

**U.S. FISH AND WILDLIFE SERVICE  
SPECIES ASSESSMENT  
AND LISTING PRIORITY ASSIGNMENT FORM**

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SCIENTIFIC NAME: *Sonorella grahamensis* and *Sonorella eremita*

COMMON NAME: Pinaleño talussnail and San Xavier talussnail

LEAD REGION: Region 2

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DATE INFORMATION CURRENT AS OF: December 4, 2023

STATUS/ACTION

Species petitioned for listing which we have determined does not warrant listing (does not meet the definition of a threatened or endangered species)

Petition Information:

Petitioned; Date petition received: June 25, 2007  
90-day “substantial” finding FR publication date; citation: December 16, 2009; 74 FR 66865

PREVIOUS FEDERAL ACTIONS:

On June 25, 2007, the U.S. Fish and Wildlife Service (Service) received a petition dated June 18, 2007, from Forest Guardians (i.e., WildEarth Guardians) requesting that the Service list 475 species, including the Pinaleño talussnail and the San Xavier talussnail (Arizona talussnails), as threatened or endangered species and designate critical habitat under the Act. On December 16, 2009, the Service published a partial 90-day finding (74 FR 66866) on the Pinaleño talussnail and the San Xavier talussnail, and 190 other species, stating that the petition presented substantial scientific information indicating that listing may be warranted for 67 of the 192

species. This document constitutes our 12-month finding on the June 25, 2007, petition to list the Pinaleño talussnail and San Xavier talussnail under the Act.

ANIMAL GROUP AND FAMILY: Snails: Xanthonychidae

DISTINCT POPULATION SEGMENT (DPS)

Not Applicable

#### ANALYTICAL FRAMEWORK

To assess the Pinaleño talussnail and the San Xavier talussnail viability, we conducted a species status assessment (SSA) using the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–311). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years, variation in demographic rates), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt to both near-term and long-term changes in its physical and biological environment (for example, climate change, disease). A species with a high degree of resiliency, representation, and redundancy is better able to adapt to novel changes and to tolerate environmental stochasticity and catastrophes. In general, species viability will increase with increases in resiliency, redundancy, and representation (Smith et al. 2018, p. 306). Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

We use the SSA framework to assemble the best scientific and commercial data available for this species. The SSA framework consists of three sequential stages. During the first stage, we evaluate the species' needs. The next stage involves an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition (i.e., how threats and conservation actions have influenced the species). The final stage of the SSA framework involves assessing the species' plausible range of future responses to positive and negative environmental and anthropogenic influences. The SSA framework uses the best available information to characterize viability as the ability of a species to sustain populations in the wild over time and is used to inform our regulatory decision.

The SSA report does not represent a decision by the Service on whether the Pinaleño talussnail and the San Xavier talussnail should be listed under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The Species Status Assessment Report for the Pinaleño Talussnail (*Sonorella grahamensis*) and the San Xavier Talussnail (*Sonorella eremita*) – July 2023, Version 1.1 (SSA report) is a summary of the information we have assembled and reviewed and incorporates the best scientific and

commercial data available for this species. Excerpts of the SSA report are provided in the sections below. For more detailed information, please refer to the SSA report (Service 2023, entire).

## BIOLOGICAL INFORMATION

The Pinaleño talussnail and San Xavier talussnail are land snails endemic to southeastern Arizona that reside in montane habitats within the sky islands (isolated mountain ranges) on rocky hillsides, rocky washes, and talus slopes. The Pinaleño talussnail occurs in the Pinaleño Mountains on the Coronado National Forest within an estimated 25 square miles (64.7 square kilometers). The San Xavier talussnail is restricted to the northwestern slope of White Hill in the Sonoran Desert with an approximate range of 1.08 acres (0.44 hectares) on private land. Each species is represented by a single population.

