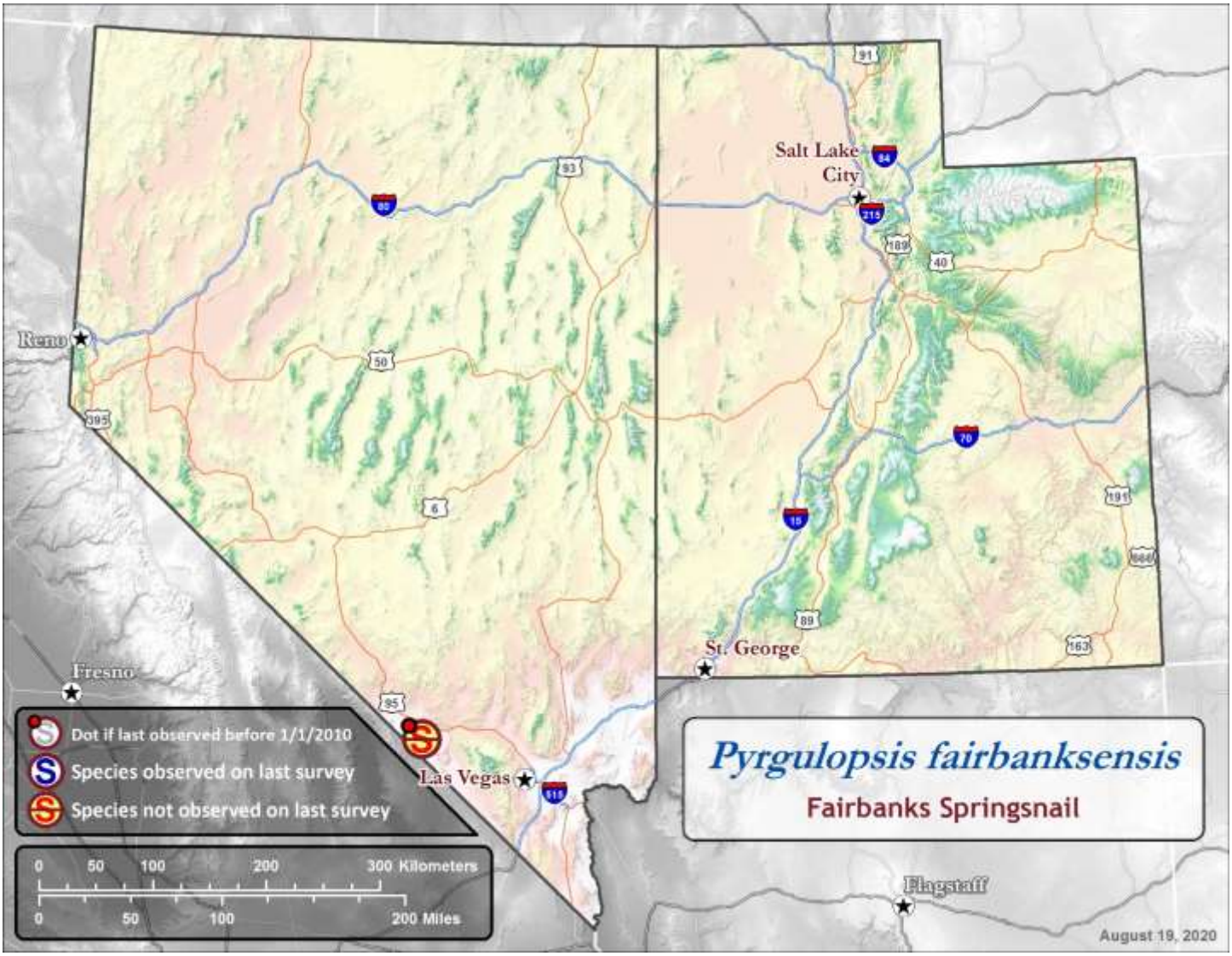
LAND MANAGEMENT

P. fairbanksensis were observed at a single location on **FWS** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [75%; 3 surveys] and **Sada Import** [25%; 1 survey] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1994) A review of the North American freshwater snail genus Pyrgulopsis (Hydrobiidae). Smithsonian Contributions to Zoology 554:1-115. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/5139/SCtZ-0554-Lo_res.pdf?sequence=2&isAllowed=y.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., Sada, D.W. (1987) Springsnails (Gastropoda: Hydrobiidae) of Ash Meadows, Amargosa basin, California-Nevada. Proceedings of the Biological Society of Washington: Pg 776-843. Publication. Available at https://repository.si.edu/handle/10088/11319.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis fairbanksensis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+fairbanksensis (Accessed 2019).

Sada, D.W. (1990) Recovery Plan for the Endangered and Threatened Species of Ash Meadows, Nevada. U.S. Fish and Wildlife Service, Portalnd, Oregon. 130 pp. Report. Available at http://ecos.fws.gov/docs/recovery_plan/900928d.pdf##.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. Corn Creek Pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, The USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	7 sampling locations reported in Utah or Nevada [n = 7 sites]
Most Recent Observation (restricted to UT and NV)	**September 20, 2019** (*24 surveys total in UT or NV between 9/16/1975 and 9/20/2019*)

TAXONOMY

Pyrgulopsis fausta is described in Hershler, 1998: 15, 23, figs. 6A, 12A, 17A, 26A-C. *P. fausta* has been assigned Invertebrate Taxon ID 6240 in the Springs Online database.

DISTRIBUTION

This species was described by Hershler (1998) as endemic to Corn Creek Springs on Desert National Wildlife Range (DNWR). It is known from only five springs (one of these was a new locality recorded during the Sada 2016 surveys). Identity of this new locality has not been confirmed, but due to its proximity to other *P. fausta* populations and the absence of nearby populations of other species, the population is likely to be *P. fausta*. Two of these sites are small and occur on mounded, vegetated sand dunes. The type locality is Corn Creek Springs, Las Vegas Valley, Clark County, Nevada. Holotype, USNM 874757; paratypes, USNM 860765 (Hershler and Liu 2017).

Pyrgulopsis fausta has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. fausta* has been reported at 7 sites across its entire range. This species has been recorded at 7 locations in Clark County, Nevada. This species has been observed on 24 surveys between September 16, 1975 and September 20, 2019. The last surveys at 3 of these locations did not record any observations of this species. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Corn Creek Springs is a small thermal spring system (Hershler 1998).

The water quality variables Flow, Specific Conductance, pH, Temperature and Alkalinity were measured and recorded at sites where this species was observed. Flow was measured 9 times at 7 locations for this species, with average flow-per-location ranging from 0 to 1.17 liters per second [mean = 0.34 l/s, median = 0.05 l/s]. Specific Conductance was measured 11 times at 6 locations, with average specific conductance-per-location ranging from 120 to 637 µS/cm [mean = 432 µS/cm, median = 454 µS/cm]. Spring pH was measured 7 times at 3 locations, with average pH-per-location ranging from 6.88 to 7.57 [mean = 7.32, median = 7.5]. Temperature was measured 12 times at 6 locations, with average temperature-per-location ranging from 19 to 23° Celsius [mean = 21°C, median = 21°C]. Alkalinity was measured a single time at 160 mg/L for this species.

This species was observed in **mound-form** [44%; n = 4], **hillslope** [22%; n = 2], **helocrene** [22%; n = 2] and **limnocrene** [11%; n = 1] springs. Elevations for this species range from 889 m (2,917 ft) to 909 m (2,982 ft), with a mean of 902 m (2,958 ft) and median of 900 m (2,953 ft).

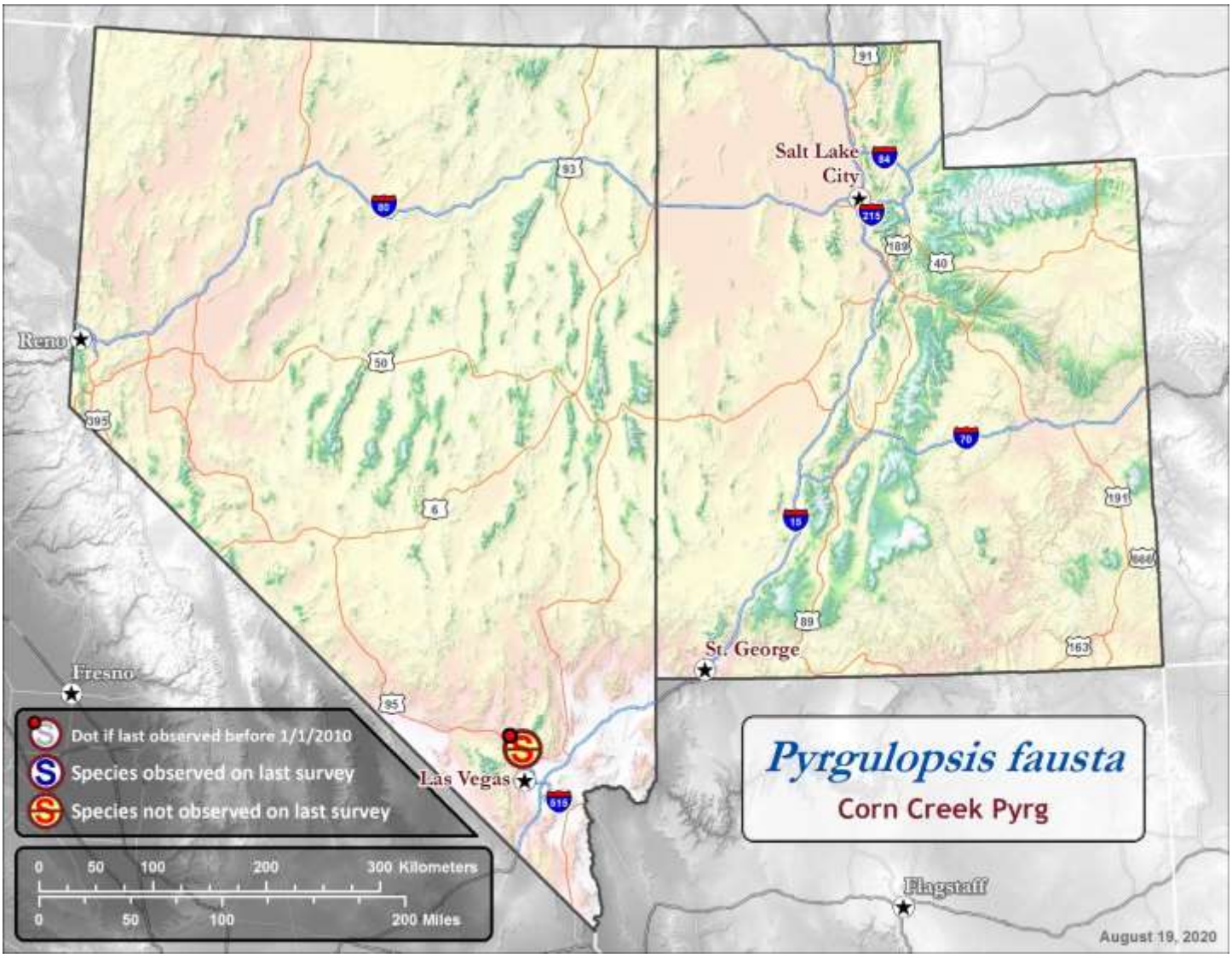
LAND MANAGEMENT

All 7 locations where *P. fausta* were observed were located on **FWS** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [33%; 8 surveys], **Sada Import** [25%; 6 surveys], **Sada Import 2017** [25%; 6 surveys], **NDOW- Southern Region** [8%; 2 surveys] and **Nevada EPA 2018-19** [8%; 2 surveys] projects.

RELATED LITERATURE

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	6 sampling locations reported in Utah or Nevada [n = 6 sites]
Most Recent Observation (restricted to UT and NV)	**October 1, 1993** (*6 surveys total in UT or NV between 7/15/1993 and 10/1/1993*)

TAXONOMY

Pyrgulopsis fusca is described in Hershler, 1998: 122, figs. 10F, 24K-M, 47A-C. *P. fusca* has been assigned Invertebrate Taxon ID 10732 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis fusca has been classified with an endemism level of "subcontinentally widely distributed" as reported in NatureServe. In the Springs Online Database, *P. fusca* has been reported at 6 sites across its entire range. Species observations have been recorded in two counties in Utah, including 4 locations in Sevier County and 2 in Piute County. This species has been observed on 6 surveys between July 15, 1993 and October 1, 1993. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This species has been reported at springs in Utah between 1,932 and 2,264 meters.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured 3 times at 3 locations for this species, with average specific conductance-per-location ranging from 190 to 200 µS/cm [mean = 193 µS/cm, median = 190 µS/cm]. Spring pH was measured 3 times at 3 locations, with average pH-per-location ranging from 7.9 to 8.1 [mean = 7.97, median = 7.9]. Temperature was measured 3 times at 3 locations, with average temperature-per-location ranging from 7 to 13° Celsius [mean = 11°C, median = 12°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,932 m (6,339 ft) to 2,264 m (7,428 ft), with a mean of 2,104 m (6,901 ft) and median of 2,100 m (6,890 ft).

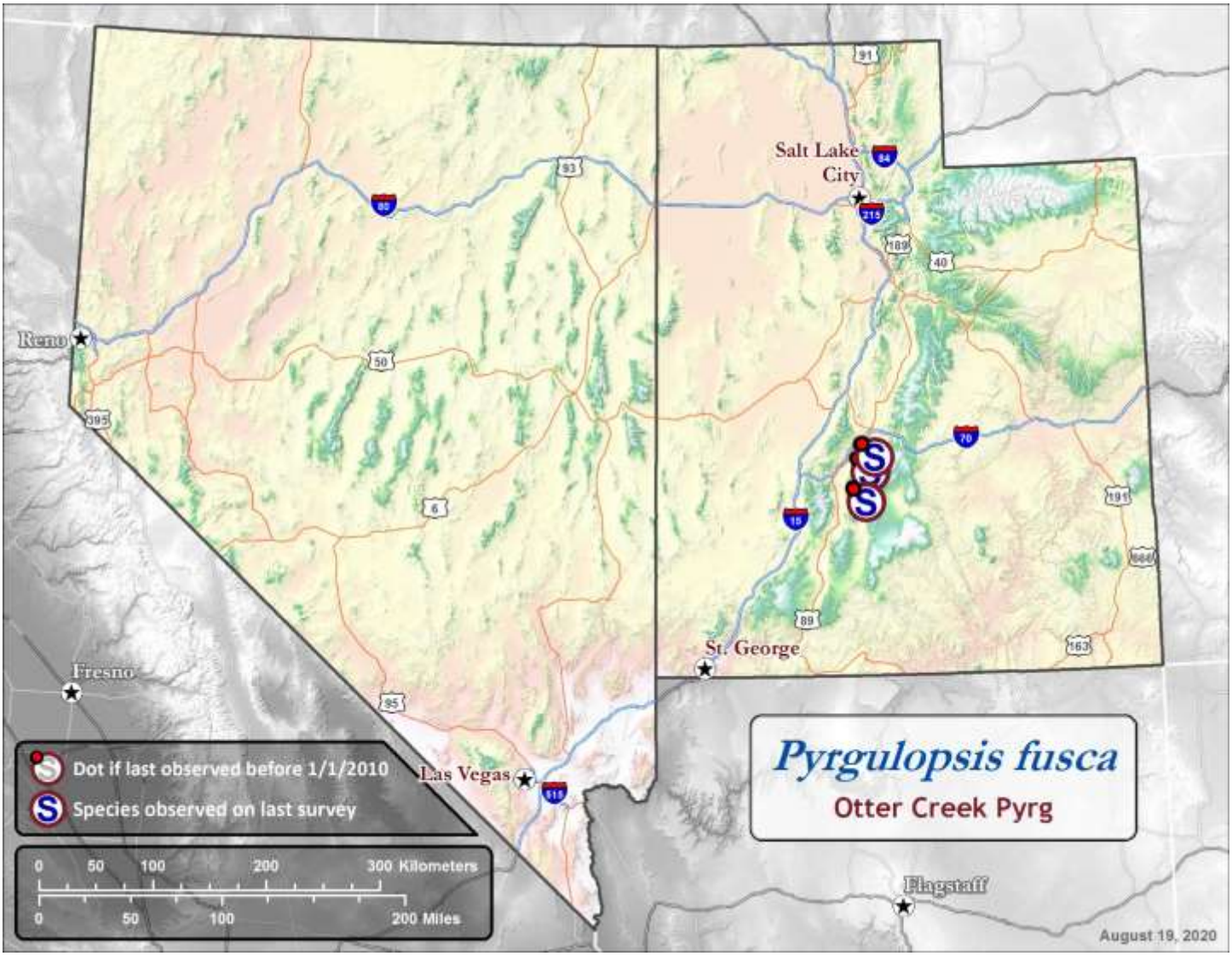
LAND MANAGEMENT

Of the 6 locations where *P. fusca* were observed, 33% were located on **BLM** land (n = 2), 33% on **Private** land (n = 2) and 33% on **USFS** land (n = 2).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [50%; 3 surveys] and **Utah CAS Import** [50%; 3 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis fusca. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+fusca (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S3: Vulnerable
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N3: Vulnerable
Global Status	G3: Vulnerable
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	145 sampling locations reported in Utah or Nevada [n = 139 sites]
Most Recent Observation (restricted to UT and NV)	**October 11, 2018** (*178 surveys total in UT or NV between 6/16/1988 and 10/11/2018*)

TAXONOMY

Pyrgulopsis gibba is described in Hershler, 1995: 354, 357-358, figs. 5C, 10-12. *P. gibba* has been assigned Invertebrate Taxon ID 6576 in the Springs Online database.

DISTRIBUTION

Surprise Valley pyrg occurs in northwestern Great Basin (California, Nevada, Oregon) (Hershler 1998). The type locality is unnamed springs west of Fee Reservoir, Surprise Valley, Modoc County, California. Holotype, USNM 860643; paratypes, USNM 858275 (Hershler and Liu 2017).

Pyrgulopsis gibba has been classified with an endemism level of "100-1000 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. gibba* has been reported at 151 sampling locations across its entire range [n = 145 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded at 145 locations in Nevada (38 locations in Washoe County, 20 in Nye County, 19 in Pershing County, 19 in Elko County, 19 in Humboldt County, 13 in Lyon County, 11 in Eureka County, 4 in Lander County and 2 in Esmeralda County), 4 locations in California (3 locations in Modoc County and 1 in Lassen County) and 2 locations in Oregon (both in Lake County). This species has been observed on 184 surveys between June 16, 1988 and October 11, 2018. The last surveys at 12 of these locations did not record any observations of this species. At 125 of these locations [83%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Surpse Valley Pyrg has been reported from 1,195 to 2,186 meters in Nevada, Oregon, and California.

The water quality variables Flow, Specific Conductance, pH, Temperature and Alkalinity were measured and recorded at sites where this species was observed. Flow was measured 59 times at 57 locations for this species, with average flow-per-location ranging from 0.01 to 6.67 liters per second [mean = 0.38 l/s, median = 0.08 l/s]. Specific Conductance was measured 120 times at 101 locations, with average specific conductance-per-location ranging from 130 to 3,815 µS/cm [mean = 437 µS/cm, median = 390 µS/cm]. Spring pH was measured 90 times at 71 locations, with average pH-per-location ranging from 6.8 to 8.57 [mean = 7.79, median = 7.76]. Temperature was measured 128 times at 107 locations, with average temperature-per-location ranging from 6 to 28° Celsius [mean = 15°C, median = 15°C]. Alkalinity was measured a single time at 184 mg/L for this species.

This species was observed in **rheocrene** [65%; n = 77], **helocrene** [22%; n = 26], **limnocrene** [8%; n = 10], **hillslope** [2%; n = 2], **anthropogenic** [2%; n = 2] and **unknown** [1%; n = 1] springs. Elevations for this species range from 1,195 m (3,921 ft) to 2,186 m (7,172 ft), with a mean of 1,606 m (5,268 ft) and median of 1,651 m (5,417 ft).

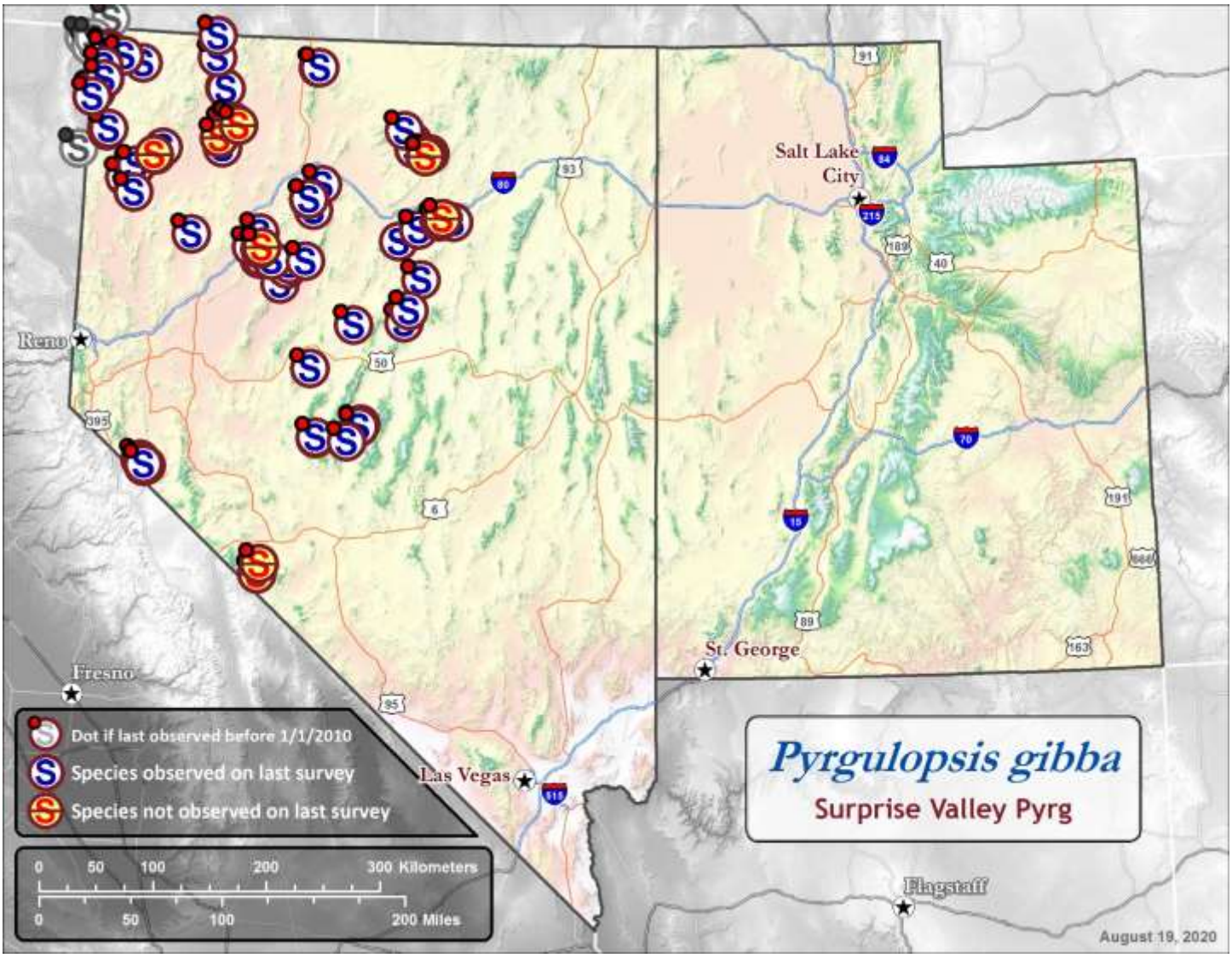
LAND MANAGEMENT

Of the 151 locations where *P. gibba* were observed, 59% were located on **Private** land (n = 89), 37% on **BLM** land (n = 56) and 4% on **USFS** land (n = 6).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [76%; 139 surveys], **Nevada Natural Heritage Data Import** [20%; 37 surveys], **NDOW- Southern Region** [4%; 7 surveys] and **Nevada EPA 2018-19** [1%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis gibba. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+gibba (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). Emigrant pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition did not present substantial information indicating that the species should be listed.	
Number of Locations Reported (restricted to UT and NV)	9 sampling locations reported in Utah or Nevada [n = 9 sites]
Most Recent Observation (restricted to UT and NV)	**June 7, 2016** (*21 surveys total in UT or NV between 9/2/1973 and 6/7/2016*)

TAXONOMY

Pyrgulopsis gracilis is described in Hershler 1998: 43, 45, 47, figs. 6I, 11D, 18B-C, 29F-H. *P. gracilis* has been assigned Invertebrate Taxon ID 6580 in the Springs Online database.

DISTRIBUTION

The Emigrant Pyrg occurs in the Emigrant Springs complex, White River Valley, Nevada (Hershler and Liu 2017). The type locality is Emigrant Springs (northernmost in spring complex), White River Valley, Nye County, Nevada. Holotype, USNM 873158; paratypes, USNM 860698 (Hershler and Liu 2017).

Pyrgulopsis gracilis has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. gracilis* has been reported at 9 sites across its entire range. This species has been recorded at 9 locations in Nye County, Nevada. This species has been observed on 21 surveys between September 2, 1973 and June 7, 2016. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Emigrant Spring is a small rheocrene with a maximum depth of 2cm (Golden et al. 2007, cited in Center for Biological Diversity 2009).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 15 times at 8 locations for this species, with average flow-per-location ranging from 0.23 to 3.89 liters per second [mean = 1.18 l/s, median = 0.89 l/s]. Specific Conductance was measured 15 times at 9 locations, with average specific conductance-per-location ranging from 324 to 435 µS/cm [mean = 390 µS/cm, median = 401 µS/cm]. Spring pH was measured 6 times at 6 locations, with average pH-per-location ranging from 7.6 to 7.8 [mean = 7.72, median = 7.7]. Temperature was measured 15 times at 9 locations, with average temperature-per-location ranging from 17 to 21° Celsius [mean = 19°C, median = 19°C].

This species was observed in **rheocrene** [89%; n = 8] and **limnocrene** [11%; n = 1] springs. Elevations for this species range from 1,663 m (5,456 ft) to 1,731 m (5,679 ft), with a mean of 1,682 m (5,517 ft) and median of 1,671 m (5,482 ft).

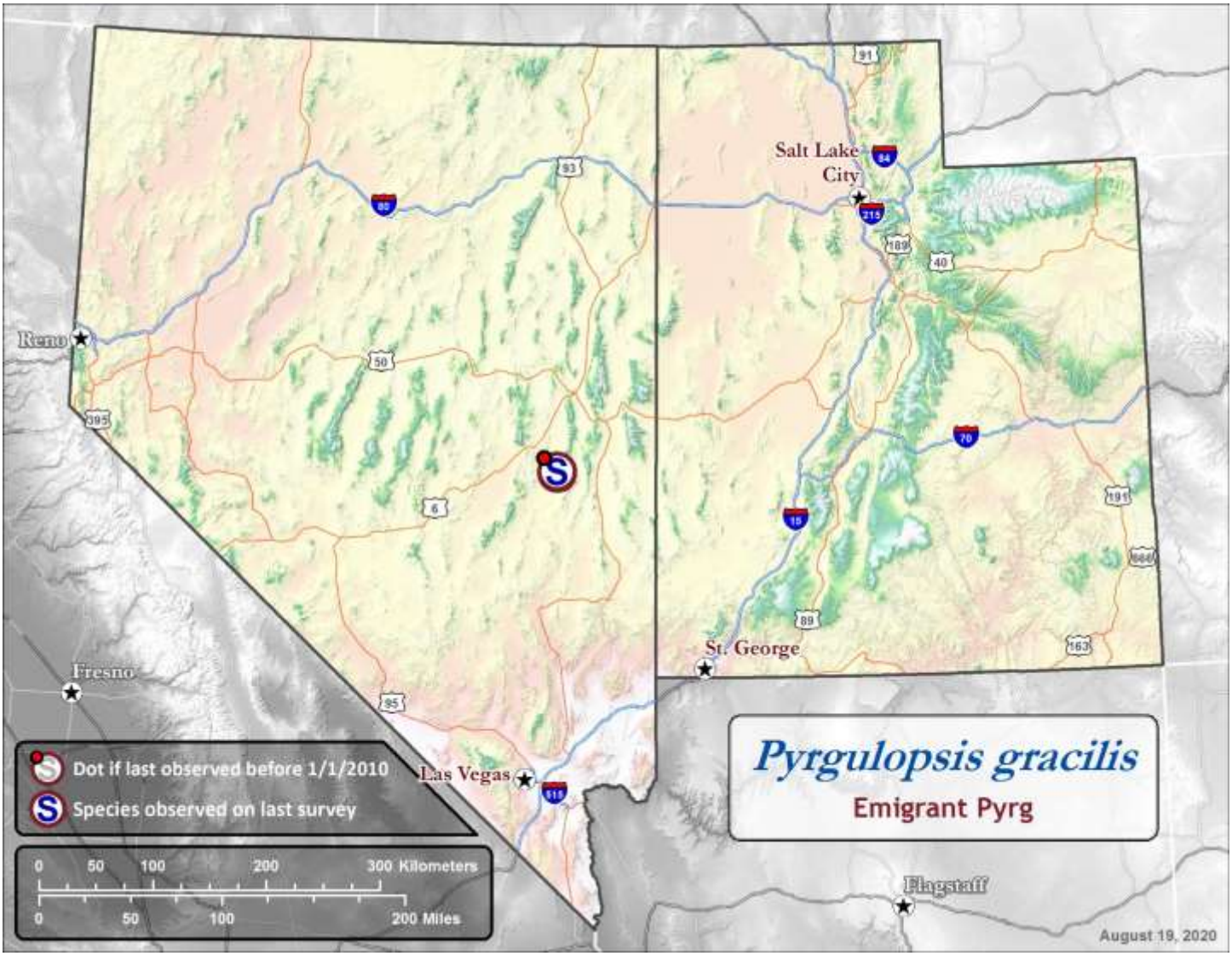
LAND MANAGEMENT

All 9 locations where *P. gracilis* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import 2017** [38%; 8 surveys], **Sada Import** [38%; 8 surveys] and **Nevada Natural Heritage Data Import** [24%; 5 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis gracilis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+gracilis (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 74 FR 46965 46966 (2009) and 74 FR 41649 41662 (2009). Hamlin Valley Pyrg was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**May 23, 2019** (*3 surveys total in UT or NV between 5/9/1993 and 5/23/2019*)

TAXONOMY

Pyrgulopsis hamlinensis is described in Hershler, 1998: 106-108, figs. 9I, 22K, 43A-C. *P. hamlinensis* has been assigned Invertebrate Taxon ID 10733 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis hamlinensis has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. hamlinensis* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in Beaver County, Utah. This species has been observed on 3 surveys between May 9, 1993 and May 23, 2019. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The single spring where this species occurs is a small high elevation rheocrene, with relatively low conductivity, and a rocky substrate (Hershler 1994, Hershler 1998).

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured a single time at 209 µS/cm for this species. Spring pH was measured a single time at 7.2 for this species. Temperature was measured a single time at 16° Celsius for this species.

Both sites where this species occurred were **rheocrene** springs. Elevations for this species range from 2,084 m (6,837 ft) to 2,206 m (7,238 ft), with a mean of 2,145 m (7,037 ft) and median of 2,145 m (7,037 ft).

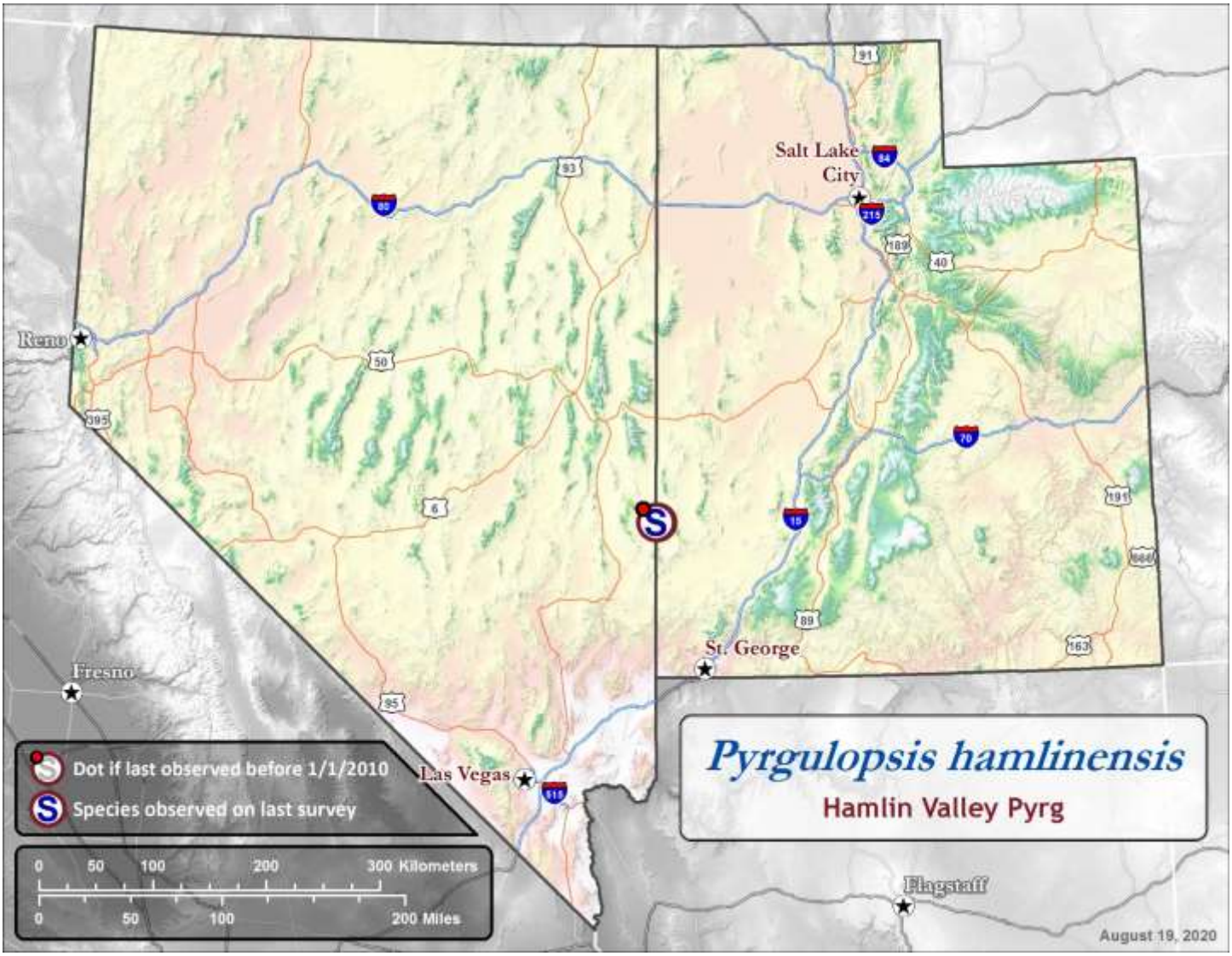
LAND MANAGEMENT

Both locations where *P. hamlinensis* were observed were located on **BLM** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Utah CAS Import** [33%; 1 survey], **Sada Import** [33%; 1 survey] and **UDWR** [33%; 1 survey] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1994) A review of the North American freshwater snail genus Pyrgulopsis (Hydrobiidae). Smithsonian Contributions to Zoology 554:1-115. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/5139/SCtZ-0554-Lo_res.pdf?sequence=2&isAllowed=y.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis hamlinensis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+hamlinensis (Accessed 2019).

Horseshutem Sp 1 Pyrg *Neotaenioglossa Hydrobiidae Pyrgulopsis horseshutem sp 1*

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	NNA: Not applicable
Global Status	GNA: Not applicable
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**April 6, 2013** (*n = 1 survey in UT or NV*)

TAXONOMY

No taxonomic history specified. *Pyrgulopsis horseshutem* has been assigned Invertebrate Taxon ID 15690 in the Springs Online database.

DISTRIBUTION

Pyrgulopsis horseshutem has been classified with an endemism level of "a single population" as reported in NatureServe. *P. horseshutem* has been reported at a single location. This species has been recorded at a single location in Nye County, Nevada. One survey has observed this species, conducted on April 6, 2013. The last survey at this site did not record any observations of this species.

HABITAT CHARACTERISTICS

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. This species has been recorded at a single elevation of 1,623 m (5,325 ft).

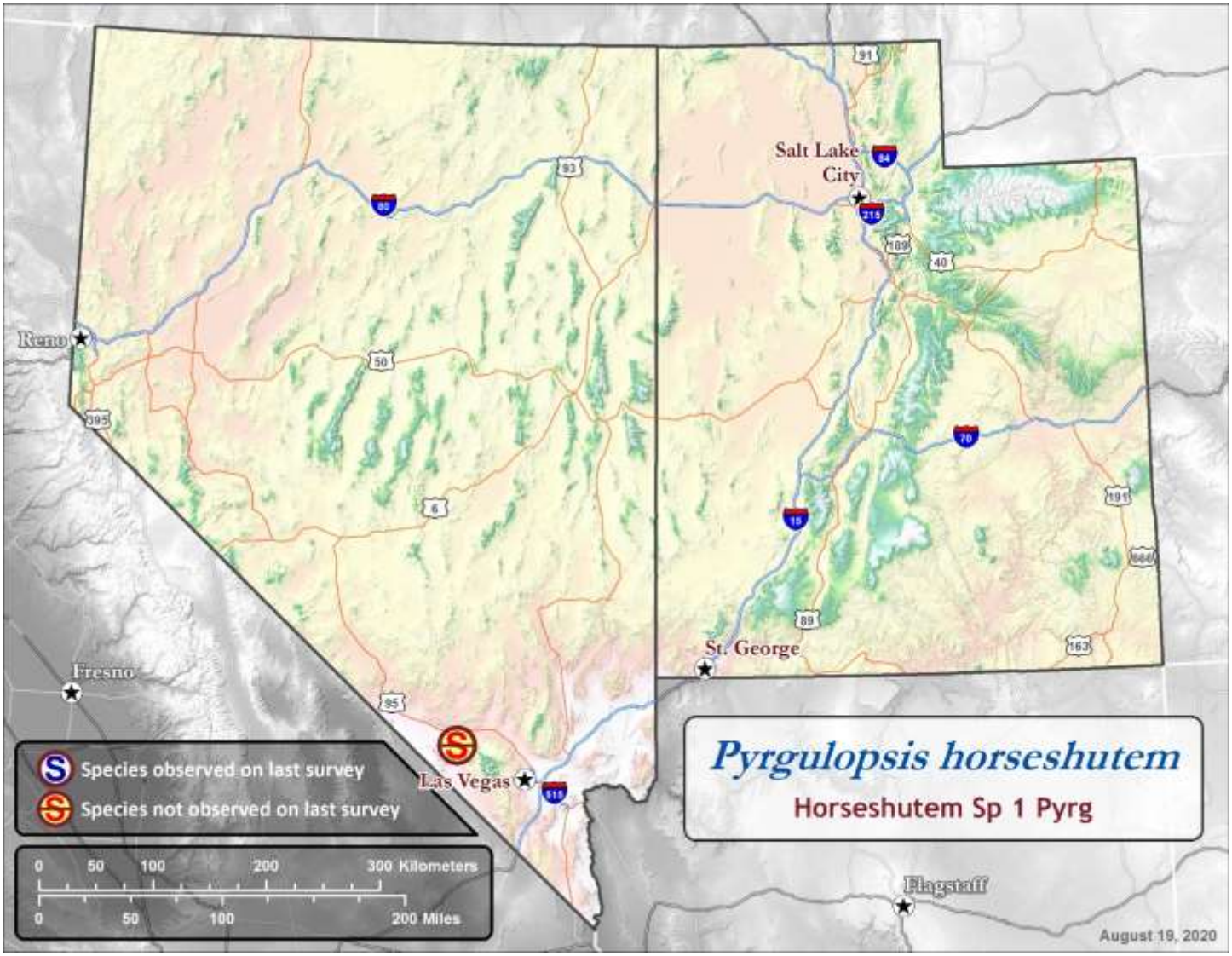
LAND MANAGEMENT

P. horseshutem were observed at a single location on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

The only project that contributed data to this summary was a single survey conducted by the **Spring Mountains** project.

RELATED LITERATURE

McKelvey, Kevin Scott, C. Kallstrom, J. Ledbetter, D. Sada, K. Pilgrim, M. Schwartz (2020) An Inventory of springsnails (Pyrgulopsis spp.) in and adjacent to the Spring Mountains, Nevada. Western North American Naturalist 80:183â€“193. Peer-reviewed article.

Upper Thousand Spring Pyrg *Neotaenioglossa Hydrobiidae Pyrgulopsis hovinghi*

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**August 8, 2013** (*3 surveys total in UT or NV between 9/18/1990 and 8/8/2013*)

TAXONOMY

Pyrgulopsis hovinghi is described in Hershler, 1998: 115, 117, figs. 10B, 11I, 16D-F, 24E, 45G-I. *P. hovinghi* has been assigned Invertebrate Taxon ID 5755 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis hovinghi has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. hovinghi* has been reported at a single location. This species has been recorded at a single location in Elko County, Nevada. This species has been observed on 3 surveys between September 18, 1990 and August 8, 2013.

HABITAT CHARACTERISTICS

In Don Sada's research, the type locality, Prather Springs, is described as a rheocrene.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured a single time at 8.33 liters per second for this species. Specific Conductance was measured 2 times at 1 site for this species, with an average specific conductance of 399 µS/cm. Spring pH was measured 2 times at 1 site for this species, with an average pH of 7.68. Temperature was measured 2 times at 1 site for this species, with an average temperature of 20° Celsius.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 1,805 m (5,922 ft).

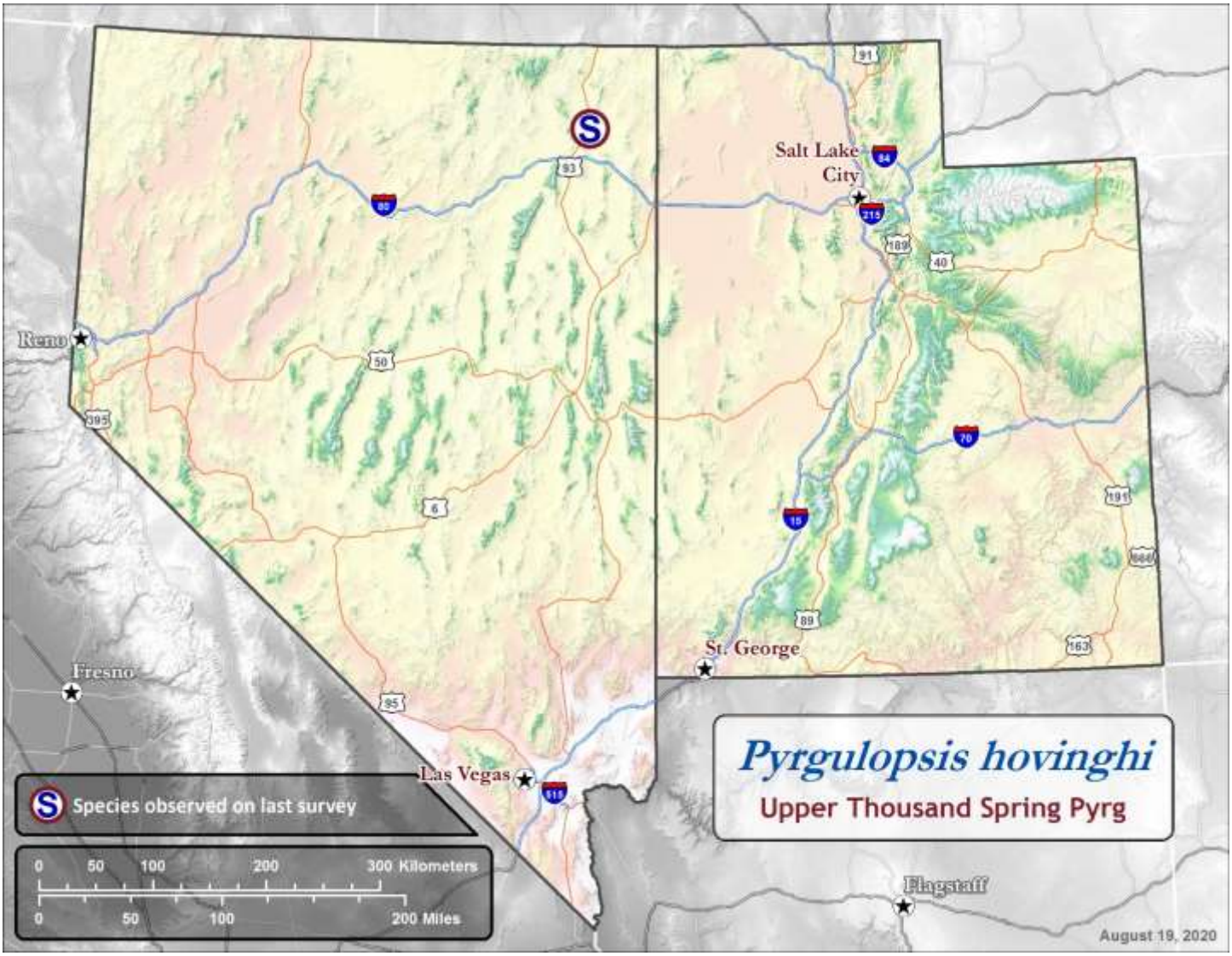
LAND MANAGEMENT

P. hovinghi were observed at a single location on **BLM** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [67%; 2 surveys] and **Nevada Natural Heritage Data Import** [33%; 1 survey] projects.

RELATED LITERATURE

Encyclopedia of Life (Year Unspecified) Pyrgulopsis hovinghi. Available from http://www.eol.org. Website. Available at http://eol.org/pages/4859515/details#http://eol.org/pages/4859515/details#.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis hovinghi. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+hovinghi (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. Hubbs pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	4 sampling locations reported in Utah or Nevada [n = 4 sites]
Most Recent Observation (restricted to UT and NV)	**July 2, 2019** (*23 surveys total in UT or NV between 9/9/1969 and 7/2/2019*)

TAXONOMY

Pyrgulopsis hubbsi is described in Hershler, 1998: 33, 35-36, figs. 6E, 14A-C, 17F-G, 27F-H. *P. hubbsi* has been assigned Invertebrate Taxon ID 6586 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis hubbsi has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. hubbsi* has been reported at 4 sites across its entire range. This species has been recorded at 4 locations in Lincoln County, Nevada. This species has been observed on 23 surveys between September 9, 1969 and July 2, 2019.

HABITAT CHARACTERISTICS

Hershler (1998) describes Hiko Spring as a large, thermal rheocrene.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 3 times at 2 locations for this species, with average flow-per-location ranging from 5 to 151.67 liters per second [mean = 78.34 l/s, median = 78.34 l/s]. Specific Conductance was measured 4 times at 2 locations, with average specific conductance-per-location ranging from 525 to 528 µS/cm [mean = 526 µS/cm, median = 526 µS/cm]. Spring pH was measured 4 times at 2 locations, with average pH-per-location ranging from 7.3 to 7.47 [mean = 7.38, median = 7.38]. Temperature was measured 4 times at 2 locations, with average temperature-per-location ranging from 27 to 27° Celsius [mean = 27°C, median = 27°C].

This species was observed in **helocrene** [50%; n = 1] and **rheocrene** [50%; n = 1] springs. Elevations for this species range from 1,162 m (3,812 ft) to 1,182 m (3,878 ft), with a mean of 1,167 m (3,830 ft) and median of 1,163 m (3,814 ft).

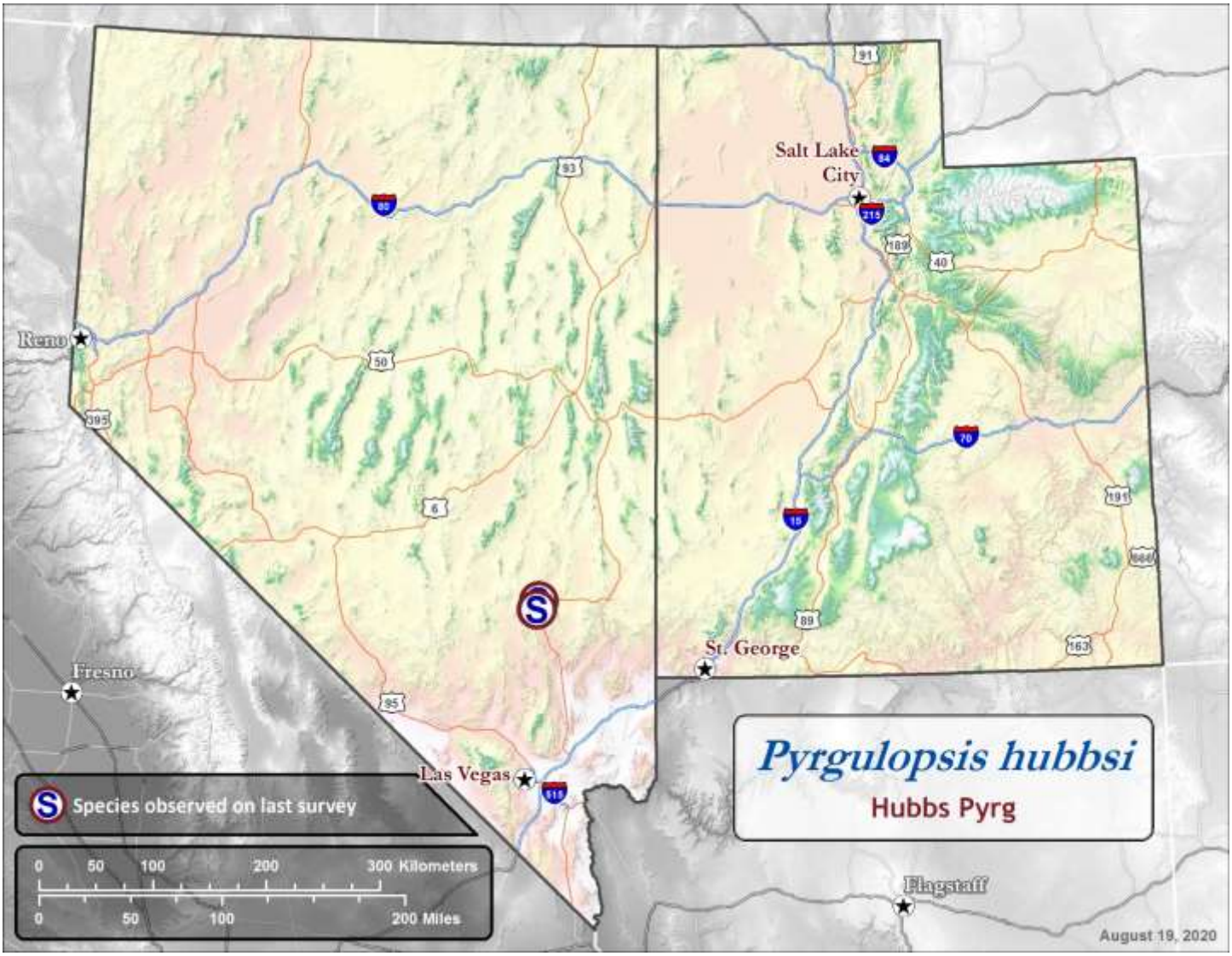
LAND MANAGEMENT

All 4 locations where *P. hubbsi* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [57%; 13 surveys], **NDOW- Southern Region** [17%; 4 surveys], **Sada Import** [17%; 4 surveys] and **Sada Import 2017** [9%; 2 surveys] projects.

RELATED LITERATURE

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis hubbsi. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+hubbsi (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	11 sampling locations reported in Utah or Nevada [n = 10 sites]
Most Recent Observation (restricted to UT and NV)	**September 18, 2008** (*17 surveys total in UT or NV between 10/7/1990 and 9/18/2008*)

TAXONOMY

Pyrgulopsis humboldtensis is described in Hershler, 1998: 97, figs. 9H, 13E, 22H-J, 42F-I. *P. humboldtensis* has been assigned Invertebrate Taxon ID 6587 in the Springs Online database.

DISTRIBUTION

This species is known throughout the Humboldt River drainage, northern Nevada (Hershler and Liu 2017). The type locality is Springs, East Fork Beaver Creek (above Cabin Creek confluence), North Fork Humboldt River, Elko County, Nevada. Holotype, USNM 874722; paratypes, USNM 860718 (Hershler and Liu 2017).

Pyrgulopsis humboldtensis has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. humboldtensis* has been reported at 11 sampling locations across its entire range [n = 10 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. This species has been recorded at 11 locations in Elko County, Nevada. This species has been observed on 17 surveys between October 7, 1990 and September 18, 2008. The last surveys at 2 of these locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Humboldt Pyrg occurs throughout the Humboldt River drainage in northern Nevada.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 4 times at 4 locations for this species, with average flow-per-location ranging from 0.17 to 1.33 liters per second [mean = 0.56 l/s, median = 0.38 l/s]. Specific Conductance was measured 7 times at 7 locations, with average specific conductance-per-location ranging from 123 to 222 µS/cm [mean = 178 µS/cm, median = 168 µS/cm]. Spring pH was measured 7 times at 7 locations, with average pH-per-location ranging from 5.2 to 8.2 [mean = 7.29, median = 7.4]. Temperature was measured 7 times at 7 locations, with average temperature-per-location ranging from 14 to 24° Celsius [mean = 18°C, median = 18°C].

This species was observed in **rheocrene** [43%; n = 3], **hillslope** [29%; n = 2], **helocrene** [14%; n = 1] and **limnocrene** [14%; n = 1] springs. Elevations for this species range from 1,710 m (5,610 ft) to 2,002 m (6,568 ft), with a mean of 1,856 m (6,091 ft) and median of 1,843 m (6,047 ft).

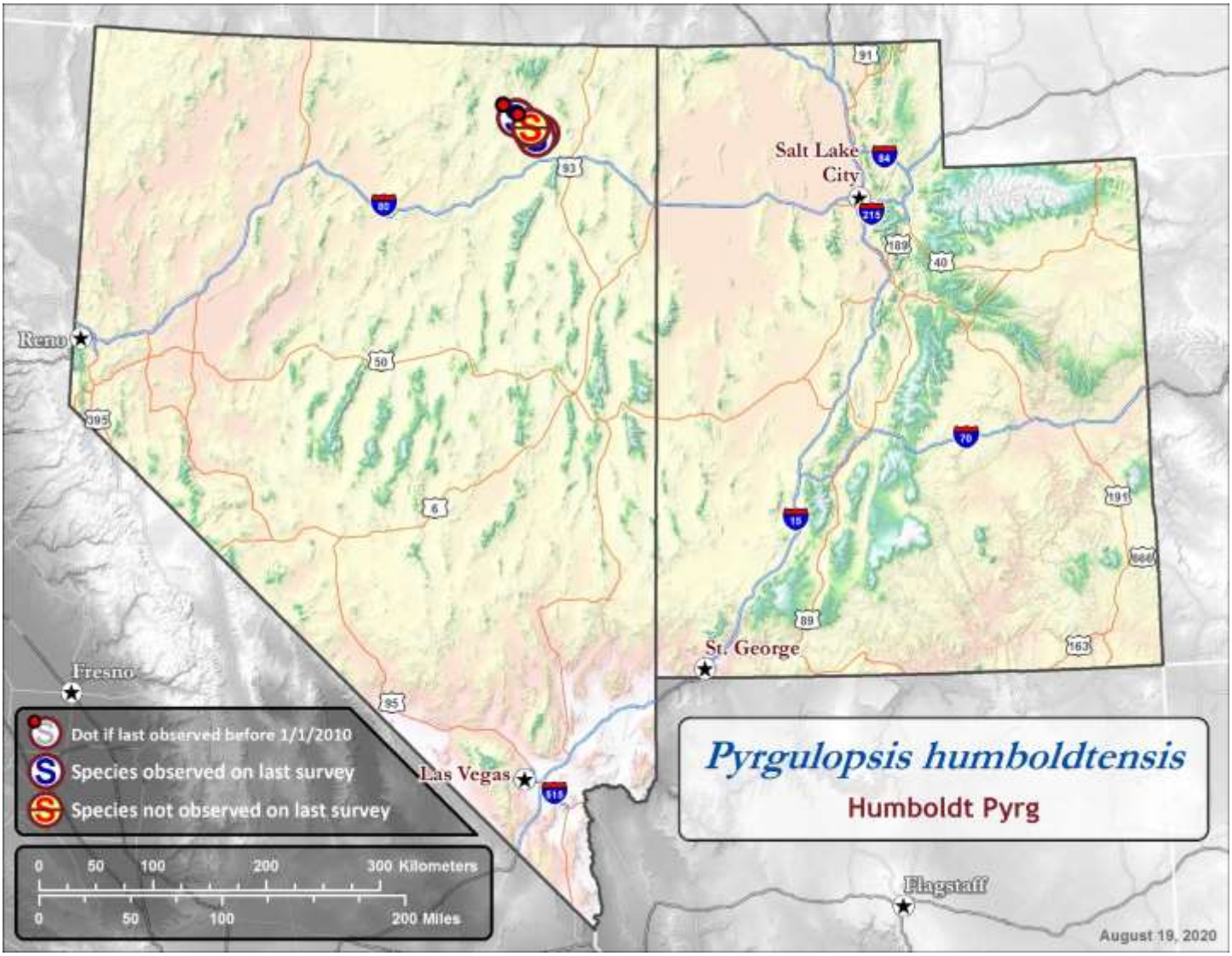
LAND MANAGEMENT

Of the 11 locations where *P. humboldtensis* were observed, 55% were located on **Private** land (n = 6) and 45% on **BLM** land (n = 5).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [59%; 10 surveys] and **Sada Import** [41%; 7 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis humboldtensis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+humboldtensis (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	Unclassified
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah.	
Number of Locations Reported (restricted to UT and NV)	13 sampling locations reported in Utah or Nevada [n = 13 sites]
Most Recent Observation (restricted to UT and NV)	**July 13, 2018** (*19 surveys total in UT or NV between 1/1/1991 and 7/13/2018*)

TAXONOMY

Pyrgulopsis imperialis was described by Hershler, 1998: 86-87, figs. 8L, 21J-K, 39D-F. *P. imperialis* has been assigned Invertebrate Taxon ID 6589 in the Springs Online database.

DISTRIBUTION

Kings River pyrg is known to occur in the Kings River Valley near Thacker Pass, Nevada. The type locality is Spring, south side of road, Thacker Pass, Kings River Valley, Humboldt County, Nevada. Holotype, USNM 874207; paratypes, USNM 860716.

Pyrgulopsis imperialis has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. imperialis* has been reported at 13 sites across its entire range. This species has been recorded at 13 locations in Humboldt County, Nevada. This species has been observed on 19 surveys between January 1, 1991 and July 13, 2018.

HABITAT CHARACTERISTICS

Kings River pyrg occurs between 1,369 and 1,514 meters.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured a single time at 0.61 liters per second for this species. Specific Conductance was measured 3 times at 2 locations for this species, with average specific conductance-per-location ranging from 303 to 445 µS/cm [mean = 374 µS/cm, median = 374 µS/cm]. Spring pH was measured 3 times at 2 locations, with average pH-per-location ranging from 7.92 to 8.1 [mean = 8.01, median = 8.01]. Temperature was measured 3 times at 2 locations, with average temperature-per-location ranging from 14 to 20° Celsius [mean = 17°C, median = 17°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,369 m (4,491 ft) to 1,514 m (4,967 ft), with a mean of 1,427 m (4,683 ft) and median of 1,407 m (4,616 ft).

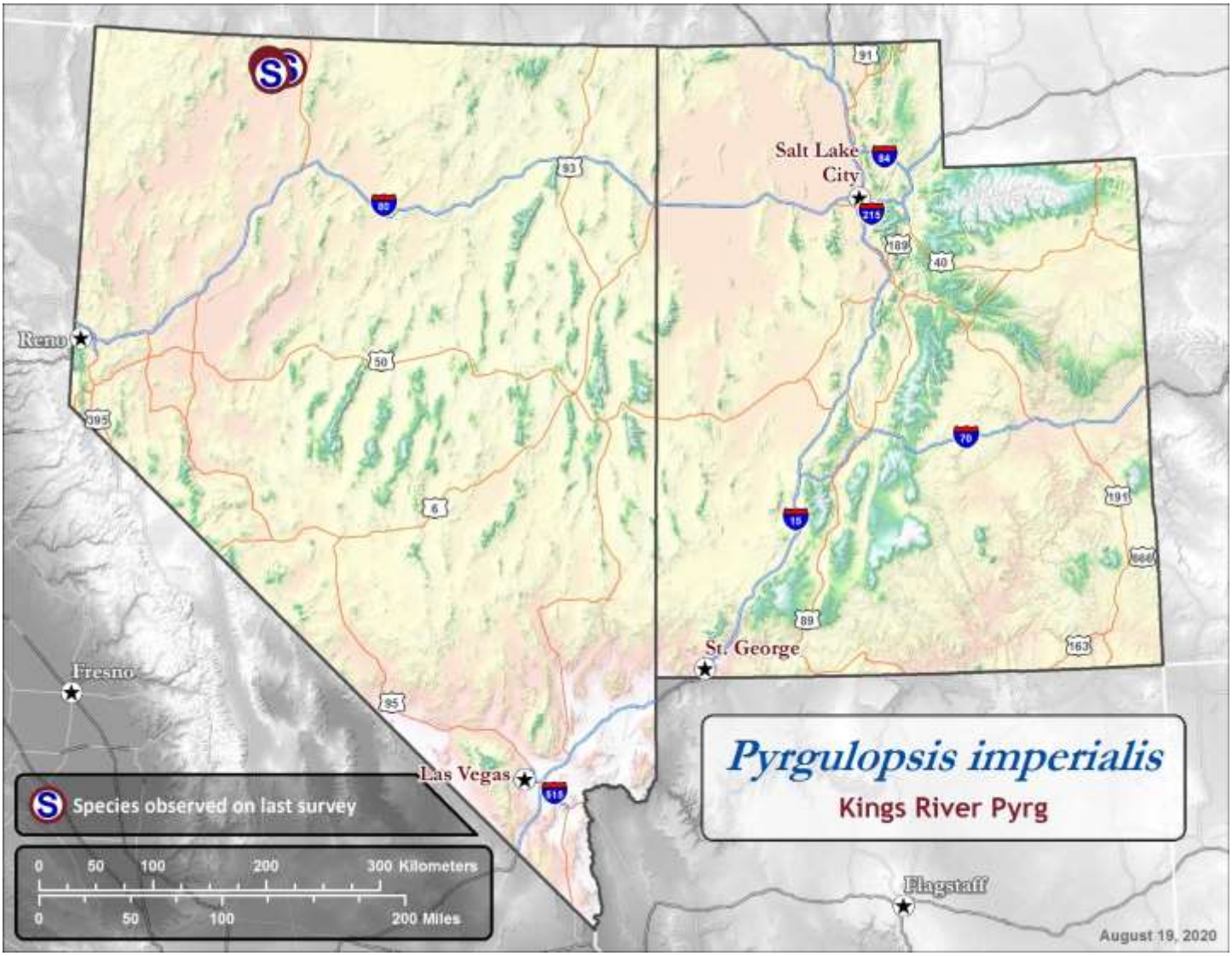
LAND MANAGEMENT

Of the 13 locations where *P. imperialis* were observed, 85% were located on **Private** land (n = 11) and 15% on **BLM** land (n = 2).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [84%; 16 surveys] and **Sada Import** [16%; 3 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	5 sampling locations reported in Utah or Nevada [n = 5 sites]
Most Recent Observation (restricted to UT and NV)	**September 4, 2019** (*5 surveys total in UT or NV between 7/15/1993 and 9/4/2019*)

TAXONOMY

Pyrgulopsis inopinata is described in Hershler, 1998: 124-125, figs. 10H, 25D-F, 47H-J. *P. inopinata* has been assigned Invertebrate Taxon ID 10734 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis inopinata has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. inopinata* has been reported at 5 sites across its entire range. This species has been recorded at 5 locations in Sevier County, Utah. This species has been observed on 5 surveys between July 15, 1993 and September 4, 2019. At 3 of these locations [60%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This species has been reported at springs in Utah between 1,596 and 1,689 meters.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured 2 times at 2 locations for this species, with average specific conductance-per-location ranging from 283 to 308 µS/cm [mean = 296 µS/cm, median = 296 µS/cm]. Spring pH was measured a single time at 8.2 for this species. Temperature was measured 2 times at 2 locations, with average temperature-per-location ranging from 16 to 16° Celsius [mean = 16°C, median = 16°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,596 m (5,236 ft) to 1,689 m (5,541 ft), with a mean of 1,661 m (5,451 ft) and median of 1,677 m (5,502 ft).

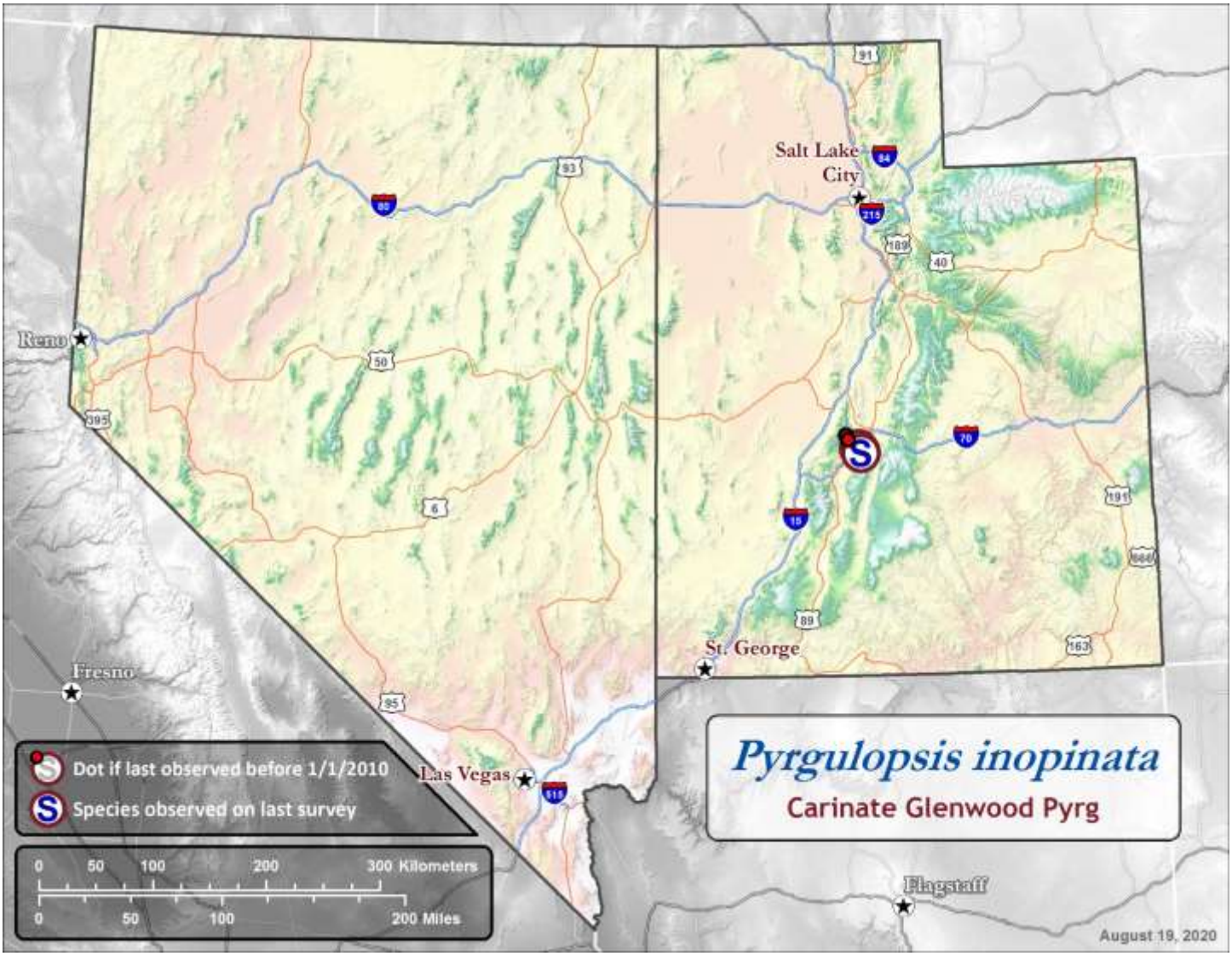
LAND MANAGEMENT

Of the 5 locations where *P. inopinata* were observed, 80% were located on **Private** land (n = 4) and 20% on **State** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **UDWR** [40%; 2 surveys], **Utah CAS Import** [40%; 2 surveys] and **Sada Import** [20%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis inopinata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+inopinata (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), and 54 FR 554 579 (1989). Elongate-gland Springsnail was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**June 29, 2000** (*3 surveys total in UT or NV between 11/7/1985 and 6/29/2000*)

TAXONOMY

Pyrgulopsis isolata was described by Hershler and Sada, 1987: 807-810, figs. 19d, 29c,f, 33d,g, 37-38. *P. isolata* has been assigned Invertebrate Taxon ID 6591 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis isolata has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. isolata* has been reported at a single location. This species has been recorded at a single location in Nye County, Nevada. This species has been observed on 3 surveys between November 7, 1985 and June 29, 2000. The last survey at this site did not record any observations of this species. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This springsnail is locally common on soft substrates in its thermal habitat. It can be found on outflows from the marsh (Hershler and Sada 1987).

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 659 m (2,162 ft).

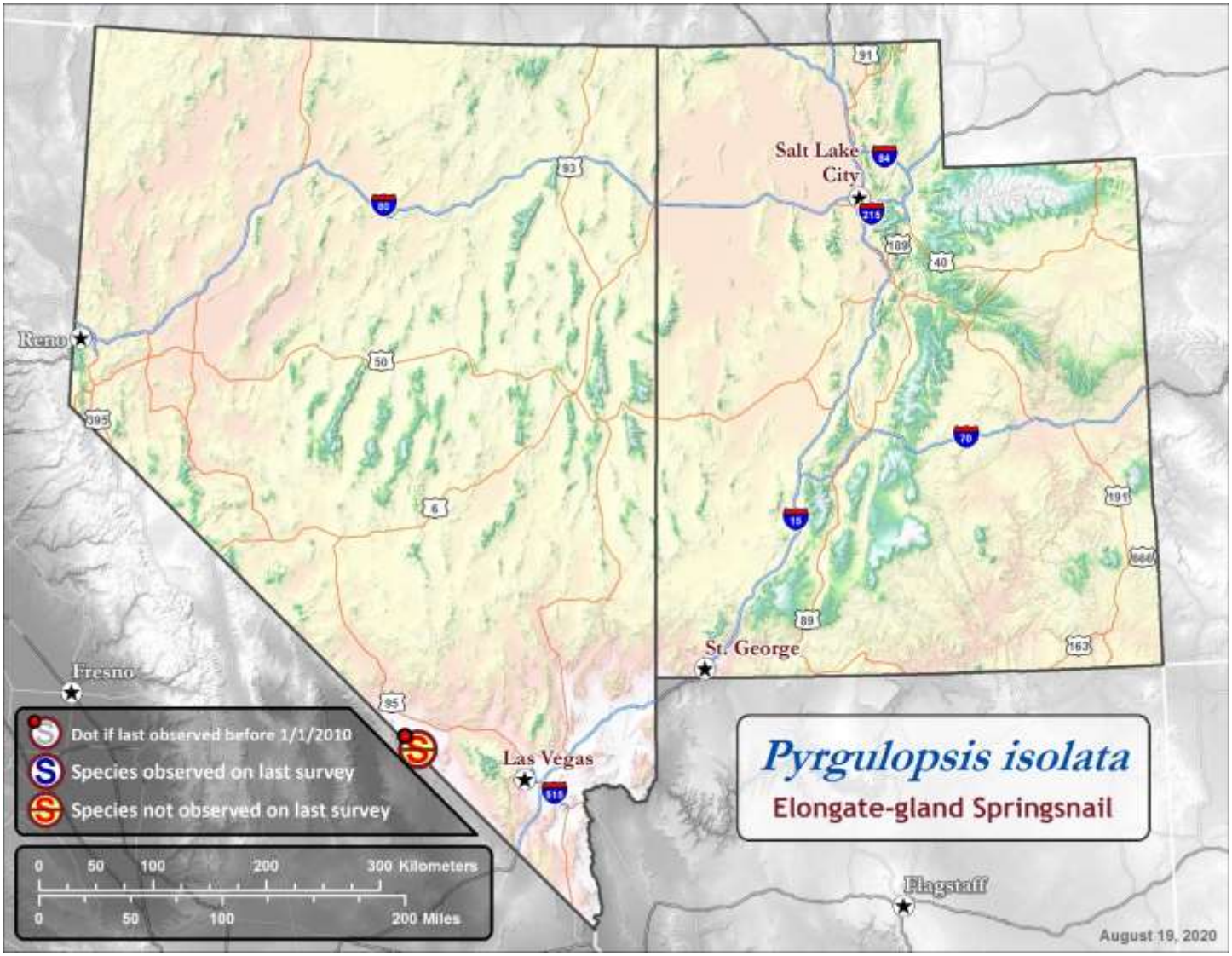
LAND MANAGEMENT

P. isolata were observed at a single location on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

All surveys that contributed data to this summary were conducted by the **Nevada Natural Heritage Data Import** project.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., Sada, D.W. (1987) Springsnails (Gastropoda: Hydrobiidae) of Ash Meadows, Amargosa basin, California-Nevada. Proceedings of the Biological Society of Washington: Pg 776-843. Publication. Available at https://repository.si.edu/handle/10088/11319.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). Landyes pyrg was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**October 18, 2000** (*3 surveys total in UT or NV between 9/2/1980 and 10/18/2000*)

TAXONOMY

Pyrgulopsis landyei is described in Hershler 1998: 70-71, figs. 8A, 20B, 35C-F. *P. landyei* has been assigned Invertebrate Taxon ID 6593 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis landyei has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. landyei* has been reported at a single location. This species has been recorded at a single location in White Pine County, Nevada. This species has been observed on 3 surveys between September 2, 1980 and October 18, 2000. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Center for Biological Diversity (2009) states that the spring where this species occurs is a small rheocrene.

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. This species has been recorded at a single elevation of 1,866 m (6,122 ft).

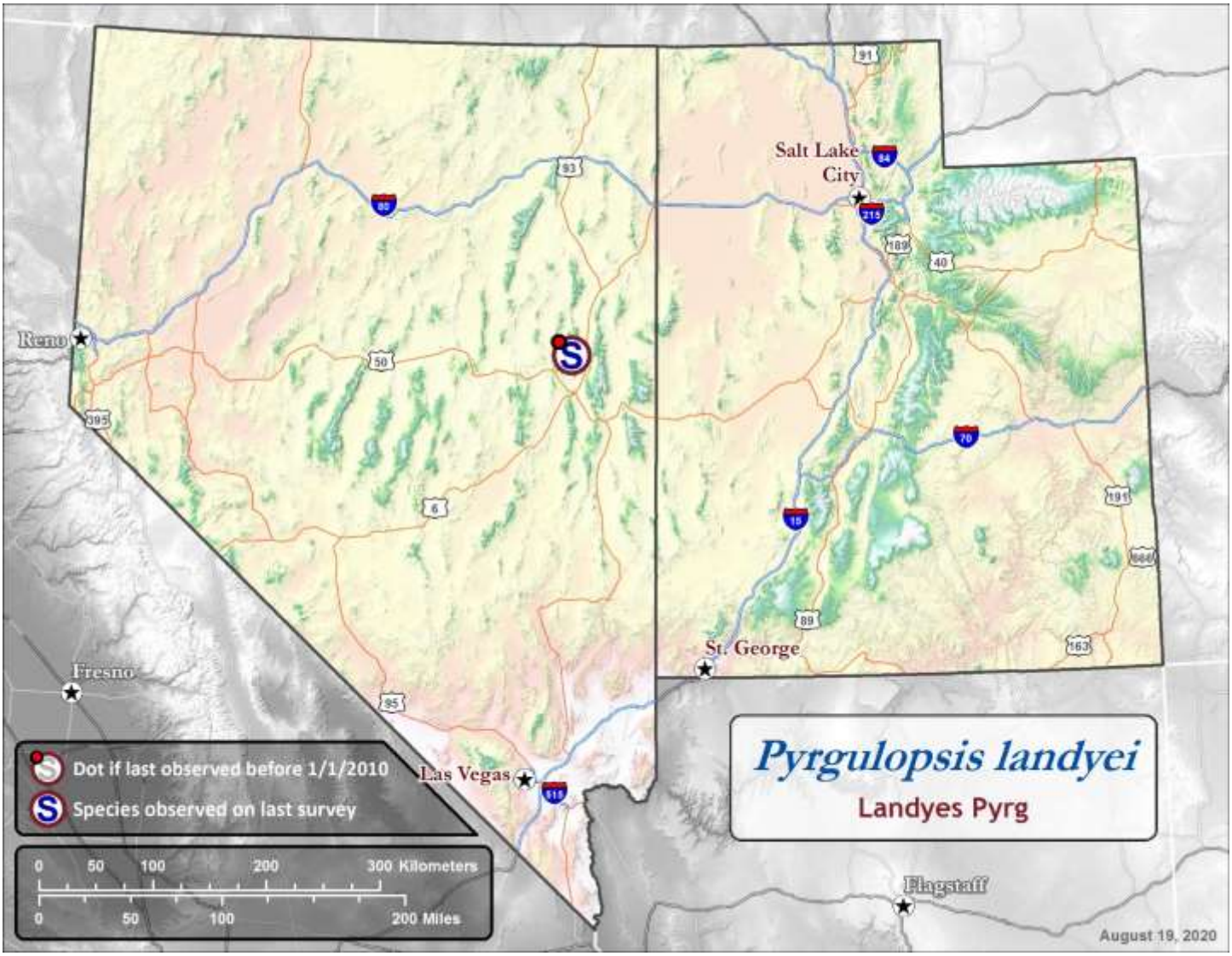
LAND MANAGEMENT

P. landyei were observed at a single location on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

All surveys that contributed data to this summary were conducted by the **Nevada Natural Heritage Data Import** project.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis landyei. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+landyei (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011) and 82 FR 46618 46645 (2017). Butterfield pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	5 sampling locations reported in Utah or Nevada [n = 4 sites]
Most Recent Observation (restricted to UT and NV)	**June 7, 2016** (*13 surveys total in UT or NV between 9/2/1973 and 6/7/2016*)

TAXONOMY

Pyrgulopsis lata is described in Hershler 1998: 41, 43, figs. 6H, 12D, 18A, 29A-E. The type locality is Butterfield Springs, White River Valley, Nye County, Nevada. Holotype, USNM 874667; paratypes, USNM 860697. (Hershler and Liu, 2017) *P. lata* has been assigned Invertebrate Taxon ID 6594 in the Springs Online database.

DISTRIBUTION

The Butterfield Pyrg occurs in Butterfield Springs in the White River Valley of Nye County, Nevada (Hershler 1998). The type locality is Butterfield Springs, White River Valley, Nye County, Nevada. Holotype, USNM 874667; paratypes, USNM 860697 (Hershler and Liu, 2017).

Pyrgulopsis lata has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. lata* has been reported at 5 sampling locations across its entire range [n = 4 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. This species has been recorded at 5 locations in Nye County, Nevada. This species has been observed on 13 surveys between September 2, 1973 and June 7, 2016. The last survey at one of these locations did not record any observations of this species. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Butterfield Spring is a small rheocrene with a maximum depth of 1 cm (Golden et al. 2007, cited in Center for Biological Diversity 2009).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 6 times at 4 locations for this species, with average flow-per-location ranging from 2.25 to 10 liters per second [mean = 4.33 l/s, median = 2.54 l/s]. Specific Conductance was measured 7 times at 5 locations, with average specific conductance-per-location ranging from 310 to 384 µS/cm [mean = 354 µS/cm, median = 349 µS/cm]. Spring pH was measured 4 times at 4 locations, with average pH-per-location ranging from 7.8 to 8.2 [mean = 7.95, median = 7.9]. Temperature was measured 7 times at 5 locations, with average temperature-per-location ranging from 16 to 17° Celsius [mean = 17°C, median = 17°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,582 m (5,190 ft) to 1,622 m (5,322 ft), with a mean of 1,606 m (5,269 ft) and median of 1,621 m (5,318 ft).

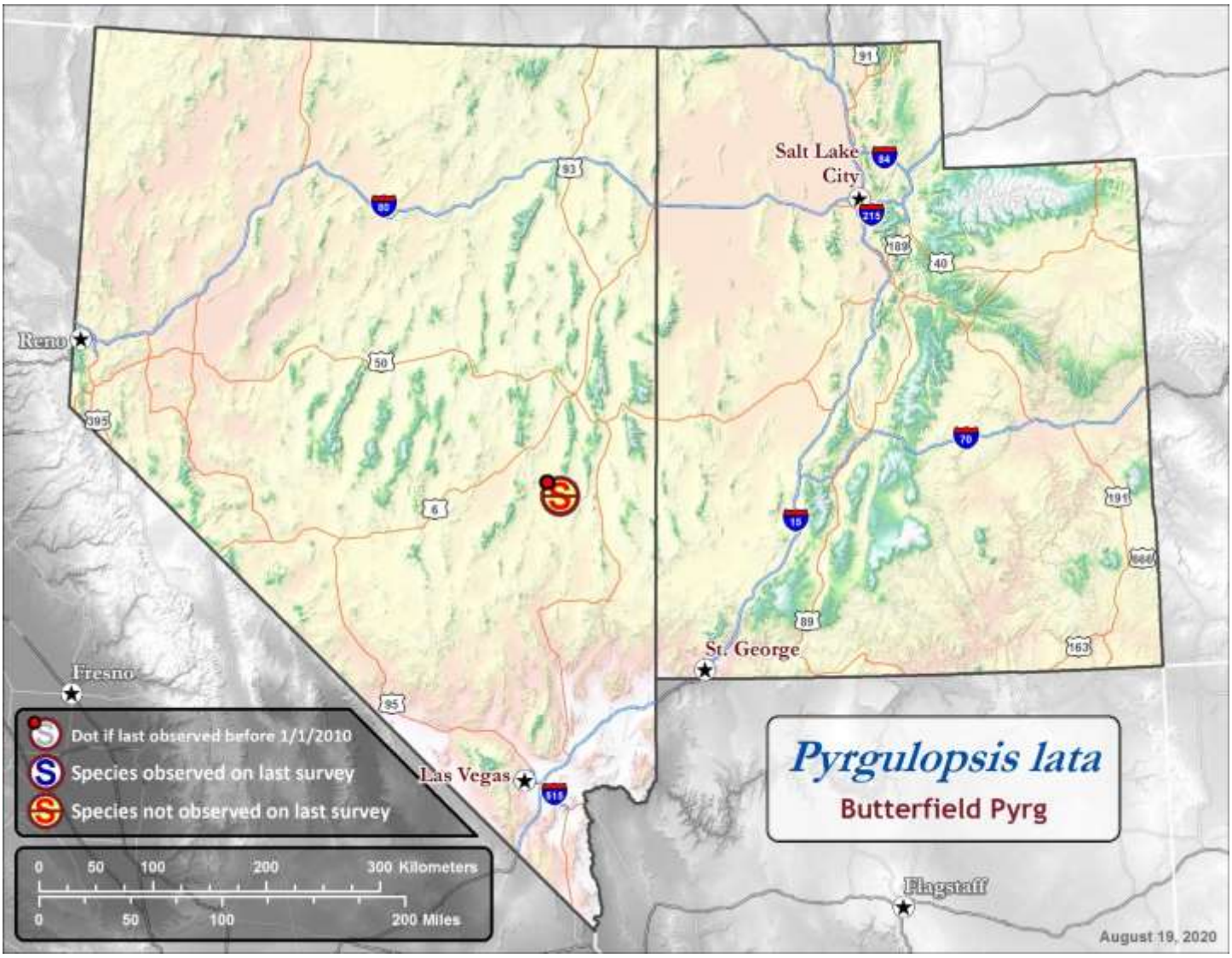
LAND MANAGEMENT

All 5 locations where *P. lata* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [46%; 6 surveys], **Sada Import** [31%; 4 surveys] and **Sada Import 2017** [23%; 3 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis lata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+lata (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**August 8, 2013** (*6 surveys total in UT or NV between 8/19/1989 and 8/8/2013*)

TAXONOMY

Pyrgulopsis lentiglans is described in Hershler, 1998: 118-120, figs. 10D, 24G-H, 46C-E. *P. lentiglans* has been assigned Invertebrate Taxon ID 6595 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis lentiglans has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. lentiglans* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in Elko County, Nevada. This species has been observed on 6 surveys between August 19, 1989 and August 8, 2013. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Crittenden pyrg is reported at three locations in Elko County between 1608 and 1685 meters.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured a single time at 4 liters per second for this species. Specific Conductance was measured 2 times at 1 site for this species, with an average specific conductance of 411 µS/cm. Spring pH was measured 2 times at 1 site for this species, with an average pH of 7.66. Temperature was measured 2 times at 1 site for this species, with an average temperature of 17° Celsius.

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,608 m (5,276 ft) to 1,609 m (5,279 ft), with a mean of 1,609 m (5,277 ft) and median of 1,609 m (5,277 ft).

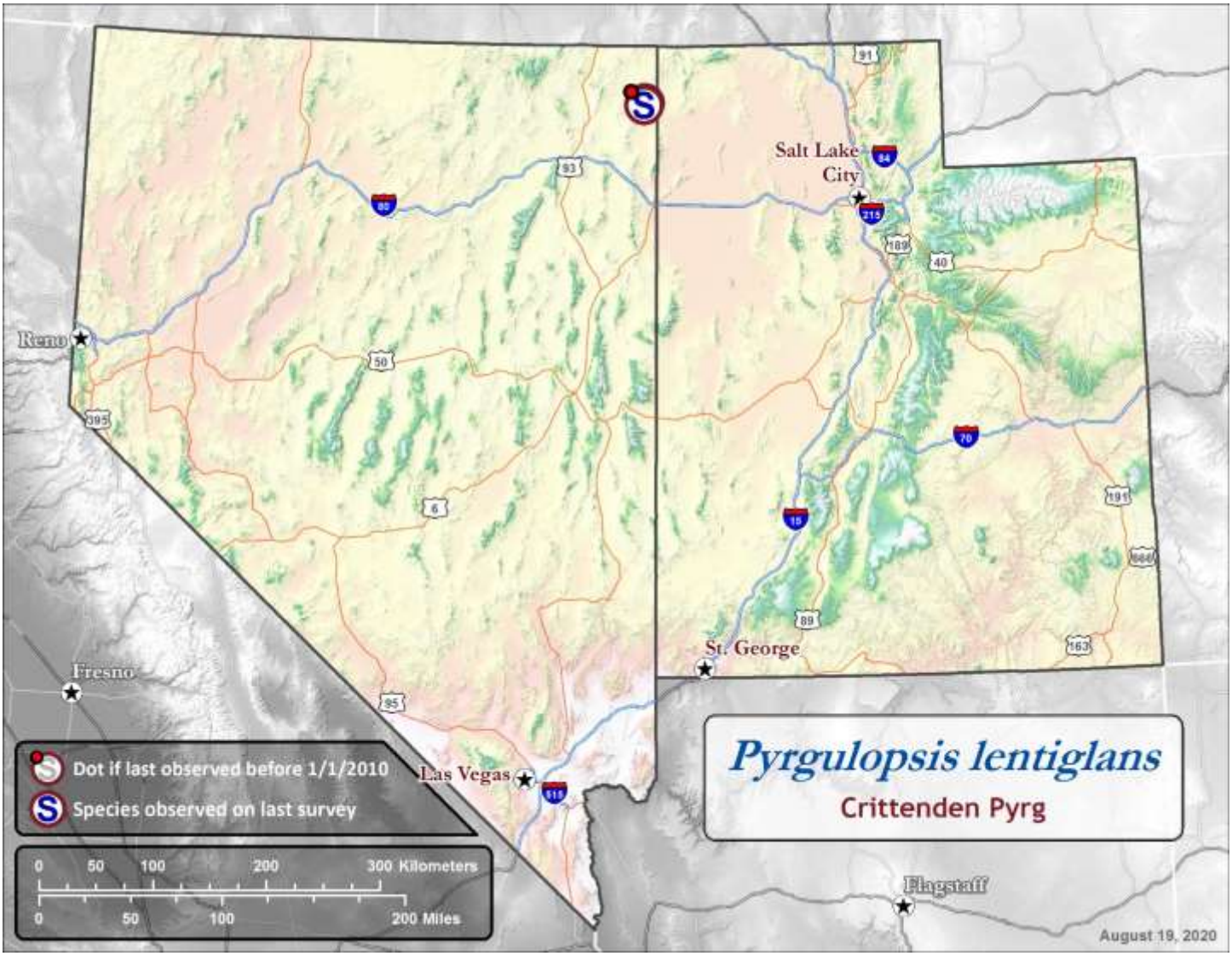
LAND MANAGEMENT

Both locations where *P. lentiglans* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [67%; 4 surveys] and **Sada Import** [33%; 2 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis lentiglans. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+lentiglans (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. Elko pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition did not present substantial information indicating that the species should be listed.	
Number of Locations Reported (restricted to UT and NV)	5 sampling locations reported in Utah or Nevada [n = 5 sites]
Most Recent Observation (restricted to UT and NV)	**July 29, 2008** (*10 surveys total in UT or NV between 7/30/1991 and 7/29/2008*)

TAXONOMY

Pyrgulopsis leporina is described in Hershler, 1998: 96-97, figs. 9G, 22G, 42A-E. *P. leporina* has been assigned Invertebrate Taxon ID 6596 in the Springs Online database.

DISTRIBUTION

According to Hershler and Liu, 2017, the Elko Pyrg is only know in single springs in both the Humboldt River drainage and Ruby Valley, Nevada. The type locality is from springs near Rabbit Creek, Humboldt River drainage, Elko County, Nevada. Holotype, USNM 874336; paratypes, USNM 860717 (Hershler and Liu 2017).

Pyrgulopsis leporina has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. leporina* has been reported at 5 sites across its entire range. This species has been recorded at 5 locations in Elko County, Nevada. This species has been observed on 10 surveys between July 30, 1991 and July 29, 2008. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Elko pyrg occurs at locations on private land between 1,699 and 1,937 meters.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 2 times at 2 locations for this species, with average flow-per-location ranging from 0.12 to 0.13 liters per second [mean = 0.13 l/s, median = 0.13 l/s]. Specific Conductance was measured 4 times at 4 locations, with average specific conductance-per-location ranging from 235 to 480 µS/cm [mean = 318 µS/cm, median = 279 µS/cm]. Spring pH was measured 4 times at 4 locations, with average pH-per-location ranging from 7.5 to 8.7 [mean = 8.15, median = 8.2]. Temperature was measured 4 times at 4 locations, with average temperature-per-location ranging from 12 to 13° Celsius [mean = 12°C, median = 12°C].

This species was observed in **rheocrene** [80%; n = 4] and **helocrene** [20%; n = 1] springs. Elevations for this species range from 1,699 m (5,574 ft) to 1,937 m (6,355 ft), with a mean of 1,756 m (5,760 ft) and median of 1,708 m (5,604 ft).

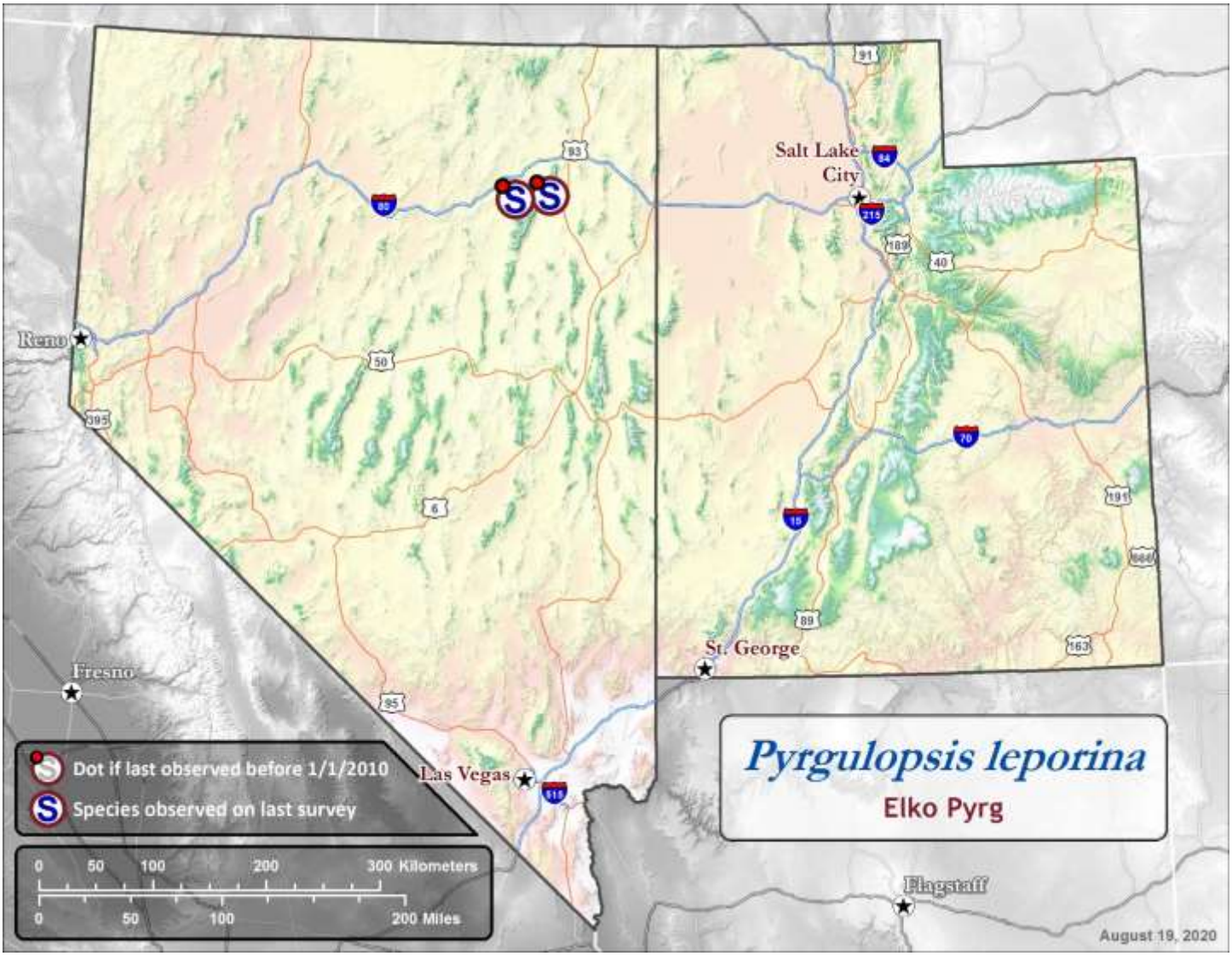
LAND MANAGEMENT

All 5 locations where *P. leporina* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [50%; 5 surveys] and **Nevada Natural Heritage Data Import** [50%; 5 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis leporina. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+leporina (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	NNA: Not applicable
Global Status	GNA: Not applicable
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah.	
Number of Locations Reported (restricted to UT and NV)	16 sampling locations reported in Utah or Nevada [n = 16 sites]
Most Recent Observation (restricted to UT and NV)	**January 1, 2013** (*38 surveys total in UT or NV between 11/7/1985 and 1/1/2013*)

TAXONOMY

No taxonomic history specified. *Pyrgulopsis licina* has been assigned Invertebrate Taxon ID 13851 in the Springs Online database.

DISTRIBUTION

This species occurs at springs in Ash Meadows National Wildlife Refuge.

Pyrgulopsis licina has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. licina* has been reported at 16 sites across its entire range. This species has been recorded at 16 locations in Nye County, Nevada. This species has been observed on 38 surveys between November 7, 1985 and January 1, 2013. The last surveys at 3 of these locations did not record any observations of this species. At 11 of these locations [69%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Curved filament Pyrg occurs at nine springs in Ash Meadows National Wildlife Refuge, 640-730 meters.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 8 times at 7 locations for this species, with average flow-per-location ranging from 0.01 to 0.06 liters per second [mean = 0.03 l/s, median = 0.03 l/s]. Specific Conductance was measured 12 times at 9 locations, with average specific conductance-per-location ranging from 410 to 1,424 µS/cm [mean = 767 µS/cm, median = 739 µS/cm]. Spring pH was measured 4 times at 4 locations, with average pH-per-location ranging from 7 to 8.1 [mean = 7.68, median = 7.8]. Temperature was measured 12 times at 9 locations, with average temperature-per-location ranging from 10 to 31° Celsius [mean = 16°C, median = 15°C].

This species was observed in **rheocrene** [75%; n = 9], **helocrene** [17%; n = 2] and **limnocrene** [8%; n = 1] springs. Elevations for this species range from 657 m (2,156 ft) to 708 m (2,323 ft), with a mean of 680 m (2,230 ft) and median of 681 m (2,233 ft).

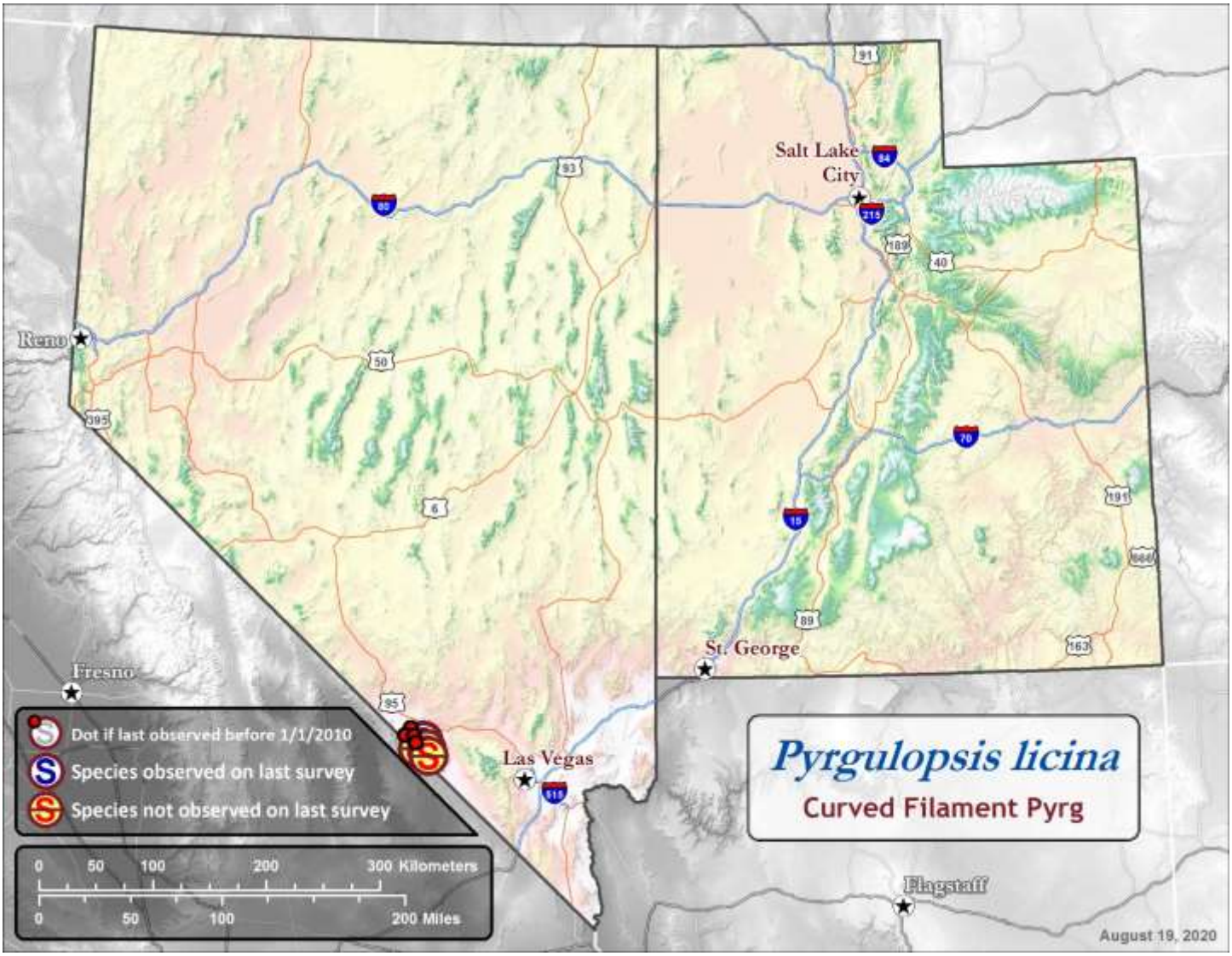
LAND MANAGEMENT

Of the 16 locations where *P. licina* were observed, 50% were located on **FWS** land (n = 8), 25% on **BLM** land (n = 4) and 25% on **Private** land (n = 4).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [53%; 20 surveys] and **Nevada Natural Heritage Data Import** [47%; 18 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., H. Liu, and C. Bradford (Year Unspecified) Pyrgulopsis micrococcus. Encyclopedia of Life. Website. Available at http://eol.org/pages/592697/details#http://eol.org/pages/592697/details#.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019 the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	12 sampling locations reported in Utah or Nevada [n = 11 sites]
Most Recent Observation (restricted to UT and NV)	**September 8, 2005** (*15 surveys total in UT or NV between 8/8/1991 and 9/8/2005*)

TAXONOMY

Pyrgulopsis limaria is described in Hershler, 1998: 82-83, figs. 8I, 21E-F, 38A-E. *P. limaria* has been assigned Invertebrate Taxon ID 5757 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis limaria has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. limaria* has been reported at 12 sampling locations across its entire range [n = 11 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. This species has been recorded at 12 locations in Humboldt County, Nevada. This species has been observed on 15 surveys between August 8, 1991 and September 8, 2005. The last survey at one of these locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Squat Mud Meadows Pyrg is reported at springs and springbrooks in Soldier Meadow.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 7 times at 7 locations for this species, with average flow-per-location ranging from 0.01 to 0.33 liters per second [mean = 0.08 l/s, median = 0.02 l/s]. Specific Conductance was measured 10 times at 10 locations, with average specific conductance-per-location ranging from 249 to 430 µS/cm [mean = 378 µS/cm, median = 392 µS/cm]. Spring pH was measured 3 times at 3 locations, with average pH-per-location ranging from 8.2 to 9.3 [mean = 8.57, median = 8.2]. Temperature was measured 10 times at 10 locations, with average temperature-per-location ranging from 30 to 49° Celsius [mean = 35°C, median = 35°C].