Both species require interstitial spaces in the talus for estivation (dormancy); dense vegetation and canopy cover; available food sources of fungus, lichen, decaying plant matter, and young green shoots; and adequate moisture. Individuals spend most of their time in estivation to avoid drying out or freezing during unfavorable conditions. An adequate level of moisture is needed for the talussnails' to come out of estivation and be active because they have very porous skin and are, therefore, susceptible to rapid dehydration when exposed to the summer sun, desert dryness, or freezing temperatures (Hoffman 1990, p. 7). Therefore, when weather conditions fall within appropriate ranges of temperature, precipitation, relative humidity, and evaporation deficit, estivation is broken and feeding, reproduction, and individual growth occurs (Miller 1967, p. 8; Hoffman 1990, pp. 10, 30; Hoffman 1995, pp. 5–6). Adequate moisture levels also support suitable habitat for the talussnails. The primary environmental influences are climate change and drought for both species, as well as wildfire and erosion for the Pinaleño talussnail. Talussnail populations need abundant individuals within habitats of adequate area and quality to maintain survival and reproduction despite disturbance. Although we are not aware of any specific ecological diversity across each species' ranges that might be important for future adaptation, it would be prudent to maintain as much geographic extent of each species' range as possible to maintain any potential, but undetected, ecological diversity.

For additional information on the species description, taxonomy, habitat/life history, historical and current range/distribution please refer to pp. 6–12 of the SSA report. For additional information on population and species needs, please refer to pp. 12–15 of the SSA report.

## FACTORS INFLUENCING THE STATUS

The Act directs us to determine whether any species is an endangered species or a threatened species because of any factors (or threats) affecting its continued existence (i.e., whether it meets the definition of a threatened species or an endangered species). We use the term “threat” to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term “threat” includes actions or conditions that have a direct

impact on individuals, as well as those that affect individuals through alteration of their habitat or required resources. The term “threat” may encompass—either together or separately—the source of the action or condition, or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an “endangered species” or a “threatened species.” In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an “endangered species” or a “threatened species” only after conducting this cumulative analysis and describing the expected effect on the species now and (if evaluating whether a species is a threatened species) in the foreseeable future.

#### Threats, Conservation Measures, and Existing Regulatory Mechanisms

While there are likely many complex factors influencing Arizona talussnail viability, primary stressors affect the: 1) climatic conditions, such as temperature, precipitation, relative humidity, and evaporation deficit that effect the frequency and duration of talussnail active periods; and 2) habitat quality and quantity (i.e., availability of soil moisture, presence of talus slopes with sufficient interstitial spaces and vegetative ground cover, and habitat connectivity throughout the species range). We have determined that the primary stressors influencing Arizona talussnail viability include drought for both species, and wildfire and erosion for the Pinaleño talussnail, all of which are affected by climate change. These factors were determined to be the most important because according to the best scientific information available (Miller 1967, p. 8; Hoffman 1990, pp. 29-30; Waters 2017, p. 2; Sorensen 2018, p. 9; Sorensen et al. 2021, p. 1), they contribute to environmental conditions necessary to support talussnail active periods and provide suitable talussnail habitat. Mining operations were not recognized as a threat to the Pinaleño talussnail; however, the area surrounding White Hill has a history of mining operations, including the Pima Mine. In the early to mid-1990s, the prospect of future mining activity was a concern for the San Xavier talussnail from potential loss and degradation of talus habitat for expansion of the Pima mine, building new mines and associated road construction, and encroachment of development (SXTWG 2018, p. 14). However, due to its distance from White Hill, it was determined that it is unlikely that impacts from these activities such as any dust originating from Pima Mine would reach, and therefore impact, San Xavier talussnail habitat. Further, no other mines have been constructed in the nearby surrounding area since the concern in the 1990s. For additional information on the best available scientific information regarding these threats, please refer to pp. 31–38 of the SSA report.