This species was observed in **rheocrene** [90%; n = 9] and **limnocrene** [10%; n = 1] springs. Elevations for this species range from 1,320 m (4,331 ft) to 1,383 m (4,537 ft), with a mean of 1,363 m (4,472 ft) and median of 1,370 m (4,495 ft).

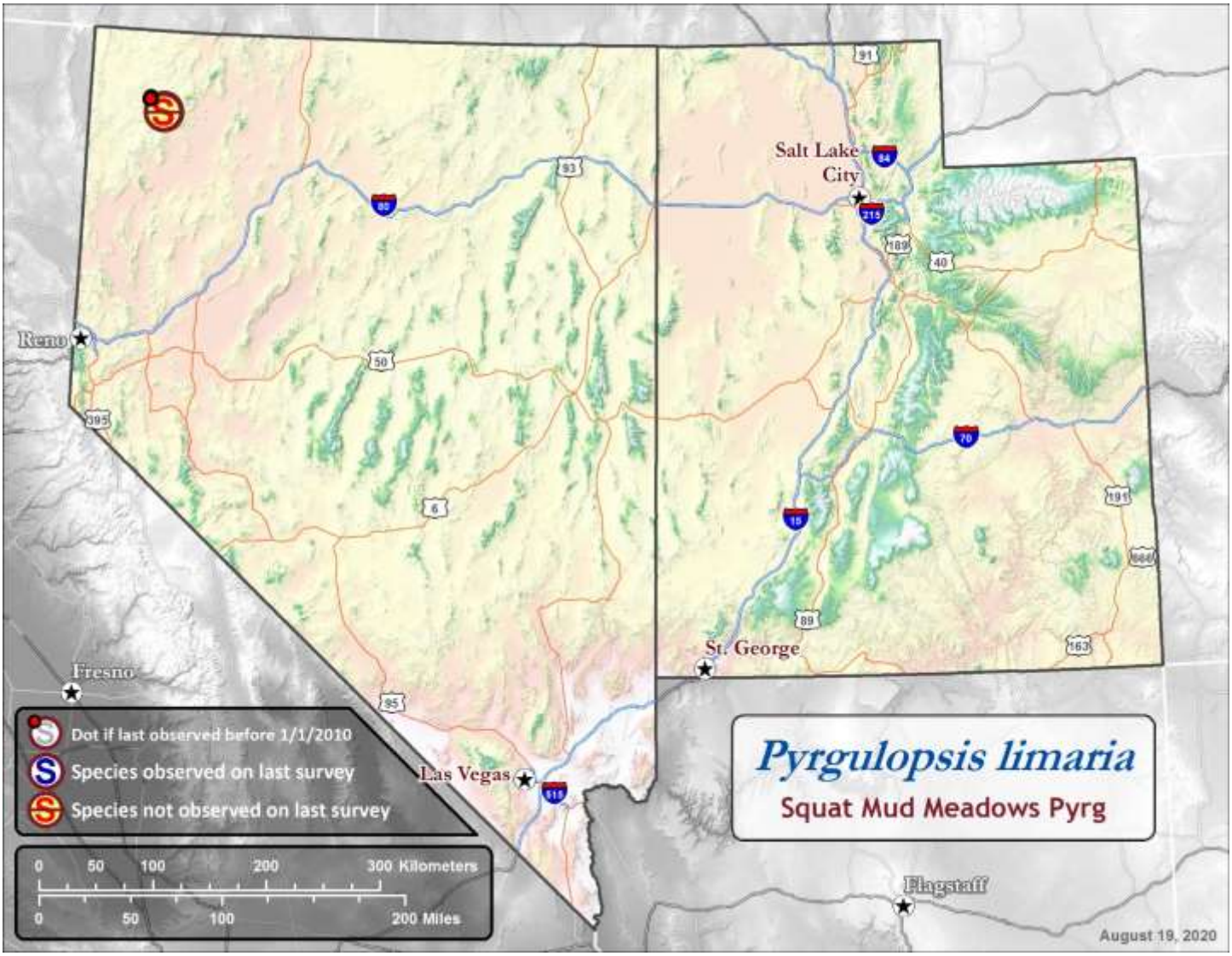
LAND MANAGEMENT

Of the 12 locations where *P. limaria* were observed, 83% were located on **BLM** land (n = 10) and 17% on **Private** land (n = 2).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [67%; 10 surveys] and **Nevada Natural Heritage Data Import** [33%; 5 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., H. Liu and D.W. Sada (2007) Origin and Diversification of the Soldier Meadow Springsnails (Hydrobiidae: Pyrgulopsis), a Species Flock in the Northwestern Great Basin, United States. Journal of Molluscan Studies 73:167-183. Publication. Available at http://mollus.oxfordjournals.org/content/73/2/167.full.pdf#http://mollus.oxfordjournals.org/content/73/2/167.full.pdf#.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis limaria. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+limaria (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	Unclassified
ESA Status	Unclassified
National Status	Unclassified
Global Status	Unclassified
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**May 21, 2015** (*3 surveys total in UT or NV between 10/5/1976 and 5/21/2015*)

TAXONOMY

Pyrgulopsis lindahlae is described in Hershler et al., 2017:161-171. This species was split from the *P. kolobensis* complex. *P. lindahlae* has been assigned Invertebrate Taxon ID 15481 in the Springs Online database.

DISTRIBUTION

This species is known in two nearby springs in the Left Fork of North Creek near the Right Fork confluence in Zion National Park, Washington County, Utah (Hershler et al. 2017). The type locality is Grapevine Spring, Left Fork of North creek, Zion National Park, Washington County, Utah. Holotype, USNM 905098; paratypes: USNM 1409023 (Hershler et al. 2017).

This species has not been classified by endemism level. In the Springs Online Database, *P. lindahlae* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in Washington County, Utah. This species has been observed on 3 surveys between October 5, 1976 and May 21, 2015. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. Elevations for this species range from 1,393 m (4,570 ft) to 1,784 m (5,853 ft), with a mean of 1,589 m (5,212 ft) and median of 1,589 m (5,212 ft).

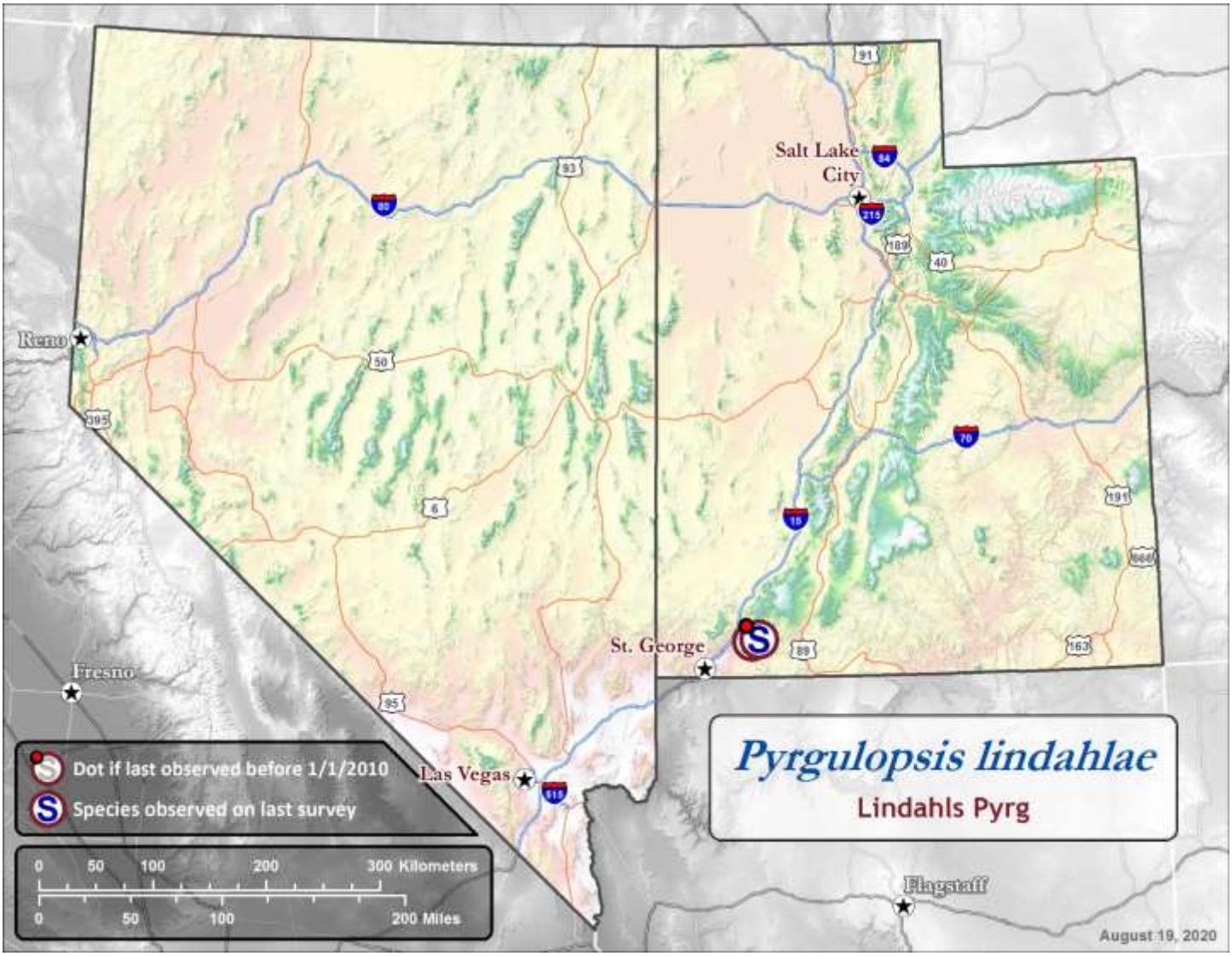
LAND MANAGEMENT

Both locations where *P. lindahlae* were observed were located on **NPS** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

All surveys that contributed data to this summary were conducted by the **UDWR** project.

RELATED LITERATURE

Robert Hershler, Hsiu-Ping Liu, Cynthia Forsythe, Peter Hovingh, and Kevin Wheeler (2017) Partial revision of the Pyrgulopsis kolobensis complex (Caenogastropoda: Hydrobiidae), with resurrection of P. pinetorum and description of three new species from the Virgin River drainage, Utah. Journal of Molluscan Studies. Peer-reviewed article. Available at https://academic.oup.com/mollus/article/83/2/161/2918118.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). The Lockes Pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition did not present substantial information indicating that the species should be listed.	
Number of Locations Reported (restricted to UT and NV)	5 sampling locations reported in Utah or Nevada [n = 5 sites]
Most Recent Observation (restricted to UT and NV)	**June 13, 2012** (*15 surveys total in UT or NV between 9/5/1973 and 6/13/2012*)

TAXONOMY

Pyrgulopsis lockensis is described in Hershler, 1998: 57-59, figs. 7C, 12F, 14G-I, 19A, 32A-C. *P. lockensis* has been assigned Invertebrate Taxon ID 5758 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis lockensis has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. lockensis* has been reported at 5 sites across its entire range. This species has been recorded at 5 locations in Nye County, Nevada. This species has been observed on 15 surveys between September 5, 1973 and June 13, 2012. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The spring where Lockes Pyrg occurs is a large, thermal limnocrene.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 10 times at 5 locations for this species, with average flow-per-location ranging from 4.45 to 15.63 liters per second [mean = 8.54 l/s, median = 7.42 l/s]. Specific Conductance was measured 10 times at 5 locations, with average specific conductance-per-location ranging from 784 to 870 µS/cm [mean = 834 µS/cm, median = 841 µS/cm]. Spring pH was measured 10 times at 5 locations, with average pH-per-location ranging from 6.89 to 7.29 [mean = 7.08, median = 7.01]. Temperature was measured 11 times at 5 locations, with average temperature-per-location ranging from 34 to 36° Celsius [mean = 35°C, median = 35°C].

All sites where this species occurred were **limnocrene** springs. Elevations for this species range from 1,461 m (4,793 ft) to 1,468 m (4,816 ft), with a mean of 1,464 m (4,803 ft) and median of 1,462 m (4,797 ft).

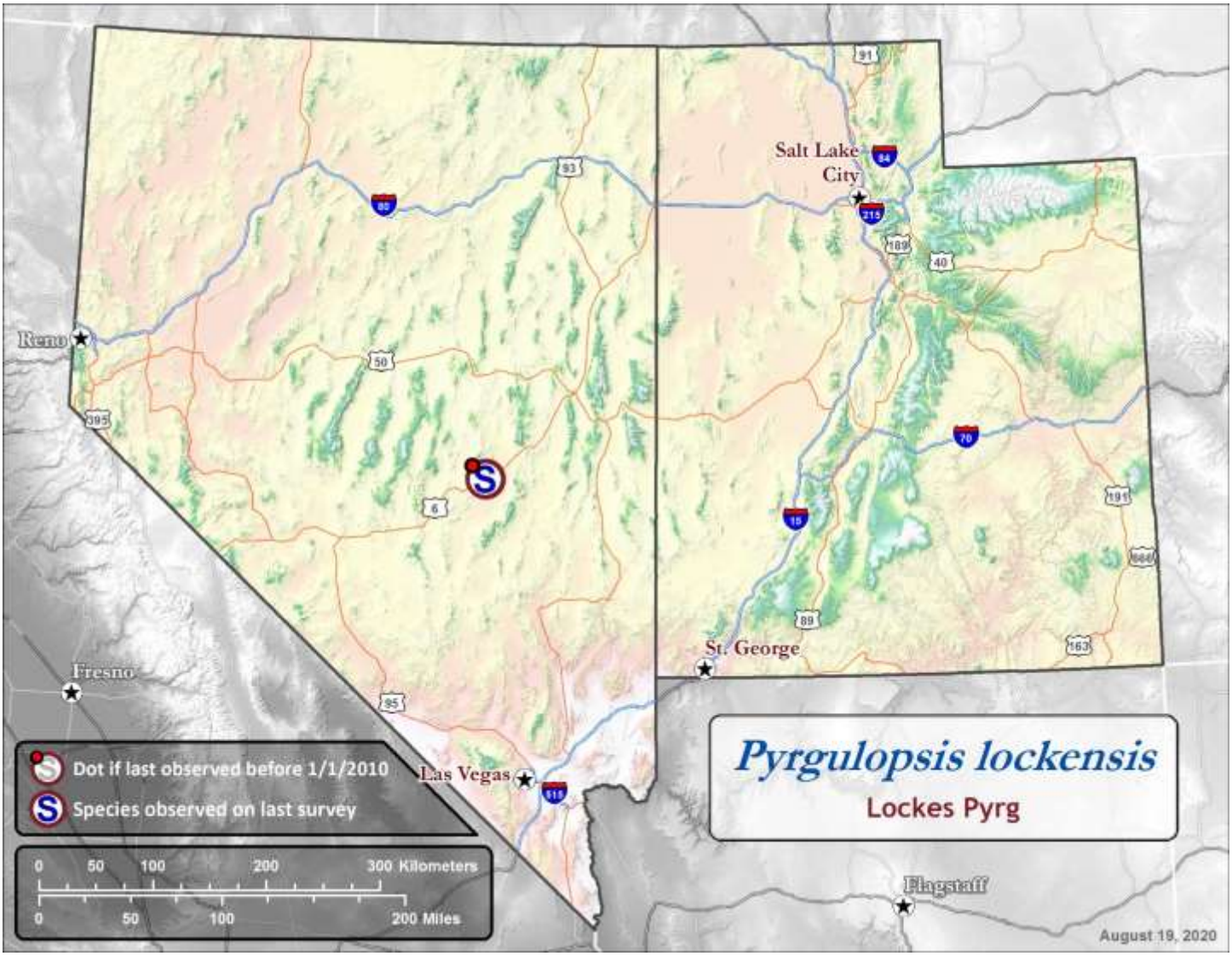
LAND MANAGEMENT

Of the 5 locations where *P. lockensis* were observed, 60% were located on **BLM** land (n = 3) and 40% on **Private** land (n = 2).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [87%; 13 surveys] and **Nevada Natural Heritage Data Import** [13%; 2 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Encyclopedia of Life (Year Unspecified) Pyrgulopsis lockensis. Available from http://www.eol.org. Website. Available at http://eol.org/pages/4859528/details#http://eol.org/pages/4859528/details#.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis lockensis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+lockensis (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S2S3: Imperiled/Vulnerable
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N2N3: Imperiled/Vulnerable
Global Status	G2G3: Imperiled/Vulnerable
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	41 sampling locations reported in Utah or Nevada [n = 37 sites]
Most Recent Observation (restricted to UT and NV)	**July 30, 2012** (*66 surveys total in UT or NV between 8/30/1979 and 7/30/2012*)

TAXONOMY

Pyrgulopsis longiglans is described in Hershler, 1998: 77-79, figs. 8F, 20M-P, 37A-C. *P. longiglans* has been assigned Invertebrate Taxon ID 6599 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis longiglans has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. longiglans* has been reported at 41 sampling locations across its entire range [n = 37 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded in 3 counties in Nevada, including 21 locations in Humboldt County, 17 in Washoe County and 3 in Douglas County. This species has been observed on 66 surveys between August 30, 1979 and July 30, 2012. The last surveys at 7 of these locations did not record any observations of this species. At 34 of these locations [83%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This species occurrs at multiple locations in Nevada between 1,202 and 2,103 meter elevation.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 20 times at 16 locations for this species, with average flow-per-location ranging from 0 to 0.68 liters per second [mean = 0.19 l/s, median = 0.08 l/s]. Specific Conductance was measured 33 times at 24 locations, with average specific conductance-per-location ranging from 103 to 445 µS/cm [mean = 269 µS/cm, median = 283 µS/cm]. Spring pH was measured 29 times at 22 locations, with average pH-per-location ranging from 7.25 to 8.78 [mean = 7.88, median = 7.87]. Temperature was measured 38 times at 29 locations, with average temperature-per-location ranging from 7 to 25° Celsius [mean = 17°C, median = 18°C].

This species was observed in **rheocrene** [74%; n = 23], **helocrene** [23%; n = 7] and **limnocrene** [3%; n = 1] springs. Elevations for this species range from 1,202 m (3,944 ft) to 2,103 m (6,900 ft), with a mean of 1,567 m (5,143 ft) and median of 1,595 m (5,233 ft).

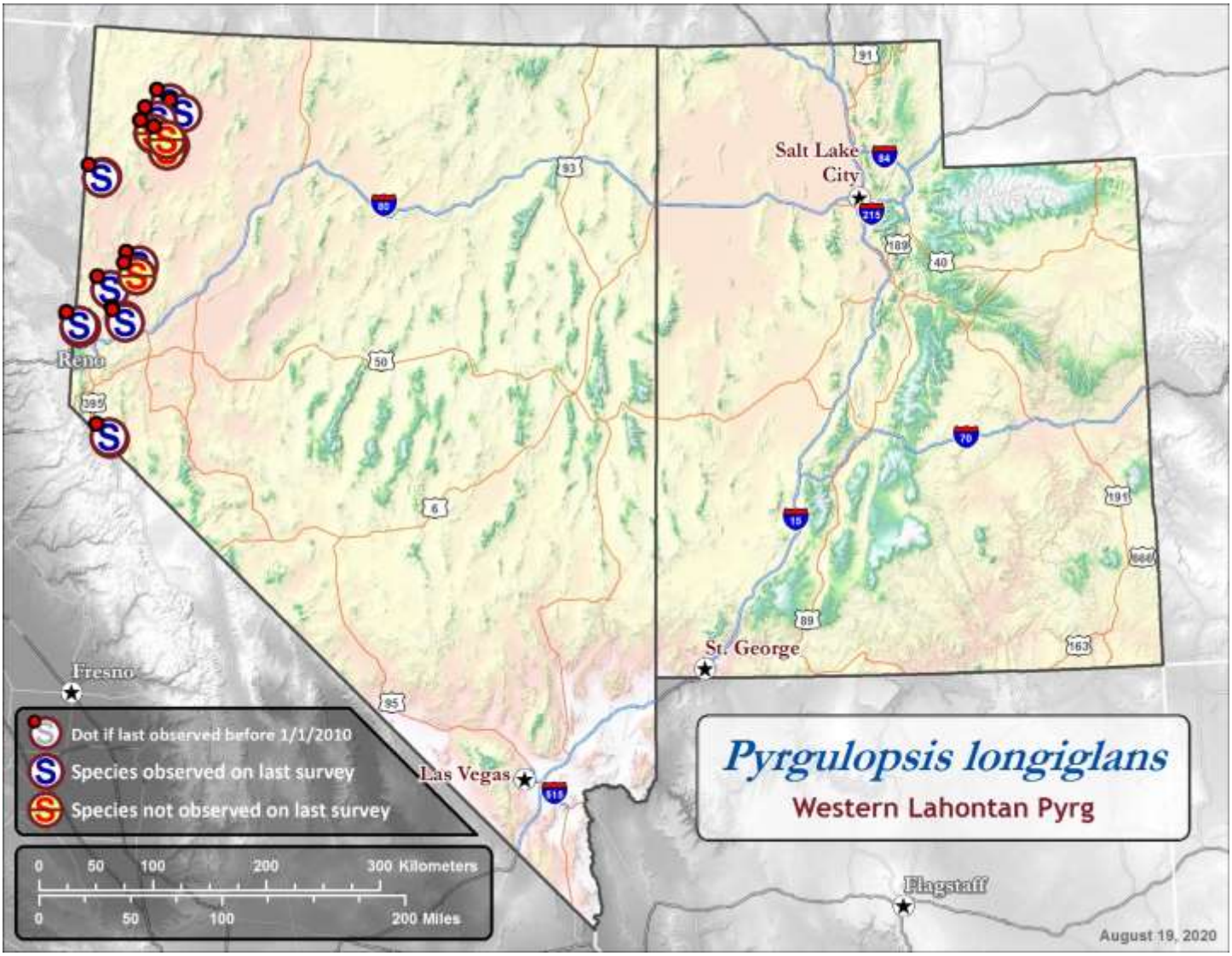
LAND MANAGEMENT

Of the 41 locations where *P. longiglans* were observed, 46% were located on **Private** land (n = 19), 41% on **BLM** land (n = 17) and 12% on **USFS** land (n = 5).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [64%; 42 surveys] and **Nevada Natural Heritage Data Import** [36%; 24 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis longiglans. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+longiglans (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N2: Imperiled
Global Status	G2: Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011) and 82 FR 46618 46645 (2017). Hardy pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	34 sampling locations reported in Utah or Nevada [n = 29 sites]
Most Recent Observation (restricted to UT and NV)	**July 2, 2016** (*70 surveys total in UT or NV between 9/2/1973 and 7/2/2016*)

TAXONOMY

Pyrgulopsis marcida is described in Hershler, 1998: 47-50, figs. 6J, 18D-F, 30A-C. *P. marcida* has been assigned Invertebrate Taxon ID 6602 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis marcida has been classified with an endemism level of "20-100 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. marcida* has been reported at 34 sampling locations across its entire range [n = 29 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded in 3 counties in Nevada, including 23 locations in Nye County, 6 in White Pine County and 5 in Lincoln County. This species has been observed on 70 surveys between September 2, 1973 and July 2, 2016. The last surveys at 3 of these locations did not record any observations of this species. At 14 of these locations [41%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Hardy pyrg occurs at several springs clusters in Nevada between 1,582 and 1,988 elevation.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 41 times at 27 locations for this species, with average flow-per-location ranging from 0.03 to 10 liters per second [mean = 1.45 l/s, median = 0.67 l/s]. Specific Conductance was measured 43 times at 29 locations, with average specific conductance-per-location ranging from 310 to 634 µS/cm [mean = 395 µS/cm, median = 385 µS/cm]. Spring pH was measured 22 times at 22 locations, with average pH-per-location ranging from 6.96 to 8.2 [mean = 7.75, median = 7.75]. Temperature was measured 43 times at 29 locations, with average temperature-per-location ranging from 13 to 21° Celsius [mean = 16°C, median = 16°C].

This species was observed in **rheocrene** [77%; n = 24], **limnocrene** [13%; n = 4] and **helocrene** [10%; n = 3] springs. Elevations for this species range from 1,582 m (5,190 ft) to 1,988 m (6,522 ft), with a mean of 1,698 m (5,570 ft) and median of 1,672 m (5,484 ft).

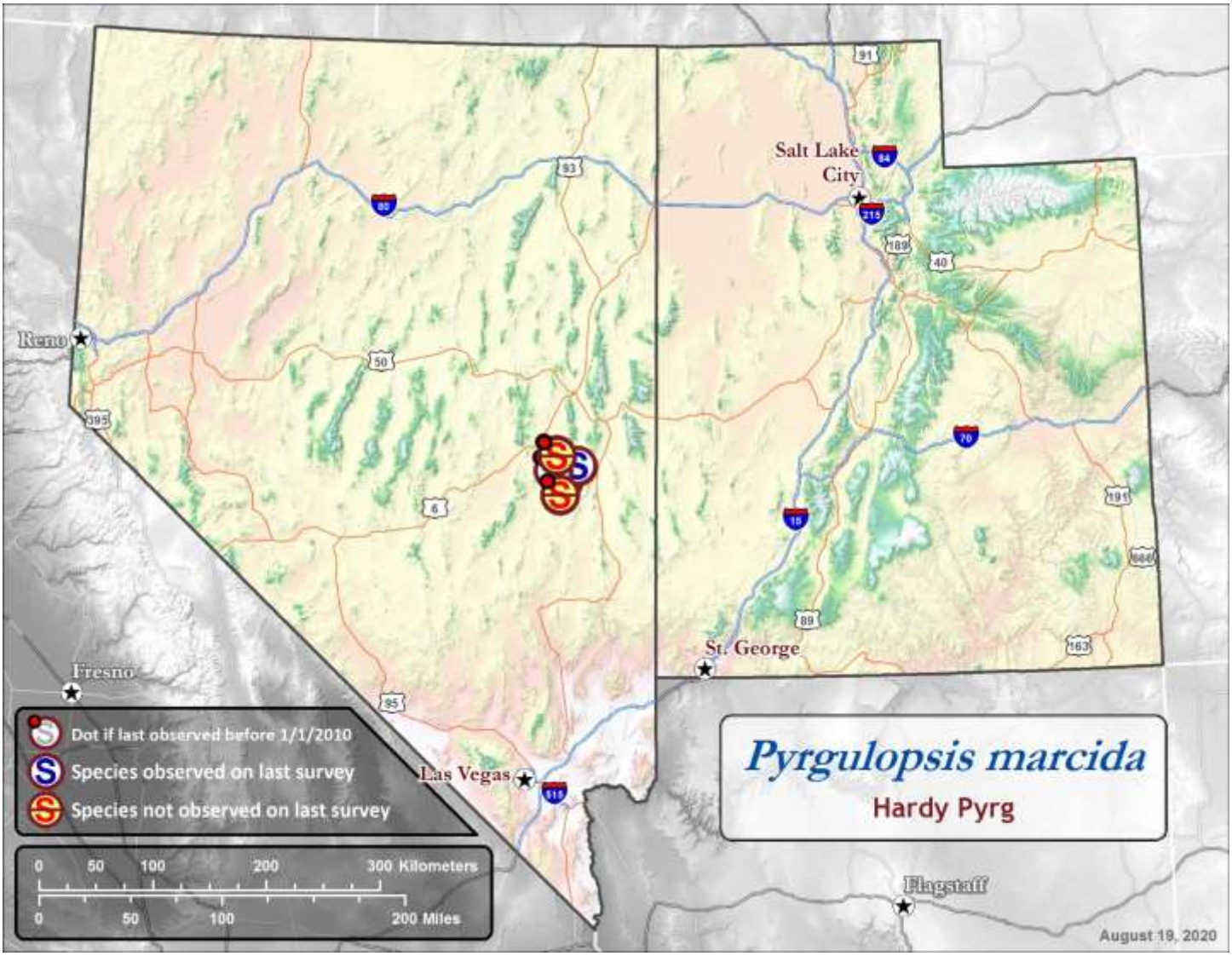
LAND MANAGEMENT

Of the 34 locations where *P. marcida* were observed, 76% were located on **Private** land (n = 26) and 24% on **BLM** land (n = 8).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [41%; 29 surveys], **Nevada Natural Heritage Data Import** [33%; 23 surveys] and **Sada Import 2017** [26%; 18 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis marcida. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+marcida (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah.This species has been recognized in the Federal Register: 82 FR 46618 46645 (2017), 76 FR 56608 56630 (2011), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 54 FR 554 579 (1989), 49 FR 21664 21675 (1984), and 41 FR 17742 17747 (1976). Pahranagat pebblesnail was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	11 sampling locations reported in Utah or Nevada [n = 9 sites]
Most Recent Observation (restricted to UT and NV)	**December 19, 2018** (*28 surveys total in UT or NV between 7/20/1969 and 12/19/2018*)

TAXONOMY

Fluminicola merriami is described in Pilsbry and Beecher in Pilsbry, 1892: 143. *Pyrgulopsis merriami* has been assigned Invertebrate Taxon ID 6603 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis merriami has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. merriami* has been reported at 11 sampling locations across its entire range [n = 9 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded in two counties in Nevada, including 7 locations in Lincoln County and 4 in Nye County. This species has been observed on 28 surveys between July 20, 1969 and December 19, 2018. The last surveys at 2 of these locations did not record any observations of this species. At 5 of these locations [45%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Pahranagat Pebblesnail occurs at thermal springs (Center for Biological Diversity 2009).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 9 times at 8 locations for this species, with average flow-per-location ranging from 0.05 to 548.33 liters per second [mean = 131.87 l/s, median = 5.53 l/s]. Specific Conductance was measured 13 times at 9 locations, with average specific conductance-per-location ranging from 514 to 653 µS/cm [mean = 580 µS/cm, median = 589 µS/cm]. Spring pH was measured 9 times at 8 locations, with average pH-per-location ranging from 7.3 to 7.8 [mean = 7.54, median = 7.5]. Temperature was measured 13 times at 9 locations, with average temperature-per-location ranging from 32 to 36° Celsius [mean = 34°C, median = 34°C].

This species was observed in **rheocrene** [89%; n = 8] and **limnocrene** [11%; n = 1] springs. Elevations for this species range from 1,102 m (3,615 ft) to 1,628 m (5,341 ft), with a mean of 1,299 m (4,261 ft) and median of 1,133 m (3,717 ft).

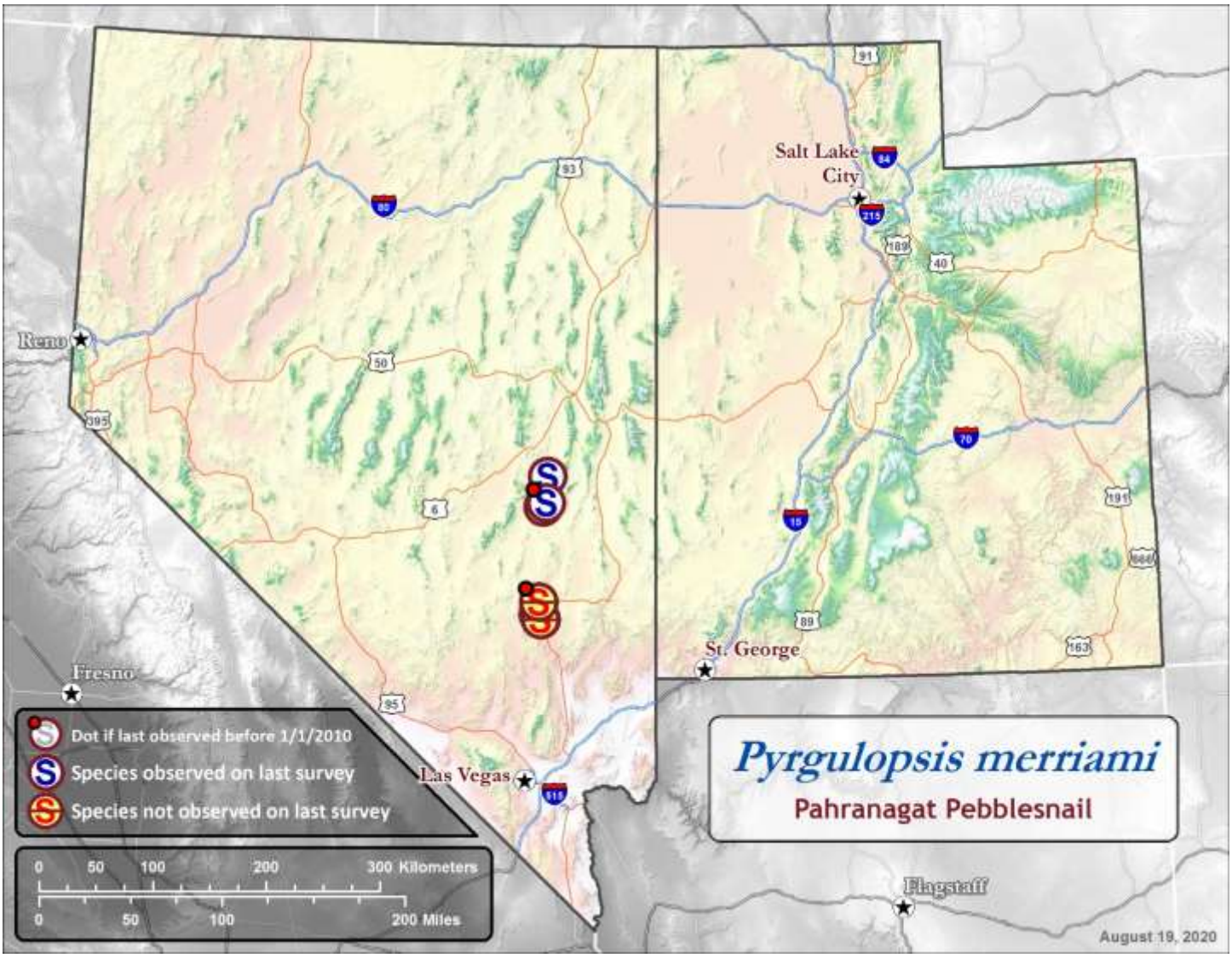
LAND MANAGEMENT

Of the 11 locations where *P. merriami* were observed, 55% were located on **BLM** land (n = 6) and 45% on **Private** land (n = 5).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [50%; 14 surveys], **Sada Import** [32%; 9 surveys], **Sada Import 2017** [14%; 4 surveys] and **NDOW- Southern Region** [4%; 1 survey] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis merriami. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+merriami (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

Oasis Valley Springsnail *Neotaenioglossa Hydrobiidae Pyrgulopsis micrococcus*

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	Unclassified
Global Status	Unclassified
IUCN Status	0: No immediate threat to the survival of the species
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	20 sampling locations reported in Utah or Nevada [n = 20 sites]
Most Recent Observation (restricted to UT and NV)	**July 3, 2019** (*31 surveys total in UT or NV between 6/27/0201 and 7/3/2019*)

TAXONOMY

Amnicola micrococcus is described in Pilsbry in Stearns, 1893: 277, fig. 1. *Pyrgulopsis micrococcus* has been assigned Invertebrate Taxon ID 5759 in the Springs Online database.

DISTRIBUTION

Hershler et al. states in 2013 that this species is known from several springs in Oasis Valley in the upper Amargosa River basin in Nevada. The type locality is a small spring in Oasis Valley, Nevada. Lectotype, ANSP 67279; paralectotypes, ANSP 368399, USNM 123622 (Hershler and Liu 2017). Its reported occurrence at Shaft Spring is dubious.

Pyrgulopsis micrococcus has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. micrococcus* has been reported at 20 sites across its entire range. This species has been recorded at 20 locations in Nye County, Nevada. This species has been observed on 31 surveys between June 27, 201 and July 3, 2019. The last surveys at 2 of these locations did not record any observations of this species. At 5 of these locations [25%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Hershler (1998) found that this species inhabits small springs and stream outflows where it is typically found on stone, travertine, watercress, and plant debris.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured a single time at 1.67 liters per second for this species. Specific Conductance was measured 11 times at 11 locations for this species, with average specific conductance-per-location ranging from 12 to 1,816 µS/cm [mean = 784 µS/cm, median = 793 µS/cm]. Spring pH was measured 3 times at 3 locations, with average pH-per-location ranging from 7.4 to 8 [mean = 7.63, median = 7.5]. Temperature was measured 11 times at 11 locations, with average temperature-per-location ranging from 15 to 28° Celsius [mean = 22°C, median = 22°C].

This species was observed in **helocrene** [62%; n = 8] and **rheocrene** [38%; n = 5] springs. Elevations for this species range from 710 m (2,329 ft) to 1,213 m (3,980 ft), with a mean of 1,135 m (3,725 ft) and median of 1,171 m (3,842 ft).

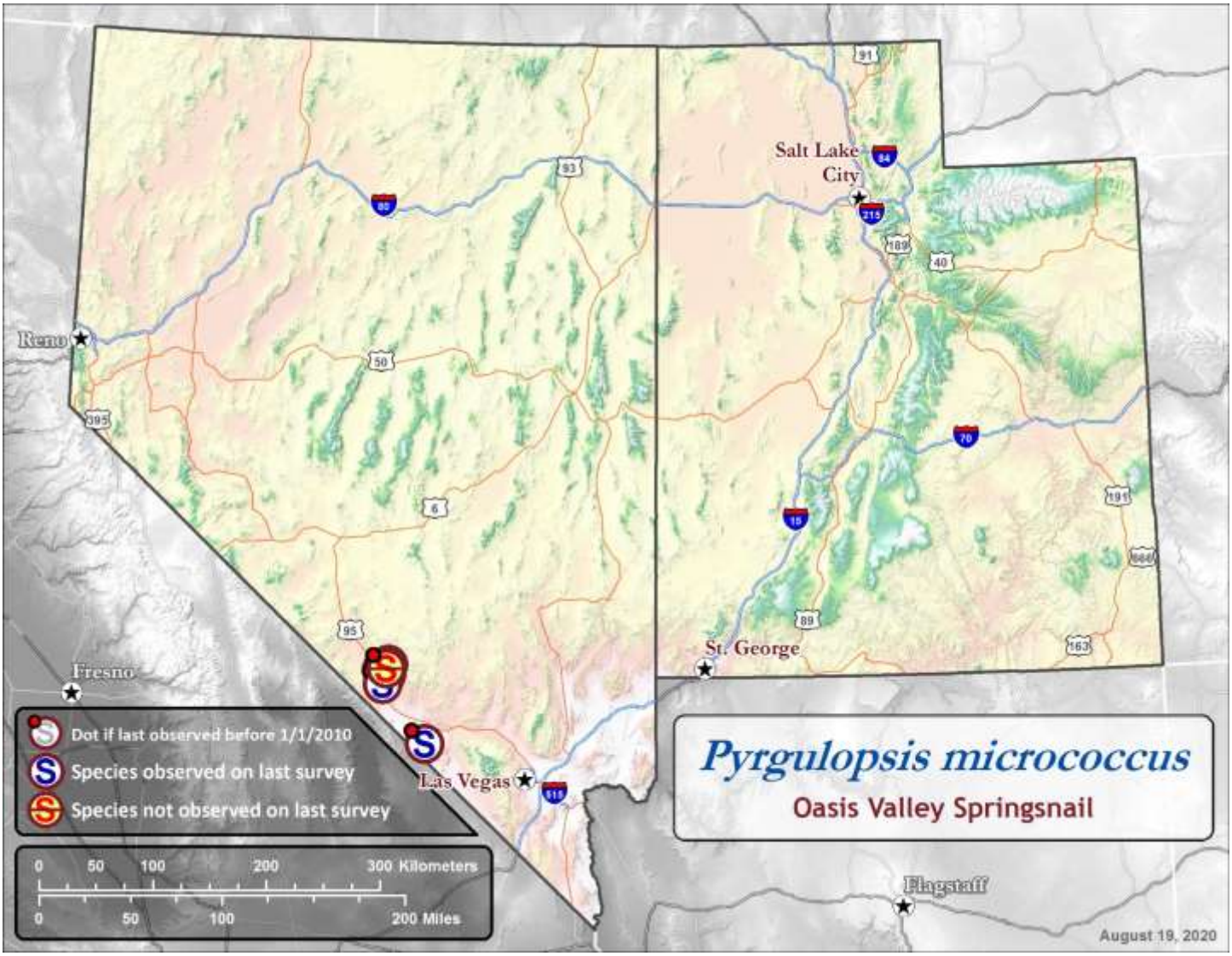
LAND MANAGEMENT

All 20 locations where *P. micrococcus* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **NDOW- Southern Region** [52%; 16 surveys], **Nevada Natural Heritage Data Import** [39%; 12 surveys] and **Sada Import** [10%; 3 surveys] projects.

RELATED LITERATURE

Hershler, R. (1989) Springsnails (Gastropoda: Hydrobiidae) of Owens and Amargosa River (Exclusive of Ash Meadows) Drainages, Death Valley System, California-Nevada. Proceedings of the Biological Society of Washington, 102:176-248. Publication. Available at http://si-pddr.si.edu/dspace/handle/10088/20441#http://si-pddr.si.edu/dspace/handle/10088/20441#.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., H. Liu, and C. Bradford (Year Unspecified) Pyrgulopsis micrococcus. Encyclopedia of Life. Website. Available at http://eol.org/pages/592697/details#http://eol.org/pages/592697/details#.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis micrococcus. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+micrococcus (Accessed 2019).

Robert Hershler, Hsiu-Ping Liu, and Corbin Bradford (2013) Systematics of a widely distributed western North American springsnail, Pyrgulopsis micrococcus (Caenogastropoda, Hydrobiidae), with descriptions of three new congeners. ZooKeys. Peer-reviewed article. Available at https://zookeys.pensoft.net/article/3635/.

U.S. Fish & Wildlife Service (2014) Oasis Valley Springsnail (Pyrgulopsis micrococcus). U.S. Fish & Wildlife Service, Washington D.C. Website. Available at

http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G010&ftb_embed=true#http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G010&ftb_embed=true#.

Northern Soldier Meadow Pyrg *Neotaenioglossa Hydrobiidae Pyrgulopsis militaris*

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**August 12, 2013** (*9 surveys total in UT or NV between 6/3/1978 and 8/12/2013*)

TAXONOMY

Pyrgulopsis militaris is described in Hershler, 1998: 79-80, figs. 8G, 15G-I, 21A-B, 37D-F. *P. militaris* has been assigned Invertebrate Taxon ID 5760 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis militaris has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. militaris* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in Humboldt County, Nevada. This species has been observed on 9 surveys between June 3, 1978 and August 12, 2013. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Northern Soldier Meadow Pyrg is only found at two springs in Humboldt County, Nevada, at 1400 meters elevation.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 2 times at 2 locations for this species, with average flow-per-location ranging from 0.67 to 3.33 liters per second [mean = 2 l/s, median = 2 l/s]. Specific Conductance was measured 2 times at 2 locations, with average specific conductance-per-location ranging from 134 to 215 µS/cm [mean = 175 µS/cm, median = 175 µS/cm]. Spring pH was measured 2 times at 2 locations, with average pH-per-location ranging from 7.36 to 8.2 [mean = 7.78, median = 7.78]. Temperature was measured 2 times at 2 locations, with average temperature-per-location ranging from 21 to 25° Celsius [mean = 23°C, median = 23°C].

Both sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,401 m (4,596 ft) to 1,403 m (4,603 ft), with a mean of 1,402 m (4,600 ft) and median of 1,402 m (4,600 ft).

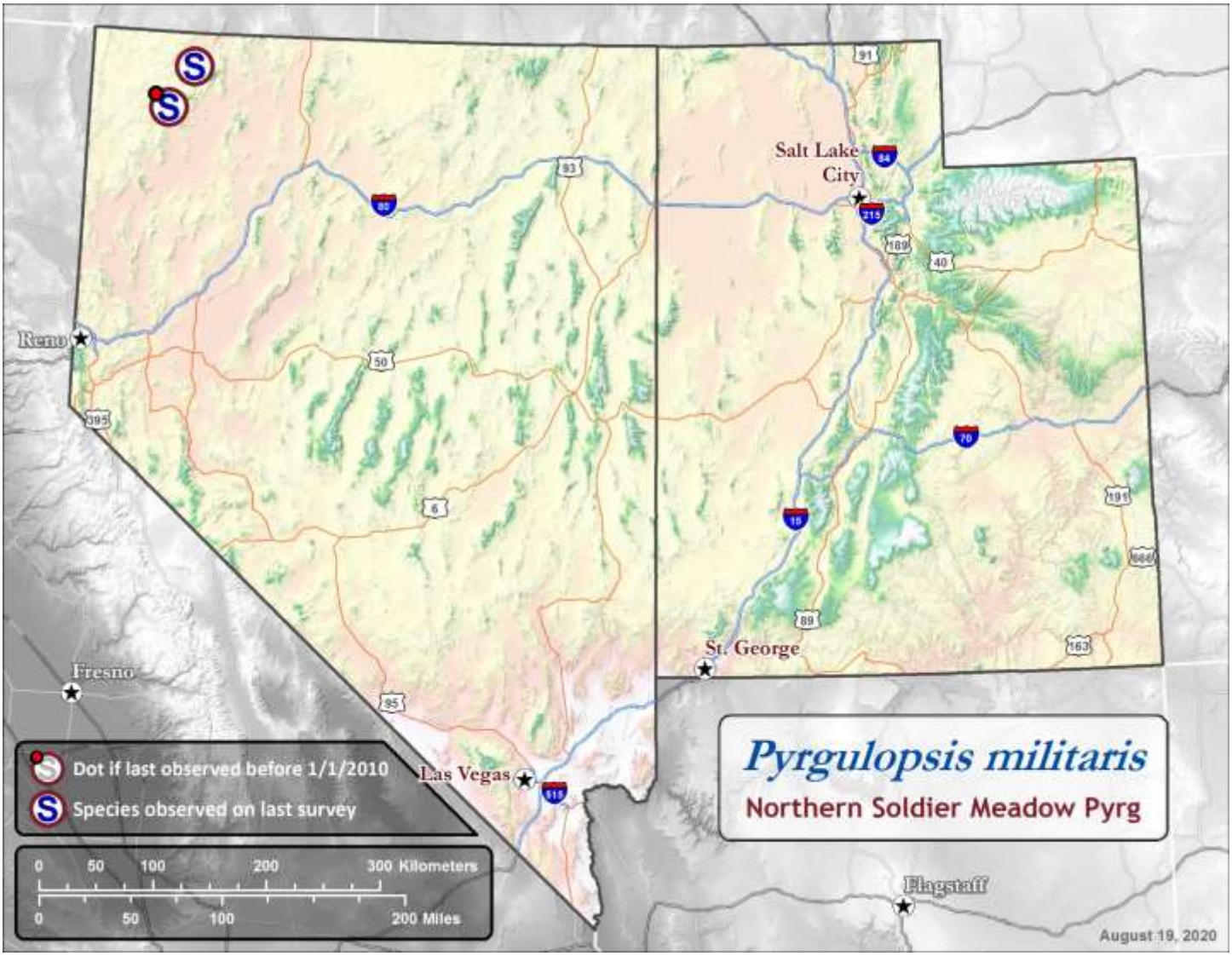
LAND MANAGEMENT

Both locations where *P. militaris* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [67%; 6 surveys] and **Sada Import** [33%; 3 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., H. Liu, and C. Bradford (Year Unspecified) Pyrgulopsis micrococcus. Encyclopedia of Life. Website. Available at http://eol.org/pages/592697/details#http://eol.org/pages/592697/details#.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis militaris. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+militaris (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**September 16, 2000** (*4 surveys total in UT or NV between 6/13/1989 and 9/16/2000*)

TAXONOMY

Pyrgulopsis millenaria is described in Hershler, 1998: 117-118, figs. 10C, 24F, 46A-B. *P. millenaria* has been assigned Invertebrate Taxon ID 6605 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis millenaria has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. millenaria* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in Elko County, Nevada. This species has been observed on 4 surveys between June 13, 1989 and September 16, 2000. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Twentyone Mile pyrg is only known to occur at one spring in Elko County, Nevada, at 1,568 meters.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured a single time at 635 µS/cm for this species. Spring pH was measured a single time at 7.5 for this species. Temperature was measured a single time at 17° Celsius for this species.

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,568 m (5,144 ft) to 1,568 m (5,144 ft), with a mean of 1,568 m (5,144 ft) and median of 1,568 m (5,144 ft).

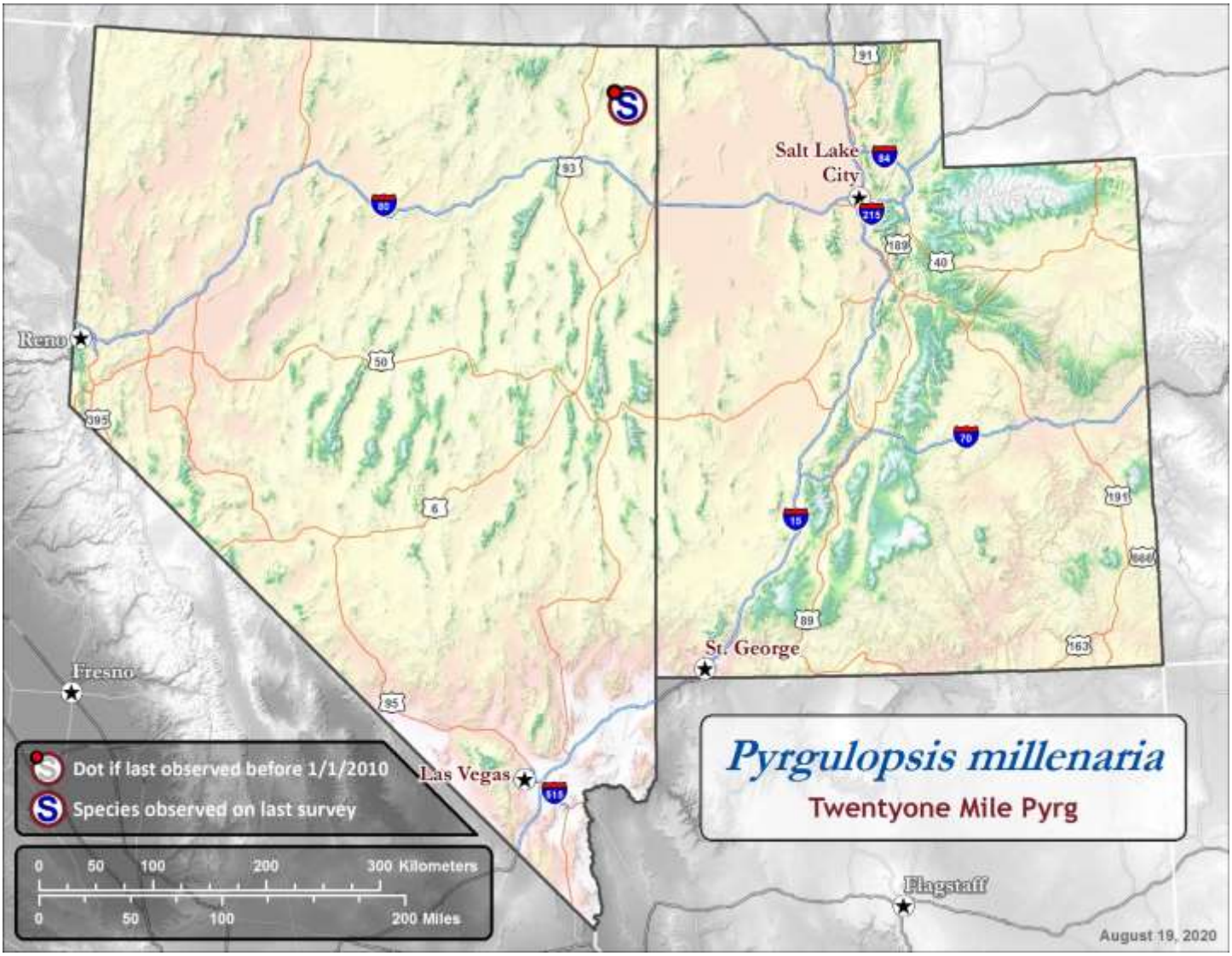
LAND MANAGEMENT

Both locations where *P. millenaria* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [75%; 3 surveys] and **Sada Import** [25%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis millenaria. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+millenaria (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. Camp Valley Pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition did not present substantial information indicating that the species should be listed.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**June 26, 2001** (*2 surveys total in UT or NV between 6/24/1992 and 6/26/2001*)

TAXONOMY

Pyrgulopsis montana is described in Hershler, 1998: 31, 33, figs. 6D, 11B, 12B, 17E, 27C-E. *P. montana* has been assigned Invertebrate Taxon ID 6606 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis montana has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. montana* has been reported at a single location. This species has been recorded at a single location in Lincoln County, Nevada. This species has been observed on 2 surveys between June 24, 1992 and June 26, 2001. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The spring where this species occurs is a small montane rheocrene (Hershler 1998).