## Climate Change

The Intergovernmental Panel on Climate Change (IPCC 2014, p. 7) summarized the likelihood of general future trends in several climatic variables, projecting: (1) warmer and fewer cold days and nights over most land areas; (2) warmer and more frequent hot days and nights over most land areas; (3) more frequent warm spells/heat waves over most land areas; (4) changes in precipitation patterns favoring an increased frequency of heavy precipitation events (or proportion of total rainfall from heavy rainfalls) over most areas; and (5) an increase in area affected by droughts. Climate change scenarios project that drought will occur more frequently and increase in severity, with a decrease in the frequency and increase in severity of precipitation events (Seager et al. 2007, p. 9; Cook et al. 2015, p. 6; Pascale et al. 2017, p. 806; Williams et al. 2020, p. 317). These global climate changes will influence climate patterns at regional and local scales within the range of the Pinaleño and San Xavier talussnail. Multiple models project that the Sonoran Desert Ecoregion will be drier through the 21st century and that the transition to a more arid climate is likely already under way (Seager et al. 2007, p. 1181). Thus, projected climate change may affect the quality and amount of suitable habitat and the climate conditions that prompt those life history behaviors associated with talussnail productivity.

## Drought

Global climate change scenarios project that drought will occur more frequently and with higher severity, and that precipitation events will decrease in frequency and increase in severity in the near future (Seager et al. 2007, p. 9; Cook et al. 2015, p. 6; Pascale et al. 2017, p. 806; Williams et al. 2020, p. 317). The southwestern United States has undergone recurring periods of drought over the last millennium, with droughts often spanning decades (Meko et al. 1995, pp. 792–795; Cook et al. 2004, p. 1016; Stahle et al. 2000, pp. 121–125; Fye et al. 2003, pp. 906–907), and both species have evolved with multiple prolonged droughts (Meko et al. 1995, pp. 791–800; Stahle et al. 2000, entire; Cook et al. 2004, p. 1017). Within the sky island habitats of southern Arizona, drought is projected to persist into the future (O'Connor et al. 2020, p. 2) instigating an elevation shift in plant communities with losses in montane habitats where the Pinaleño talussnail occurs (Nogues-Bravo et al. 2007, p. 425; Yanahan and Moore 2019, p. 1630). The effects of climate change, including drought, are likely to decrease population abundance and increase vulnerability to local extinction for the San Xavier talussnail (Bagne and Finch 2013, p. 19), but the magnitude and extent of possible effects to the species cannot be verified or quantified at this time.

## Wildfire

Wildfire was identified as a stressor for the Pinaleño talussnail but not for the San Xavier talussnail. The Pinaleño talussnail evolved with fire on the landscape, at least at pre-settlement conditions. Before 1900, surface fires generally occurred at least once per decade in montane forests with a pine component (Swetnam and Baisan 1996, p. 24). Since then, frequent low intensity surface fires in montane forests ceased to occur due to intensive livestock grazing, which removed fine fuels (Swetnam and Baisan 1996, p. 16). Additionally, fire suppression in the mid to late 20th century prevented frequent, widespread surface fires (Swetnam and Baisan

1996, p. 24). Absence of surface fires precipitated the accumulation of heavy fuel loading that contribute to infrequent but intense crown fires, i.e., fires that spread from treetop to treetop (Danzer et al. 1996, p. 269). Lack of vegetation and forest litter consumed in intense crown fires expose soils to surface erosion during storms, often causing high peak flows, sedimentation, and erosion in downstream drainages (DeBano and Neary 1996, pp. 70–73). Wildfire is a concern because forest conditions could result in a stand replacement fire, resulting in the killing of most or all trees in the Pinaleño Mountains. A stand-replacement fire in talussnail habitat, followed by a substantial precipitation event, could affect a population through habitat modification in the form of erosion and increased sedimentation resulting from the loss of vegetation that stabilizes stream banks and soil slopes. The loss of canopy cover in talussnail habitat impacted by a crown fire may lead to an increase in direct sunlight, increasing temperatures, and lower levels of humidity. There are several studies on land snail responses to fire, with findings that vary from fire-driven extirpation of snails (Beetle 1997, p. 8) to varying impacts on density, species richness, and population recovery (Kiss and Magnin 2006, p. 2929; Bros et al. 2011, p. 611; Hylander 2011, p. 1812; Santos et al. 2012, p. 175; Burke et al. 1999, p. 10; Gaines et al. 2011, pp. 1463–1464). However, survey results over a 16-year timeframe indicated that the average relative abundance of the *Sonorella* spp. populations in Wet Canyon (an area within the Pinaleño Mountains) and vicinity are unchanged following the 2004 Gibson-Nuttall Fire (Sorensen and Martinez 2016, p. 14). Therefore, fire does impact these species and their habitats, but these effects are likely temporary, only lasting up to a decade (Sorensen and Martinez 2016, p. 14).

#### Erosion

Erosion was identified as a stressor for the Pinaleño talussnail but not for the San Xavier talussnail. Soil deposition within interstitial spaces that originates from soil erosion upslope can degrade habitat by limiting the depth of talussnail refugia, therefore exposing individuals to higher temperatures and drier conditions causing desiccation and death (Hoffman 1990, pp. 7, 25, 31; Sorensen and Martinez 2016, pp. 6, 11; Sorensen 2018, p. 3), as well as causing the loss of egg laying substrate. Precipitation within areas disturbed by wildfire scars upslope of talussnails habitat has resulted in scouring events that degrade or eliminate talussnail habitat through subsequent soil deposition in the talus slope (Sorensen and Martinez 2016, p. 6; PLSWG 1019, p. 2). Precipitation within areas disturbed by wildfire scars upslope of talussnails habitat have resulted in scouring events that degrade or eliminate talussnail habitat through subsequent soil deposition in the talus slope. This was observed in Wet Canyon in the Pinaleño Mountains following the 2004 Gibson-Nuttall Fire, and again following the Frye Fire in 2017 (Sorensen and Martinez 2016, p. 6; PLSWG 1019, p. 2). More intense rainfall projected from future climate change could increase the severity of precipitation events (Seager et al. 2007, p. 9; Cook et al.

2015, p. 6; Pascale et al. 2017, p. 806; Williams et al. 2020, p. 317) exacerbating erosion in disturbed (i.e., fire scar) areas.

### Conservation Measures and Existing Regulatory Mechanisms

#### *Pinaleño Talussnail*

In 2018, the Conservation Agreement for the Land Snails in the Pinaleño Mountains on the Coronado National Forest in Arizona (PLSWG 2018, entire) was developed between the Service, Coronado National Forest, and Arizona Game and Fish Department (AGFD). The goals of this agreement are to achieve effective range-wide conservation and management of a group of land snails in the Pinaleño Mountains, including the Pinaleño talussnail, by assessing and directing lasting conservation measures in Arizona and to initiate and facilitate ongoing cooperation and collaboration among the various agencies and entities that participate in species conservation (PLSWG 2018, pp. 2–3). Primary components of the agreement involve habitat management, species monitoring, and adaptive management. Habitat management actions consist of fire management, maintaining talus and riparian habitat, and protecting occupied habitat from livestock grazing (PLSWG 2018, p. 35). The agreement has a 25-year term and may be extended by 5-year increments until long-term habitat and population conservation of the land snails is achieved (PLSWG 2018, p. 39).

Over the past decade, the Coronado National Forest also developed and implemented the Pinaleño Ecosystem Restoration Project (PERP) to address the severity of current and future wildfires with the purpose of improving forest health. The project was implemented in 2009 and involved fuel reduction (e.g., prescribed fire, thinning forest stands, dead tree removal, and masticating smaller vegetation) across the higher elevations of the mountain range, including the species range. This action has been included as a conservation measure in the 2018 Conservation Agreement (PLSWG 2018, p. 36). With the completion of PERP, wildfire severity is expected to be reduced in the next 25 years compared to the current condition within the range of the Pinaleño talussnail.

#### *San Xavier Talussnail*

In 2018, the Strategic Conservation Plan for the San Xavier Talussnail in Pima County, Arizona (SXTWG 2018, entire) was developed between the Service, AGFD, Arizona Electric Power Cooperatives, Inc. and El Paso Natural Gas Company, L.L.C. This agreement is intended to complement existing strategic-level conservation and management plans, including Arizona’s State Wildlife Action Plan and Pima County’s Multi-Species Conservation Plan, that support the conservation of land snail populations and habitat in the Pima County. The goals of this agreement are to achieve effective range-wide conservation and management of the San Xavier talussnail by assessing and directing lasting conservation measures and to initiate and facilitate ongoing cooperation and collaboration among the various agencies and entities that can potentially serve a productive role in species conservation (SXTWG 2018, p. 2). Primary components of the agreement involve developing and implementing conservation measures to maintain or enhance talussnail habitat and the population as well as species monitoring and

adaptive management (SXTWG 2018, p. 2). Habitat management actions consist of identifying suitable or potentially suitable talussnail habitat, identifying areas occupied by talussnails, and developing and implementing best management practices for avoiding and minimizing impacts to suitable and occupied talussnail habitat (SXTWG 2018, p. 20). The agreement has a 25-year term and may be extended by 10-year increments until long-term habitat and population conservation of the land snails is achieved (SXTWG 2018, p. 24).