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured a single time at 298 µS/cm for this species. Spring pH was measured a single time at 7.9 for this species. Temperature was measured a single time at 15° Celsius for this species.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 2,118 m (6,949 ft).

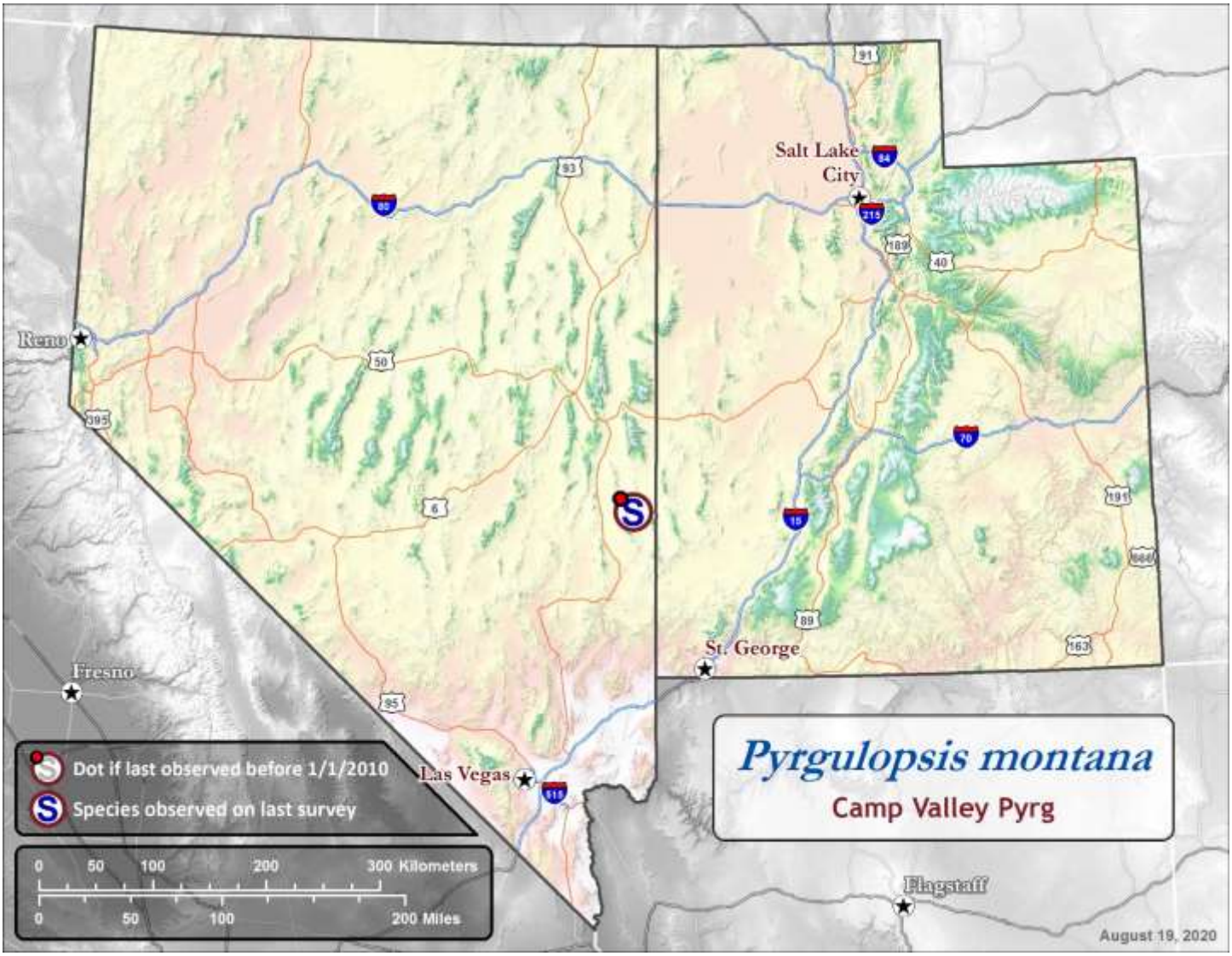
LAND MANAGEMENT

P. montana were observed at a single location on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [50%; 1 survey] and **Nevada Natural Heritage Data Import** [50%; 1 survey] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis montana. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+montana (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 54 FR 554 579 (1989), 49 FR 21664 21675 (1984). The Distal-Gland Springsnail was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	9 sampling locations reported in Utah or Nevada [n = 9 sites]
Most Recent Observation (restricted to UT and NV)	**April 23, 2008** (*14 surveys total in UT or NV between 3/2/1971 and 4/23/2008*)

TAXONOMY

Pyrgulopsis nanus is described in Hershler and Sada, 1987: 802-804, figs. 29a,d, 30-32, 33a,b. *P. nanus* has been assigned Invertebrate Taxon ID 5762 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis nanus has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. nanus* has been reported at 9 sites across its entire range. This species has been recorded at 9 locations in Nye County, Nevada. This species has been observed on 15 surveys between March 2, 1971 and April 23, 2008. The last surveys at 3 of these locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Sada (1990) reports that this species uses soft substrates in thermal springs. Hershler and Sada (1987) report that this snail is locally common in the upper segments of streams on soft sediment and loose travertine.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 5 times at 5 locations for this species, with average flow-per-location ranging from 0.02 to 1.25 liters per second [mean = 0.59 l/s, median = 0.42 l/s]. Specific Conductance was measured 8 times at 6 locations, with average specific conductance-per-location ranging from 650 to 1,924 µS/cm [mean = 1,414 µS/cm, median = 1,447 µS/cm]. Spring pH was measured 5 times at 5 locations, with average pH-per-location ranging from 7 to 7.7 [mean = 7.32, median = 7.4]. Temperature was measured 9 times at 6 locations, with average temperature-per-location ranging from 25 to 35° Celsius [mean = 30°C, median = 29°C].

This species was observed in **rheocrene** [86%; n = 6] and **limnocrene** [14%; n = 1] springs. Elevations for this species range from 698 m (2,290 ft) to 716 m (2,349 ft), with a mean of 707 m (2,320 ft) and median of 708 m (2,323 ft).

LAND MANAGEMENT

Of the 9 locations where *P. nanus* were observed, 56% were located on **FWS** land (n = 5), 33% on **Private** land (n = 3) and 11% on **BLM** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION

SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [60%; 9 surveys] and **Nevada Natural Heritage Data Import** [40%; 6 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1994) A review of the North American freshwater snail genus Pyrgulopsis (Hydrobiidae). Smithsonian Contributions to Zoology 554:1-115. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/5139/SCtZ-0554-Lo_res.pdf?sequence=2&isAllowed=y.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., Sada, D.W. (1987) Springsnails (Gastropoda: Hydrobiidae) of Ash Meadows, Amargosa basin, California-Nevada. Proceedings of the Biological Society of Washington: Pg 776-843. Publication. Available at https://repository.si.edu/handle/10088/11319.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis nanus. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+nanus (Accessed 2019).

Sada, D.W. (1990) Recovery Plan for the Endangered and Threatened Species of Ash Meadows, Nevada. U.S. Fish and Wildlife Service, Portalnd, Oregon. 130 pp. Report. Available at http://ecos.fws.gov/docs/recovery_plan/900928d.pdf##.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

Neritiform Steptoe Ranch Pyrg *Neotaenioglossa Hydrobiidae Pyrgulopsis neritella*

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). This species was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**October 18, 2000** (*3 surveys total in UT or NV between 9/2/1980 and 10/18/2000*)

TAXONOMY

Pyrgulopsis neritella is described in Hershler 1998: 68-70, figs. 7L, 11G, 20A, 35A-B. The type locality is springs north of Steptoe Ranch, Steptoe Valley, White Pine County, Nevada. Holotype, USNM 883932; paratypes, USNM 860684. (Hershler and Liu 2017) *P. neritella* has been assigned Invertebrate Taxon ID 6610 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis neritella has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. neritella* has been reported at a single location. This species has been recorded at a single location in White Pine County, Nevada. This species has been observed on 3 surveys between September 2, 1980 and October 18, 2000. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Center for Biological Diversity (2009) states that this species occurs in a thermal rheocrene.

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. This species has been recorded at a single elevation of 1,867 m (6,125 ft).

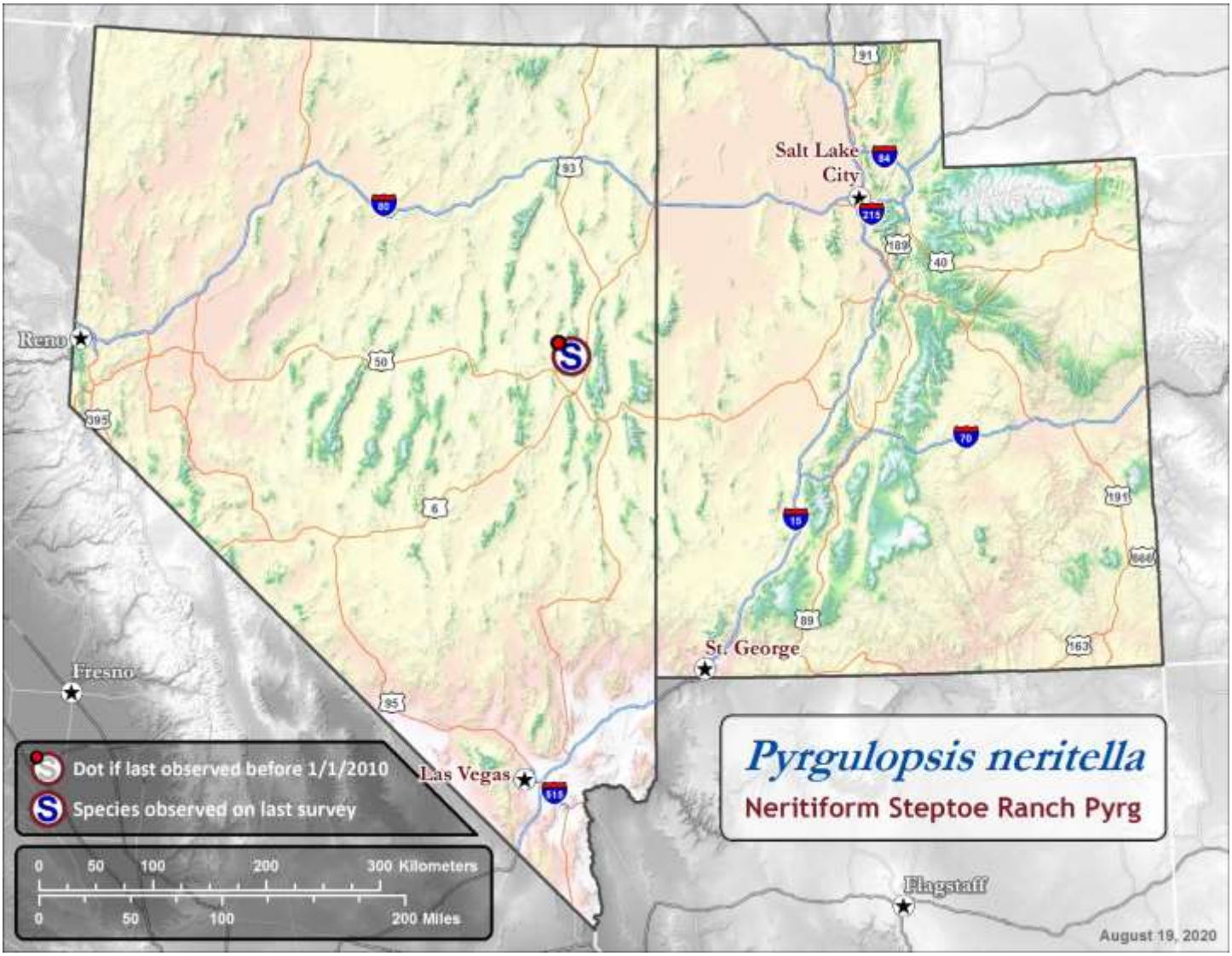
LAND MANAGEMENT

P. neritella were observed at a single location on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

All surveys that contributed data to this summary were conducted by the **Nevada Natural Heritage Data Import** project.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis neritella. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+neritella (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	SX: Presumed Extirpated
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	NX: Presumed Extirpated
Global Status	GX: Presumed Extinct or Eliminated
IUCN Status	6: Extinct or presumed extinct
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. The sole population at Pyramid Lake is thought to be extirpated or extinct. Hershler (1994) considered this species was extinct when he described it. As of 1/2020, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**January 1, 1962** (*7 surveys total in UT or NV between 1/1/1883 and 1/1/1962*)

TAXONOMY

This species has also been reported as Pyramid Lake pebblesnail. *Pyrgulopsis nevadensis* has been assigned Invertebrate Taxon ID 6611 in the Springs Online database.

DISTRIBUTION

This species has only been collected at Pyramid Lake, Washoe County, Nevada in the western Great Basin. It has not been collected since prior to year 2000, and may now be extinct.

Pyrgulopsis nevadensis has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. nevadensis* has been reported at 2 sites across its entire range. Species observations have been recorded in two counties in Nevada, including 1 location in Mineral County and 1 in Washoe County. This species has been observed on 7 surveys between January 1, 1883 and January 1, 1962. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

In 2016, no data were available in Natureserve. This species is considered extirpated or extinct.

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. Elevations for this species range from 1,159 m (3,802 ft) to 1,207 m (3,960 ft), with a mean of 1,183 m (3,881 ft) and median of 1,183 m (3,881 ft).

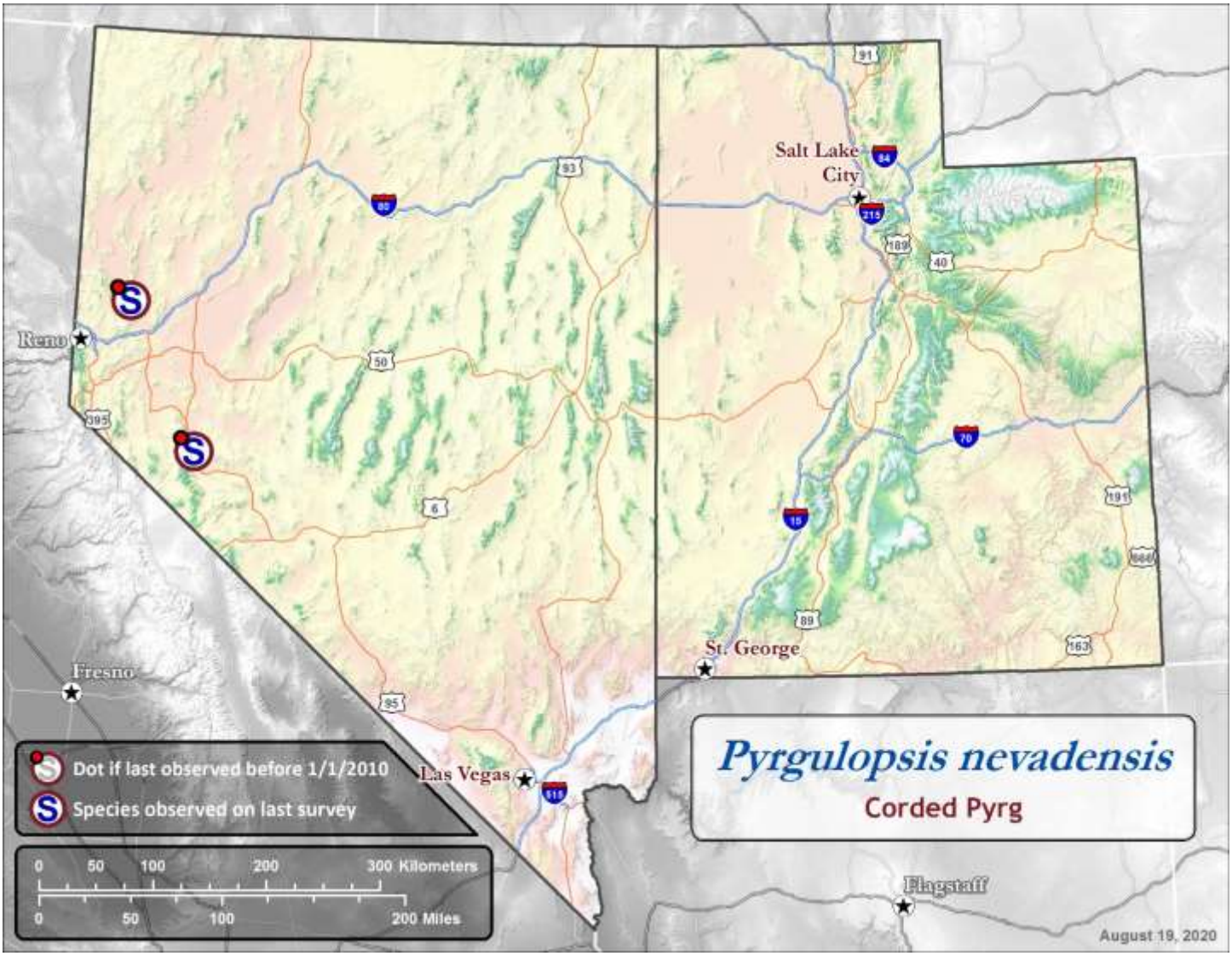
LAND MANAGEMENT

Of the 2 locations where *P. nevadensis* were observed, 50% were located on **BLM** land (n = 1) and 50% on **Tribal** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

All surveys that contributed data to this summary were conducted by the **Nevada Natural Heritage Data Import** project.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	3 sampling locations reported in Utah or Nevada [n = 3 sites]
Most Recent Observation (restricted to UT and NV)	**January 1, 1998** (*3 surveys total in UT or NV between 7/15/1993 and 1/1/1998*)

TAXONOMY

Pyrgulopsis nonaria is described in Hershler, 1998: 125, 127, figs. 10I, 25G, 48A-C. *P. nonaria* has been assigned Invertebrate Taxon ID 10736 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis nonaria has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. nonaria* has been reported at 3 sites across its entire range. This species has been recorded at 3 locations in Sanpete County, Utah. This species has been observed on 3 surveys between July 15, 1993 and January 1, 1998. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Ninemile Pyrg occurrs at three locations on private land in Sanpete County, Utah, at 1,650 meters.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured a single time at 1,213 µS/cm for this species. Spring pH was measured a single time at 8.1 for this species. Temperature was measured a single time at 12° Celsius for this species.

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,649 m (5,410 ft) to 1,656 m (5,433 ft), with a mean of 1,651 m (5,418 ft) and median of 1,649 m (5,410 ft).

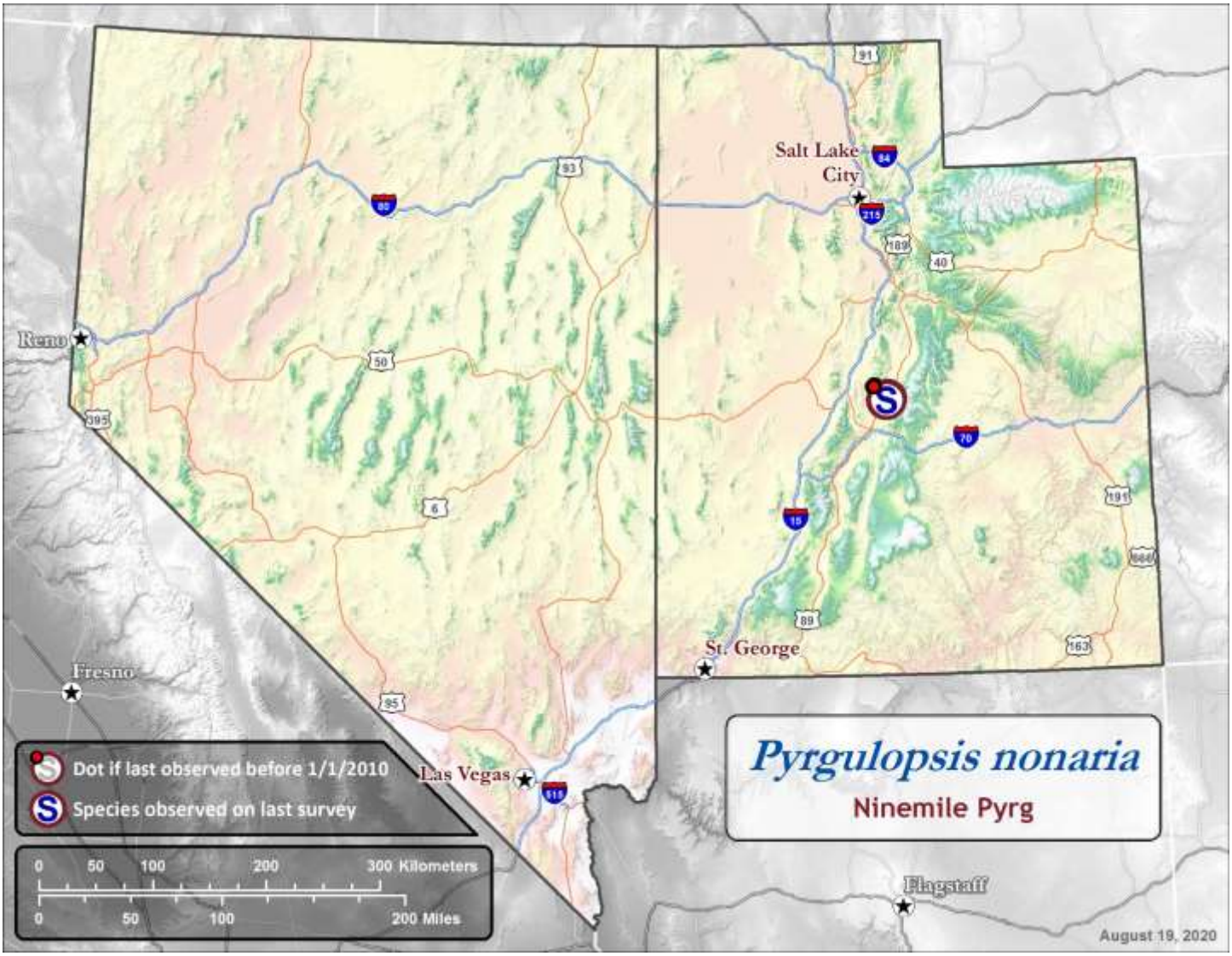
LAND MANAGEMENT

All 3 locations where *P. nonaria* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Utah CAS Import** [67%; 2 surveys] and **Sada Import** [33%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis nonaria. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+nonaria (Accessed 2019).

Elongate Mud Meadows Pyrg *Neotaenioglossa Hydrobiidae Pyrgulopsis notidicola*

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah.	
Number of Locations Reported (restricted to UT and NV)	8 sampling locations reported in Utah or Nevada [n = 7 sites]
Most Recent Observation (restricted to UT and NV)	**June 6, 2018** (*19 surveys total in UT or NV between 8/30/1979 and 6/6/2018*)

TAXONOMY

Pyrgulopsis notidicola is described in Hershler, 1998: 83-84, figs. 8J, 21G-H, 38F-H. *P. notidicola* has been assigned Invertebrate Taxon ID 5764 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis notidicola has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. notidicola* has been reported at 8 sampling locations across its entire range [n = 7 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. This species has been recorded at 8 locations in Humboldt County, Nevada. This species has been observed on 19 surveys between August 30, 1979 and June 6, 2018. At 6 of these locations [75%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Elongate Mud Meadows Pyrg has only been reported in Soldier Meadow that encompasses a province of 50 thermal, connected and isolated springs in an alluvial basin at the northwestern terminus of the Black Rock Desert.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 8 times at 8 locations for this species, with average flow-per-location ranging from 0.01 to 0.5 liters per second [mean = 0.14 l/s, median = 0.03 l/s]. Specific Conductance was measured 11 times at 8 locations, with average specific conductance-per-location ranging from 303 to 480 µS/cm [mean = 389 µS/cm, median = 378 µS/cm]. Spring pH was measured 3 times at 2 locations, with average pH-per-location ranging from 8.65 to 8.9 [mean = 8.78, median = 8.78]. Temperature was measured 11 times at 8 locations, with average temperature-per-location ranging from 24 to 44° Celsius [mean = 36°C, median = 40°C].

This species was observed in **rheocrene** [63%; n = 5] and **helocrene** [38%; n = 3] springs. Elevations for this species range from 1,244 m (4,081 ft) to 1,394 m (4,573 ft), with a mean of 1,298 m (4,258 ft) and median of 1,244 m (4,081 ft).

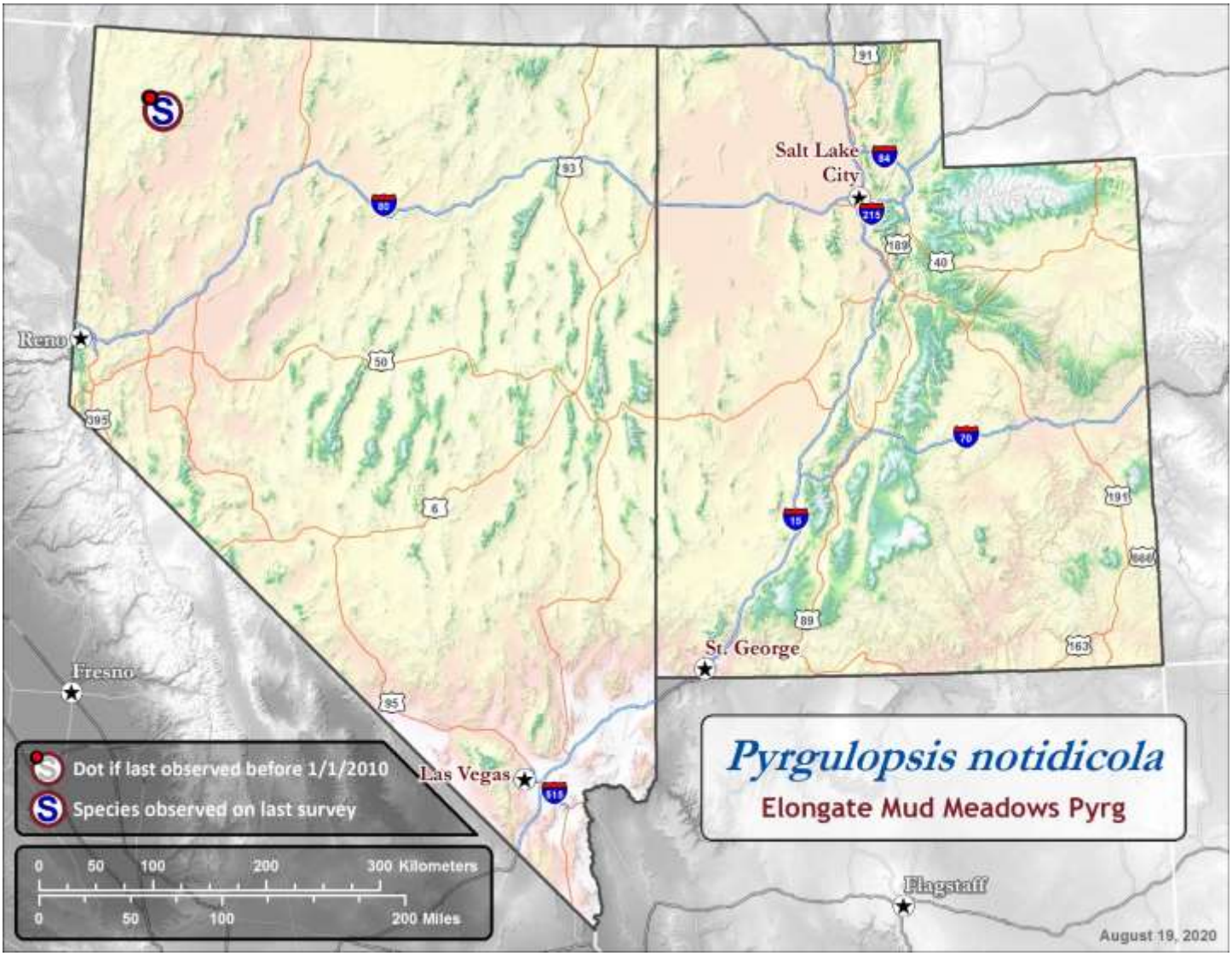
LAND MANAGEMENT

Of the 8 locations where *P. notidicola* were observed, 75% were located on **BLM** land (n = 6) and 25% on **Private** land (n = 2).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [58%; 11 surveys] and **Nevada Natural Heritage Data Import** [42%; 8 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., H. Liu and D.W. Sada (2007) Origin and Diversification of the Soldier Meadow Springsnails (Hydrobiidae: Pyrgulopsis), a Species Flock in the Northwestern Great Basin, United States. Journal of Molluscan Studies 73:167-183. Publication. Available at http://mollus.oxfordjournals.org/content/73/2/167.full.pdf#http://mollus.oxfordjournals.org/content/73/2/167.full.pdf#.

Near Toquerville Springsnail *Neotaenioglossa Hydrobiidae Pyrgulopsis nr kolobensis*

AGENCY STATUS / LISTING HISTORY

Nevada Status	S3: Vulnerable
Utah Status	S4: Apparently Secure
ESA Status	0: Not listed
National Status	N5: Secure
Global Status	G5: Secure
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	333 sampling locations reported in Utah or Nevada [n = 331 sites]
Most Recent Observation (restricted to UT and NV)	**July 4, 2019** (*429 surveys total in UT or NV between 5/12/1898 and 7/4/2019*)

TAXONOMY

Fontelicella kolobensis is described in Taylor, 1987: 19, fig. 8. *Pyrgulopsis nr kolobensis* has been assigned Invertebrate Taxon ID 6592 in the Springs Online database.

DISTRIBUTION

This species occurs in the eastern Great Basin and the lower Colorado River drainage in Idaho, Nevada, and Utah (Hershler 1998). The type locality is Toquerville Springs, Washington County, Utah. Holotype, LACM 2216 (Hershler and Liu 2017).

Pyrgulopsis nr kolobensis has been classified with an endemism level of "100-1000 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. nr kolobensis* has been reported at 333 sampling locations across its entire range [n = 331 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded at 205 locations in Utah (45 locations in Juab County, 32 in Tooele County, 28 in Millard County, 20 in Box Elder County, 18 in Utah County, 14 in Washington County, 10 in Iron County, 9 in Wasatch County, 6 in Morgan County, 5 in Cache County, 5 in Salt Lake County, 5 in Summit County, 3 in Weber County, 3 in Sevier County, 1 in Rich County and 1 in Davis County) and 128 locations in Nevada (69 locations in White Pine County, 30 in Elko County, 10 in Lincoln County, 10 in Eureka County and 9 in Nye County). This species has been observed on 429 surveys between May 12, 1898 and July 4, 2019. The last surveys at 15 of these locations did not record any observations of this species. At 282 of these locations [85%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Toquerville springsnail has been reported at multiple sites in Nevada and Utah between 1,051 and 2,523 meters.

The water quality variables Flow, Specific Conductance, pH, Temperature and Alkalinity were measured and recorded at sites where this species was observed. Flow was measured 30 times at 26 locations for this species, with average flow-per-location ranging from 0.02 to 85 liters per second [mean = 6.36 l/s, median = 0.35 l/s]. Specific Conductance was measured 193 times at 175 locations, with average specific conductance-per-location ranging from 90 to 1,996 µS/cm [mean = 524 µS/cm, median = 374 µS/cm]. Spring pH was measured 187 times at 177 locations, with average pH-per-location ranging from 4.8 to 8.6 [mean = 7.81, median = 7.9]. Temperature was measured 199 times at 180 locations, with average temperature-per-location ranging from 7 to 107° Celsius [mean = 16°C, median = 14°C]. Alkalinity was measured 2 times at 2 locations, with average alkalinity-per-location ranging from 95 to 96 mg/L [mean = 95.5 mg/L, median = 95.5 mg/L].

This species was observed in **rheocrene** [65%; n = 127], **limnocrene** [17%; n = 34], **helocrene** [15%; n = 29], **hillslope** [2%; n = 3], **anthropogenic** [1%; n = 1] and **hanging garden** [1%; n = 1] springs. Elevations for this species range from 1,079 m (3,540 ft) to 2,523 m (8,278 ft), with a mean of 1,672 m (5,484 ft) and median of 1,699 m (5,574 ft).

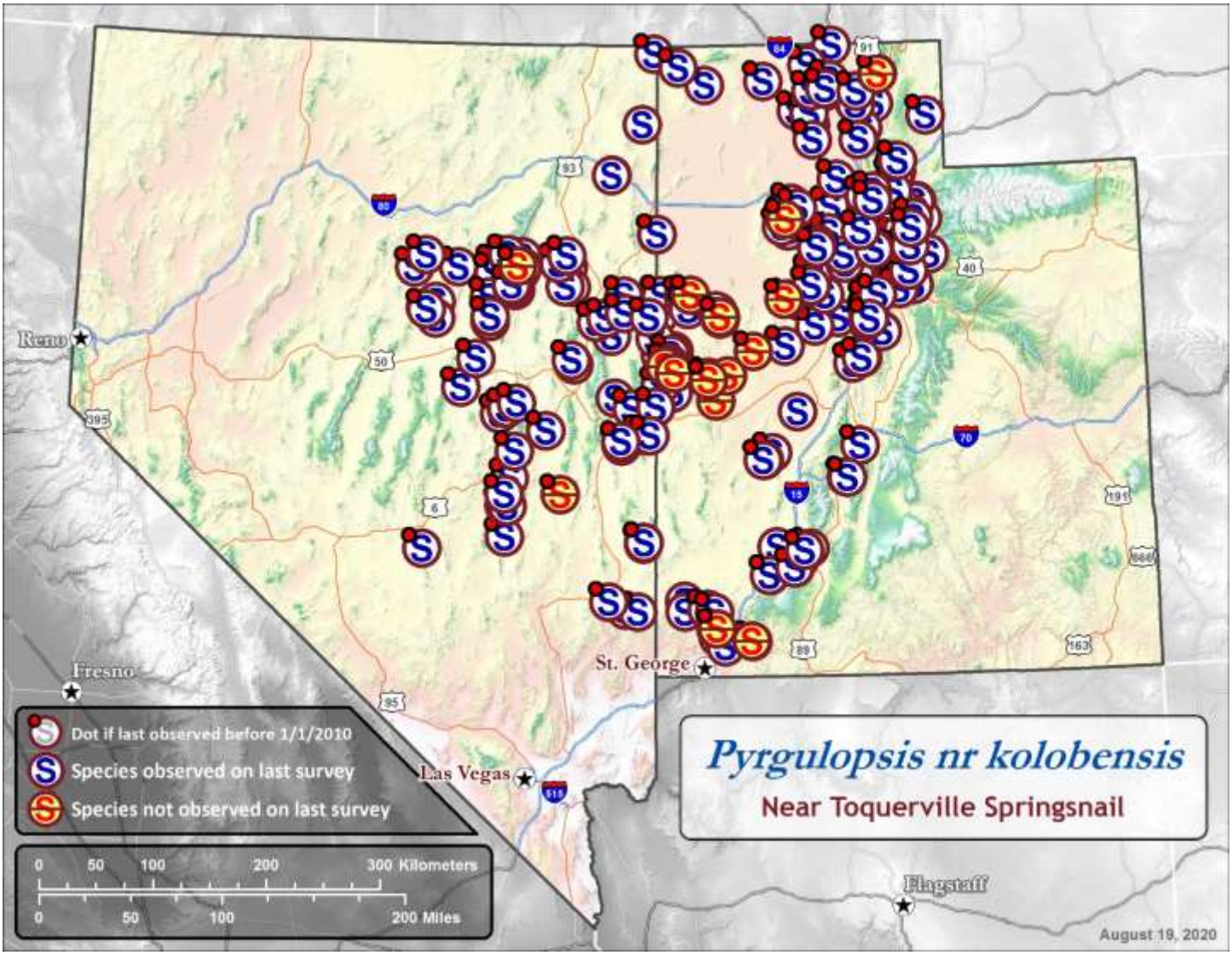
LAND MANAGEMENT

Of the 333 locations where *P. nr kolobensis* were observed, 47% were located on **Private** land (n = 157), 23% on **BLM** land (n = 76), 13% on **FWS** land (n = 42), 8% on **USFS** land (n = 26), 7% on **State** land (n = 23), 1% on **NPS** land (n = 4), 1% on **Tribal** land (n = 3), 0% on **BOR** land (n = 1) and 0% on **DOD** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [47%; 202 surveys], **Utah CAS Import** [38%; 162 surveys], **Nevada Natural Heritage Data Import** [14%; 62 surveys], **Nevada EPA 2018-19** [0%; 2 surveys] and [0%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO.

Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis kolobensis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+kolobensis (Accessed 2019).

Robert Hershler, Hsiu-Ping Liu, Cynthia Forsythe, Peter Hovingh, and Kevin Wheeler (2017) Partial revision of the Pyrgulopsis kolobensis complex (Caenogastropoda: Hydrobiidae), with resurrection of P. pinetorum and description of three new species from the Virgin River drainage, Utah. Journal of Molluscan Studies. Peer-reviewed article. Available at https://academic.oup.com/mollus/article/83/2/161/2918118.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	Unclassified
Global Status	Unclassified
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species is not in the NatureServe database. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**November 13, 1984** (*n = 1 survey in UT or NV*)

TAXONOMY

Pyrgulopsis nuwuvi is described in Hershler et al., 2017:161-171. This species was split from the *P. kolobensis* complex. *P. nuwuvi* has been assigned Invertebrate Taxon ID 15353 in the Springs Online database.

DISTRIBUTION

This species is found in several springs at Danish Ranch in the Dixie National Forest above the head of Water Canyon in Washington County, Utah (Hershler et al. 2017). The type locality is Danish Ranch, Washington County, Utah. Holotype, BellMNH 22236; paratypes: BellMNH 20889 (Hershler et al. 2017).

This species has not been classified by endemism level. In the Springs Online Database, *P. nuwuvi* has been reported at a single location. This species has been recorded at a single location in Washington County, Utah. One survey has observed this species, conducted on November 13, 1984. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Nuwuvi is the peoples name for the Southern Paiute Native Americans (Palmer, 1928).

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. This species has been recorded at a single elevation of 1,343 m (4,406 ft).

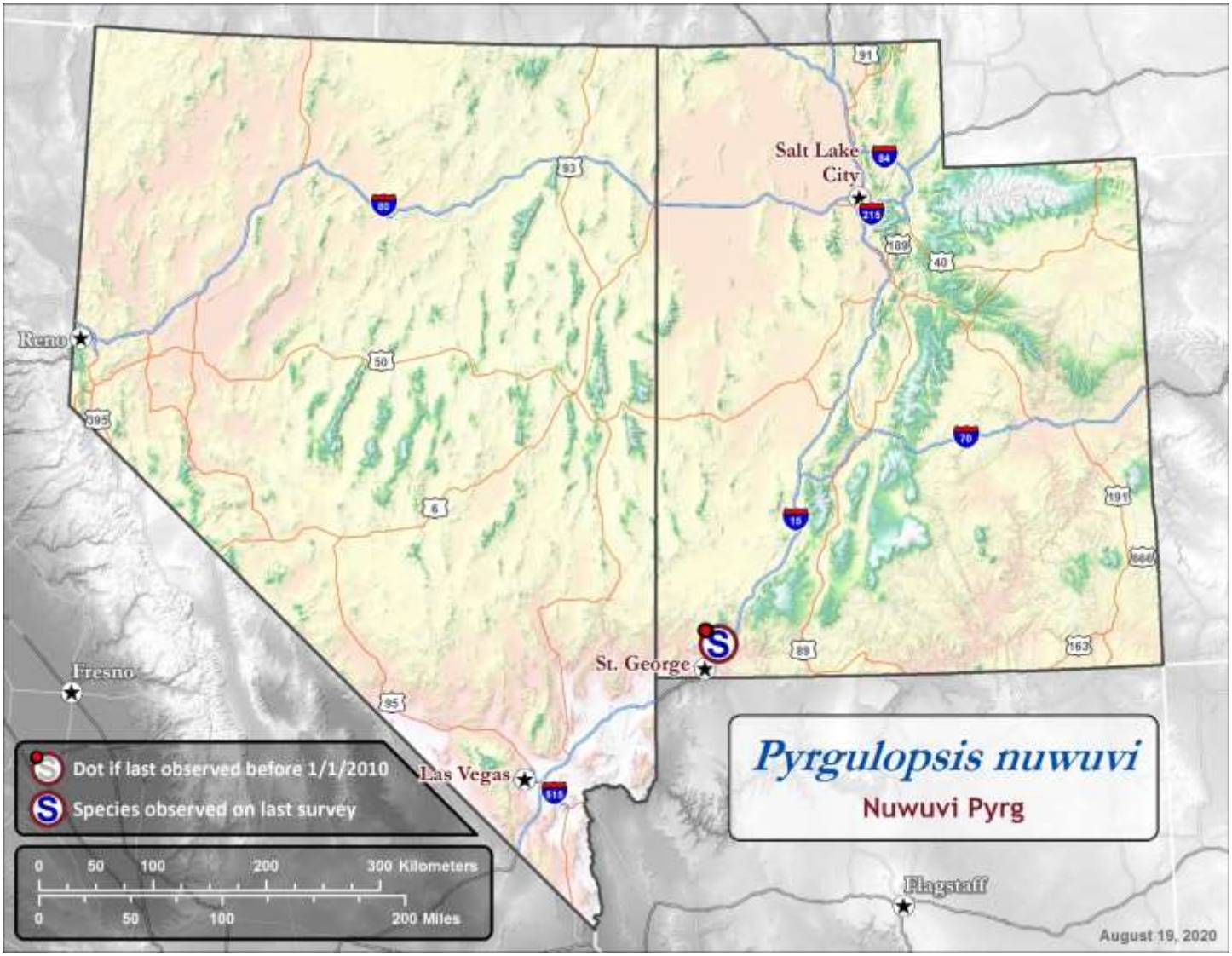
LAND MANAGEMENT

P. nuwuvi were observed at a single location on **USFS** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

The only project that contributed data to this summary was a single survey conducted by the **UDWR** project.

RELATED LITERATURE

Robert Hershler, Hsiu-Ping Liu, Cynthia Forsythe, Peter Hovingh, and Kevin Wheeler (2017) Partial revision of the Pyrgulopsis kolobensis complex (Caenogastropoda: Hydrobiidae), with resurrection of P. pinetorum and description of three new species from the Virgin River drainage, Utah. Journal of Molluscan Studies. Peer-reviewed article. Available at https://academic.oup.com/mollus/article/83/2/161/2918118.

Sub-globose Steptoe Ranch Pyrg *Neotaenioglossa Hydrobiidae Pyrgulopsis orbiculata*

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). Sub-globose Steptoe Ranch Pyrg was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**November 21, 1995** (*3 surveys total in UT or NV between 9/1/1980 and 11/21/1995*)

TAXONOMY

Pyrgulopsis orbiculata is described in Hershler 1998: 67-68, figs. 7K, 19L, 34F-G. *P. orbiculata* has been assigned Invertebrate Taxon ID 6614 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis orbiculata has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. orbiculata* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in White Pine County, Nevada. This species has been observed on 3 surveys between September 1, 1980 and November 21, 1995. The last survey at one of these locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Center for Biological Diversity (2009) states that one of the springs where this species occurs is a small rheocrene.

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. Elevations for this species range from 1,866 m (6,122 ft) to 1,869 m (6,132 ft), with a mean of 1,868 m (6,127 ft) and median of 1,868 m (6,127 ft).

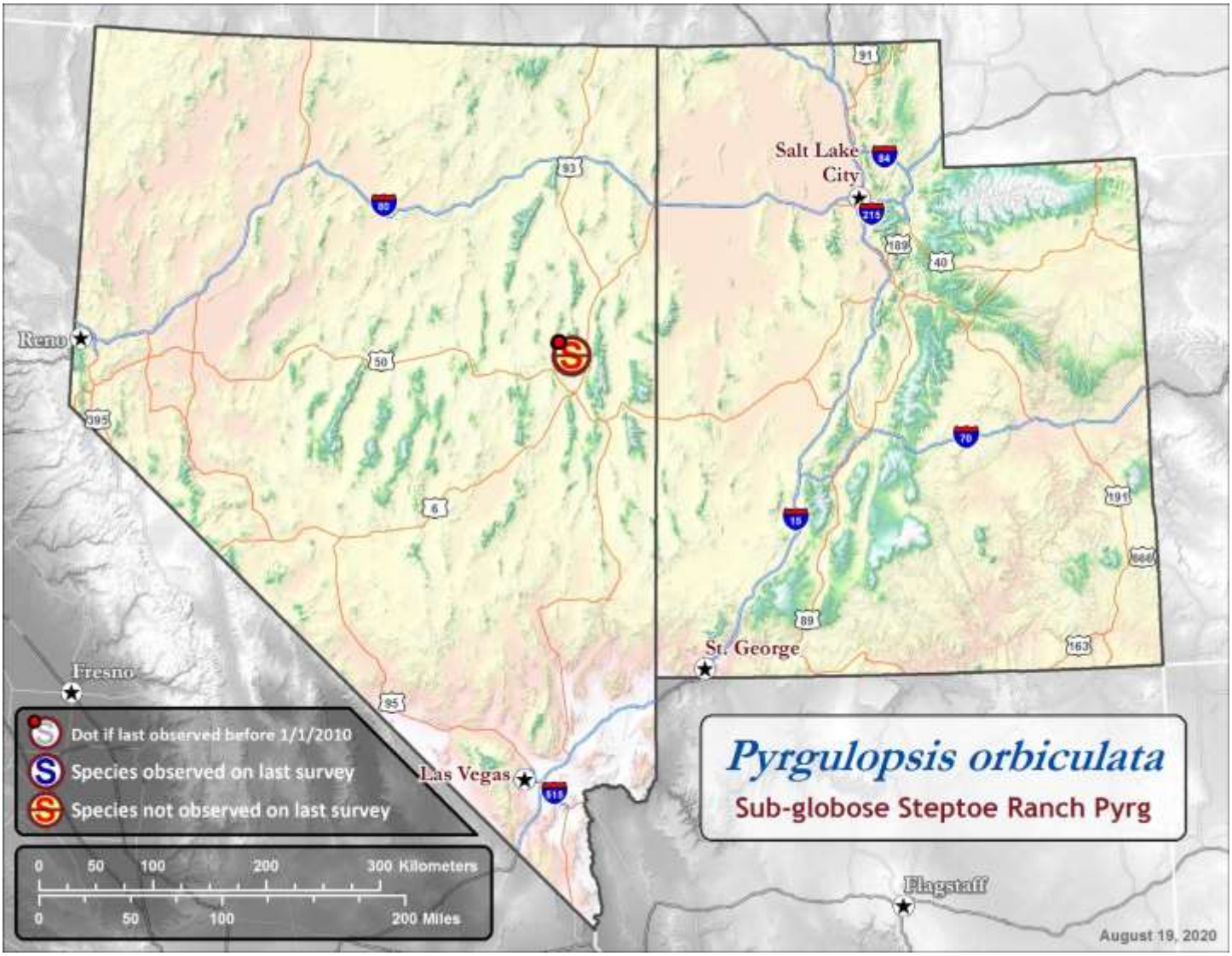
LAND MANAGEMENT

Both locations where *P. orbiculata* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

All surveys that contributed data to this summary were conducted by the **Nevada Natural Heritage Data Import** project.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis orbiculata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+orbiculata (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). Big Warm Spring pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition did not present substantial information indicating that the species should be listed.	
Number of Locations Reported (restricted to UT and NV)	3 sampling locations reported in Utah or Nevada [n = 3 sites]
Most Recent Observation (restricted to UT and NV)	**June 16, 2010** (*11 surveys total in UT or NV between 9/3/1973 and 6/16/2010*)

TAXONOMY

Pyrgulopsis papillata is described in Hershler 1998: 59-60, figs. 7D, 11E, 19B, 32D-E. *P. papillata* has been assigned Invertebrate Taxon ID 6618 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis papillata has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. papillata* has been reported at 3 sites across its entire range. This species has been recorded at 3 locations in Nye County, Nevada. This species has been observed on 11 surveys between September 3, 1973 and June 16, 2010. At 2 of these locations [67%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Center for Biological Diversity (2009) reported that one of the springs where this species occurs is a large thermal limnocrene that flows into a canal system and has bladderwort (*Utricularia*) in the spring pool.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 3 times at 2 locations for this species, with average flow-per-location ranging from 33.33 to 416.67 liters per second [mean = 225 l/s, median = 225 l/s]. Specific Conductance was measured 3 times at 2 locations, with average specific conductance-per-location ranging from 671 to 681 µS/cm [mean = 676 µS/cm, median = 676 µS/cm]. Spring pH was measured 4 times at 2 locations, with average pH-per-location ranging from 7.28 to 7.3 [mean = 7.29, median = 7.29]. Temperature was measured 5 times at 2 locations, with average temperature-per-location ranging from 32 to 32° Celsius [mean = 32°C, median = 32°C].

This species was observed in **limnocrene** [67%; n = 2] and **rheocrene** [33%; n = 1] springs. Elevations for this species range from 1,665 m (5,463 ft) to 1,710 m (5,610 ft), with a mean of 1,694 m (5,559 ft) and median of 1,708 m (5,604 ft).