For additional information on conservation measures, please refer to pp. 38–40 of the SSA report.

### Cumulative Effects

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have analyzed the cumulative effects of identified threats and conservation actions on the species. To assess the current and future condition of the species, we evaluate the effects of all the relevant factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative-effects analysis.

### ANALYSIS

Talussnail active periods are time periods throughout an individual’s lifecycle when it is motile, feeding, and reproducing (i.e., neither in hibernation nor estivation). Timing of talussnail active periods is primarily dependent on local weather patterns that provide adequate moisture (Miller 1967, p. 8; Hoffman 1990, pp. 29–30; Waters 2017, p. 2; Sorensen 2018, p. 9; Sorensen et al. 2021, p. 1). Temperature, precipitation, relative humidity, and evaporation deficit were selected as parameters used to estimate the current condition of population resiliency, as well as changes in population resiliency over time. We used these parameters because according to the best scientific information available (Miller 1967, p. 8; Hoffman 1990, pp. 29–30; Waters 2017, p. 2; Sorensen 2018, p. 9; Sorensen et al. 2021, p. 1), they contribute to the suitability of environmental conditions necessary to support talussnail active periods and provide suitable talussnail habitat, as it relates to adequate moisture as described above. For our analysis, if suitable habitat was available and weather conditions were supportive of talussnail active periods, we considered the population to be highly resilient.

Historical and current weather data were used to establish parameter criteria. We assumed that conditions during the historical period (1981–2010) were adequate for the species life history requirements, at least in the short-term (approximately 10 years). Temperature, precipitation, relative humidity, and evaporation deficit data were obtained from the USGS National Climate Change Viewer and the MACAv2-METDATA gridMet data set (referred to in this document as the “Mean Model”) (Abatzoglou and Brown 2012, entire; Alder and Hostetler 2013, entire). The output from the Mean Model is the ensemble mean value for a parameter over a specific time

period, which is the mean output of the 20 climate models that comprise the Mean Model, except for relative humidity, which was available from 18 models. Mean parameter values were categorized by condition criteria we established for the Pinaleño talussnail and San Xavier talussnail. Because the MACAv2-METDATA datasets included historical climate measurements as part of model development and training, we used these model outputs for past weather conditions, as well as current weather conditions where information specific to the Arizona talussnails or congeners were lacking.

To assess the current condition of population resiliency for each species, we compared weather parameters that influence talussnail active period, habitat quality, and habitat quantity (i.e., mean daily maximum temperature, mean annual precipitation, mean daily maximum relative humidity, mean annual evaporation deficit, and mean annual temperature change) between the historical and current time periods. Each parameter value for each scenario was binned into one of three condition categories: low, moderate, or high. These condition categories were used to translate each specific parameter value and the overall condition of the population to probability of persistence. Populations with overall high resiliency have a high likelihood of persistence (>90 percent over 10 years), populations with moderate resiliency score have a moderate likelihood of persistence (50 – 90 percent over 10 years), and populations with an overall low resiliency score have a low likelihood of persistence (<50 percent over 10 years).