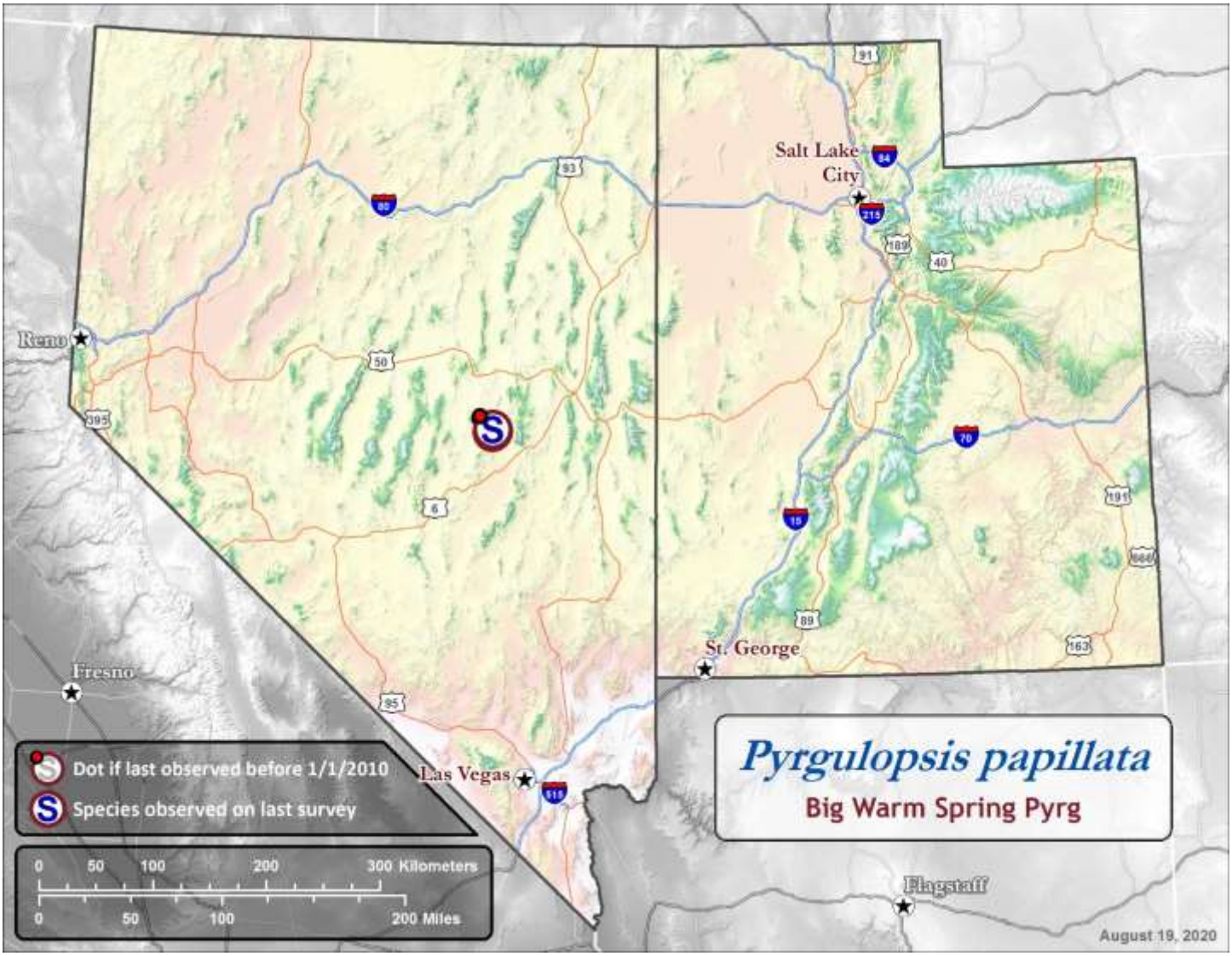
LAND MANAGEMENT

Of the 3 locations where *P. papillata* were observed, 67% were located on **Tribal** land (n = 2) and 33% on **Private** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [55%; 6 surveys] and **Sada Import** [45%; 5 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis papillata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+papillata (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N2: Imperiled
Global Status	G2: Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011) and 82 FR 46618 46645 (2017). Bifid duct pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	26 sampling locations reported in Utah or Nevada [n = 22 sites]
Most Recent Observation (restricted to UT and NV)	**July 1, 2016** (*49 surveys total in UT or NV between 8/6/1991 and 7/1/2016*)

TAXONOMY

Pyrgulopsis peculiaris is described in Hershler 1998: 108-110, figs. 9J, 23A-G, 43D-I. *P. peculiaris* has been assigned Invertebrate Taxon ID 6620 in the Springs Online database.

DISTRIBUTION

This species is known from six sites in Millard County, Utah, and two sites in White Pine County, Nevada. In White Pine County *P. peculiaris* occurs at an unnamed spring at Big Springs Creek in Snake Valley and at Turnley Spring in Spring Valley, but it may be extirpated at Turnley Spring (Golden et al. 2007). In Millard County this snail occurs at a spring in Maple Grove, and at Church Spring and T Spring at South Fork Chalk Creek in Pahvant Valley. It also occurs in the Sevier River drainage (Big Spring, Oak Creek, spring above Swasey Spring, Whirlwind Valley; Antelope Spring, House Range). The type locality is Maple Grove Spring, Round Valley, Millard County, Utah. Holotype, USNM 883933; paratypes, USNM 860703 (Hershler and Liu 2017).

Pyrgulopsis peculiaris has been classified with an endemism level of "20-100 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. peculiaris* has been reported at 26 sampling locations across its entire range [n = 22 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded at 14 locations in Nevada (all in White Pine County) and 12 locations in Utah (all in Millard County). This species has been observed on 49 surveys between August 6, 1991 and July 1, 2016. The last surveys at 4 of these locations did not record any observations of this species. At 8 of these locations [31%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Center for Biological Diversity (2009) states that this species occurs primarily in rheocrene springs.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 24 times at 21 locations for this species, with average flow-per-location ranging from 0.03 to 141.67 liters per second [mean = 13.72 l/s, median = 0.5 l/s]. Specific Conductance was measured 35 times at 25 locations, with average specific conductance-per-location ranging from 200 to 520 µS/cm [mean = 377 µS/cm, median = 392 µS/cm]. Spring pH was measured 13 times at 12 locations, with average pH-per-location ranging from 7.15 to 8.6 [mean = 7.75, median = 7.58]. Temperature was measured 35 times at 25 locations, with average temperature-per-location ranging from 9 to 16° Celsius [mean = 12°C, median = 13°C].

This species was observed in **rheocrene** [80%; n = 20], **helocrene** [8%; n = 2], **hillslope** [8%; n = 2] and **anthropogenic** [4%; n = 1] springs. Elevations for this species range from 1,603 m (5,259 ft) to 2,282 m (7,487 ft), with a mean of 1,919 m (6,295 ft) and median of 1,961 m (6,432 ft).

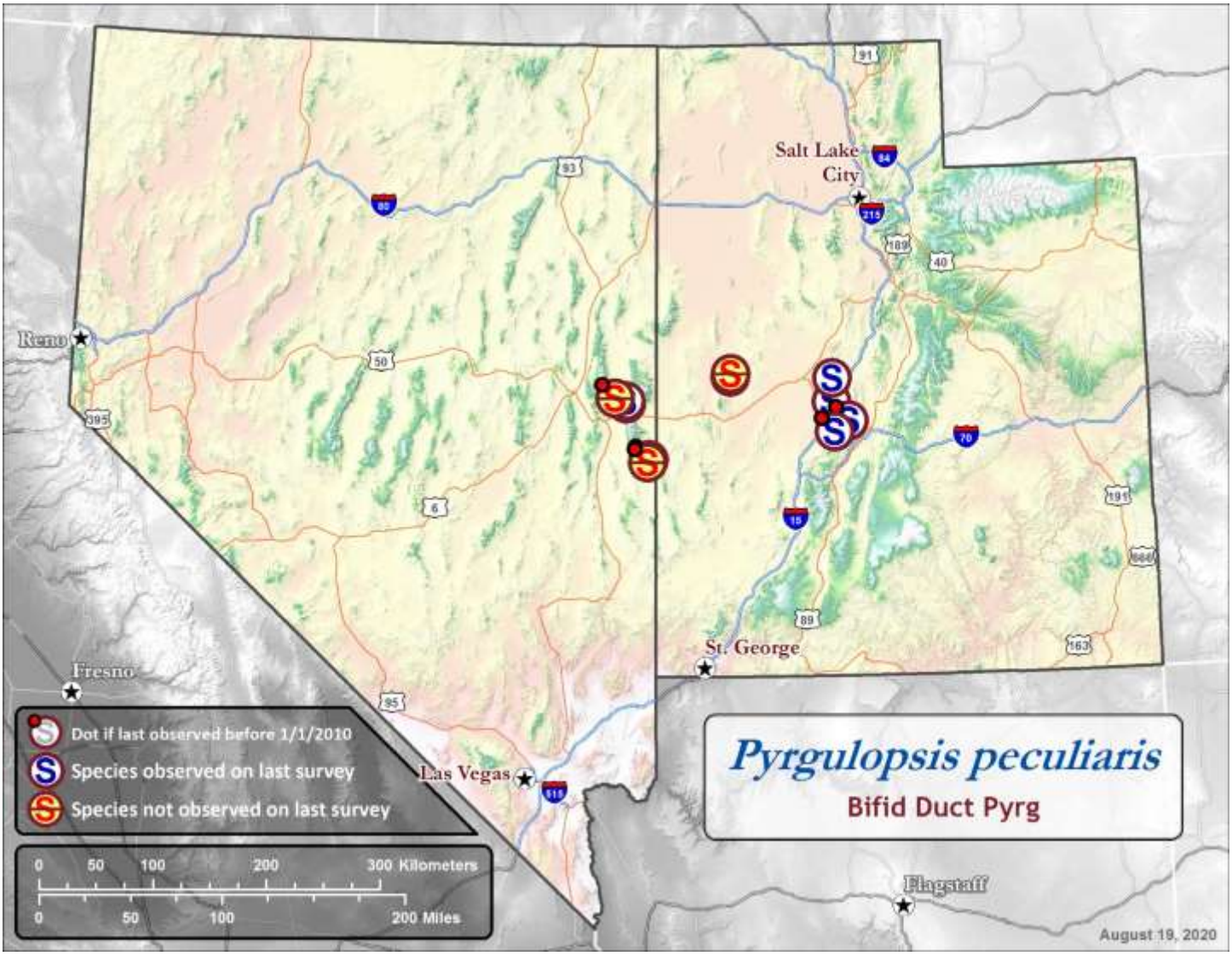
LAND MANAGEMENT

Of the 26 locations where *P. peculiaris* were observed, 42% were located on **BLM** land (n = 11), 35% on **USFS** land (n = 9) and 23% on **Private** land (n = 6).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [41%; 20 surveys], **Sada Import 2017** [31%; 15 surveys], **Nevada Natural Heritage Data Import** [20%; 10 surveys] and **Utah CAS Import** [8%; 4 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis peculiaris. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+peculiaris (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	Unclassified
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**July 6, 2001** (*3 surveys total in UT or NV between 6/8/1991 and 7/6/2001*)

TAXONOMY

Pyrgulopsis pellita is described in Hershler, 1998: 94-96, figs. 9F, 22F, 41D-F. *P. pellita* has been assigned Invertebrate Taxon ID 6621 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis pellita has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. pellita* has been reported at a single location. This species has been recorded at a single location in Eureka County, Nevada. This species has been observed on 3 surveys between June 8, 1991 and July 6, 2001. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Antelope Valley pyrg is only known to occur at one spring on private land in Eureka County, Nevada.

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. This species has been recorded at a single elevation of 2,081 m (6,827 ft).

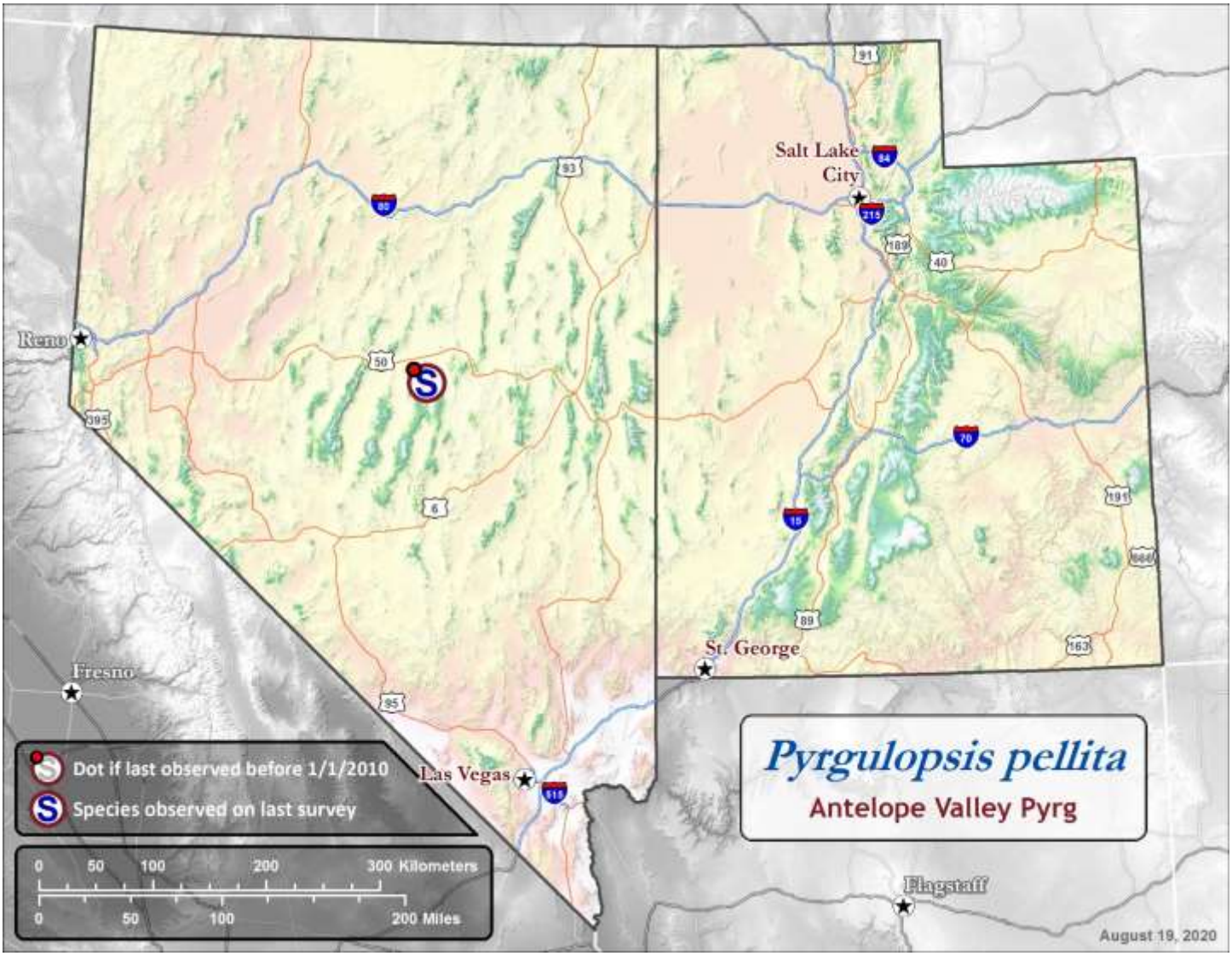
LAND MANAGEMENT

P. pellita were observed at a single location on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

All surveys that contributed data to this summary were conducted by the **Nevada Natural Heritage Data Import** project.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis pellita. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+pellita (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**October 31, 2001** (*2 surveys total in UT or NV between 9/10/1991 and 10/31/2001*)

TAXONOMY

Pyrgulopsis pictilis is described in Hershler, 1998:89-91, figs. 9C, 22B-C, 40C-E. *P. pictilis* has been assigned Invertebrate Taxon ID 6623 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis pictilis has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. pictilis* has been reported at a single location. This species has been recorded at a single location in Lander County, Nevada. This species has been observed on 2 surveys between September 10, 1991 and October 31, 2001. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Ovate Cain Spring pyrg only occurs at a spring on private land in Lander County, Nevada, at 1,658 meters.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured a single time at 0.33 liters per second for this species. Specific Conductance was measured a single time at 560 µS/cm for this species. Spring pH was measured a single time at 7.9 for this species. Temperature was measured a single time at 17° Celsius for this species.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 1,658 m (5,440 ft).

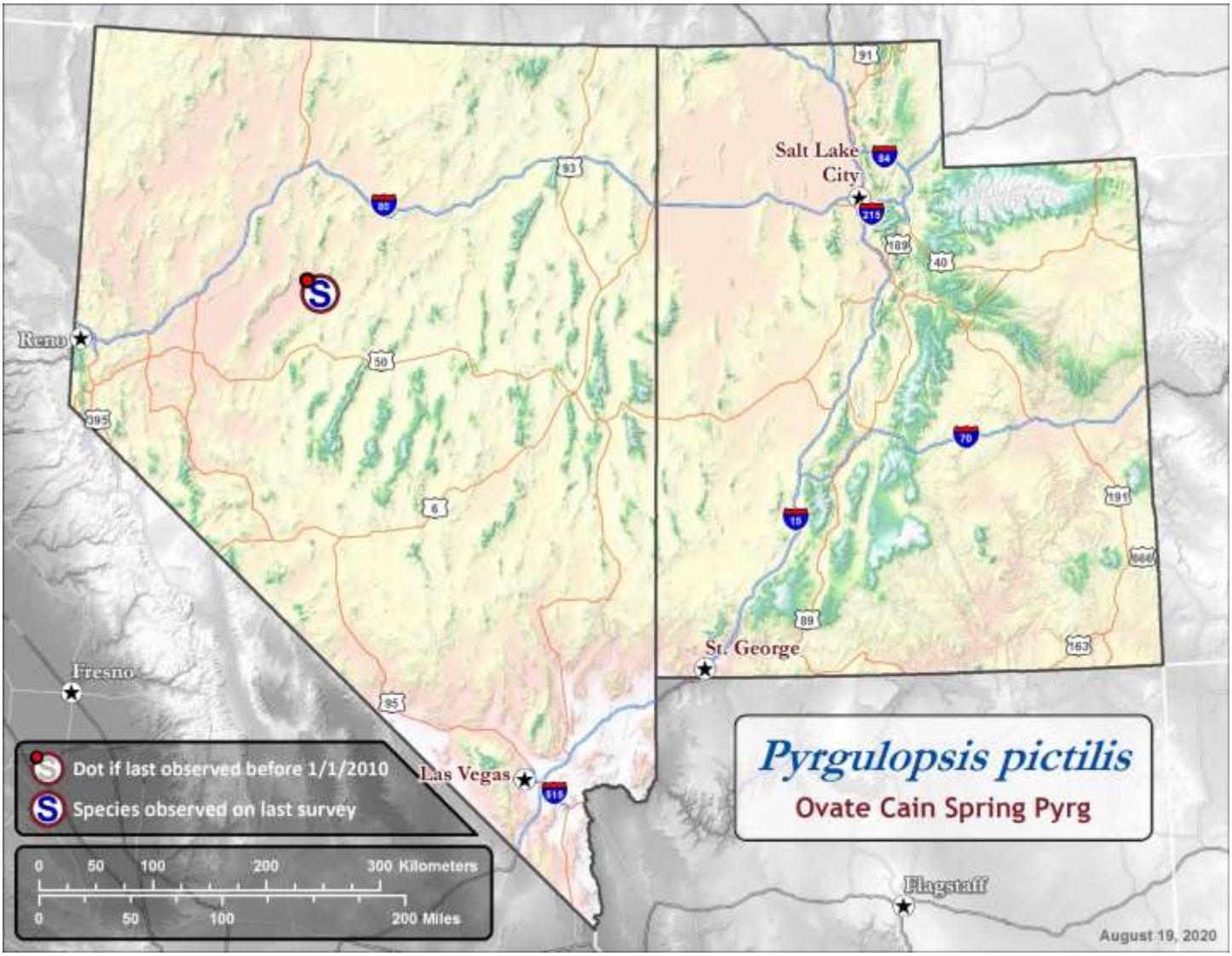
LAND MANAGEMENT

P. pictilis were observed at a single location on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [50%; 1 survey] and **Sada Import** [50%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis pictilis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+pictilis (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N2: Imperiled
Global Status	G2: Imperiled
IUCN Status	1: May be considered threatened in the near future
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	4 sampling locations reported in Utah or Nevada [n = 4 sites]
Most Recent Observation (restricted to UT and NV)	**July 19, 1993** (*n = 4 surveys, all conducted on this date*)

TAXONOMY

Amnicola pilsbryi is described in Baily and Baily, 1951: 50, pl. 4: fig. 3. *Amnicola pilsbryana* Baily and Baily, 1952: 144. Replacement name for *Amnicola pilsbryi* Baily and Baily, 1951; preoccupied in Amnicola by *Amnicola pilsbryi* Walker, 1906 (Hershler and Liu 2017). *Pyrgulopsis pilsbryana* has been assigned Invertebrate Taxon ID 6624 in the Springs Online database.

DISTRIBUTION

Hershler reported this species range from Bear Lake basin in southeastern Idaho to northeastern Utah (Hershler 1994); as well as southwestern Wyoming (Hershler 1998). The type locality is Lifton, Ideal Beach, Bear Lake, Idaho. Holotype, ANSP 187691; paratypes, ANSP 368401 (Hershler and Liu 2017).

Pyrgulopsis pilsbryana has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. pilsbryana* has been reported at 4 sites across its entire range. This species has been recorded at 4 locations in Rich County, Utah. This species has been observed on 4 surveys, all conducted on July 19, 1993. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Bear Lake springsnail is known from small springs (Hershler 1994). Known localities range from 1,600 to 1,932 meters.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured a single time at 508 µS/cm for this species. Spring pH was measured 3 times at 3 locations for this species, with average pH-per-location ranging from 7.8 to 8.1 [mean = 7.93, median = 7.9]. Temperature was measured 3 times at 3 locations, with average temperature-per-location ranging from 10 to 14° Celsius [mean = 11°C, median = 10°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,600 m (5,249 ft) to 1,932 m (6,339 ft), with a mean of 1,822 m (5,976 ft) and median of 1,877 m (6,158 ft).

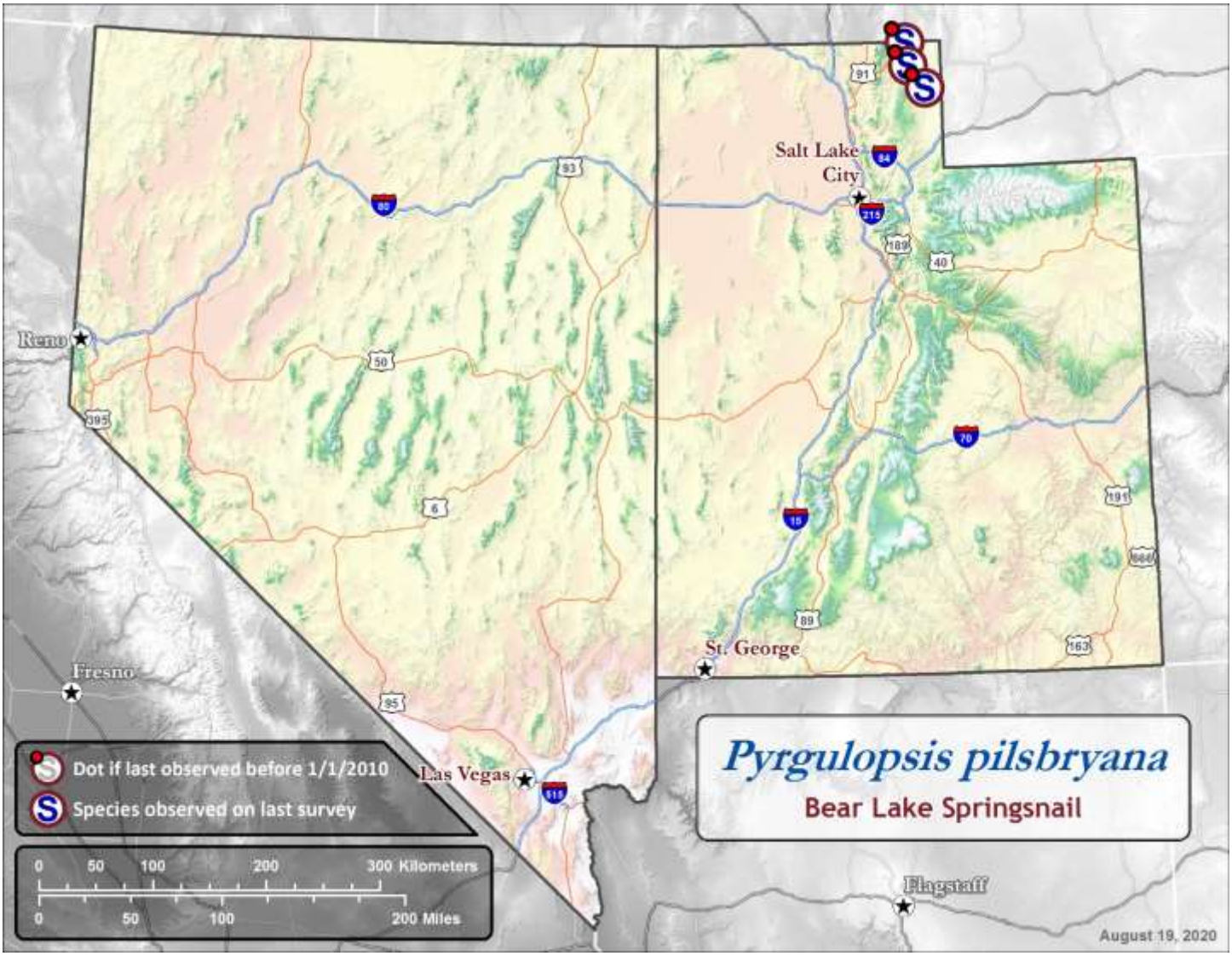
LAND MANAGEMENT

All 4 locations where *P. pilsbryana* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [75%; 3 surveys] and **Utah CAS Import** [25%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis pilsbryana. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+pilsbryana (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	Unclassified
Global Status	Unclassified
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2020 it was not included in the NatureServe database. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	5 sampling locations reported in Utah or Nevada [n = 5 sites]
Most Recent Observation (restricted to UT and NV)	**October 6, 2016** (*5 surveys total in UT or NV between 2/17/1977 and 10/6/2016*)

TAXONOMY

Pyrgulopsis pinetorum is described in Taylor, 1987: 20-21, fig. 9, tables 17-19. This species was split from the *P. kolobensis* complex in Hershler et al., 2017:161-171. *P. pinetorum* has been assigned Invertebrate Taxon ID 15355 in the Springs Online database.

DISTRIBUTION

No Data Entered

This species has not been classified by endemism level. In the Springs Online Database, *P. pinetorum* has been reported at 5 sites across its entire range. This species has been recorded at 5 locations in Washington County, Utah. This species has been observed on 5 surveys between February 17, 1977 and October 6, 2016. The last survey at one of these locations did not record any observations of this species. At 4 of these locations [80%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. Elevations for this species range from 947 m (3,107 ft) to 1,797 m (5,896 ft), with a mean of 1,320 m (4,330 ft) and median of 1,079 m (3,540 ft).

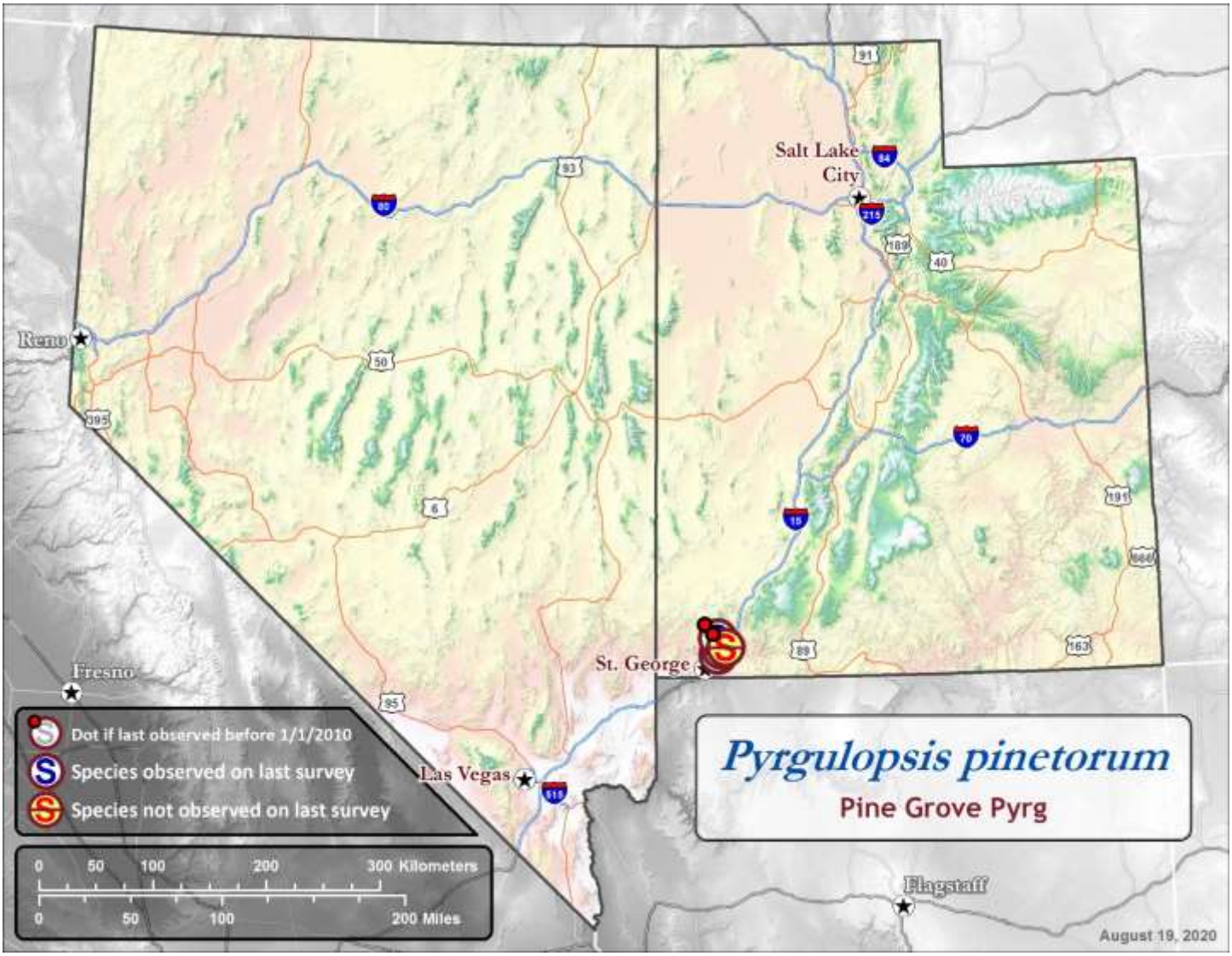
LAND MANAGEMENT

Of the 5 locations where *P. pinetorum* were observed, 80% were located on **USFS** land (n = 4) and 20% on **Private** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

All surveys that contributed data to this summary were conducted by the **UDWR** project.

RELATED LITERATURE

Robert Hershler, Hsiu-Ping Liu, Cynthia Forsythe, Peter Hovingh, and Kevin Wheeler (2017) Partial revision of the Pyrgulopsis kolobensis complex (Caenogastropoda: Hydrobiidae), with resurrection of P. pinetorum and description of three new species from the Virgin River drainage, Utah. Journal of Molluscan Studies. Peer-reviewed article. Available at https://academic.oup.com/mollus/article/83/2/161/2918118.

Taylor, D.W (1987) Fresh-water molluscs from New Mexico and vicinity. New Mexico Bureau of Mines and Mineral Resources. 116:1-50. Peer-reviewed article. Available at http://www.nativefishlab.net/library/textpdf/13497.pdf.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. The Median-gland Springsnail has been recognized in the Federal Register: 76 FR 56608 56630 (2011), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 54 FR 554 579 (1989), 49 FR 21664 21675 (1984). This species was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	5 sampling locations reported in Utah or Nevada [n = 5 sites]
Most Recent Observation (restricted to UT and NV)	**May 5, 2012** (*14 surveys total in UT or NV between 11/9/1985 and 5/5/2012*)

TAXONOMY

Pyrgulopsis pisteri is described in Hershler and Sada, 1987: 804-807, figs. 29b,e, 33c, 34a-e, 35-36. *P. pisteri* has been assigned Invertebrate Taxon ID 5767 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis pisteri has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. pisteri* has been reported at 5 sites across its entire range. This species has been recorded at 5 locations in Nye County, Nevada. This species has been observed on 14 surveys between November 9, 1985 and May 5, 2012. The last survey at one of these locations did not record any observations of this species. At 4 of these locations [80%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This springsnail is found in the outflows of thermal springs on travertine, aquatic macrophytes, or soft substrates (Hershler and Sada 1987, Sada 1990).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 3 times at 2 locations for this species, with average flow-per-location ranging from 0.5 to 1.5 liters per second [mean = 1 l/s, median = 1 l/s]. Specific Conductance was measured 4 times at 2 locations, with average specific conductance-per-location ranging from 1,285 to 1,741 µS/cm [mean = 1,513 µS/cm, median = 1,513 µS/cm]. Spring pH was measured 3 times at 2 locations, with average pH-per-location ranging from 7.45 to 7.5 [mean = 7.48, median = 7.48]. Temperature was measured 4 times at 2 locations, with average temperature-per-location ranging from 30 to 33° Celsius [mean = 31°C, median = 31°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 687 m (2,254 ft) to 712 m (2,336 ft), with a mean of 703 m (2,305 ft) and median of 707 m (2,320 ft).

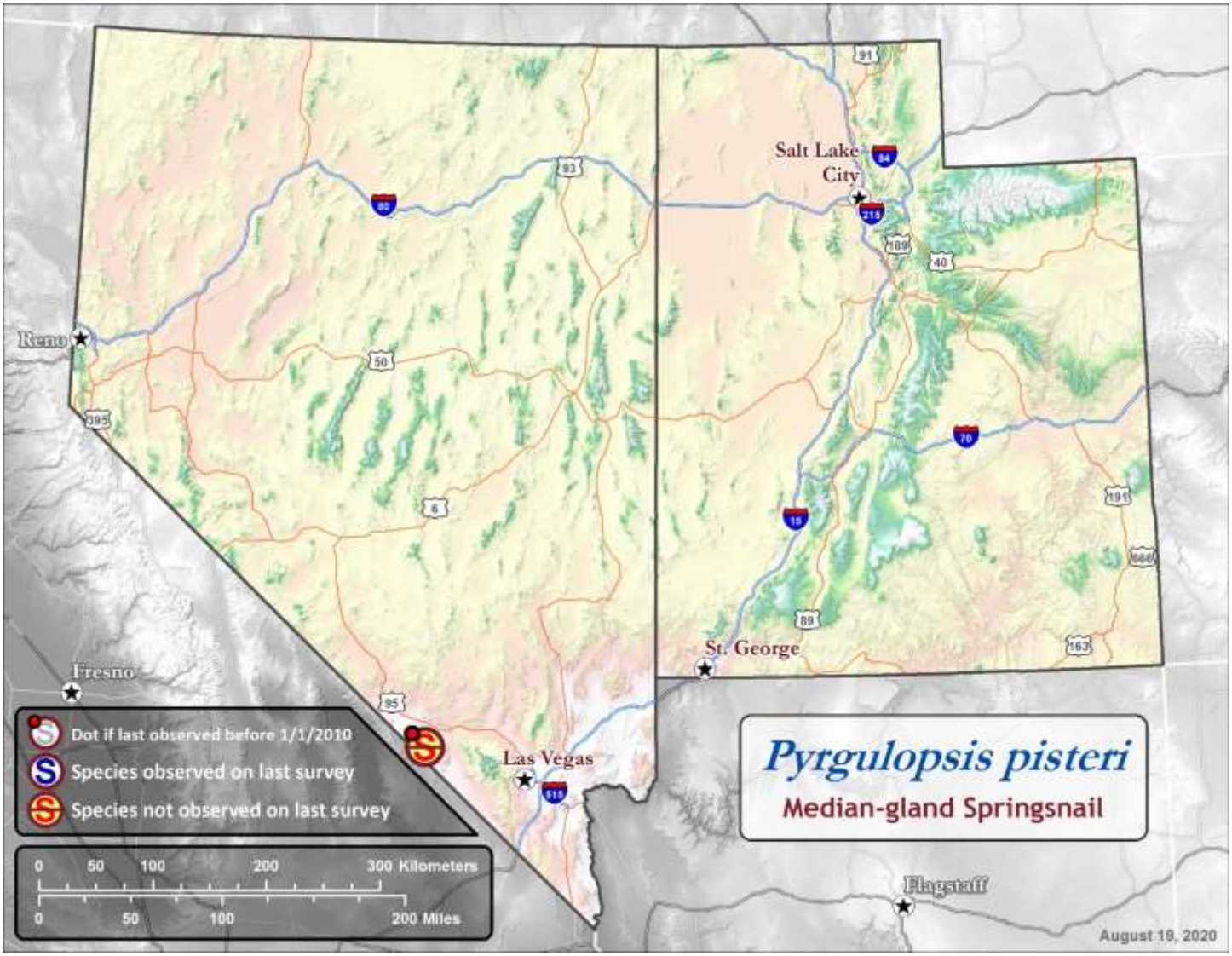
LAND MANAGEMENT

All 5 locations where *P. pisteri* were observed were located on **FWS** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [57%; 8 surveys] and **Sada Import** [43%; 6 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1994) A review of the North American freshwater snail genus Pyrgulopsis (Hydrobiidae). Smithsonian Contributions to Zoology 554:1-115. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/5139/SCtZ-0554-Lo_res.pdf?sequence=2&isAllowed=y.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis pisteri. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+pisteri (Accessed 2019).

Sada, D.W. (1990) Recovery Plan for the Endangered and Threatened Species of Ash Meadows, Nevada. U.S. Fish and Wildlife Service, Portalnd, Oregon. 130 pp. Report. Available at http://ecos.fws.gov/docs/recovery_plan/900928d.pdf##.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). Flat-topped Steptoe pyrg was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	4 sampling locations reported in Utah or Nevada [n = 4 sites]
Most Recent Observation (restricted to UT and NV)	**June 14, 2012** (*8 surveys total in UT or NV between 6/23/1992 and 6/14/2012*)

TAXONOMY

Pyrgulopsis planulata is described in Hershler 1998: 64-66, figs. 7I, 13B, 15A-C, 19J, 34A-C. *P. planulata* has been assigned Invertebrate Taxon ID 6626 in the Springs Online database.

DISTRIBUTION

This species is only known from the type locality. The Flat-topped Steptoe Pyrg occurs only at a spring northwest of Clark Spring in the Steptoe Valley of White Pine County, Nevada (Hershler 1998, cited in Center for Biological Diversity 2009). The type locality is an unnamed spring northwest of Clark Spring, Steptoe Valley, White Pine County, Nevada. Holotype, USNM 892023; paratypes, USNM 860686 (Hershler and Liu 2017).

Pyrgulopsis planulata has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. planulata* has been reported at 4 sites across its entire range. This species has been recorded at 4 locations in White Pine County, Nevada. This species has been observed on 8 surveys between June 23, 1992 and June 14, 2012. The last survey at one of these locations did not record any observations of this species. At 2 of these locations [50%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Center for Biological Diversity (2009) states that this snail occurs in a small, thermal rheocrene.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 5 times at 2 locations for this species, with average flow-per-location ranging from 0.05 to 1.1 liters per second [mean = 0.57 l/s, median = 0.57 l/s]. Specific Conductance was measured 5 times at 3 locations, with average specific conductance-per-location ranging from 362 to 495 µS/cm [mean = 425 µS/cm, median = 419 µS/cm]. Spring pH was measured 4 times at 3 locations, with average pH-per-location ranging from 6.6 to 7.67 [mean = 7.25, median = 7.47]. Temperature was measured 5 times at 3 locations, with average temperature-per-location ranging from 19 to 20° Celsius [mean = 19°C, median = 19°C].

This species was observed in **helocrene** [67%; n = 2] and **rheocrene** [33%; n = 1] springs. Elevations for this species range from 1,857 m (6,093 ft) to 1,862 m (6,109 ft), with a mean of 1,860 m (6,101 ft) and median of 1,860 m (6,101 ft).

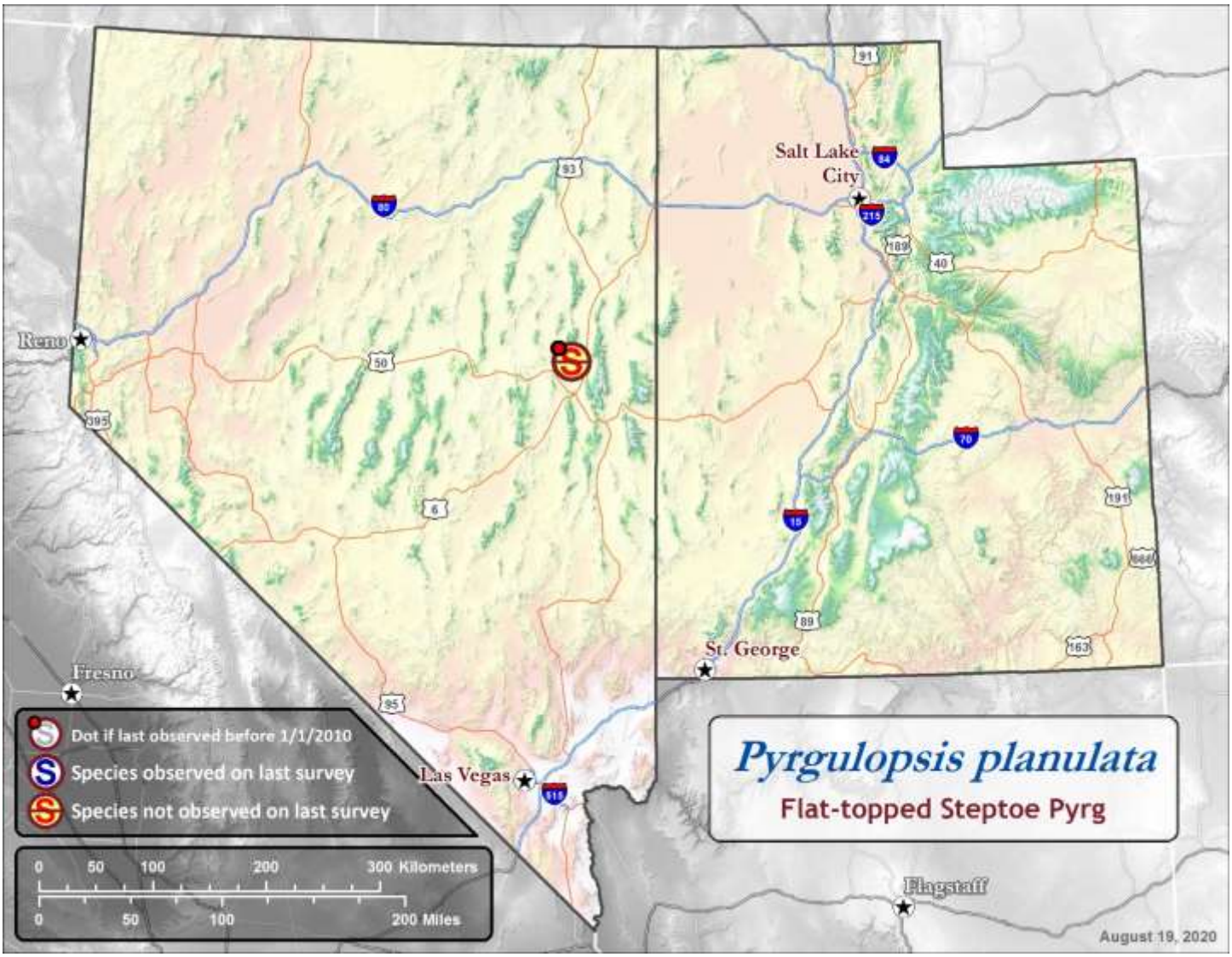
LAND MANAGEMENT

All 4 locations where *P. planulata* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [75%; 6 surveys] and **Nevada Natural Heritage Data Import** [25%; 2 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis planulata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+planulata (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**July 14, 1993** (*n = 1 survey in UT or NV*)

TAXONOMY

Pyrgulopsis plicata is described in Hershler 1998: 120-121, figs. 10E, 13F, 24I-J, 46F-G. *P. plicata* has been assigned Invertebrate Taxon ID 10738 in the Springs Online database.

DISTRIBUTION

In 1998, Hershler reported the Black Canyon Pyrg in the Black Canyon, East Fork Sevier River, Utah. The type locality is a spring, Black Canyon, East Fork Sevier River, Garfield County, Utah. Holotype, USNM 883594; paratypes, USNM 860727 (Hershler and Liu 2017).

Pyrgulopsis plicata has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. plicata* has been reported at a single location. This species has been recorded at a single location in Garfield County, Utah. One survey has observed this species, conducted on July 14, 1993. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Black Canyon Pyrg has been reported at one spring on BLM land in Garfield County, Utah, at 2,053 meters.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured a single time at 236 µS/cm for this species. Spring pH was measured a single time at 8.4 for this species. Temperature was measured a single time at 16° Celsius for this species.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 2,053 m (6,736 ft).

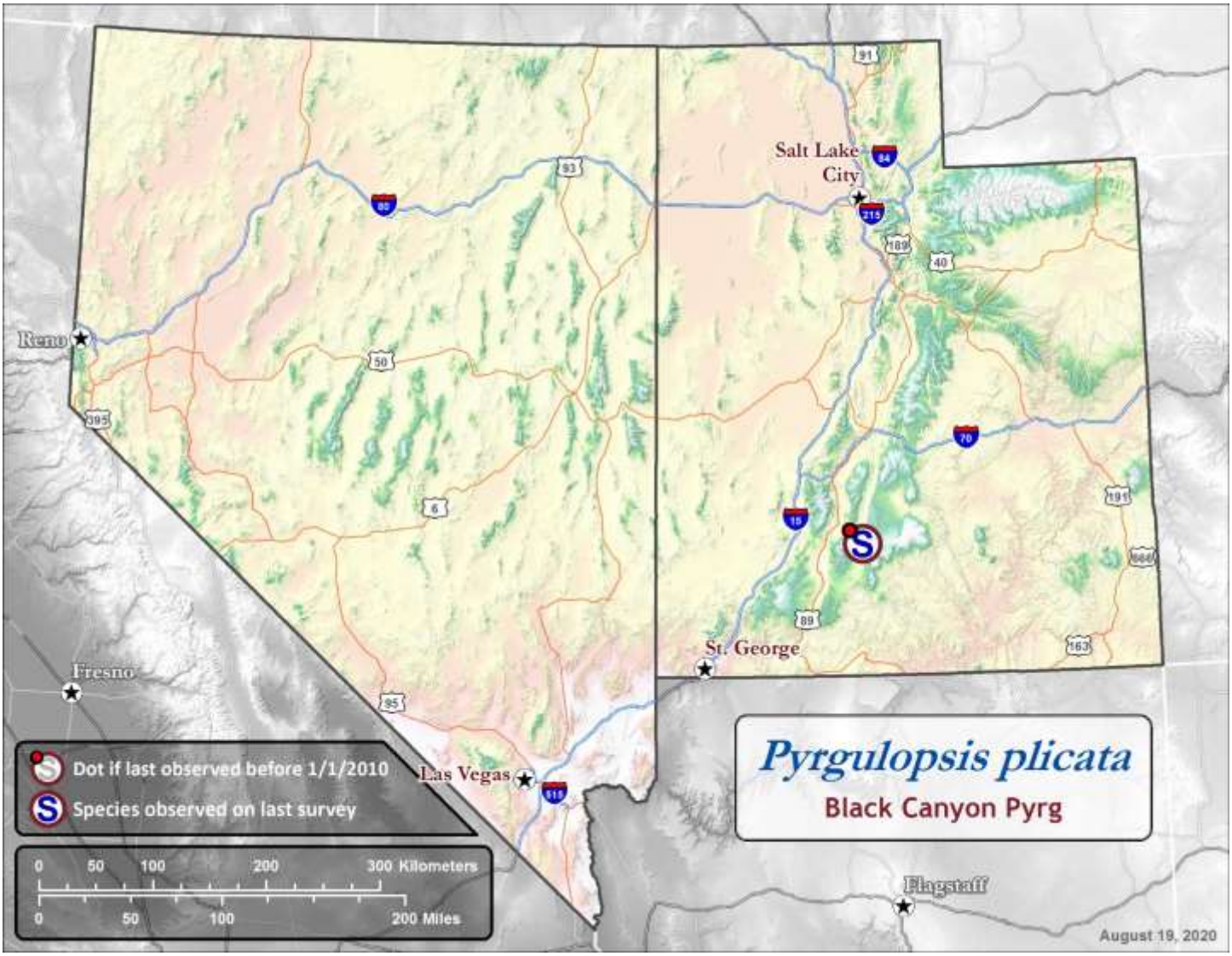
LAND MANAGEMENT

P. plicata were observed at a single location on **BLM** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

The only project that contributed data to this summary was a single survey conducted by the **Sada Import** project.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis plicata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+plicata (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	SX: Presumed Extirpated
Utah Status	Unclassified
ESA Status	6: Extinct or extirpated from the U.S.
National Status	NX: Presumed Extirpated
Global Status	GX: Presumed Extinct or Eliminated
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. In 1998 Hershler reported that the spring where this species occurred was highly degraded, and no springsnails were found.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**January 1, 1992** (*3 surveys total in UT or NV between 6/16/1988 and 1/1/1992*)

TAXONOMY

Pyrgulopsis ruinosa was described by Hershler and Liu in 2017. *P. ruinosa* has been assigned Invertebrate Taxon ID 6629 in the Springs Online database.

DISTRIBUTION

Spring southwest of The Crossing, Fish Lake Valley, Esmerald County, Nevada.

Pyrgulopsis ruinosa has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *P. ruinosa* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in Esmeralda County, Nevada. This species has been observed on 3 surveys between June 16, 1988 and January 1, 1992. The last survey at one of these locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Hershler and Liu (2017): "Spring southwest of The Crossing, Fish Lake Valley, Esmeralda County, Nevada".

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,437 m (4,715 ft) to 1,497 m (4,911 ft), with a mean of 1,467 m (4,813 ft) and median of 1,467 m (4,813 ft).

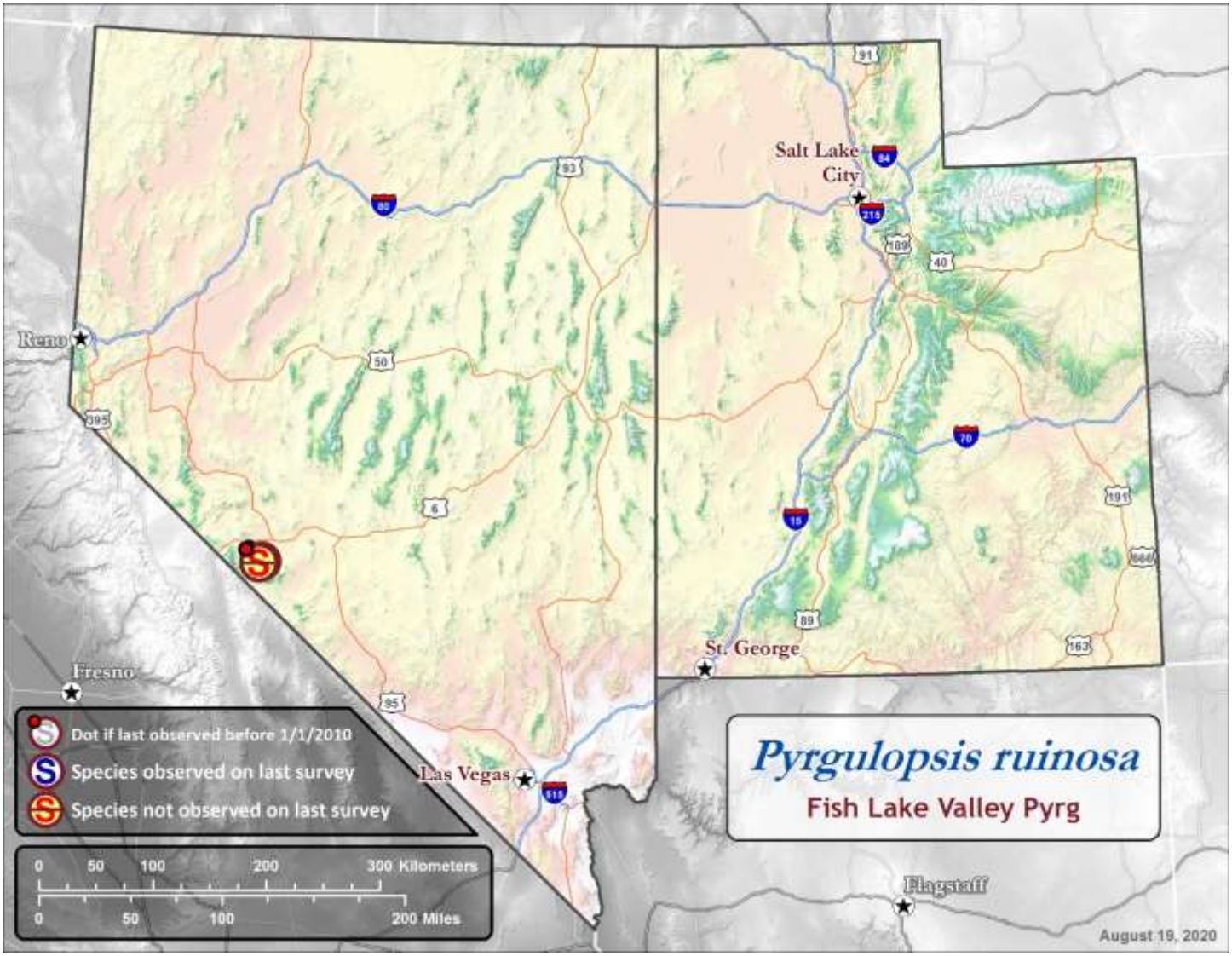
LAND MANAGEMENT

Of the 2 locations where *P. ruinosa* were observed, 50% were located on **BLM** land (n = 1) and 50% on **Private** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [67%; 2 surveys] and **Sada Import** [33%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1S2: Critically Imperiled/Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1N2: Critically Imperiled/Imperiled
Global Status	G2: Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	15 sampling locations reported in Utah or Nevada [n = 15 sites]
Most Recent Observation (restricted to UT and NV)	**August 11, 2013** (*33 surveys total in UT or NV between 6/22/1991 and 8/11/2013*)

TAXONOMY

Pyrgulopsis sadai is described in Hershler, 1998: 87-89, figs. 9A, 21L-N, 39G-J. *P. sadai* has been assigned Invertebrate Taxon ID 6630 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis sadai has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. sadai* has been reported at 15 sites across its entire range. Species observations have been recorded in 3 counties in Nevada, including 7 locations in Lander County, 6 in Humboldt County and 2 in Pershing County. This species has been observed on 33 surveys between June 22, 1991 and August 11, 2013. The last surveys at 4 of these locations did not record any observations of this species. At 12 of these locations [80%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Sadas Pyrg occurs at several sites in Nevada between 1,418 and 1,969 meters.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 16 times at 11 locations for this species, with average flow-per-location ranging from 0.02 to 1.68 liters per second [mean = 0.4 l/s, median = 0.14 l/s]. Specific Conductance was measured 17 times at 11 locations, with average specific conductance-per-location ranging from 155 to 817 µS/cm [mean = 393 µS/cm, median = 342 µS/cm]. Spring pH was measured 10 times at 7 locations, with average pH-per-location ranging from 7.6 to 7.91 [mean = 7.75, median = 7.8]. Temperature was measured 17 times at 11 locations, with average temperature-per-location ranging from 9 to 18° Celsius [mean = 13°C, median = 13°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,418 m (4,652 ft) to 1,969 m (6,460 ft), with a mean of 1,766 m (5,795 ft) and median of 1,776 m (5,827 ft).

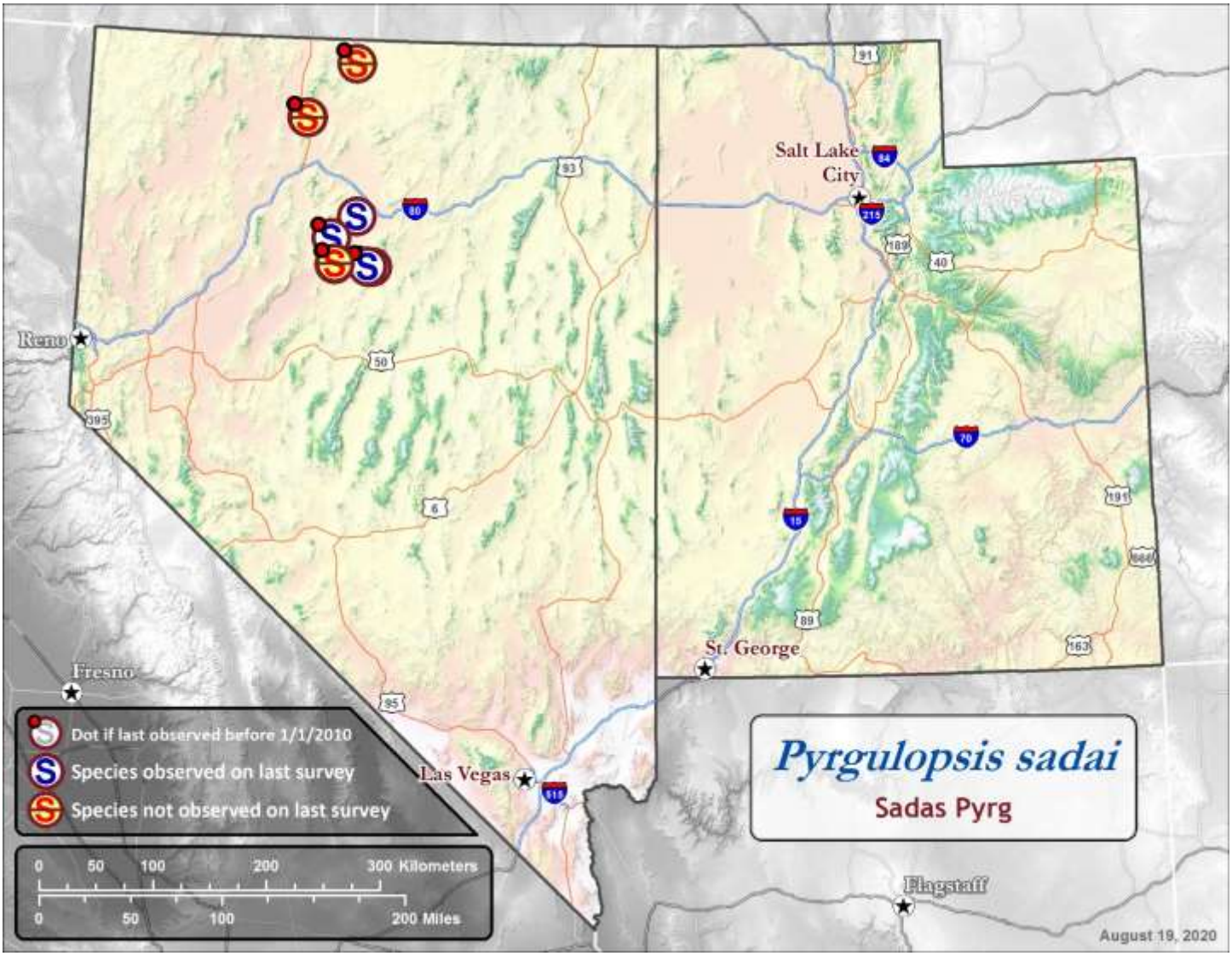
LAND MANAGEMENT

Of the 15 locations where *P. sadai* were observed, 80% were located on **BLM** land (n = 12) and 20% on **Private** land (n = 3).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [55%; 18 surveys] and **Nevada Natural Heritage Data Import** [45%; 15 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	NNA: Not applicable
Global Status	GNA: Not applicable
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah.	
Number of Locations Reported (restricted to UT and NV)	16 sampling locations reported in Utah or Nevada [n = 14 sites]
Most Recent Observation (restricted to UT and NV)	**November 14, 2012** (*31 surveys total in UT or NV between 10/10/1985 and 11/14/2012*)

TAXONOMY

No taxonomic history specified. *Pyrgulopsis sanchezi* has been assigned Invertebrate Taxon ID 13850 in the Springs Online database.

DISTRIBUTION

The Sanchezi species has been reported in discharge areas in the Amargosa River basin (California and Nevada).

Pyrgulopsis sanchezi has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. sanchezi* has been reported at 16 sampling locations across its entire range [n = 14 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. This species has been recorded at 16 locations in Nye County, Nevada. This species has been observed on 32 surveys between October 10, 1985 and November 14, 2012. The last surveys at 2 of these locations did not record any observations of this species. At 14 of these locations [88%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 11 times at 11 locations for this species, with average flow-per-location ranging from 0.01 to 1.25 liters per second [mean = 0.41 l/s, median = 0.08 l/s]. Specific Conductance was measured 15 times at 12 locations, with average specific conductance-per-location ranging from 560 to 1,924 µS/cm [mean = 1,261 µS/cm, median = 1,365 µS/cm]. Spring pH was measured 9 times at 9 locations, with average pH-per-location ranging from 7 to 8 [mean = 7.66, median = 7.8]. Temperature was measured 15 times at 12 locations, with average temperature-per-location ranging from 12 to 33° Celsius [mean = 22°C, median = 20°C].

This species was observed in **rheocrene** [73%; n = 11], **helocrene** [20%; n = 3] and **limnocrene** [7%; n = 1] springs. Elevations for this species range from 658 m (2,159 ft) to 716 m (2,349 ft), with a mean of 699 m (2,292 ft) and median of 707 m (2,318 ft).

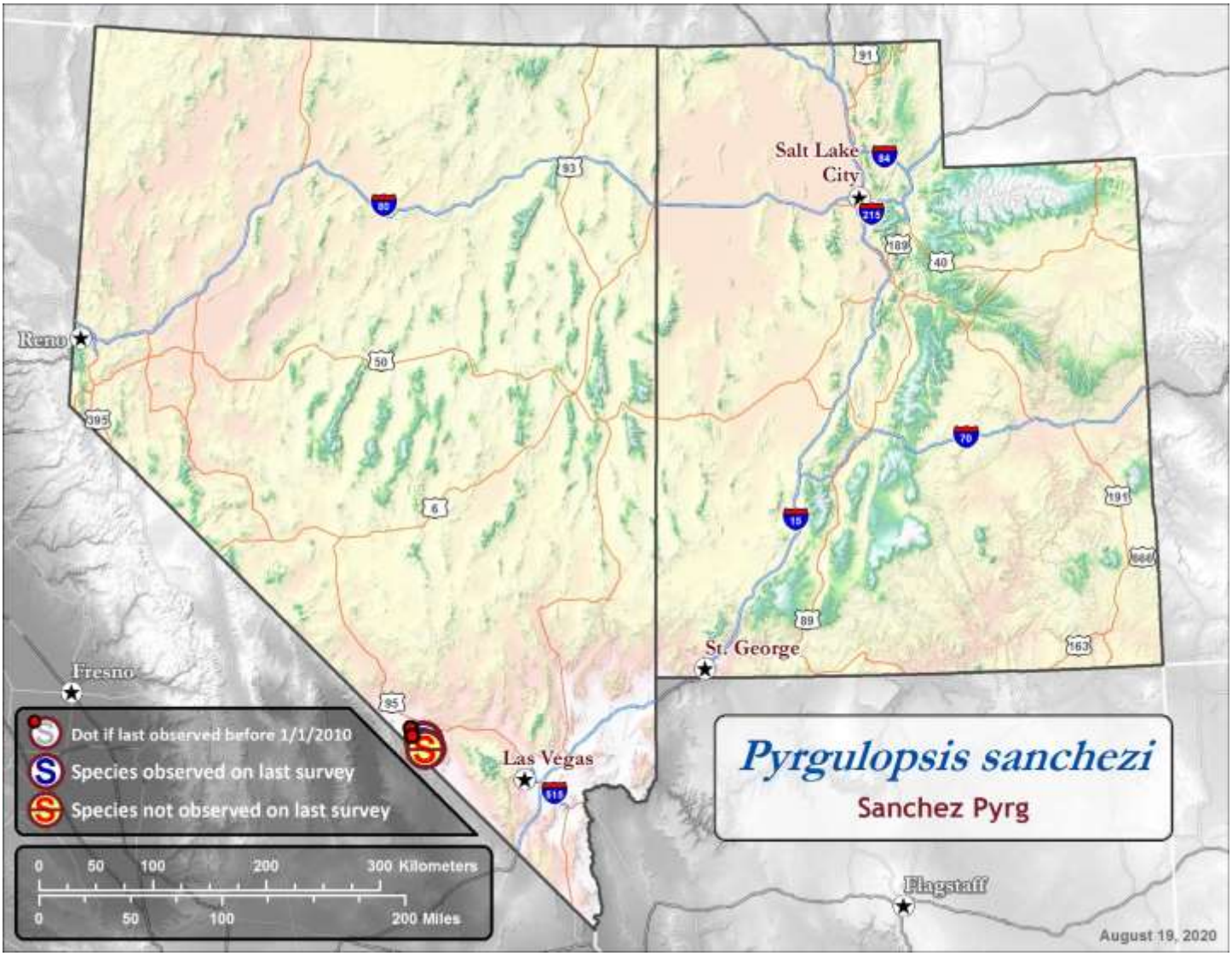
LAND MANAGEMENT

Of the 16 locations where *P. sanchezi* were observed, 44% were located on **FWS** land (n = 7), 31% on **Private** land (n = 5) and 25% on **BLM** land (n = 4).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [66%; 21 surveys] and **Nevada Natural Heritage Data Import** [34%; 11 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., H. Liu, and C. Bradford (Year Unspecified) Pyrgulopsis micrococcus. Encyclopedia of Life. Website. Available at http://eol.org/pages/592697/details#http://eol.org/pages/592697/details#.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	Unclassified
Global Status	Unclassified
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2020 this species was not included in the NatureServe database. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**October 6, 2015** (*5 surveys total in UT or NV between 9/2/1980 and 10/6/2015*)

TAXONOMY

Pyrgulopsis santaclarensis is described in Hershler et al., 2017:161-171. This species was split from the *P. kolobensis* complex. *P. santaclarensis* has been assigned Invertebrate Taxon ID 15356 in the Springs Online database.

DISTRIBUTION

This species is only known from its type locality in the Left Fork Santa Clara river, Pine Valley, Dixie National Forest, Washington County, Utah (Hershler et al. 2017). The type locality is the Left Fork Santa Clara River, Pine Valley, in the Dixie National Forest, Washington County, Utah. Holotype, USNM 847209; paratypes,USNM 1411243 (Hershler et al. 2017).

This species has not been classified by endemism level. In the Springs Online Database, *P. santaclarensis* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in Washington County, Utah. This species has been observed on 5 surveys between September 2, 1980 and October 6, 2015. The last survey at one of these locations did not record any observations of this species. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

No flow, pH, temperature, specific conductance or alkalinity recorded at sites where this species was observed.

No spring types recorded in database. Elevations for this species range from 2,172 m (7,126 ft) to 2,279 m (7,477 ft), with a mean of 2,226 m (7,302 ft) and median of 2,226 m (7,302 ft).

LAND MANAGEMENT

Both locations where *P. santaclarensis* were observed were located on **USFS** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION

SOURCE DATA

All surveys that contributed data to this summary were conducted by the **UDWR** project.

RELATED LITERATURE

Robert Hershler, Hsiu-Ping Liu, Cynthia Forsythe, Peter Hovingh, and Kevin Wheeler (2017) Partial revision of the Pyrgulopsis kolobensis complex (Caenogastropoda: Hydrobiidae), with resurrection of P. pinetorum and description of three new species from the Virgin River drainage, Utah. Journal of Molluscan Studies. Peer-reviewed article. Available at https://academic.oup.com/mollus/article/83/2/161/2918118.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011) and 82 FR 46618 46645 (2017). White River Valley pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	9 sampling locations reported in Utah or Nevada [n = 8 sites]
Most Recent Observation (restricted to UT and NV)	**July 3, 2016** (*27 surveys total in UT or NV, ranging from 5/28/1972 to 7/3/2016, plus 1 survey with no date recorded*)

TAXONOMY

Pyrgulopsis sathos is described in Hershler 1998: 37, 39, figs. 6F, 12C, 17H-K, 28A-C. *P. sathos* has been assigned Invertebrate Taxon ID 6631 in the Springs Online database.

DISTRIBUTION

This species is reported in White River Valley of Nye, Lincoln, and White Pine Counties in Nevada (Hershler 1998). The type locality is Flag Springs, White River Valley, Nye County, Nevada. Holotype, USNM 874664; paratypes, USNM 860691 (Hershler and Liu, 2017).

Pyrgulopsis sathos has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. sathos* has been reported at 9 sampling locations across its entire range [n = 8 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded in two counties in Nevada, including 5 locations in Nye County and 4 in White Pine County. This species has been observed on 27 surveys between May 28, 1972 and July 3, 2016, and also on 1 additional survey in which no date was recorded. The last survey at one of these locations did not record any observations of this species. At 2 of these locations [22%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

One of the springs where this species occurs is a large rheocrene where snails are found on hard substrate in a pool just below the spring source (Hershler 1998).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 9 times at 6 locations for this species, with average flow-per-location ranging from 1.67 to 141.67 liters per second [mean = 43.06 l/s, median = 28.33 l/s]. Specific Conductance was measured 12 times at 8 locations, with average specific conductance-per-location ranging from 341 to 511 µS/cm [mean = 420 µS/cm, median = 407 µS/cm]. Spring pH was measured 8 times at 8 locations, with average pH-per-location ranging from 7.45 to 8.4 [mean = 7.93, median = 7.9]. Temperature was measured 13 times at 8 locations, with average temperature-per-location ranging from 16 to 22° Celsius [mean = 20°C, median = 19°C].

This species was observed in **rheocrene** [89%; n = 8] and **limnocrene** [11%; n = 1] springs. Elevations for this species range from 1,579 m (5,180 ft) to 1,747 m (5,732 ft), with a mean of 1,656 m (5,433 ft) and median of 1,614 m (5,295 ft).

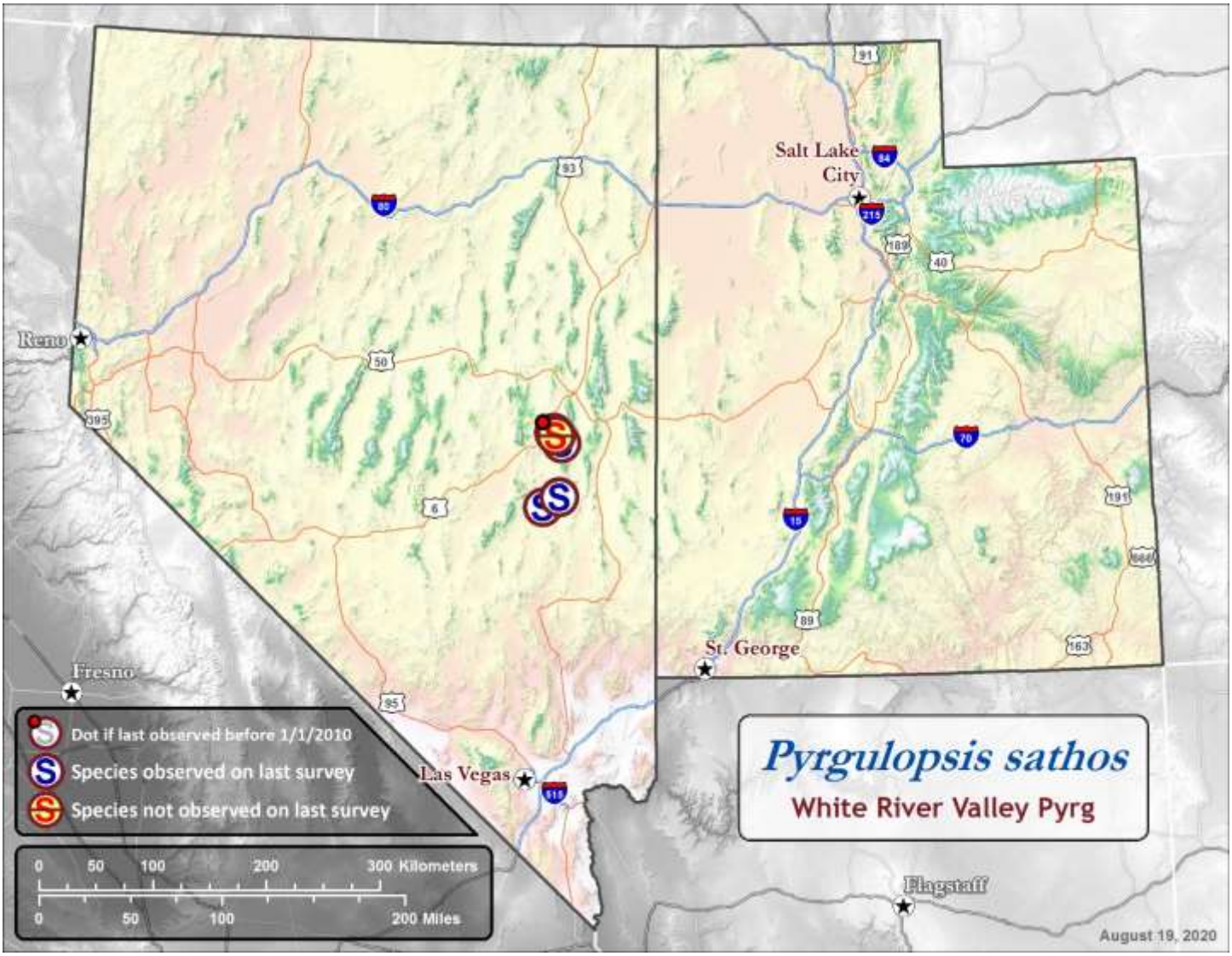
LAND MANAGEMENT

Of the 9 locations where *P. sathos* were observed, 56% were located on **Private** land (n = 5), 33% on **State** land (n = 3) and 11% on **BLM** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [50%; 14 surveys], **Sada Import** [32%; 9 surveys] and **Sada Import 2017** [18%; 5 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis sathos. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+sathos (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species is recognized in the Federal Register: 74 FR 41649 41662 (2009) and 74 FR 46965 46966 (2009). This species was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS Partial 90-Day Finding on a Petition To List 206 Species in the Midwest and Western United States as Threatened or Endangered with Critical Habitat (2009) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	3 sampling locations reported in Utah or Nevada [n = 3 sites]
Most Recent Observation (restricted to UT and NV)	**August 16, 2019** (*10 surveys total in UT or NV between 5/10/1993 and 8/16/2019*)

TAXONOMY

Pyrgulopsis saxatilis is described in Hershler 1998: 111, 113, figs. 9L, 11H, 16A-C, 23K-L, 44F-H. *P. saxatilis* has been assigned Invertebrate Taxon ID 10740 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis saxatilis has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. saxatilis* has been reported at 3 sites across its entire range. This species has been recorded at 3 locations in Millard County, Utah. This species has been observed on 10 surveys between May 10, 1993 and August 16, 2019. The last survey at one of these locations did not record any observations of this species. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Saxatilis in latin means 'that lives amongst rocks', and refers to the rocky habitat of this species (CBD 2009).

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured 2 times at 1 site for this species, with an average specific conductance of 534 µS/cm. Spring pH was measured 2 times at 1 site for this species, with an average pH of 7.85. Temperature was measured 3 times at 1 site for this species, with an average temperature of 27° Celsius.

This species was observed in **rheocrene** [50%; n = 2], **gushet** [25%; n = 1] and **mound-form** [25%; n = 1] springs. Elevations for this species range from 1,593 m (5,226 ft) to 1,603 m (5,259 ft), with a mean of 1,597 m (5,238 ft) and median of 1,594 m (5,230 ft).

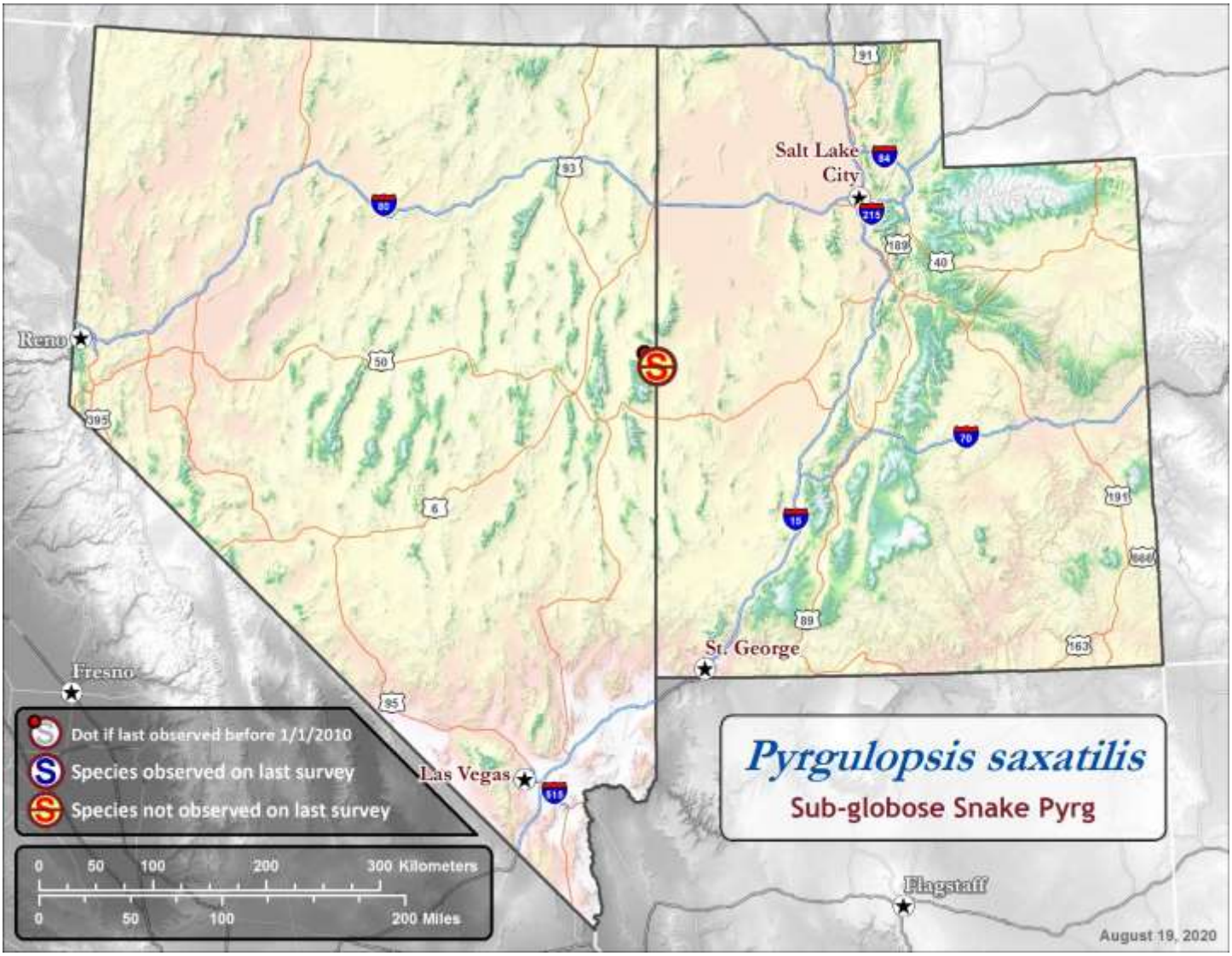
LAND MANAGEMENT

All 3 locations where *P. saxatilis* were observed were located on **BLM** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Utah CAS Import** [50%; 5 surveys], **UDWR** [30%; 3 surveys] and **Sada Import** [20%; 2 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis saxatilis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+saxatilis (Accessed 2019).

US Fish and Wildlife Service (2009) Partial 90-Day Finding on a Petition To List 206 Species in the Midwest and Western United States as Threatened or Endangered With Critical Habitat; Correction. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2009-09-14/pdf/E9-21995.pdf#page=1.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). Northern Steptoe pyrg was proposed for review under the Center for Biological Diversity (2009) petition. USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	33 sampling locations reported in Utah or Nevada [n = 31 sites]
Most Recent Observation (restricted to UT and NV)	**July 13, 2018** (*42 surveys total in UT or NV between 8/7/1988 and 7/13/2018*)

TAXONOMY

Pyrgulopsis serrata is described in Hershler, 1998: 71-72, figs. 8B, 15D-F, 20C-E, 35G-J. *P. serrata* has been assigned Invertebrate Taxon ID 6633 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis serrata has been classified with an endemism level of "20-100 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. serrata* has been reported at 33 sampling locations across its entire range [n = 31 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded in two counties in Nevada, including 17 locations in White Pine County and 16 in Elko County. This species has been observed on 42 surveys between August 7, 1988 and July 13, 2018. The last survey at one of these locations did not record any observations of this species. At 26 of these locations [79%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Most of the springs where this species occurs in the Northern Steptoe Valley are helocrenes with generally longer and narrower springbrooks and greater discharge than the average of other springs in the vicinity (Sada 2006, cited in Center for Biological Diversity 2009).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 30 times at 27 locations for this species, with average flow-per-location ranging from 0.01 to 11.67 liters per second [mean = 1.05 l/s, median = 0.12 l/s]. Specific Conductance was measured 33 times at 29 locations, with average specific conductance-per-location ranging from 270 to 2,906 µS/cm [mean = 415 µS/cm, median = 315 µS/cm]. Spring pH was measured 33 times at 29 locations, with average pH-per-location ranging from 7.39 to 8.4 [mean = 7.9, median = 7.9]. Temperature was measured 33 times at 29 locations, with average temperature-per-location ranging from 10 to 21° Celsius [mean = 13°C, median = 12°C].

This species was observed in **helocrene** [52%; n = 12], **rheocrene** [35%; n = 8] and **limnocrene** [13%; n = 3] springs. Elevations for this species range from 1,789 m (5,869 ft) to 1,958 m (6,424 ft), with a mean of 1,821 m (5,975 ft) and median of 1,803 m (5,915 ft).

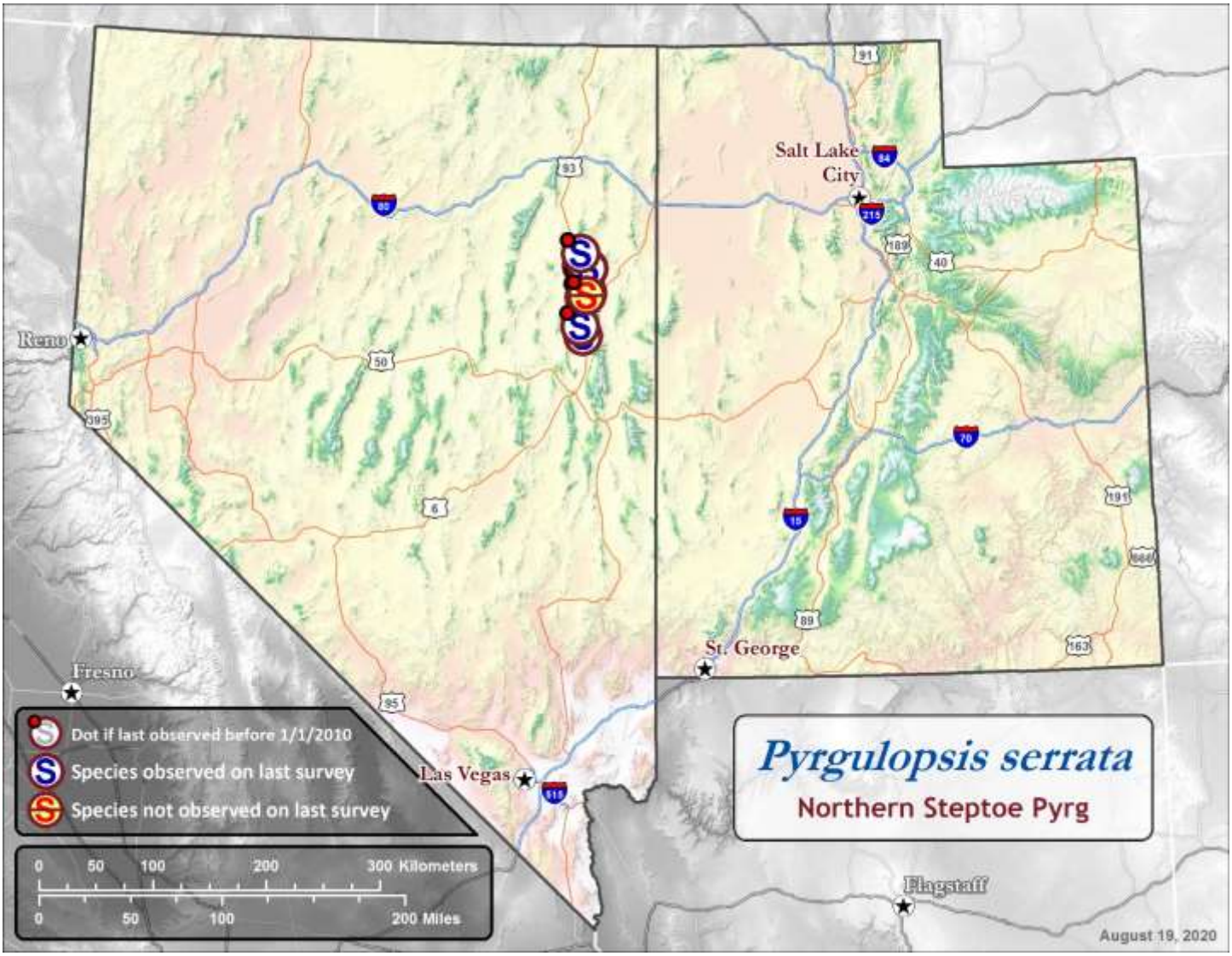
LAND MANAGEMENT

Of the 33 locations where *P. serrata* were observed, 85% were located on **Private** land (n = 28) and 15% on **BLM** land (n = 5).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [79%; 33 surveys] and **Nevada Natural Heritage Data Import** [21%; 9 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Sada, D.W (2006) Northern Steptoe Valley Springsnail Surveys, White Pine County,Nevada. Commissioned report for EDAW, Inc. 30 pp. Report.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). The Sterile basin pyrg was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	6 sampling locations reported in Utah or Nevada [n = 4 sites]
Most Recent Observation (restricted to UT and NV)	**July 1, 2020** (*15 surveys total in UT or NV between 10/2/1992 and 7/1/2020*)

TAXONOMY

Pyrgulopsis sterilis is described in Hershler 1998: 53-54, figs. 6L, 18K-L, 30G-I. *P. sterilis* has been assigned Invertebrate Taxon ID 6637 in the Springs Online database.

DISTRIBUTION

NatureServe (2019) reports that this species is only known from three springs in Nevada. The Sterile Basin Pyrg occurs in Nye County at a spring at Hunts Canyon Ranch in the Ralston Valley and at Sidehill Spring in Stone Cabin Valley (Center for Biological Diversity 2009). The type locality is Spring, Hunts Canyon Ranch, Ralston Valley, Nye County, Nevada. Holotype,USNM 874876; paratypes, USNM 860714 (Hershler and Liu 2017).

Pyrgulopsis sterilis has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. sterilis* has been reported at 6 sampling locations across its entire range [n = 4 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. This species has been recorded at 6 locations in Nye County, Nevada. This species has been observed on 15 surveys between October 2, 1992 and July 1, 2020. The last survey at one of these locations did not record any observations of this species. At 3 of these locations [50%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Center for Biological Diversity (2009) reported that one of the springs where this species occurs is a small rheocrene.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 10 times at 4 locations for this species, with average flow-per-location ranging from 0.11 to 0.22 liters per second [mean = 0.15 l/s, median = 0.14 l/s]. Specific Conductance was measured 11 times at 6 locations, with average specific conductance-per-location ranging from 245 to 563 µS/cm [mean = 356 µS/cm, median = 337 µS/cm]. Spring pH was measured 11 times at 6 locations, with average pH-per-location ranging from 7.4 to 8 [mean = 7.7, median = 7.69]. Temperature was measured 11 times at 6 locations, with average temperature-per-location ranging from 12 to 20° Celsius [mean = 18°C, median = 20°C].

This species was observed in **helocrene** [40%; n = 4], **hillslope** [30%; n = 3], **rheocrene** [20%; n = 2] and **gushet** [10%; n = 1] springs. Elevations for this species range from 1,872 m (6,142 ft) to 2,069 m (6,788 ft), with a mean of 1,939 m (6,362 ft) and median of 1,875 m (6,152 ft).

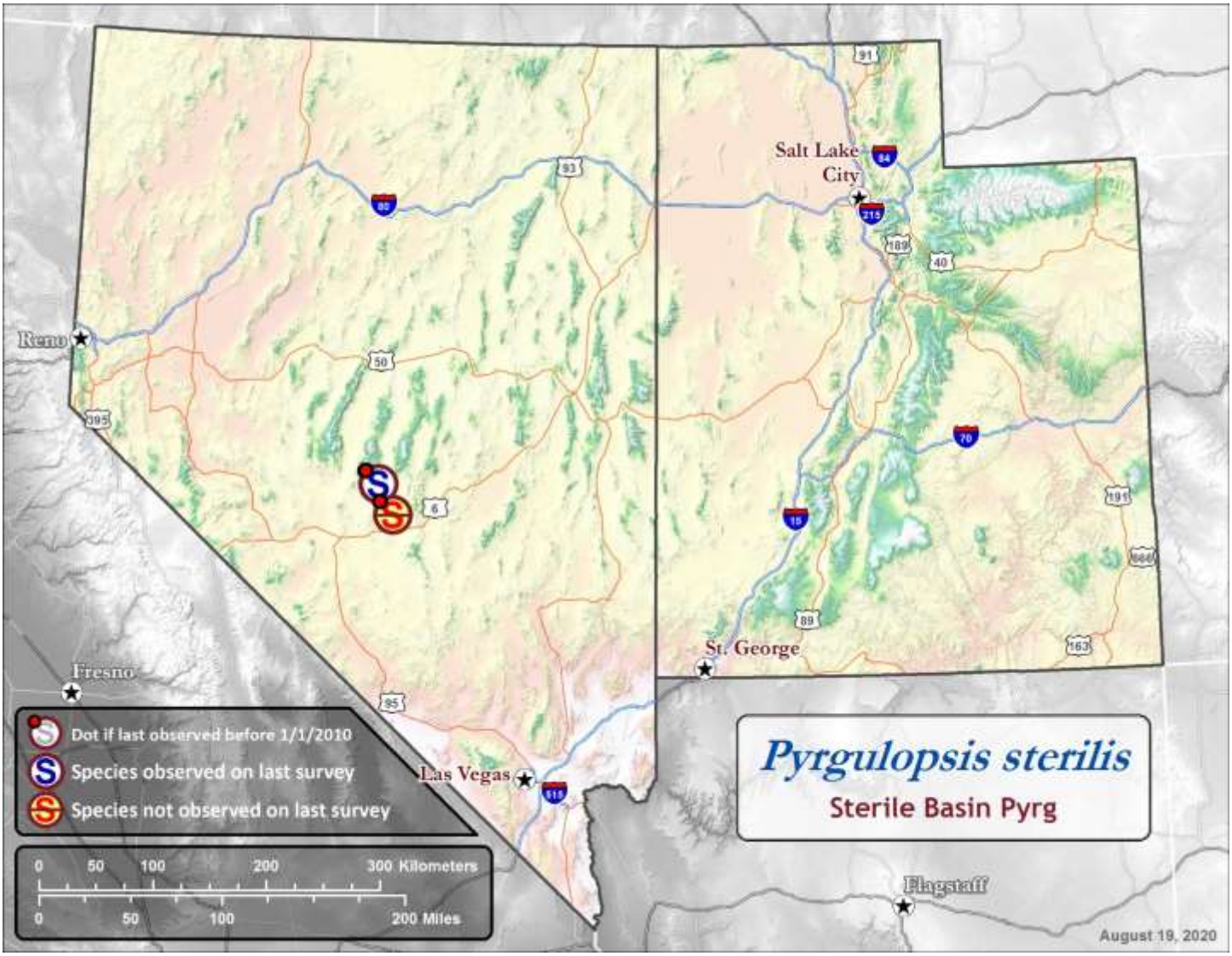
LAND MANAGEMENT

Of the 6 locations where *P. sterilis* were observed, 50% were located on **Private** land (n = 3), 33% on **BLM** land (n = 2) and 17% on **USFS** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [60%; 9 surveys], **Nevada Tonopah** [20%; 3 surveys] and **Nevada Natural Heritage Data Import** [20%; 3 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis sterilis. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+sterilis (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 82 FR 46618 46645 (2017) and 76 FR 56608 56630 (2011). Lake Valley Pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	4 sampling locations reported in Utah or Nevada [n = 4 sites]
Most Recent Observation (restricted to UT and NV)	**July 2, 2016** (*9 surveys total in UT or NV between 6/26/1992 and 7/2/2016*)

TAXONOMY

Pyrgulopsis sublata is described in Hershler, 1998: 56-57, figs. 7B, 12E, 18N-O, 31D-F. *P. sublata* has been assigned Invertebrate Taxon ID 6638 in the Springs Online database.

DISTRIBUTION

Lake Valley pryg is only known from the type locality. This springsnail occurs only at Wambolt Springs in the Lake Valley watershed in Lincoln County, NV. The type locality is Wambolt Springs, Lake Valley, Lincoln County, Nevada. Holotype, USNM 874681; paratypes, USNM 860724 (Hershler and Liu 2017).

Pyrgulopsis sublata has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. sublata* has been reported at 4 sites across its entire range. This species has been recorded at 4 locations in Lincoln County, Nevada. This species has been observed on 9 surveys between June 26, 1992 and July 2, 2016. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Hershler (1998) characterizes Wambolt Springs as a shallow broad helocrene. Golden et al. (2007) characterize Wambolt Springs as a limnocrene with vegetation including watercress (*Rorippa sp.*) and Mare's tail (Hippuris sp.). The wet areas around Wambolt Springs are dominated by spikerush (*Eleocharis sp.*) and Nebraska sedge (*Carex nebrascensis*) (cited in Center for Biological Diversity 2009).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 6 times at 3 locations for this species, with average flow-per-location ranging from 0.32 to 1.08 liters per second [mean = 0.79 l/s, median = 0.96 l/s]. Specific Conductance was measured 7 times at 4 locations, with average specific conductance-per-location ranging from 305 to 326 µS/cm [mean = 316 µS/cm, median = 316 µS/cm]. Spring pH was measured 3 times at 3 locations, with average pH-per-location ranging from 7.05 to 8.3 [mean = 7.63, median = 7.55]. Temperature was measured 7 times at 4 locations, with average temperature-per-location ranging from 15 to 19° Celsius [mean = 17°C, median = 18°C].

This species was observed in **helocrene** [75%; n = 3] and **rheocrene** [25%; n = 1] springs. Elevations for this species range from 1,804 m (5,919 ft) to 1,815 m (5,955 ft), with a mean of 1,810 m (5,937 ft) and median of 1,810 m (5,937 ft).

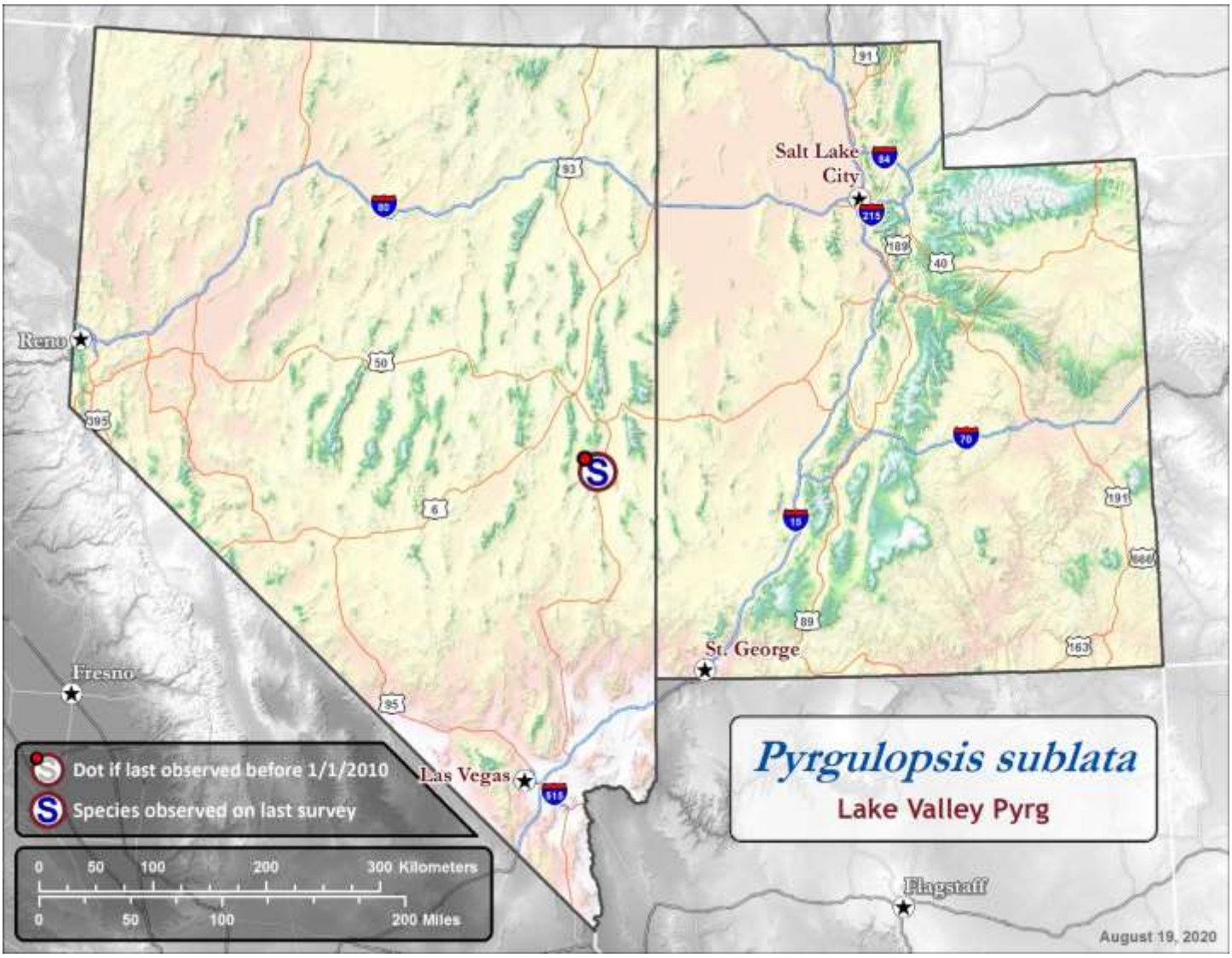
LAND MANAGEMENT

All 4 locations where *P. sublata* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [44%; 4 surveys], **Sada Import 2017** [33%; 3 surveys] and **Nevada Natural Heritage Data Import** [22%; 2 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis sublata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+sublata (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). Southern Steptoe pyrg was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	5 sampling locations reported in Utah or Nevada [n = 5 sites]
Most Recent Observation (restricted to UT and NV)	**June 14, 2012** (*11 surveys total in UT or NV between 8/5/1991 and 6/14/2012*)

TAXONOMY

Pyrgulopsis sulcata is described in Hershler 1998: 66-67, figs. 7J, 11F, 19K, 34D-E. *P. sulcata* has been assigned Invertebrate Taxon ID 6639 in the Springs Online database.

DISTRIBUTION

The Southern Steptoe Pyrg is restricted to two spring complexes in the Steptoe Valley of White Pine County, Nevada in springs north of Grass Springs and a spring northwest of Clark Spring (Hershler 1998, cited in Center for Biological Diversity 2009). The type locality is Springs north of Grass Springs, Steptoe Valley, White Pine County, Nevada. Holotype, USNM 874326; paratypes, USNM 860683 (Hershler and Liu 2017).

Pyrgulopsis sulcata has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. sulcata* has been reported at 5 sites across its entire range. This species has been recorded at 5 locations in White Pine County, Nevada. This species has been observed on 11 surveys between August 5, 1991 and June 14, 2012. At 3 of these locations [60%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Center for Biological Diversity (2009) states that one of the springs where this springsnail occurs is a small marshy rheocrene.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 5 times at 2 locations for this species, with average flow-per-location ranging from 0.05 to 1.1 liters per second [mean = 0.57 l/s, median = 0.57 l/s]. Specific Conductance was measured 6 times at 4 locations, with average specific conductance-per-location ranging from 250 to 495 µS/cm [mean = 382 µS/cm, median = 391 µS/cm]. Spring pH was measured 5 times at 4 locations, with average pH-per-location ranging from 6.6 to 7.67 [mean = 7.34, median = 7.54]. Temperature was measured 6 times at 4 locations, with average temperature-per-location ranging from 19 to 21° Celsius [mean = 20°C, median = 20°C].

This species was observed in **helocrene** [50%; n = 2] and **rheocrene** [50%; n = 2] springs. Elevations for this species range from 1,857 m (6,093 ft) to 1,869 m (6,132 ft), with a mean of 1,861 m (6,107 ft) and median of 1,860 m (6,102 ft).