Future population conditions of the Pinaleño talussnail and San Xavier talussnail were projected 25 and 50 years into future under differing greenhouse gas emission representative concentration pathways (RCP), RCP 4.5 (a lower emissions future) and RCP 8.5 (a higher emissions future). Scenarios 1 (25-yr, RCP 4.5) and 2 (50-yr, RCP 4.5) for both species, evaluate the condition of Pinaleño talussnail and San Xavier talussnail if there is no increase in risks to the populations in the future from what exists today (i.e., current condition). Scenarios 3 (25-yr, RCP 8.5) and 4 (25-yr, RCP 8.5) for both species evaluate the response to changes in risks under a higher emissions future (RCP 8.5), subsequent impacts on climate conditions, and potential changes to habitat quantity and quality. Populations with high resiliency have a high likelihood of persistence (>90 percent over 25 years), populations with moderate resiliency score have a moderate likelihood of persistence (50 – 90 percent over 25 years), and populations with an overall low resiliency score have a low likelihood of persistence (<50 percent over 25 years).

We consider the Pinaleño talussnail to be an endemic organism with a single population restricted to the Pinaleño Mountains with naturally limited redundancy both currently and into the future. We also consider the San Xavier talussnail to be an endemic organism with a single population restricted to White Hill possessing naturally limited redundancy both currently and into the future. The genetic diversity in both species is currently unknown. Although we are not aware of any specific ecological diversity across each species' ranges that might be important for future adaptation, it would be prudent to maintain as much geographic extent of each species' range as possible to maintain any potential, but undetected, ecological diversity.

For additional information on the methods used to analyze the condition of the species, please refer to pp. 19–26 and Appendix C of the SSA report.

#### CURRENT CONDITION

According to our assessment, factors influencing active periods (i.e., precipitation, temperature, and relative humidity) over the past 41 years (1981–2022), and existing habitat quality and quantity conditions indicate that the Pinaleño talussnail current condition exhibits an overall high resiliency. Based on the estimated amount of suitable habitat and connectivity between habitat patches, the Pinaleño talussnail is assumed to exist as a single population in the Pinaleño Mountains, and therefore, as a species, has little to no redundancy, making it vulnerable to catastrophic events. The most plausible catastrophic event for the Pinaleño talussnail would be the loss interstitial spaces in occupied talus habitats following a stand replacement wildfire and a subsequent, significant rainfall event. Other potential catastrophic events could include unusual or extreme heat or cold events, or prolonged drought. The Pinaleño talussnail has adaptive capacity and evolutionary potential because the species' life history shows it has adapted to survive and rebound after poor conditions, such as historical and recent catastrophic fires and mega-droughts (Gaines et al. 2011, pp. 1463–1464; Burke et al. 1999, p. 13; Santos et al. 2012, p. 176; Ray and Bergey 2015, p. 48; Sorensen and Martinez 2016, pp. 11, 14). Therefore, the species has sufficient representation.

As with the Pinaleño talussnail, factors influencing active periods (i.e., precipitation, temperature, and relative humidity) over the past 41 years (1981–2022), and existing habitat quality and quantity conditions at White Hill were evaluated to determine current population resiliency of the San Xavier talussnail. Our assessment showed that the San Xavier talussnail exhibits an overall moderate resiliency. Resiliency is in moderate condition due to mean annual precipitation, which is 0.1 millimeters below the high condition lower limit. Because the San Xavier talussnail is assumed to exist as a single population, the species has little to no redundancy, making it vulnerable to catastrophic events. The most plausible catastrophic event for the San Xavier talussnail would be the loss interstitial spaces in occupied talus habitats, although potential catastrophic events could include unusual or extreme heat or cold events, or prolonged drought. The San Xavier talussnail has adaptive capacity and evolutionary potential because the San Xavier talussnails' life history indicates that the species survives and rebounds after recent and historical catastrophic events like wildfire and mega-drought (Stahle et al. 2000, pp. 121–125), and therefore has sufficient representation. For additional information on the current condition of the species, please refer to pp. 26–30 of the SSA report.

#### FUTURE CONDITION

According to our assessment, Pinaleño talussnail was projected to be in overall high condition category under Scenario 1 (25-yr, RCP 4.5) and Scenario 3 (25-yr, RCP 8.5). Future climate change under Scenario 2 (50-yr, RCP 4.5) and Scenario 4 (50-yr, RCP 8.5) indicated a transition from high overall condition to moderate overall condition. For both 50-year future scenarios, the

projected changes in weather conditions are small. None of the future scenarios projected that the population would enter a low overall condition in the foreseeable future.