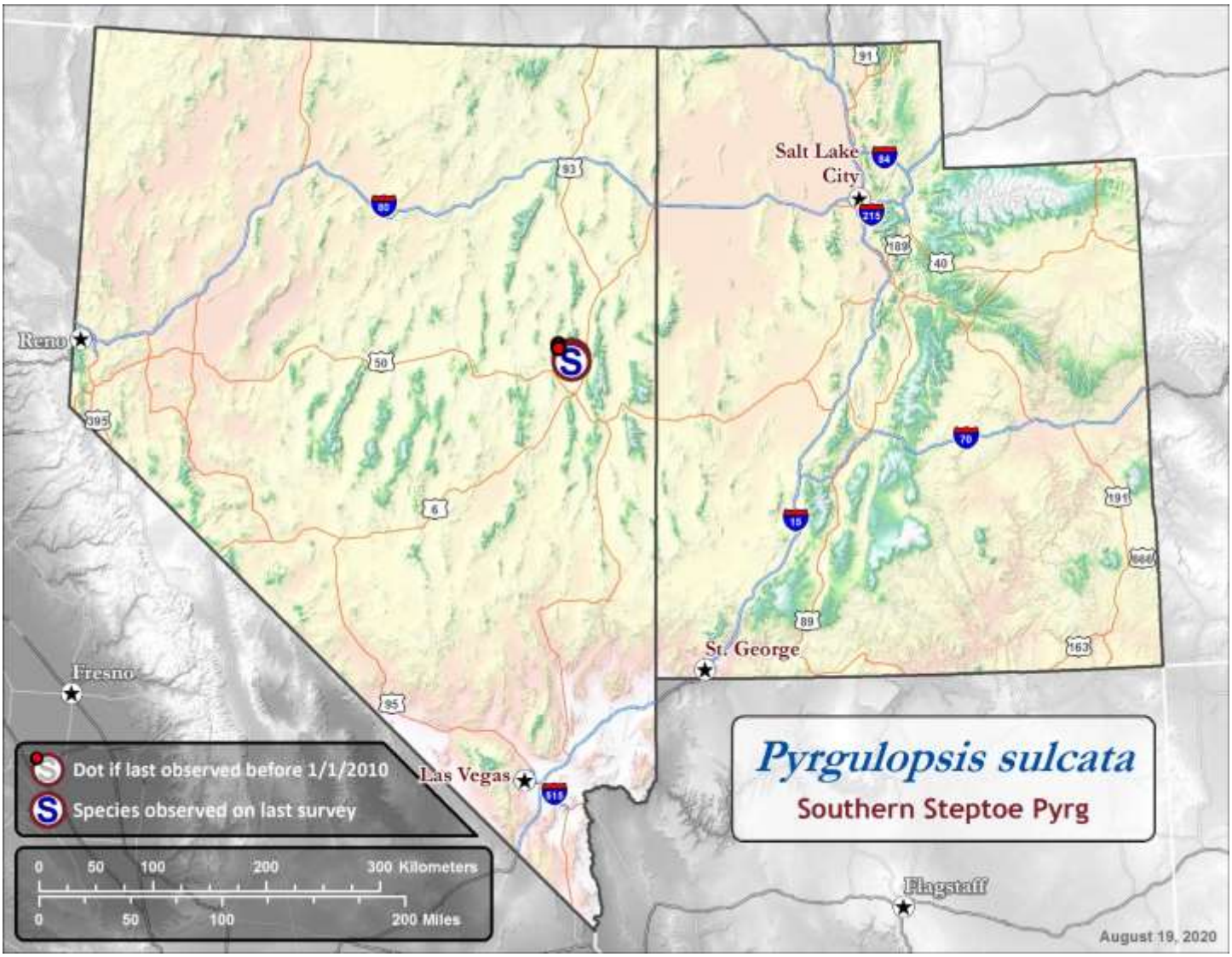
LAND MANAGEMENT

All 5 locations where *P. sulcata* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [64%; 7 surveys] and **Nevada Natural Heritage Data Import** [36%; 4 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis sulcata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+sulcata (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N2: Imperiled
Global Status	G2: Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	11 sampling locations reported in Utah or Nevada [n = 11 sites]
Most Recent Observation (restricted to UT and NV)	**August 26, 1993** (*11 surveys total in UT or NV between 5/11/1993 and 8/26/1993*)

TAXONOMY

Pyrgulopsis transversa is described in Hershler, 1998: 129-130, figs. 10J, 16G-I, 25H-K, 48D-H. *P. transversa* has been assigned Invertebrate Taxon ID 10744 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis transversa has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. transversa* has been reported at 11 sites across its entire range. Species observations have been recorded in 3 counties in Utah, including 7 locations in Tooele County, 2 in Sanpete County and 2 in Utah County. This species has been observed on 11 surveys between May 11, 1993 and August 26, 1993. The last survey at one of these locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This species has been reported at springs in Utah between 1,701 and 2,476 meters.

The water quality variables Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured 6 times at 6 locations for this species, with average specific conductance-per-location ranging from 360 to 1,126 µS/cm [mean = 635 µS/cm, median = 486 µS/cm]. Spring pH was measured 6 times at 6 locations, with average pH-per-location ranging from 7.4 to 8.2 [mean = 7.86, median = 7.98]. Temperature was measured 6 times at 6 locations, with average temperature-per-location ranging from 8 to 16° Celsius [mean = 12°C, median = 12°C].

This species was observed in **rheocrene** [82%; n = 9], **fountain** [9%; n = 1] and **helocrene** [9%; n = 1] springs. Elevations for this species range from 1,701 m (5,581 ft) to 2,476 m (8,123 ft), with a mean of 1,946 m (6,385 ft) and median of 1,961 m (6,434 ft).

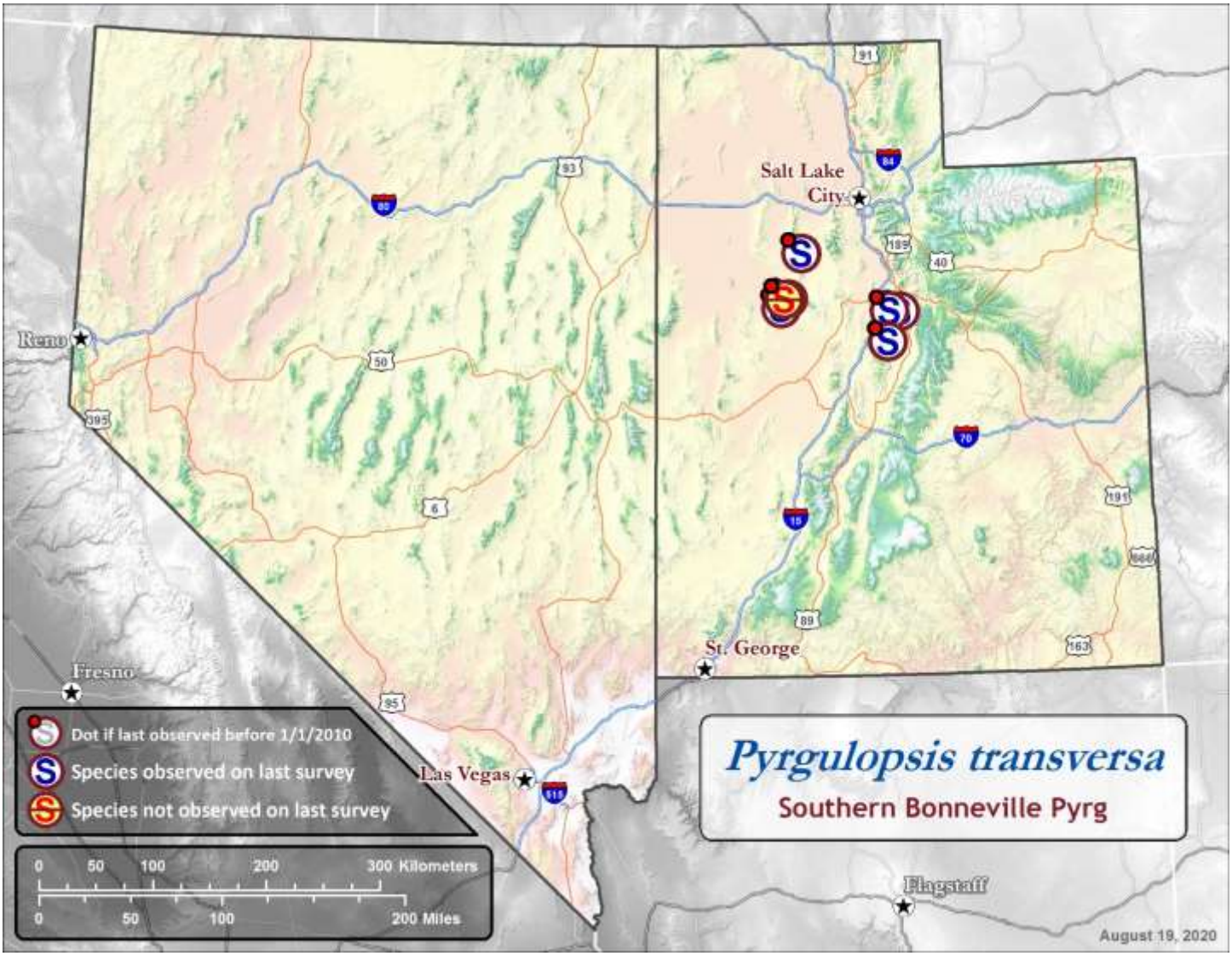
LAND MANAGEMENT

Of the 11 locations where *P. transversa* were observed, 36% were located on **Private** land (n = 4), 27% on **State** land (n = 3), 18% on **BLM** land (n = 2) and 18% on **USFS** land (n = 2).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [55%; 6 surveys] and **Utah CAS Import** [45%; 5 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis transversa. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+transversa (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S2: Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	Unclassified
Global Status	Unclassified
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011). Southwest Nevada pyrg was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review. NatureServe has not yet ranked the global and national status for this species.	
Number of Locations Reported (restricted to UT and NV)	24 sampling locations reported in Utah or Nevada [n = 23 sites]
Most Recent Observation (restricted to UT and NV)	**June 3, 2016** (*86 surveys total in UT or NV between 3/2/1972 and 6/3/2016*)

TAXONOMY

Pyrgulopsis turbatrix is described in Hershler 1998: 50-53, figs. 6K, 18G-J, 30D-F. The common name was originally incorrectly given as Southeast Nevada Pyrg (Hershler and Liu, 2017). *P. turbatrix* has been assigned Invertebrate Taxon ID 6242 in the Springs Online database.

DISTRIBUTION

This species is found in the Spring Mountains region in Nevada (Clark and Nye counties) and the San Bernardino Mountains and central Death Valley region in California (Inyo and San Bernardino counties) (Hershler et al. 2013, cited in NatureServe 2019). The Center for Biological Diversity (2009) states that the Southeast Nevada Pyrg is historically known from ten to eleven sites, but may no longer be extant at all of them. In Indian Springs Valley it occurs at Willow Spring and Cold Creek Spring. In the Las Vegas Valley in Clark County it occurs at La Madre Spring, Lost Creek Spring, Willow Spring, and at Lost Canyon Spring in Red Rock Wash. In Nye County it occurs at Horseshutem Springs in the Pahrump Valley and at Grapevine Springs in the Amargosa Flat and at Cane Spring in the Frenchman Flat Basin. The Clark County Multispecies Habitat Conservation Plan reports that there are five extant and one extirpated populations of this species (Clark County 2000). The type locality is Horseshutem Springs, Pahrump Valley, Nye County, Nevada. Holotype, USNM 883978; paratypes, USNM 860699.

Pyrgulopsis turbatrix has been classified with an endemism level of "20-100 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. turbatrix* has been reported at 28 sampling locations across its entire range [n = 27 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded at 24 locations in Nevada (14 locations in Nye County and 10 in Clark County) and 4 locations in California (3 locations in Inyo County and 1 in San Bernardino County). This species has been observed on 90 surveys between March 2, 1972 and June 3, 2016. The last surveys at 5 of these locations did not record any observations of this species. At 5 of these locations [18%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Southwest Nevada Pyrg requires permanently flowing, highlyoxygenated, unpolluted water with high mineral content (Center of Biological Diversity 2009).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 46 times at 23 locations for this species, with average flow-

per-location ranging from 0 to 13.25 liters per second [mean = 2.4 l/s, median = 0.19 l/s]. Specific Conductance was measured 48 times at 21 locations, with average specific conductance-per-location ranging from 197 to 1,030 µS/cm [mean = 471 µS/cm, median = 467 µS/cm]. Spring pH was measured 30 times at 12 locations, with average pH-per-location ranging from 7.34 to 8.4 [mean = 7.85, median = 7.81]. Temperature was measured 50 times at 21 locations, with average temperature-per-location ranging from 11 to 23° Celsius [mean = 16°C, median = 17°C].

This species was observed in **rheocrene** [71%; n = 12], **helocrene** [18%; n = 3] and **hillslope** [12%; n = 2] springs. Elevations for this species range from 328 m (1,076 ft) to 2,078 m (6,818 ft), with a mean of 1,477 m (4,846 ft) and median of 1,517 m (4,977 ft).

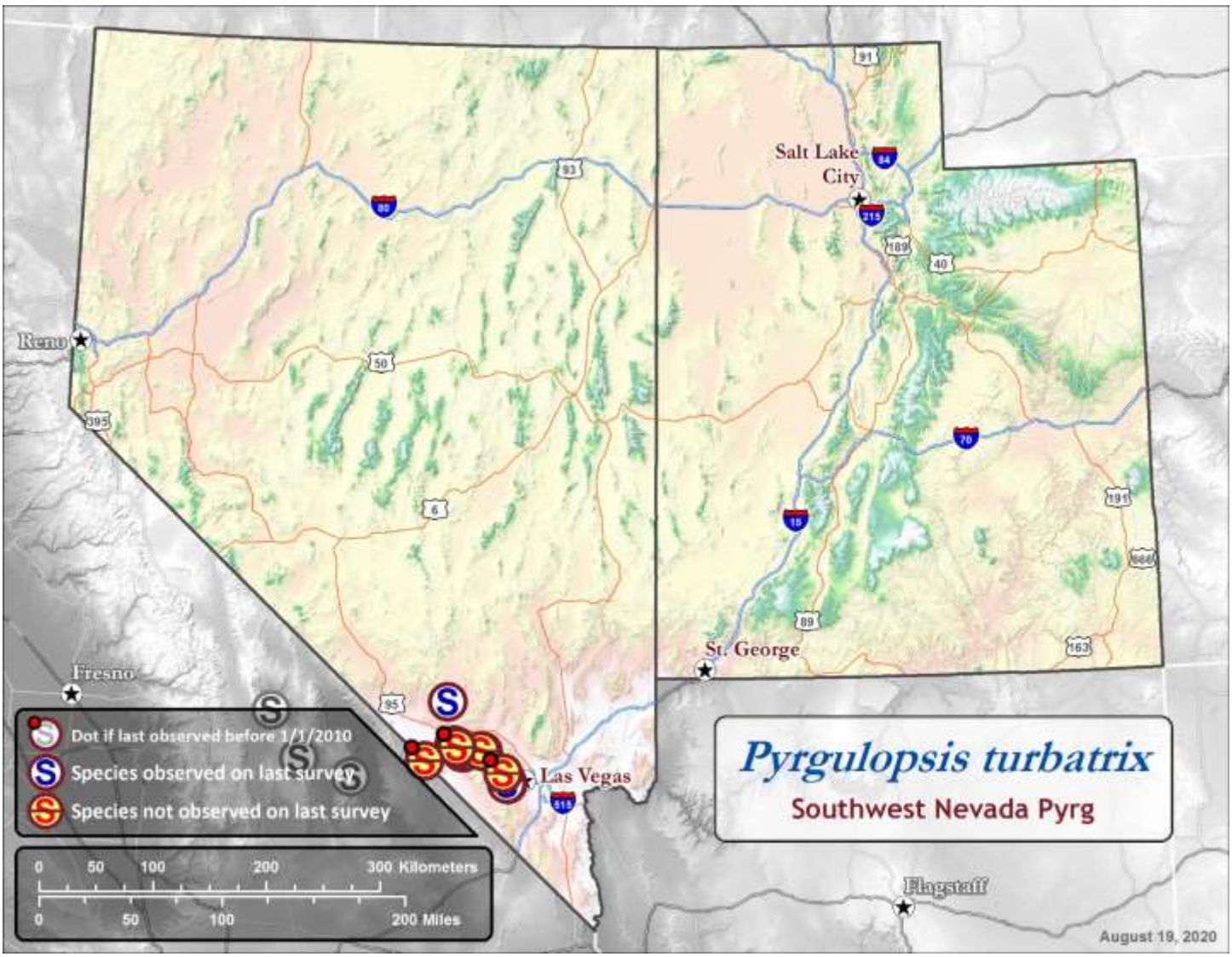
LAND MANAGEMENT

Of the 28 locations where *P. turbatrix* were observed, 29% were located on **BLM** land (n = 8), 29% on **Private** land (n = 8), 29% on **USFS** land (n = 8), 11% on **NPS** land (n = 3) and 4% on **DOD** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [36%; 32 surveys], **Nevada Natural Heritage Data Import** [32%; 29 surveys], **Sada Import 2017** [22%; 20 surveys], **SDS** [6%; 5 surveys], **Spring Mountains** [3%; 3 surveys] and **SSI Springs** [1%; 1 survey] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Clark County Department of Comprehensive Planning and U.S. Fish and Wildlife Service Nevada (Year Unspecified) Final Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement for Issuance of a Permit to Allow Incidental Take of 79 Species in Clark County, Nevada. RECON, San Diego, California. Report. Available at http://www.clarkcountynv.gov/airquality/dcp/Documents/Library/current%20HCP/ccfeis.pdf.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis turbatrix. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+turbatrix (Accessed 2019).

Pilgrim, K. and M. Schwartz (2013) Spring Mountains Nevada DNA Assessment of Spring Mountain Snail (Pyrgulopsis sp.) 2013 Samples. Unpublished U.S. Forest Service Report, Forestry Sciences Laboratory, Missoula, MT. Unpublished report.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

Southern Soldier Meadow Pyrg *Neotaenioglossa Hydrobiidae Pyrgulopsis umbilicata*

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	8 sampling locations reported in Utah or Nevada [n = 7 sites]
Most Recent Observation (restricted to UT and NV)	**September 8, 2005** (*15 surveys total in UT or NV between 6/3/1978 and 9/8/2005*)

TAXONOMY

Pyrgulopsis umbilicata is described in Hershler, 1998: 81, figs. 8H, 21C-D, 37G-I. *P. umbilicata* has been assigned Invertebrate Taxon ID 5770 in the Springs Online database.

DISTRIBUTION

Hershler reported the Southern Soldier Meadow Pyrg only in Soldier Meadow, Nevada (1998). The type locality is Spring near mouth of Warm Springs canyon, Soldier Meadow, Humboldt County, Nevada. Holotype, USNM 873208; paratypes, USNM 860705 (Hershler and Liu 2017).

Pyrgulopsis umbilicata has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. umbilicata* has been reported at 8 sampling locations across its entire range [n = 7 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. This species has been recorded at 8 locations in Humboldt County, Nevada. This species has been observed on 15 surveys between June 3, 1978 and September 8, 2005. The last survey at one of these locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

The Southern Soldier Meadow Pyrg has only been reported at six springs in Soldier Meadow, Nevada.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 6 times at 6 locations for this species, with average flow-per-location ranging from 0.02 to 6.67 liters per second [mean = 2.54 l/s, median = 0.92 l/s]. Specific Conductance was measured 9 times at 7 locations, with average specific conductance-per-location ranging from 317 to 495 µS/cm [mean = 408 µS/cm, median = 404 µS/cm]. Spring pH was measured 3 times at 1 site for this species, with an average pH of 8.64. Temperature was measured 9 times at 7 locations, with average temperature-per-location ranging from 17 to 40° Celsius [mean = 33°C, median = 38°C].

This species was observed in **rheocrene** [71%; n = 5], **helocrene** [14%; n = 1] and **limnocrene** [14%; n = 1] springs. Elevations for this species range from 1,325 m (4,347 ft) to 1,378 m (4,521 ft), with a mean of 1,354 m (4,443 ft) and median of 1,360 m (4,460 ft).

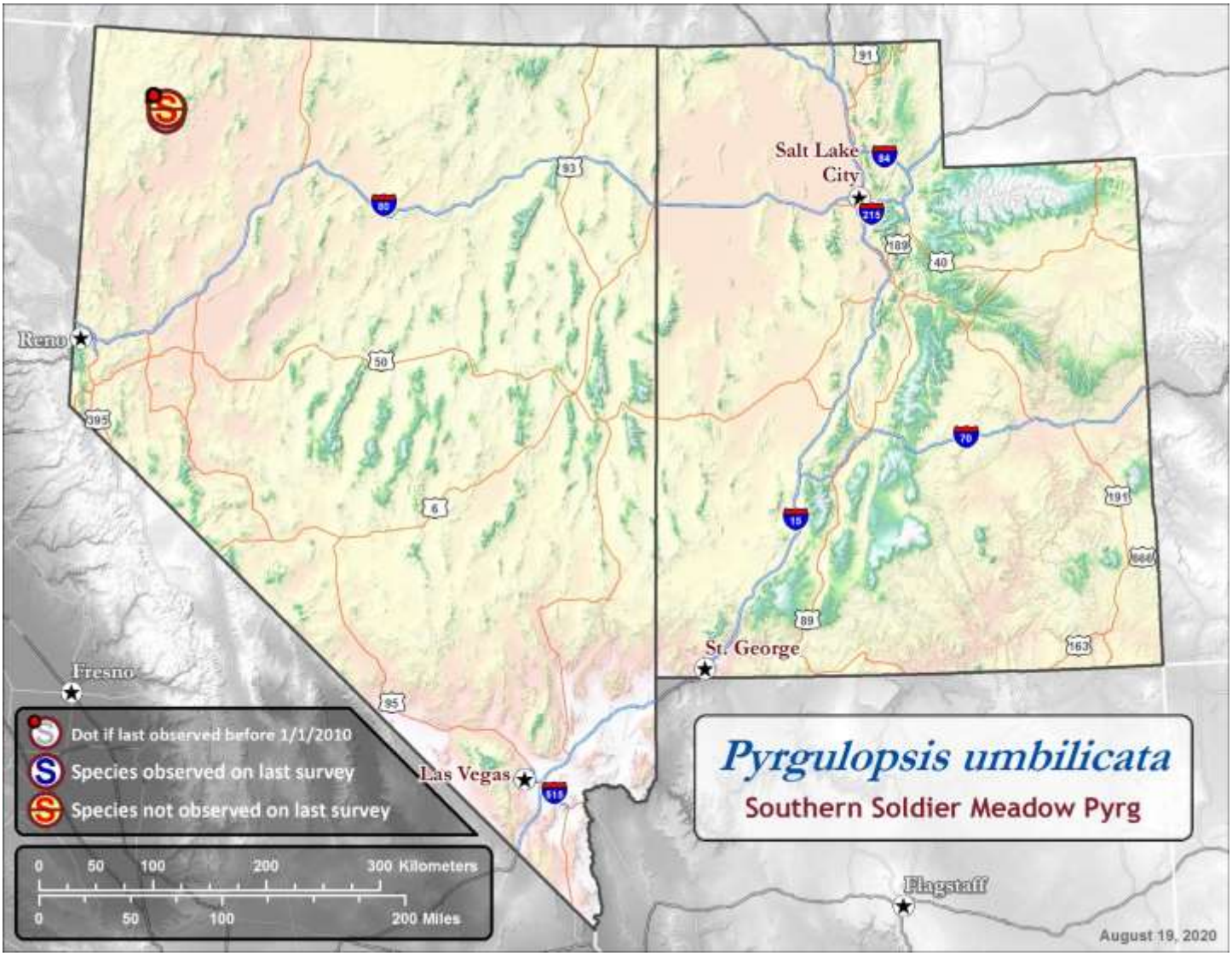
LAND MANAGEMENT

Of the 8 locations where *P. umbilicata* were observed, 63% were located on **BLM** land (n = 5) and 38% on **Private** land (n = 3).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [60%; 9 surveys] and **Nevada Natural Heritage Data Import** [40%; 6 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., H. Liu and D.W. Sada (2007) Origin and Diversification of the Soldier Meadow Springsnails (Hydrobiidae: Pyrgulopsis), a Species Flock in the Northwestern Great Basin, United States. Journal of Molluscan Studies 73:167-183. Publication. Available at http://mollus.oxfordjournals.org/content/73/2/167.full.pdf#http://mollus.oxfordjournals.org/content/73/2/167.full.pdf#.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis umbilicata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+umbilicata (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	S1: Critically Imperiled
ESA Status	0: Not listed
National Status	N2: Imperiled
Global Status	G2: Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. Searches for this snail in springs not surveyed by Hershler in northwestern Utah have been recommended by UDWR, and periodic examinations at known localities would be of value in order to evaluate population trends. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	18 sampling locations reported in Utah or Nevada [n = 18 sites]
Most Recent Observation (restricted to UT and NV)	**August 8, 2013** (*26 surveys total in UT or NV between 8/30/1992 and 8/8/2013*)

TAXONOMY

Pyrgulopsis variegata is described in Hershler, 1998: 113-115, figs. 10A, 24A-D, 45A-F. *P. variegata* has been assigned Invertebrate Taxon ID 6645 in the Springs Online database.

DISTRIBUTION

In Utah this species is known from 8 springs in far western Box Elder county and from one spring in extreme northwestern Tooele County (Hershler 1998). In most of the springs inhabited by this snail in Utah, it has been reported to be common, though at one spring it was scarce and in another it was abundant (Hershler no date). Localities from Nevada have yet to be identified. The type locality is a spring ca. 2.5 km south of South Patterson Spring, Pilot Valley, Box Elder County, Utah. Holotype, USNM 883627; paratypes, USNM 860723 (Hershler and Liu 2017).

Pyrgulopsis variegata has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. variegata* has been reported at 18 sites across its entire range. Species observations have been recorded at 13 locations in Utah (10 locations in Box Elder County and 3 in Tooele County) and 5 locations in Nevada (all in Elko County). This species has been observed on 26 surveys between August 30, 1992 and August 8, 2013. At 16 of these locations [89%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

UDWR reported that all but one of the known Utah populations of this species occur in rheocrenes, springs that emerge from the ground as flowing streams; the one Utah exception is in a helocrene, a spring in a marshy situation (Hershler no date).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 4 times at 3 locations for this species, with average flow-per-location ranging from 0.03 to 4.33 liters per second [mean = 1.68 l/s, median = 0.67 l/s]. Specific Conductance was measured 11 times at 10 locations, with average specific conductance-per-location ranging from 142 to 671 µS/cm [mean = 445 µS/cm, median = 498 µS/cm]. Spring pH was measured 12 times at 10 locations, with average pH-per-location ranging from 7.3 to 8.3 [mean = 7.71, median = 7.74]. Temperature was measured 12 times at 10 locations, with average temperature-per-location ranging from 9 to 19° Celsius [mean = 15°C, median = 15°C].

This species was observed in **rheocrene** [93%; n = 14] and **helocrene** [7%; n = 1] springs. Elevations for this species range from 1,302 m (4,272 ft) to 2,088 m (6,850 ft), with a mean of 1,654 m (5,425 ft) and median of 1,687 m (5,535 ft).

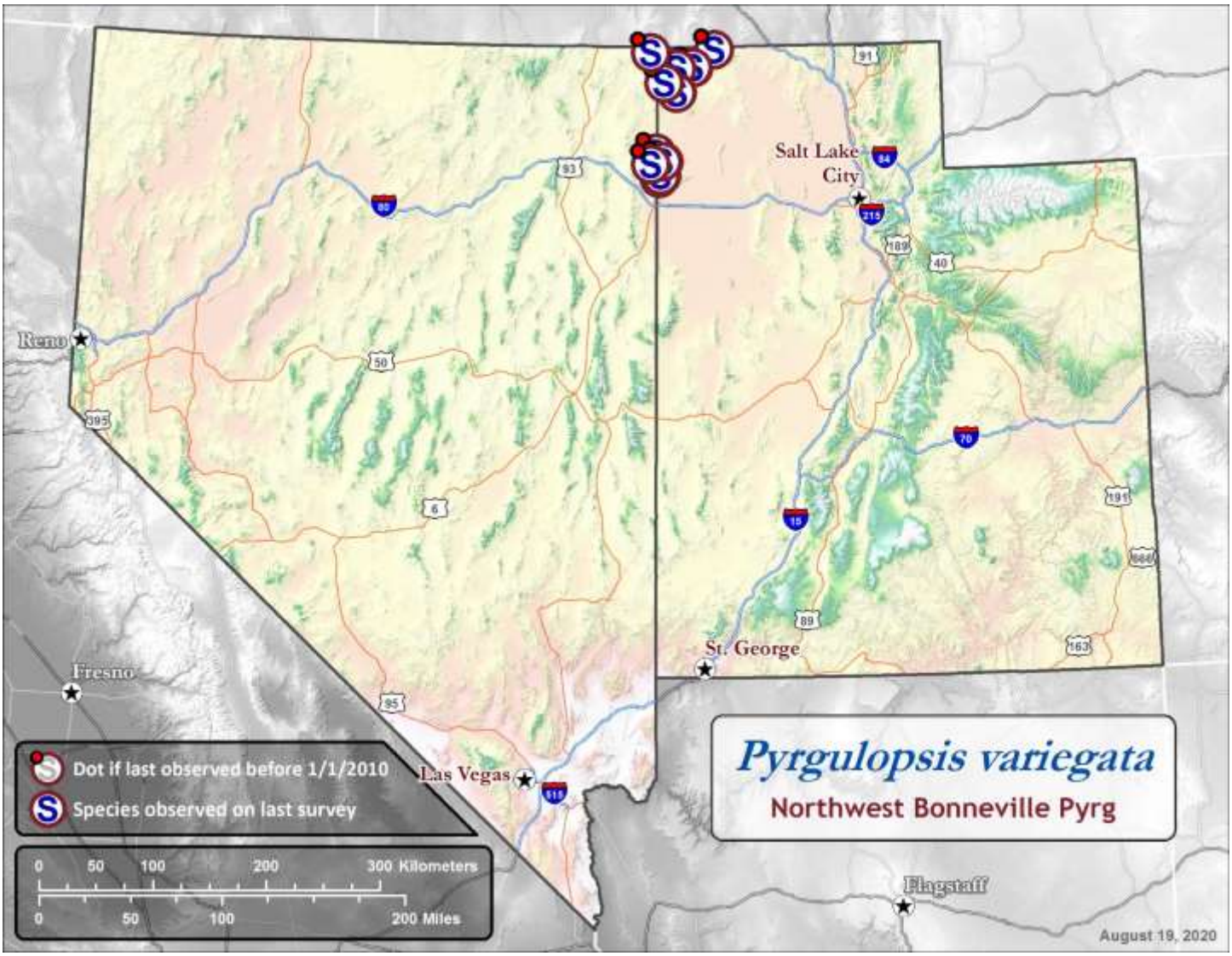
LAND MANAGEMENT

Of the 18 locations where *P. variegata* were observed, 50% were located on **BLM** land (n = 9), 44% on **Private** land (n = 8) and 6% on **USFS** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [50%; 13 surveys], **Utah CAS Import** [31%; 8 surveys] and **Nevada Natural Heritage Data Import** [19%; 5 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis variegata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+variegata (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	9 sampling locations reported in Utah or Nevada [n = 9 sites]
Most Recent Observation (restricted to UT and NV)	**September 28, 2011** (*18 surveys total in UT or NV between 8/8/1991 and 9/28/2011*)

TAXONOMY

Pyrgulopsis varneri is described in Hershler, Liu, and Sada, 2007b: 176-777, 180, figs. 7, 11. *P. varneri* has been assigned Invertebrate Taxon ID 10745 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis varneri has been classified with an endemism level of "6-20 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. varneri* has been reported at 9 sites across its entire range. This species has been recorded at 9 locations in Humboldt County, Nevada. This species has been observed on 18 surveys between August 8, 1991 and September 28, 2011. The last surveys at 2 of these locations did not record any observations of this species. At 8 of these locations [89%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Varners pyrg has been reported at springs in Humboldt County, Nevada at elevations between 1,320 and 1,378 meters.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 8 times at 7 locations for this species, with average flow-per-location ranging from 0.01 to 3.33 liters per second [mean = 1.15 l/s, median = 0.03 l/s]. Specific Conductance was measured 9 times at 7 locations, with average specific conductance-per-location ranging from 249 to 460 µS/cm [mean = 326 µS/cm, median = 305 µS/cm]. Spring pH was measured 2 times at 2 locations, with average pH-per-location ranging from 7.13 to 9.3 [mean = 8.22, median = 8.22]. Temperature was measured 9 times at 7 locations, with average temperature-per-location ranging from 19 to 35° Celsius [mean = 26°C, median = 25°C].

This species was observed in **rheocrene** [63%; n = 5], **limnocrene** [25%; n = 2] and **helocrene** [13%; n = 1] springs. Elevations for this species range from 1,320 m (4,331 ft) to 1,378 m (4,521 ft), with a mean of 1,349 m (4,426 ft) and median of 1,345 m (4,413 ft).

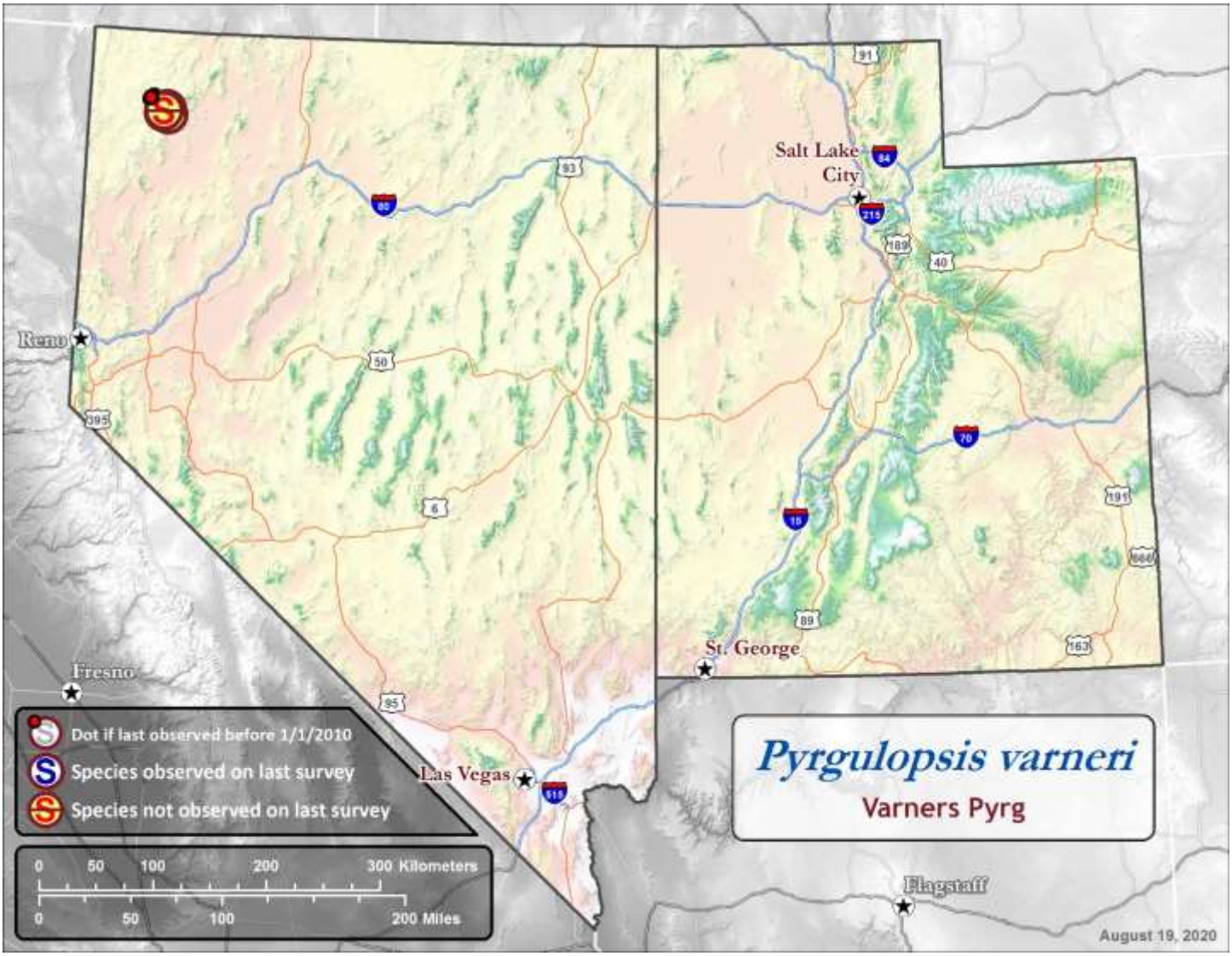
LAND MANAGEMENT

Of the 9 locations where *P. varneri* were observed, 67% were located on **BLM** land (n = 6) and 33% on **Private** land (n = 3).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [56%; 10 surveys] and **Nevada Natural Heritage Data Import** [44%; 8 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., H. Liu and D.W. Sada (2007) Origin and Diversification of the Soldier Meadow Springsnails (Hydrobiidae: Pyrgulopsis), a Species Flock in the Northwestern Great Basin, United States. Journal of Molluscan Studies 73:167-183. Publication. Available at http://mollus.oxfordjournals.org/content/73/2/167.full.pdf#http://mollus.oxfordjournals.org/content/73/2/167.full.pdf#.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis varneri. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+varneri (Accessed 2019).

Duckwater Warm Springs Pyrg *Neotaenioglossa Hydrobiidae Pyrgulopsis villacampae*

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. It is included in the Nevada BLM Special Status Species Program, but this discretionary program does not provide the species with legal protective status (Center for Biological Diversity 2009). Duckwater Warm Springs pyrg was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition did not present substantial information indicating that the species should be listed.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**June 16, 2010** (*10 surveys total in UT or NV between 9/3/1973 and 6/16/2010*)

TAXONOMY

Pyrgulopsis villacampae is described in Hershler, 1998: 62-63, figs. 7G, 13A, 19F-G, 33C-E. *P. villacampae* has been assigned Invertebrate Taxon ID 6646 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis villacampae has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. villacampae* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in Nye County, Nevada. This species has been observed on 10 surveys between September 3, 1973 and June 16, 2010. The most recent date the species was observed at this site was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This springsnail is found among rocks in deep (1 m) thermal spring outflows (Center for Biological Diversity 2009).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 3 times at 2 locations for this species, with average flow-per-location ranging from 33.33 to 416.67 liters per second [mean = 225 l/s, median = 225 l/s]. Specific Conductance was measured 3 times at 2 locations, with average specific conductance-per-location ranging from 671 to 681 µS/cm [mean = 676 µS/cm, median = 676 µS/cm]. Spring pH was measured 4 times at 2 locations, with average pH-per-location ranging from 7.28 to 7.3 [mean = 7.29, median = 7.29]. Temperature was measured 5 times at 2 locations, with average temperature-per-location ranging from 32 to 32° Celsius [mean = 32°C, median = 32°C].

Both sites where this species occurred were **limnocrene** springs. Elevations for this species range from 1,708 m (5,604 ft) to 1,710 m (5,610 ft), with a mean of 1,709 m (5,607 ft) and median of 1,709 m (5,607 ft).

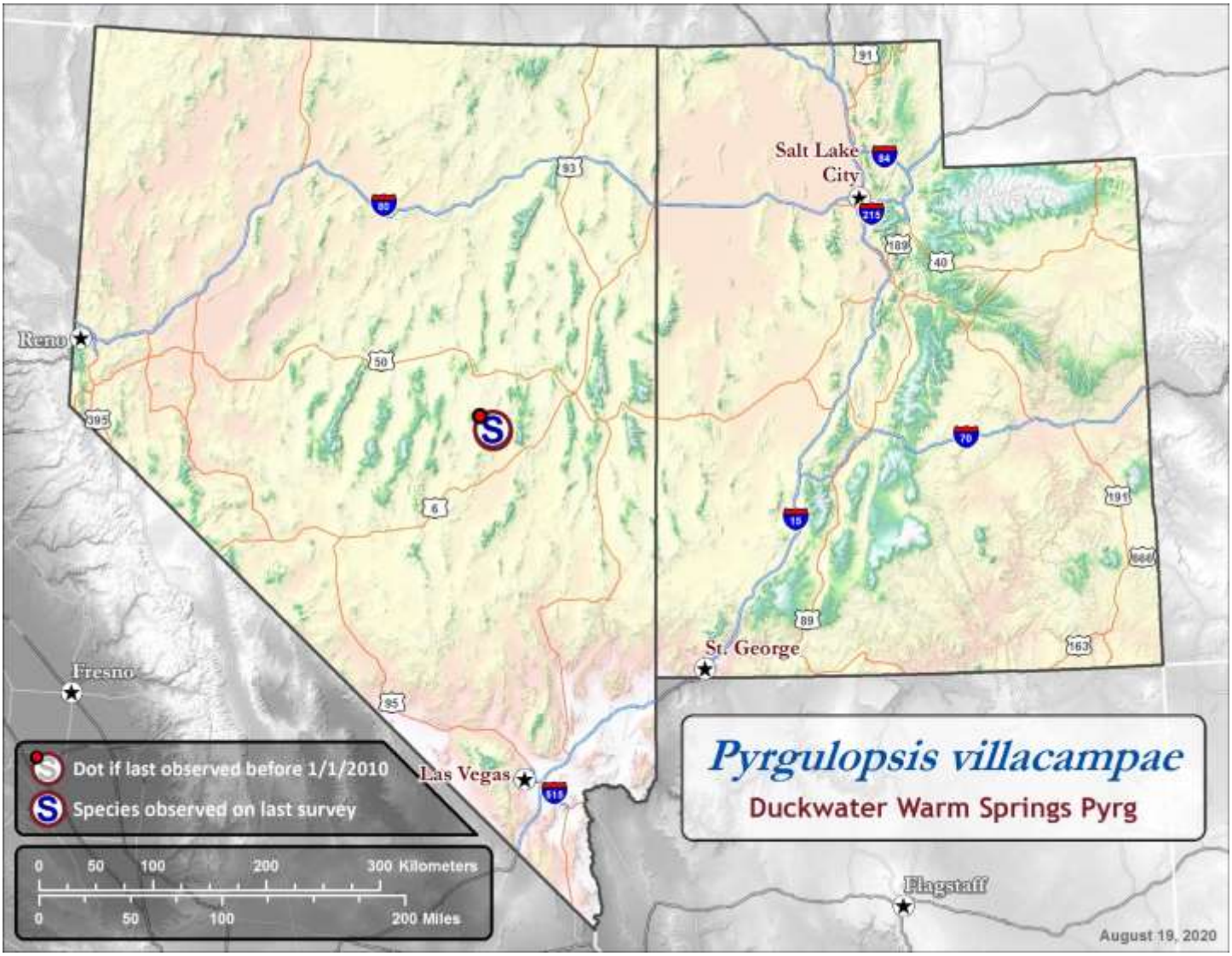
LAND MANAGEMENT

Both locations where *P. villacampae* were observed were located on **Tribal** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [50%; 5 surveys] and **Nevada Natural Heritage Data Import** [50%; 5 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis villacampae. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+villacampae (Accessed 2019).

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	2 sampling locations reported in Utah or Nevada [n = 2 sites]
Most Recent Observation (restricted to UT and NV)	**September 27, 2017** (*11 surveys total in UT or NV between 1/1/1992 and 9/27/2017*)

TAXONOMY

Pyrgulopsis vinyardi is described in Hershler, 1998: 84-86, figs, 8K, 21I, 39A-C. *P. vinyardi* has been assigned Invertebrate Taxon ID 6647 in the Springs Online database.

DISTRIBUTION

No Data Entered

Pyrgulopsis vinyardi has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. vinyardi* has been reported at 2 sites across its entire range. This species has been recorded at 2 locations in Elko County, Nevada. This species has been observed on 11 surveys between January 1, 1992 and September 27, 2017.

HABITAT CHARACTERISTICS

This springsnail occurs at two springs on private land, at 1,689 meters.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 2 times at 1 site for this species, with an average flow of 3.69 liters per second. Specific Conductance was measured 4 times at 2 locations for this species, with average specific conductance-per-location ranging from 122 to 151 µS/cm [mean = 136 µS/cm, median = 136 µS/cm]. Spring pH was measured 4 times at 2 locations, with average pH-per-location ranging from 7.63 to 7.82 [mean = 7.72, median = 7.72]. Temperature was measured 4 times at 2 locations, with average temperature-per-location ranging from 17 to 18° Celsius [mean = 17°C, median = 17°C].

Both sites where this species occurred were **rheocrene** springs. Elevations for this species range from 1,689 m (5,541 ft) to 1,698 m (5,571 ft), with a mean of 1,694 m (5,556 ft) and median of 1,694 m (5,556 ft).

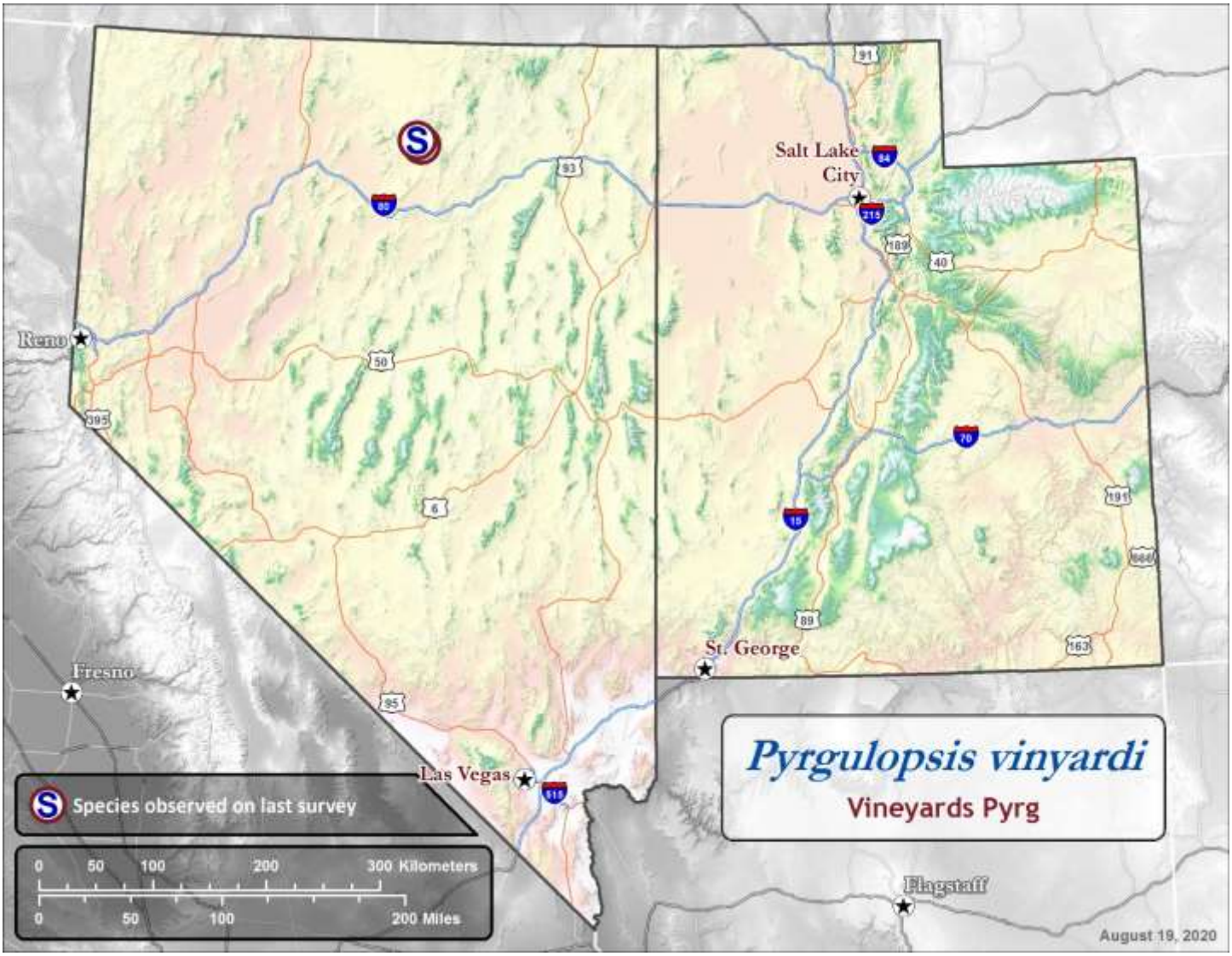
LAND MANAGEMENT

Both locations where *P. vinyardi* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [64%; 7 surveys] and **Sada Import** [36%; 4 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis vinyardi. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+vinyardi (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N2N3: Imperiled/Vulnerable
Global Status	G2: Imperiled
IUCN Status	0: No immediate threat to the survival of the species
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. Species state- and agency-level conservation status includes: BLM NV: Sensitive; USFS Region 5 CA: Sensitive; Nevada WAP 2012: Species of Conservation Priority. This is a Moderately Vulnerable species, with factors contributing to increased vulnerability are natural barriers, dispersal/movement, and historical and physiological hydrological niche. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	18 sampling locations reported in Utah or Nevada [n = 18 sites]
Most Recent Observation (restricted to UT and NV)	**July 12, 2018** (*34 surveys total in UT or NV, ranging from 1/1/1989 to 7/12/2018, plus 2 surveys with no date recorded*)

TAXONOMY

Pyrgulopsis wongi is described in Hershler, 1989: 196, 198-202, figs. 41-46. *P. wongi* has been assigned Invertebrate Taxon ID 6648 in the Springs Online database.

DISTRIBUTION

This species has been reported at eight localities, including in California in Inyo and Mono Counties, and in NV in Douglas, Esmeralda, and Mineral Counties. The type locality is an unnamed western spring tributary to Pine Creek, Birchim Canyon, Owens Valley, Inyo County, California. Holotype, USNM 860403; paratypes, USNM 857941. (Hershler and Liu 2017).

Pyrgulopsis wongi has been classified with an endemism level of "20-100 discrete populations" as reported in NatureServe. In the Springs Online Database, *P. wongi* has been reported at 51 sites across its entire range. Species observations have been recorded at 33 locations in California (28 locations in Inyo County, 4 in Mono County and 1 in Fresno County) and 18 locations in Nevada (14 locations in Mineral County, 3 in Esmeralda County and 1 in Douglas County). This species has been observed on 59 surveys between January 1, 1989 and July 12, 2018, and also on 10 additional surveys in which no date was recorded. The last surveys at 4 of these locations did not record any observations of this species. At 36 of these locations [71%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Wong's Springsnail occurs at springs in Nevada and California, ranging from 1,089 to 2,449 meters.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 9 times at 7 locations for this species, with average flow-per-location ranging from 0.03 to 2 liters per second [mean = 0.72 l/s, median = 0.5 l/s]. Specific Conductance was measured 31 times at 30 locations, with average specific conductance-per-location ranging from 85 to 2,275 µS/cm [mean = 428 µS/cm, median = 230 µS/cm]. Spring pH was measured 33 times at 31 locations, with average pH-per-location ranging from 7.1 to 9 [mean = 7.83, median = 7.8]. Temperature was measured 33 times at 31 locations, with average temperature-per-location ranging from 12 to 25° Celsius [mean = 18°C, median = 17°C].

This species was observed in **rheocrene** [74%; n = 31] and **helocrene** [26%; n = 11] springs. Elevations for this species range from 1,089 m (3,573 ft) to 2,449 m (8,035 ft), with a mean of 1,727 m (5,666 ft) and median of 1,847 m (6,060 ft).