We expect the current level of redundancy for the Pinaleño talussnail population to be maintained in all plausible future scenarios. For representation, we expect individuals to remain present in the same ecological areas such that the species is considered represented in all areas within its distribution, and that the adaptive capacity would remain the same as in the current condition.

The population condition for the San Xavier talussnail is expected to improve into the foreseeable future, with both 25-year scenarios showing the population in high condition, specifically with an increase in mean annual precipitation from current condition. San Xavier talussnail was also projected to increase to an overall high condition in Scenario 2 (50-yr, RCP 4.5). Climate conditions only reach a point where the active periods for San Xavier talussnail are affected in 50 years under Scenario 4 (50-yr, RCP 8.5) because mean maximum temperature and mean temperature change are expected to fall into moderate condition, for an overall moderate population condition. None of the future scenarios projected that population would enter a low overall condition in the foreseeable future.

We expect the current level of redundancy for the San Xavier talussnail population to be maintained in all plausible future scenarios. For representation, we expect individuals to remain present in the same ecological areas such that the species is considered represented in all areas within its distribution, and that the adaptive capacity would remain the same as in the current condition.

For additional information on the future condition of the species, please refer to pp. 41–55 of the SSA report.

## FINDING

### Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an “endangered species” or a “threatened species.” The Act defines an endangered species as a species that is “in danger of extinction throughout all or a significant portion of its range,” and a threatened species as a species that is “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” The Act requires that we determine whether any species

is an “endangered species” or a “threatened species” because of any one or a combination of the following factors:

- (A) The present or threatened destruction, modification, or curtailment of its habitat or range;
- (B) Overutilization for commercial, recreational, scientific, or educational purposes;
- (C) Disease or predation;
- (D) The inadequacy of existing regulatory mechanisms; or
- (E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species’ continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

The Act does not define the term “foreseeable future, which appears in the statutory definition of “threatened species.” Our implementing regulations at 50 CFR 424.11(d), as revised in 2019, set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term “foreseeable future” extends only so far into the future as we can reasonably determine that both the future threats and the species’ responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. “Reliable” does not mean “certain”; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

It is not always possible or necessary to define the foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial data available and should consider the timeframes applicable to the relevant threats and to the species’ likely responses to those threats in view of its life-history characteristics. Data that are typically relevant to assessing the species’ biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.

#### Status Assessment

##### *Status Throughout All of Its Range*

##### *Pinaleño Talussnail*

After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we determined that the factors affecting the Pinaleño talussnail include drought and impacts from climate change (Factor E), and wildfire and erosion (Factor A).

Furthermore, we considered the existing regulatory mechanisms (Factor D) and conservation measures and their effect on the identified threats and the status of the species. The best available

information did not show that overutilization for commercial, recreational, scientific, or educational purposes (Factor B) or disease or predation (Factor C) were threats to the species.

The current population resiliency of Pinaleño talussnail is high because weather parameters used to evaluate the current condition of talussnail active periods, habitat quality, and habitat quantity are fully supportive of talussnail life history requirements. Pinaleño talussnail habitat is currently largely intact and connected and does not have any development or land use changes nearby that would alter the habitat conditions at these sites, thereby contributing to the conservation of habitat quality into the future. While redundancy is inherently low for the Pinaleño talussnail, the species has demonstrated its ability to withstand catastrophic events, including multiple past severe drought events, such as the mega-drought in the 1700s. The species' life history indicates that the Pinaleño talussnail is adapted to variable environmental conditions (representation) by spending most of their time in estivation to avoid desiccation or freezing during unfavorable conditions. The Pinaleño talussnail evolved with fire on the landscape; the mixed-conifer fire regime of the past four or five centuries was characterized by frequent, low-intensity surface fires—as often as every four to six years (Grissino-Mayer et al. 1995, p. 402). Talus and other rocky substrates provide protection and refugia from fire and subsequent short-term changes to their habitats (Gaines et al. 2011, pp. 1463–1464; Burke et al. 1999, p. 13; Santos et al. 2012, p. 176; Ray and Bergey 2015, p. 48). Therefore, the Pinaleño talussnail, may be less susceptible to the impacts of wildfire (i.e., immolation), and these effects are likely temporary (Sorensen and Martinez 2016, p. 14). A 16-year survey effort indicated that land snail abundance estimates were similar before and after the 2004 Gibson-Nuttall Fire, which was a high intensity fire that left a mosaic of areas with complete mortality of trees, lightly burned areas, and undamaged areas of habitat (Sorensen and Martinez 2016, pp. 11, 14). Further, fuel reduction activities through PERP, such as prescribed fire, thinning forest stands, dead tree removal, and masticating smaller vegetation, are ongoing to address the severity of current and future wildfires. Overall, the threats acting on Pinaleño talussnail are not currently acting on the species such that they are significantly reducing the current viability of the species. Thus, after assessing the best available information, we conclude that the Pinaleño talussnail is not in danger of extinction throughout all of its range. Therefore, we proceed with determining whether the Pinaleño talussnail is likely to become endangered within the foreseeable future throughout all of its range.