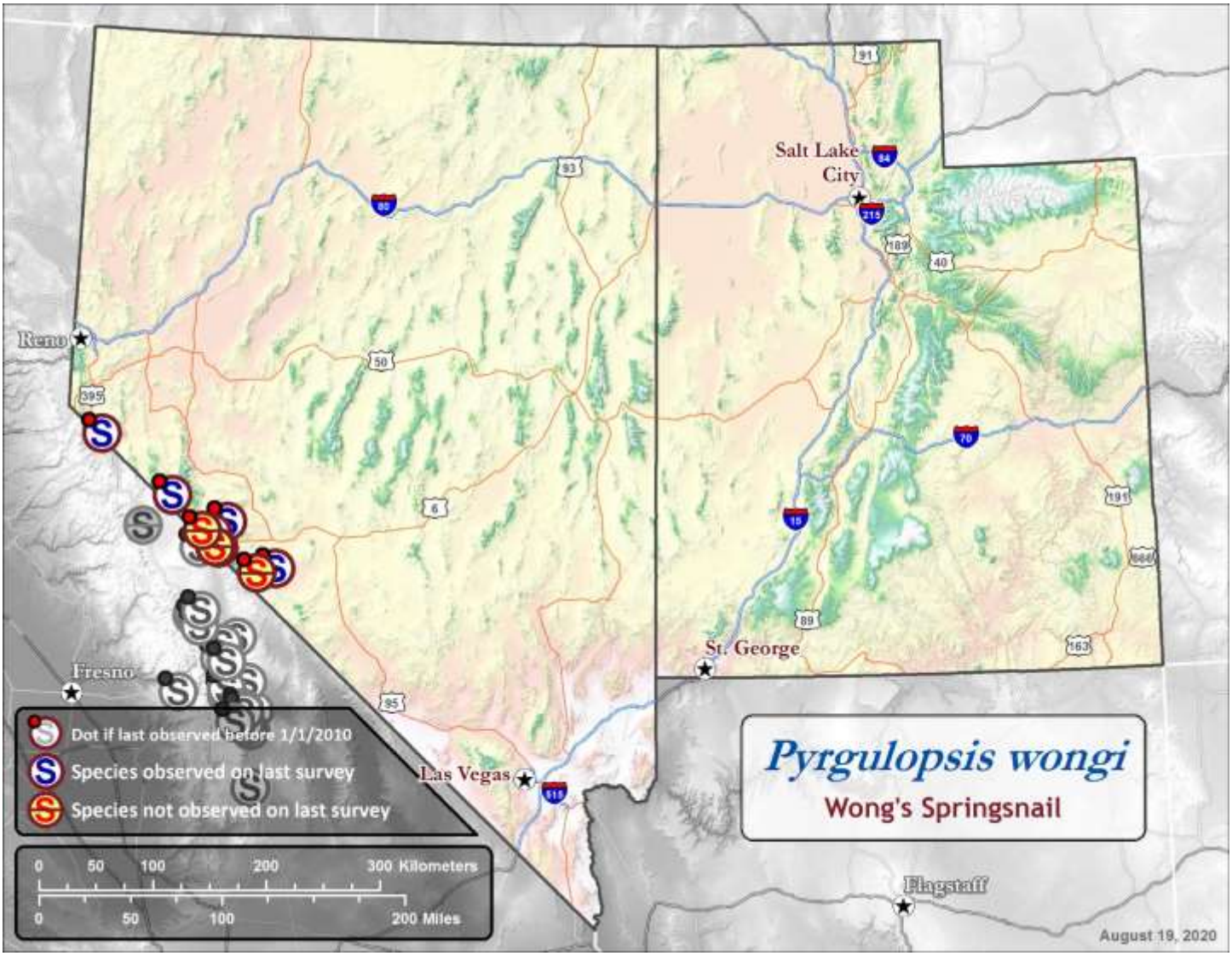
LAND MANAGEMENT

Of the 51 locations where *P. wongi* were observed, 39% were located on **USFS** land (n = 20), 24% on **BLM** land (n = 12), 22% on **City** land (n = 11), 14% on **Private** land (n = 7) and 2% on **State** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [70%; 48 surveys], **Nevada Natural Heritage Data Import** [23%; 16 surveys] and **NDOW- Southern Region** [7%; 5 surveys] projects.

RELATED LITERATURE

Hershler, R. (1998) A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus Pyrgulopsis. Veliger 41:1-132. Peer-reviewed article.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Pyrgulopsis wongi. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Pyrgulopsis+wongi (Accessed 2019).

Nevada Natural Heritage Program (2017) Pyrgulopsis wongi species information. Publisher Unspecified. Website. Available at http://heritage.nv.gov/taxon_detail/18659.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 54 FR 554 579 (1989), 49 FR 21664 21675 (1984). Sportinggoods Tryonia was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	3 sampling locations reported in Utah or Nevada [n = 3 sites]
Most Recent Observation (restricted to UT and NV)	**April 25, 2008** (*15 surveys total in UT or NV between 11/22/1969 and 4/25/2008*)

TAXONOMY

This genus was formerly in the *Hydrobiidae* family. *Tryonia angulata* is described in Hershler and Sada, 1987: 810-811, 814-817, figs. 39a, 40-41, 42a,d, 43. *T. angulata* has been assigned Invertebrate Taxon ID 5783 in the Springs Online database.

DISTRIBUTION

No Data Entered

Tryonia angulata has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *T. angulata* has been reported at 3 sites across its entire range. This species has been recorded at 3 locations in Nye County, Nevada. This species has been observed on 15 surveys between November 22, 1969 and April 25, 2008. The last surveys at 2 of these locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This species is found on soft substrates in three large thermal low elevation limnocrenes (Sada 1990, Hershler and Sada 1987).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 2 times at 2 locations for this species, with average flow-per-location ranging from 16.67 to 83.33 liters per second [mean = 50 l/s, median = 50 l/s]. Specific Conductance was measured 5 times at 3 locations, with average specific conductance-per-location ranging from 700 to 1,332 µS/cm [mean = 1,119 µS/cm, median = 1,325 µS/cm]. Spring pH was measured 2 times at 2 locations, with average pH-per-location ranging from 7.4 to 7.5 [mean = 7.45, median = 7.45]. Temperature was measured 5 times at 3 locations, with average temperature-per-location ranging from 27 to 29° Celsius [mean = 28°C, median = 27°C].

All sites where this species occurred were **limnocrene** springs. Elevations for this species range from 670 m (2,198 ft) to 689 m (2,260 ft), with a mean of 681 m (2,233 ft) and median of 683 m (2,241 ft).

LAND MANAGEMENT

Of the 3 locations where *T. angulata* were observed, 67% were located on **FWS** land (n = 2) and 33% on **BLM** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION

SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [67%; 10 surveys] and **Sada Import** [33%; 5 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., Sada, D.W. (1987) Springsnails (Gastropoda: Hydrobiidae) of Ash Meadows, Amargosa basin, California-Nevada. Proceedings of the Biological Society of Washington: Pg 776-843. Publication. Available at https://repository.si.edu/handle/10088/11319.

Hershler, R.H. (2001) Systematics of the North and Central American aquatic snail genus Tryonia (Rissooidea: Hydrobiidae). Smithsonian Contributions to Zoology, 612: 1-53. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/5136/SCtZ-0612-Lo_res.pdf.pdf?sequence=2&isAllowed=y.

NatureServe (2019) NatureServe Explorer; Tryonia angulata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Tryonia+angulata (Accessed 2019).

Sada, D.W. (1990) Recovery Plan for the Endangered and Threatened Species of Ash Meadows, Nevada. U.S. Fish and Wildlife Service, Portalnd, Oregon. 130 pp. Report. Available at http://ecos.fws.gov/docs/recovery_plan/900928d.pdf##.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S2: Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N2: Imperiled
Global Status	G2: Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 82 FR 46618 46645 (2017), 76 FR 56608 56630 (2011), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 54 FR 554 579 (1989), 49 FR 21664 21675 (1984), 44 FR 70796 70797 (1979), 41 FR 17742 17747 (1976). Grated Tryonia was proposed for review under the Center for Biodiversity (2009) petition. However, the USFWS 12-Month Findings on Petitions to List 25 Species as Endangered or Threatened Species (2017) concluded that this species did not warrant listing under the ESA.	
Number of Locations Reported (restricted to UT and NV)	40 sampling locations reported in Utah or Nevada [n = 23 sites]
Most Recent Observation (restricted to UT and NV)	**June 8, 2016** (*93 surveys total in UT or NV between 8/31/1973 and 6/8/2016*)

TAXONOMY

Tryonia clathrata is described in Stimpson, 1865: 54, pl. 8, fig. 1. This genus was formerly in the *Hydrobiidae* family (Hershler and Liu 2017). *T. clathrata* has been assigned Invertebrate Taxon ID 6247 in the Springs Online database.

DISTRIBUTION

No Data Entered

Tryonia clathrata has been classified with an endemism level of "20-100 discrete populations" as reported in NatureServe. In the Springs Online Database, *T. clathrata* has been reported at 40 sampling locations across its entire range [n = 23 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. Species observations have been recorded in 3 counties in Nevada, including 28 locations in Clark County, 6 in Lincoln County and 6 in Nye County. This species has been observed on 93 surveys between August 31, 1973 and June 8, 2016. The last surveys at 4 of these locations did not record any observations of this species. At 16 of these locations [40%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Sada (2008) found that *T. clathrata* was most common along spring brook banks where it preferred shallow water (< 5 cm deep). In terms of substrate, Sada (2008) found that this species preferred sand, fines, and coarse particulate organic matter, and strongly avoided gravel and cobbles.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 50 times at 34 locations for this species, with average flow-per-location ranging from 0.25 to 548.33 liters per second [mean = 38.47 l/s, median = 2.54 l/s]. Specific Conductance was measured 58 times at 35 locations, with average specific conductance-per-location ranging from 514 to 1,163 µS/cm [mean = 918 µS/cm, median = 1,010 µS/cm]. Spring pH was measured 37 times at 28 locations, with average pH-per-location ranging from 7.35 to 7.8 [mean = 7.52, median = 7.5]. Temperature was measured 58 times at 35 locations, with average temperature-per-location ranging from 31 to 36° Celsius [mean = 32°C, median = 32°C].

This species was observed in **rheocrene** [88%; n = 28], **limnocrene** [9%; n = 3] and **helocrene** [3%; n = 1] springs. Elevations for this species range from 536 m (1,759 ft) to 1,708 m (5,604 ft), with a mean of 798 m (2,617 ft) and median of 555 m (1,821 ft).

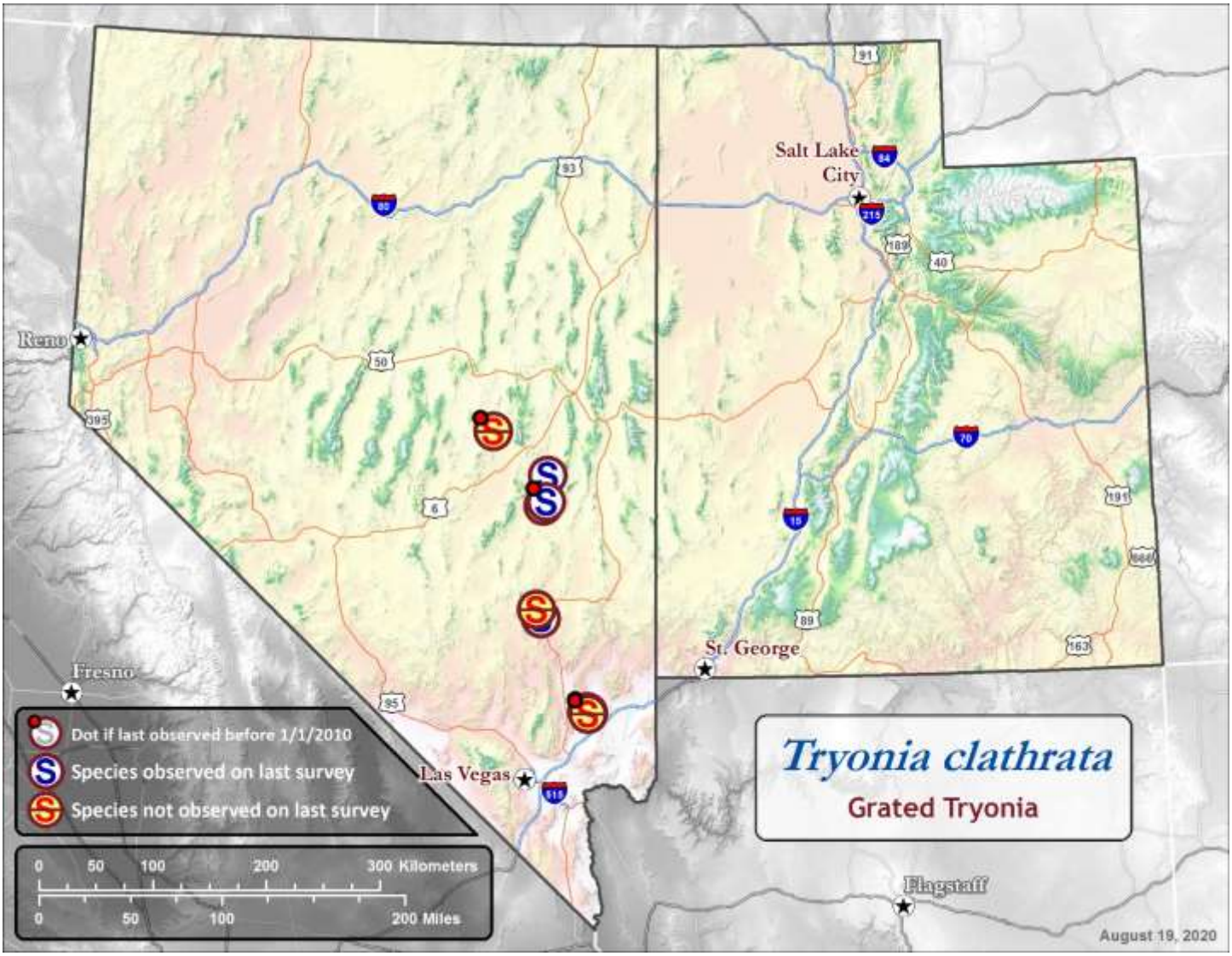
LAND MANAGEMENT

Of the 40 locations where *T. clathrata* were observed, 50% were located on **FWS** land (n = 20), 23% on **BLM** land (n = 9), 20% on **Private** land (n = 8), 3% on **BOR** land (n = 1), 3% on **State** land (n = 1) and 3% on **Tribal** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [40%; 37 surveys], **Nevada Natural Heritage Data Import** [35%; 33 surveys], **Sada Import 2017** [24%; 22 surveys] and **SDS** [1%; 1 survey] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Department of the Interior Fish and Wildlife Service (2017) 12-Month Findings on Petitions To List 25 Species as Endangered or Threatened Species. Federal Register. Report. Available at https://www.govinfo.gov/content/pkg/FR-2017-10-05/pdf/2017-21352.pdf#page=1.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Tryonia clathrata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Tryonia+clathrata (Accessed 2019).

Sada DW. Herbst DB (1999) Habitat use by rare aquatic macroinvertebrates in spring brooks on the upper Muddy River, Clark County, Nevada. The Nature Conservancy, Las Vegas, NV. Report.

Stimpson, W. (1895) Diagnoses of newly discovered genera of gasteropods [sic], belonging to the sub-fam. Hydrobiinae, of the family Rissoidae. American Journal of Conchology 1:52-54. Peer-reviewed article.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 54 FR 554 579 (1989), 49 FR 21664 21675 (1984). Point of Rocks Tryonia was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	3 sampling locations reported in Utah or Nevada [n = 3 sites]
Most Recent Observation (restricted to UT and NV)	**October 1, 1993** (*6 surveys total in UT or NV between 11/8/1985 and 10/1/1993*)

TAXONOMY

This genus was formerly in the *Hydrobiidae* family. *Tryonia elata* is described in Hershler and Sada, 1987: 831, figs. 39b, 42c, 53e-h, 56. *T. elata* has been assigned Invertebrate Taxon ID 5786 in the Springs Online database.

DISTRIBUTION

No Data Entered

Tryonia elata has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *T. elata* has been reported at 3 sites across its entire range. This species has been recorded at 3 locations in Nye County, Nevada. This species has been observed on 6 surveys between November 8, 1985 and October 1, 1993. The last surveys at all locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This species is found at two small springs on a travertine mound. It is locally common in the silted stream outflows (Center for Biological Diversity 2009).

The water quality variables Specific Conductance and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured 2 times at 2 locations for this species, with average specific conductance-per-location ranging from 700 to 810 µS/cm [mean = 755 µS/cm, median = 755 µS/cm]. Temperature was measured 2 times at 2 locations, with average temperature-per-location ranging from 28 to 32° Celsius [mean = 30°C, median = 30°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 709 m (2,326 ft) to 714 m (2,343 ft), with a mean of 711 m (2,333 ft) and median of 710 m (2,329 ft).

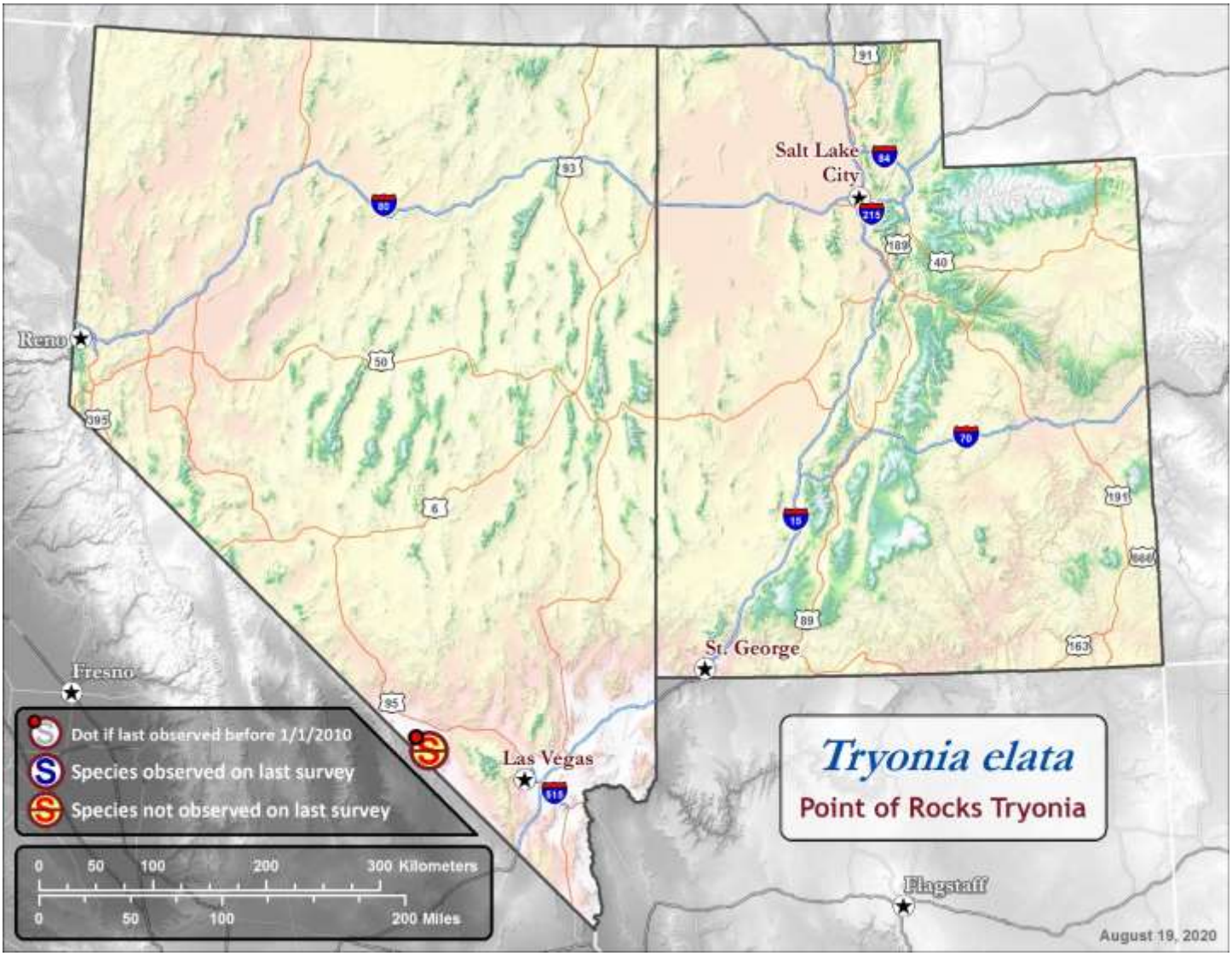
LAND MANAGEMENT

Of the 3 locations where *T. elata* were observed, 67% were located on **FWS** land (n = 2) and 33% on **BLM** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [67%; 4 surveys] and **Sada Import** [33%; 2 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Tryonia elata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Tryonia+elata (Accessed 2019).

Sada, D.W. (1990) Recovery Plan for the Endangered and Threatened Species of Ash Meadows, Nevada. U.S. Fish and Wildlife Service, Portalnd, Oregon. 130 pp. Report. Available at http://ecos.fws.gov/docs/recovery_plan/900928d.pdf##.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 54 FR 554 579 (1989), 49 FR 21664 21675 (1984). Minute Tryonia was proposed for review under the Center for Biological Diversity (2009) petition. The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	3 sampling locations reported in Utah or Nevada [n = 3 sites]
Most Recent Observation (restricted to UT and NV)	**October 1, 1993** (*5 surveys total in UT or NV between 11/9/1985 and 10/1/1993*)

TAXONOMY

This genus was formerly in the *Hydrobiidae* family. *Tryonia ericae* is described in Hershler and Sada, 1987: 826-831, figs. 39c-d, 42f,i, 53a-d, 54. *T. ericae* has been assigned Invertebrate Taxon ID 5787 in the Springs Online database.

DISTRIBUTION

No Data Entered

Tryonia ericae has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *T. ericae* has been reported at 3 sites across its entire range. This species has been recorded at 3 locations in Nye County, Nevada. This species has been observed on 5 surveys between November 9, 1985 and October 1, 1993. The last surveys at 2 of these locations did not record any observations of this species. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

This springsnail is found on macrophytes, in stream outflows, on travertine fragments, and on mats of algae at two small low-elevation springs (Hershler and Sada 1987).

The water quality variables Specific Conductance and Temperature were measured and recorded at sites where this species was observed. Specific Conductance was measured 2 times at 2 locations for this species, with average specific conductance-per-location ranging from 650 to 810 µS/cm [mean = 730 µS/cm, median = 730 µS/cm]. Temperature was measured 2 times at 2 locations, with average temperature-per-location ranging from 27 to 32° Celsius [mean = 30°C, median = 30°C].

All sites where this species occurred were **rheocrene** springs. Elevations for this species range from 707 m (2,320 ft) to 709 m (2,326 ft), with a mean of 708 m (2,323 ft) and median of 708 m (2,323 ft).

LAND MANAGEMENT

All 3 locations where *T. ericae* were observed were located on **FWS** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION

SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [60%; 3 surveys] and **Sada Import** [40%; 2 surveys] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., Sada, D.W. (1987) Springsnails (Gastropoda: Hydrobiidae) of Ash Meadows, Amargosa basin, California-Nevada. Proceedings of the Biological Society of Washington: Pg 776-843. Publication. Available at https://repository.si.edu/handle/10088/11319.

NatureServe (2019) NatureServe Explorer; Tryonia ericae. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Tryonia+ericae (Accessed 2019).

Sada, D.W. (1990) Recovery Plan for the Endangered and Threatened Species of Ash Meadows, Nevada. U.S. Fish and Wildlife Service, Portalnd, Oregon. 130 pp. Report. Available at http://ecos.fws.gov/docs/recovery_plan/900928d.pdf##.

U.S. Fish & Wildlife Service (2014) Amargosa tryonia (Tryonia variegata). U.S. Fish & Wildlife Service Species Profile, Washington, D.C. Website. Available at

http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G011#http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G011#.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	NX: Presumed Extirpated
Global Status	GNA: Not applicable
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah.	
Number of Locations Reported (restricted to UT and NV)	1 sampling location reported in Utah or Nevada
Most Recent Observation (restricted to UT and NV)	**May 31, 2016** (*7 surveys total in UT or NV between 7/24/1988 and 5/31/2016*)

TAXONOMY

This species was reported in Hershler and Liu (2017). *Tryonia infernalis* has been assigned Invertebrate Taxon ID 13873 in the Springs Online database.

DISTRIBUTION

No Data Entered

Tryonia infernalis has been classified with an endemism level of "a single population" as reported in NatureServe. In the Springs Online Database, *T. infernalis* has been reported at a single location. This species has been recorded at a single location in Clark County, Nevada. This species has been observed on 7 surveys between July 24, 1988 and May 31, 2016. The last survey at this site did not record any observations of this species.

HABITAT CHARACTERISTICS

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 3 times at 1 site for this species, with an average flow of 5.94 liters per second. Specific Conductance was measured 3 times at 1 site for this species, with an average specific conductance of 3,210 µS/cm. Spring pH was measured 2 times at 1 site for this species, with an average pH of 7.12. Temperature was measured 3 times at 1 site for this species, with an average temperature of 30° Celsius.

The single site where this species occurred was a **rheocrene** spring. This species has been recorded at a single elevation of 471 m (1,545 ft).

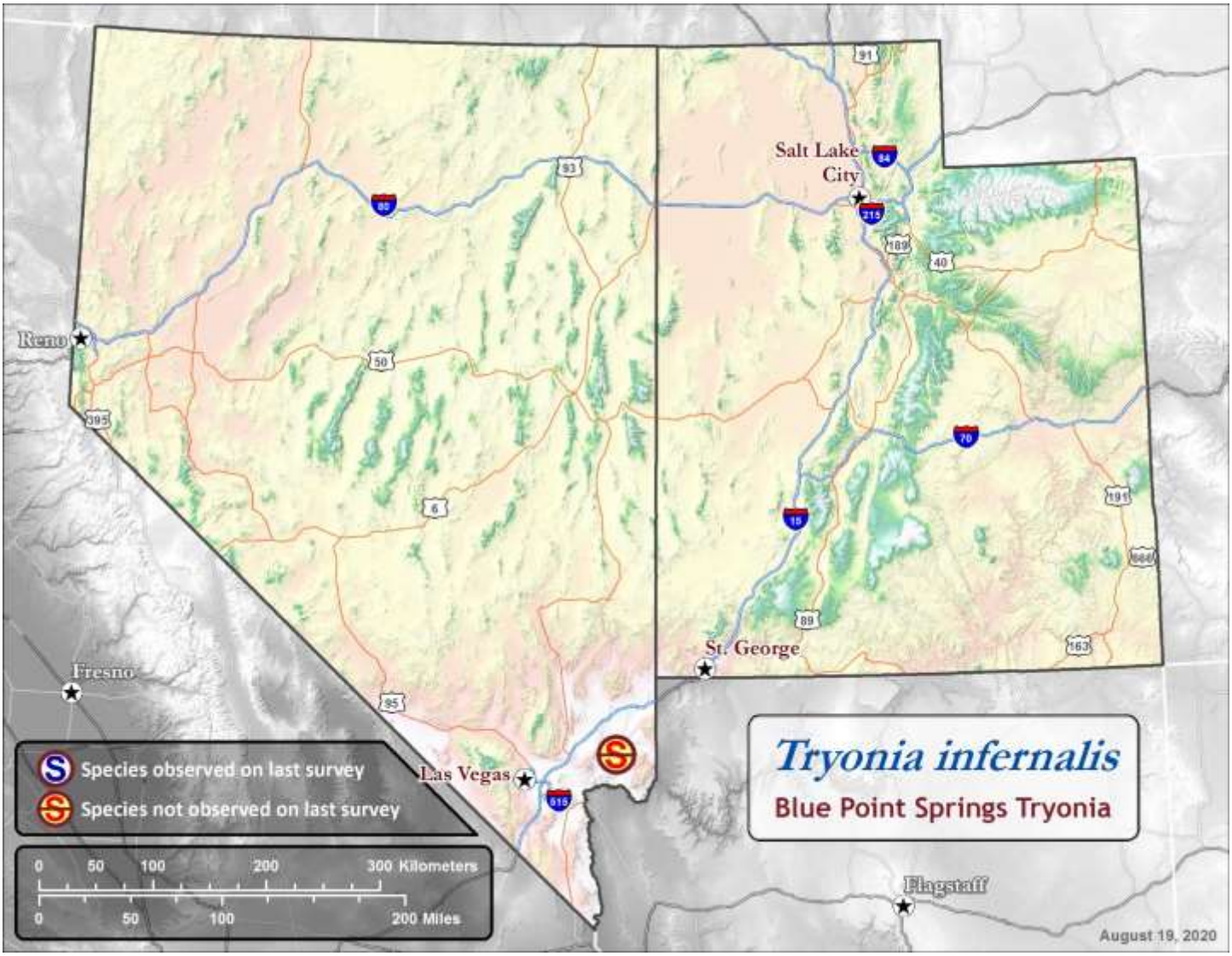
LAND MANAGEMENT

T. infernalis were observed at a single location on **NPS** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [43%; 3 surveys], **Nevada Natural Heritage Data Import** [43%; 3 surveys] and **Sada Import 2017** [14%; 1 survey] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S1: Critically Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N1: Critically Imperiled
Global Status	G1: Critically Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	5 sampling locations reported in Utah or Nevada [n = 4 sites]
Most Recent Observation (restricted to UT and NV)	**August 1, 2009** (*13 surveys total in UT or NV between 1/1/1992 and 8/1/2009*)

TAXONOMY

Tryonia monitorae is described in Hershler, 1999: 332, 334, figs. 3D, 13D-G, 15. *T. monitorae* has been assigned Invertebrate Taxon ID 6665 in the Springs Online database.

DISTRIBUTION

This species is restricted to the type locality: Hot Springs, Potts Ranch, Monitor Valley, Nye County, Nevada. Holotype, USNM 892046; paratypes, USNM 860760 (Hershler and Liu 2017).

Tryonia monitorae has been classified with an endemism level of "2-5 discrete populations" as reported in NatureServe. In the Springs Online Database, *T. monitorae* has been reported at 5 sampling locations across its entire range [n = 4 sites, where a site is defined as a cluster of sampling locations within 15 m of each other]. This species has been recorded at 5 locations in Nye County, Nevada. This species has been observed on 13 surveys between January 1, 1992 and August 1, 2009. At all locations, the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

Monitor Tryonia occurs at thermal springs between 2,030 and 2,065 meters.

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 4 times at 4 locations for this species, with average flow-per-location ranging from 0.1 to 16.67 liters per second [mean = 4.86 l/s, median = 1.33 l/s]. Specific Conductance was measured 5 times at 4 locations, with average specific conductance-per-location ranging from 436 to 664 µS/cm [mean = 593 µS/cm, median = 637 µS/cm]. Spring pH was measured 6 times at 4 locations, with average pH-per-location ranging from 6.72 to 7.7 [mean = 7.14, median = 7.07]. Temperature was measured 7 times at 4 locations, with average temperature-per-location ranging from 37 to 43° Celsius [mean = 41°C, median = 41°C].

This species was observed in **rheocrene** [75%; n = 3] and **limnocrene** [25%; n = 1] springs. Elevations for this species range from 2,030 m (6,660 ft) to 2,065 m (6,775 ft), with a mean of 2,041 m (6,696 ft) and median of 2,031 m (6,663 ft).

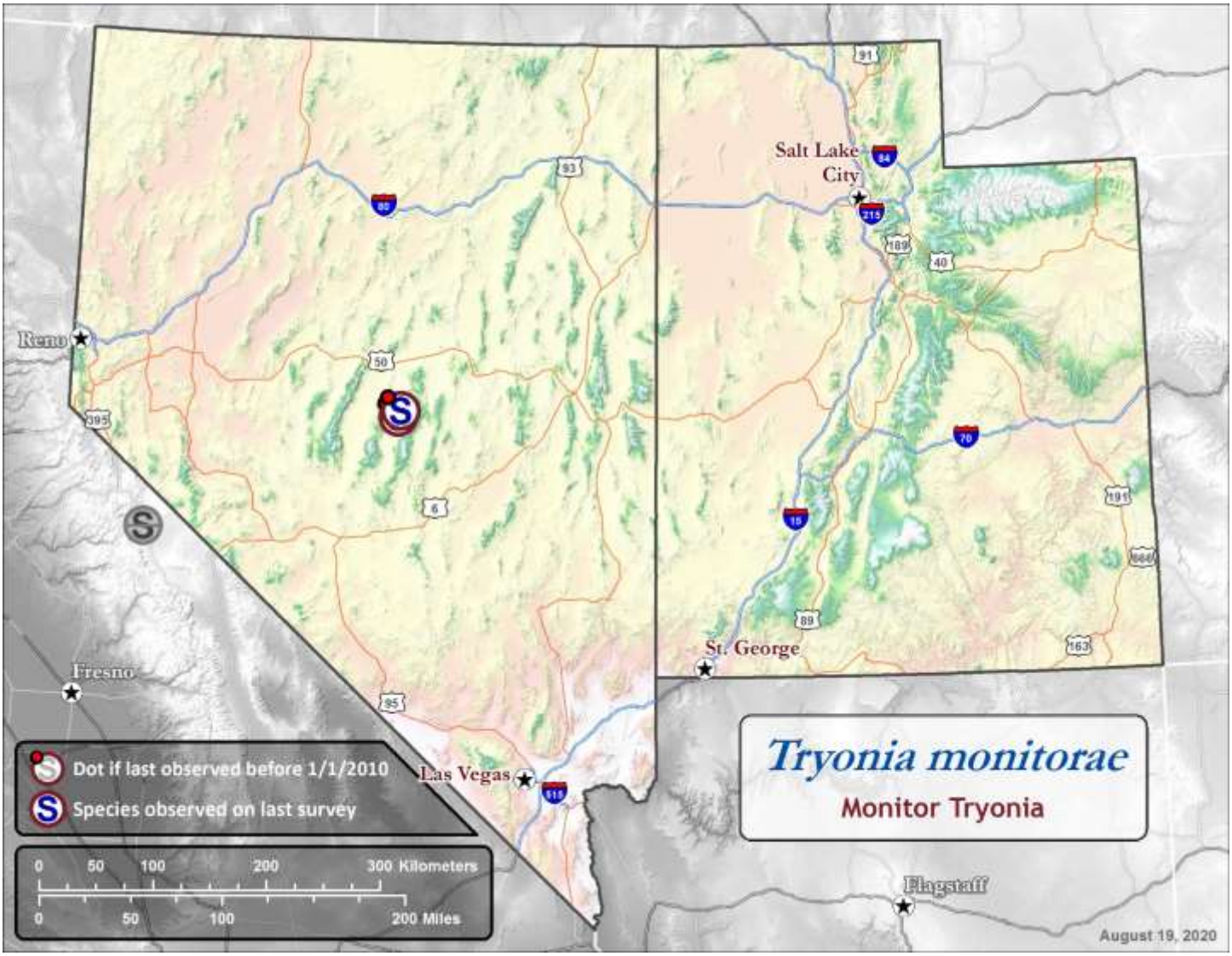
LAND MANAGEMENT

All 5 locations where *T. monitorae* were observed were located on **Private** land.

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Sada Import** [54%; 7 surveys] and **Nevada Natural Heritage Data Import** [46%; 6 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

NatureServe (2019) NatureServe Explorer; Tryonia monitorae. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Tryonia+monitorae (Accessed 2019).

AGENCY STATUS / LISTING HISTORY

Nevada Status	Unclassified
Utah Status	S2: Imperiled
ESA Status	0: Not listed
National Status	N2: Imperiled
Global Status	G3: Vulnerable
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. As of 7/2019, the USFWS did not have a listing status for this species.	
Number of Locations Reported (restricted to UT and NV)	20 sampling locations reported in Utah or Nevada [n = 20 sites]
Most Recent Observation (restricted to UT and NV)	**December 13, 2018** (*23 surveys total in UT or NV between 8/26/1927 and 12/13/2018*)

TAXONOMY

Paludina porrecta is described in Mighels, 1848: 22. Oahu [Hawaii]. *Tryonia porrecta* has been assigned Invertebrate Taxon ID 10762 in the Springs Online database.

DISTRIBUTION

Lower Colorado River basin (Arizona, California, Mexico), Great Basin (Nevada, Utah), San Francisco Bay (California), Hawaii. The populations in San Francisco Bay (Hershler et al. 2007a) and artificial lakes in Phoenix (Hershler et al. 2015a) may have been introduced, The Hawaiian population could be native or prehistorically introduced (Holocrene only). The type locality has not been found[however, NHMUK 1995123 may be a syntype lot; Hershler 2001].

Tryonia porrecta has been classified with an endemism level of "20-100 discrete populations" as reported in NatureServe. In the Springs Online Database, *T. porrecta* has been reported at 22 sites across its entire range. Species observations have been recorded at 19 locations in Utah (10 locations in Tooele County, 8 in Juab County and 1 in Utah County), 2 locations in California (both in Mono County) and 1 location in Nevada (in Washoe County). This species has been observed on 25 surveys between August 26, 1927 and December 13, 2018. The last surveys at 7 of these locations did not record any observations of this species. At 20 of these locations [91%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

In the San Francisco estuary in California, where it is introduced, it is typically found on mud with fewer numbers collected from vegetation (primarily Enteromorpha) (Hershler et al., 2007); in contrast with native populations in other areas that are found in highly mineralized (1760-9500 micro mho/cm), thermal (22-28C) springs (Hershler and Sada, 2000, cited from NatureServe: *T. porrecta*).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 2 times at 2 locations for this species, with average flow-per-location ranging from 0.08 to 6.67 liters per second [mean = 3.38 l/s, median = 3.38 l/s]. Specific Conductance was measured 5 times at 5 locations, with average specific conductance-per-location ranging from 310 to 3,480 µS/cm [mean = 1,486 µS/cm, median = 950 µS/cm]. Spring pH was measured 5 times at 5 locations, with average pH-per-location ranging from 5.9 to 8.2 [mean = 7.44, median = 7.6]. Temperature was measured 7 times at 7 locations, with average temperature-per-location ranging from 22 to 29° Celsius [mean = 26°C, median = 26°C].

This species was observed in **limnocrene** [50%; n = 5], **rheocrene** [40%; n = 4] and **hillslope** [10%; n = 1] springs. Elevations for this species range from 1,224 m (4,016 ft) to 2,137 m (7,011 ft), with a mean of 1,419 m (4,654 ft) and median of 1,311 m (4,301 ft).

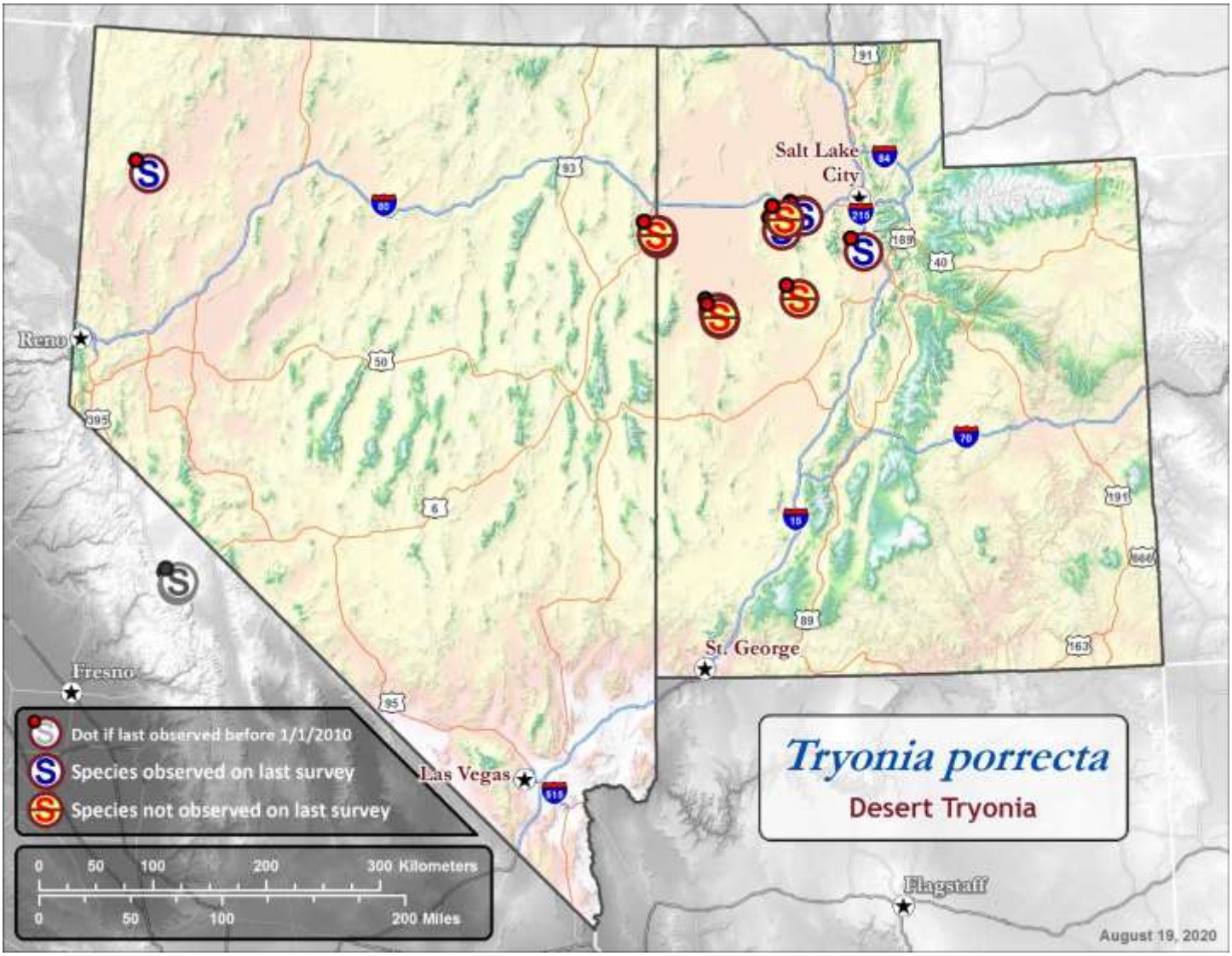
LAND MANAGEMENT

Of the 22 locations where *T. porrecta* were observed, 36% were located on **FWS** land (n = 8), 27% on **State** land (n = 6), 14% on **BLM** land (n = 3), 14% on **Private** land (n = 3), 5% on **DOD** land (n = 1) and 5% on **USFS** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Utah CAS Import** [60%; 15 surveys], **Sada Import** [28%; 7 surveys] and **None** [12%; 3 surveys] projects.

RELATED LITERATURE

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R.Sada, D.W. (2000) A new species of hydrobiid snail of the genus Pyrgulopsis from northwestern Nevada. Veliger 43:367-375. Peer-reviewed article. Available at https://repository.si.edu/bitstream/handle/10088/11320/iz_HershlerSada2000.pdf.

Mighels, J.W (1848) Description of shells from the Sandwich Islands, and other localities. Proceedings of the Boston Society of Natural History 2:18-25. Publication.

NatureServe (2019) NatureServe Explorer; Tryonia porrecta. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Tryonia+porrecta (Accessed 2019).

Robert Hershler, Cheryl L. Davis, Christopher L. Kitting and Hsiu-Ping Liu (2007) DISCOVERY OF INTRODUCED AND CRYPTOGENIC COCHLIOPID GASTROPODS IN THE SAN FRANCISCO ESTUARY, CALIFORNIA. Journal of Molluscan Studies 73: 323 –332. Peer-reviewed article. Available at https://www.researchgate.net/publication/240589326_Discovery_of_introduced_and_cryptogenic_cochliopid_gastropods_in_the_San_Francisco_Estuary_California.

AGENCY STATUS / LISTING HISTORY

Nevada Status	S2: Imperiled
Utah Status	Unclassified
ESA Status	0: Not listed
National Status	N2: Imperiled
Global Status	G2: Imperiled
IUCN Status	Unclassified
Listing History: This springsnail is a species of management concern for conservation planning in the states of Nevada and Utah. This species has been recognized in the Federal Register: 76 FR 56608 56630 (2011), 59 FR 58982 59028 (1994), 56 FR 58804 58836 (1991), 54 FR 554 579 (1989), 49 FR 21664 21675 (1984). Amargosa Tryonia was proposed for review under the Center for Biological Diversity (2009) petition.The USFWS 90-Day Finding on a Petition to List 42 Springsnails (2011) concluded that the petition presents substantial information to initiate a 12-month status review. As of 7/2019, the USFWS listed the status as under review.	
Number of Locations Reported (restricted to UT and NV)	25 sampling locations reported in Utah or Nevada [n = 25 sites]
Most Recent Observation (restricted to UT and NV)	**June 13, 2017** (*63 surveys total in UT or NV between 11/23/1969 and 6/13/2017*)

TAXONOMY

This genus was formerly in the *Hydrobiidae* family. *Tryonia variegata* is described in Hershler and Sada 1987: 817, 819, 822, 824-826, figs. 39e-g, 42b,e,g-h, 45-52. Holotype, USNM 859166; paratypes, UF 93961, USNM 859167 (Hershler and Liu 2017). *T. variegata* has been assigned Invertebrate Taxon ID 5792 in the Springs Online database.

DISTRIBUTION

This species occurs on private and public land in at least 21 small springs in Nye County, Nevada, and 2 springs in Inyo County, California (Hershler and Sada, 1987).

Tryonia variegata has been classified with an endemism level of "20-100 discrete populations" as reported in NatureServe. In the Springs Online Database, *T. variegata* has been reported at 25 sites across its entire range. This species has been recorded at 25 locations in Nye County, Nevada. This species has been observed on 63 surveys between November 23, 1969 and June 13, 2017. The last surveys at 12 of these locations did not record any observations of this species. At 21 of these locations [84%], the most recent date the species was observed was prior to January 1, 2010.

HABITAT CHARACTERISTICS

T. variegata is locally abundant in detritus-covered areas, on macrophytes, or on travertine blocks in spring pools. It is also found on travertine or soft sediment along the sides of upper segments of thermal stream outflows (Hershler and Sada 1987).

The water quality variables Flow, Specific Conductance, pH and Temperature were measured and recorded at sites where this species was observed. Flow was measured 12 times at 10 locations for this species, with average flow-per-location ranging from 0.02 to 20.83 liters per second [mean = 2.28 l/s, median = 0.21 l/s]. Specific Conductance was measured 20 times at 16 locations, with average specific conductance-per-location ranging from 700 to 1,742 µS/cm [mean = 1,129 µS/cm, median = 824 µS/cm]. Spring pH was measured 10 times at 8 locations, with average pH-per-location ranging from 7 to 7.7 [mean = 7.48, median = 7.48]. Temperature was measured 22 times at 16 locations, with average temperature-per-location ranging from 11 to 32° Celsius [mean = 28°C, median = 30°C].

This species was observed in **rheocrene** [86%; n = 18] and **limnocrene** [14%; n = 3] springs. Elevations for this species range from 657 m (2,156 ft) to 1,213 m (3,980 ft), with a mean of 722 m (2,367 ft) and median of 707 m (2,320 ft).

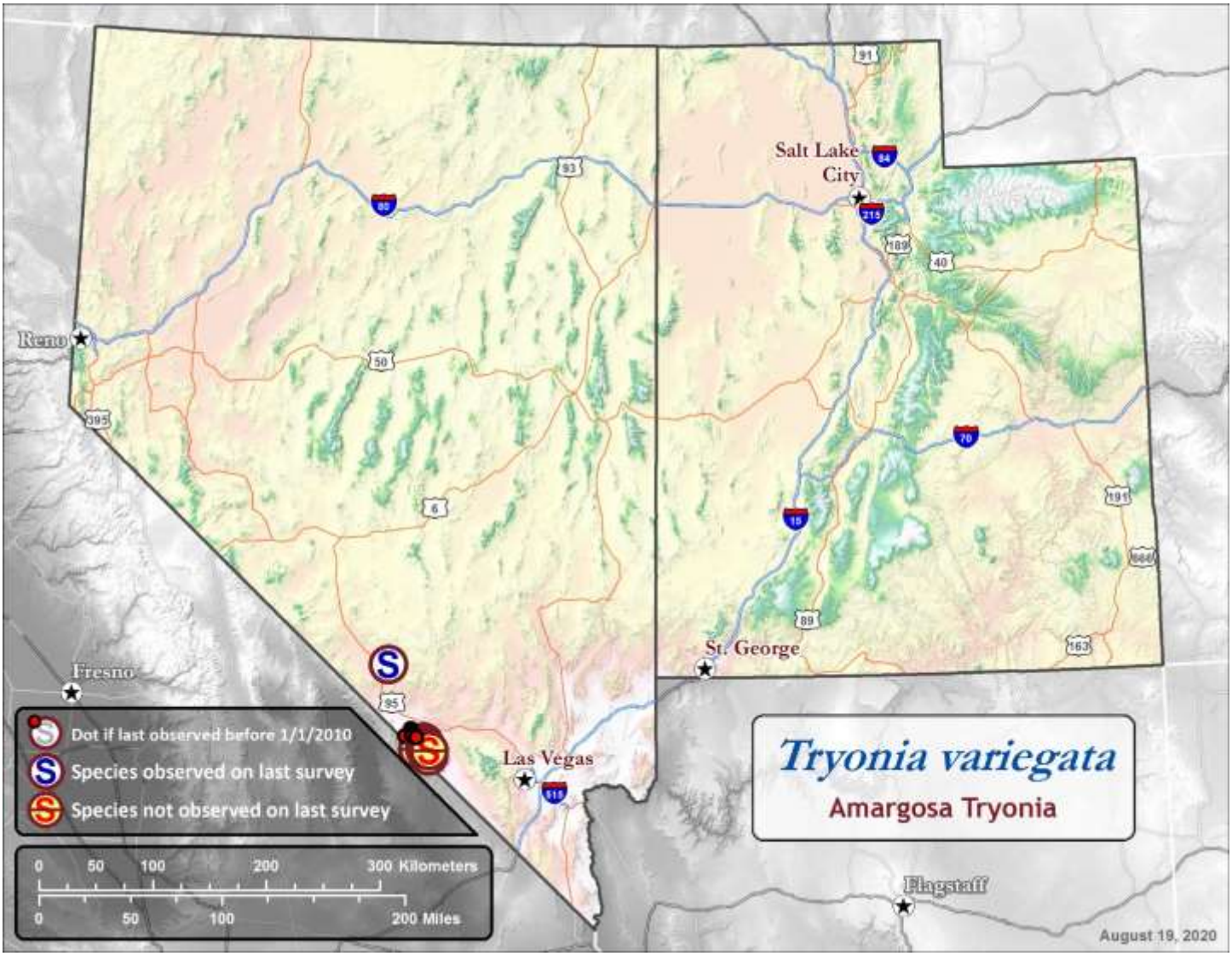
LAND MANAGEMENT

Of the 25 locations where *T. variegata* were observed, 56% were located on **FWS** land (n = 14), 24% on **Private** land (n = 6), 16% on **BLM** land (n = 4) and 4% on **NPS** land (n = 1).

KNOWN HISTORIC OR CURRENT THREATS

Awaiting Expert Review...

GENERAL DISTRIBUTION



SOURCE DATA

Projects that contributed data to this summary included the **Nevada Natural Heritage Data Import** [51%; 32 surveys], **Sada Import** [48%; 30 surveys] and **NDOW- Southern Region** [2%; 1 survey] projects.

RELATED LITERATURE

Center for Biological Diversity (2009) Petition to List 42 Species of Great Basin Springsnails from Nevada, Utah, and California as Threatened or Endangered Under the Endangered Species Act. Center for Biological Diversity. Report. Available at https://www.biologicaldiversity.org/species/invertebrates/Great_Basin_spring_snails/pdfs/Great-Basin-Springsnail-Petition.pdf.

Hershler, R. (1989) Springsnails (Gastropoda: Hydrobiidae) of Owens and Amargosa River (Exclusive of Ash Meadows) Drainages, Death Valley System, California-Nevada. Proceedings of the Biological Society of Washington, 102:176-248. Publication. Available at http://si-pddr.si.edu/dspace/handle/10088/20441#http://si-pddr.si.edu/dspace/handle/10088/20441#.

Hershler, R. and H.P., Liu (2017) Annotated Checklist of Freshwater Truncatelloidean Gastropods of the Western United States, with an Illustrated Key to the Genera. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Peer-reviewed article. Available at https://www.blm.gov/documents/national-office/blm-library/technical-note/annotated-checklist-freshwater-truncatelloidean.

Hershler, R., Sada, D.W. (1987) Springsnails (Gastropoda: Hydrobiidae) of Ash Meadows, Amargosa basin, California-Nevada. Proceedings of the Biological Society of Washington: Pg 776-843. Publication. Available at https://repository.si.edu/handle/10088/11319.

NatureServe (2019) NatureServe Explorer; Tryonia variegata. NatureServe. Website. Available at http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Tryonia+variegata (Accessed 2019).

U.S. Fish & Wildlife Service (2014) Amargosa tryonia (Tryonia variegata). U.S. Fish & Wildlife Service Species Profile, Washington, D.C. Website. Available at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G011#http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G011#.

US Fish and Wildlife Service (2011) 90-Day Finding on a Petition To List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered With Critical Habitat. Department of the Interior. Report. Available at https://www.govinfo.gov/content/pkg/FR-2011-09-13/pdf/2011-23272.pdf#page=2.