The future population resiliency of Pinaleño talussnail is expected to remain in high condition over the next 25 years because weather parameters used to evaluate the future condition of talussnail active periods, habitat quality, and habitat quantity are fully supportive of talussnail life history requirements. Pinaleño talussnail habitat is expected to remain intact and connected with no development or land use changes that would alter the habitat conditions at these sites, thereby contributing to the conservation of habitat quality into the foreseeable future. The risk of catastrophic wildfire and associated erosion for the Pinaleño talussnail is reduced into the foreseeable future due to the Conservation Agreement for the Land Snails in the Pinaleño Mountains on the Coronado National Forest in Arizona and PERP. Climate change impacts to mean maximum relative humidity and mean temperature change for the Pinaleño talussnail are

expected in 50-year future scenarios. However, the changes are very small and are not expected to decrease the viability of the species such that the species is in danger of extinction in the foreseeable future. In the 50-year future scenario under RCP 4.5, mean maximum relative humidity is expected to decline by less than 1 percent. In the 50-year future scenario under RCP 8.5, the changes in weather conditions are small, and therefore we expect individuals to remain present in the same ecological areas within its current distribution. Additionally, all historical habitat for the species remains intact. We also expect that the adaptive capacity (representation) would remain the same as in the current condition because the species' life history allows it to rebound after fires and other historical catastrophic events like mega droughts. The effects of any associated erosion in talus habitat are anticipated to be temporary and similar to the current condition. Overall, the threats acting on Pinaleño talussnail are not projected to impact the species such that they will significantly reduce the future viability of the species. After assessing the best available information, we conclude that the Pinaleño talussnail is not likely to become endangered within the foreseeable future throughout all of its range.

#### *San Xavier Talussnail*

After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we determined that the factors affecting the San Xavier talussnail include drought and impacts from climate change (Factor E). Furthermore, we considered the existing regulatory mechanisms (Factor D) and conservation measures and their effect on the identified threats and the status of the species. The best available information did not show that overutilization for commercial, recreational, scientific, or educational purposes (Factor B) or disease or predation (Factor C) were threats to either species.

The San Xavier talussnail current population resiliency is in moderate condition due to mean annual precipitation, which is only 0.1 millimeters below the high condition lower limit.

Although precipitation is slightly below what we assess to be ideal conditions for the species, the San Xavier talussnail's adaptation to spend most of their time in estivation allows them to avoid desiccation during times of unfavorable conditions. While redundancy is inherently low for the San Xavier talussnail, the species has evolved with multiple prolonged drought that characterized the natural history of the southwestern north America (Meko et al. 1975, pp. 791–800; Stahle et al. 2000, entire; Cook et al. 2004, p. 1017). The species has endured multiple past drought events, some of those considered severe such as the mega-drought in the 16th century (Stahle et al. 2000, pp. 121–125). The species' life history indicates that it is able to withstand periods of drought and other short-term changes to its habitat (Gaines et al. 2011, pp. 1463–1464; Burke et al. 1999, p. 13; Santos et al. 2012, p. 176; Ray and Bergey 2015, p. 48). The species' life history indicates that the San Xavier talussnail is adapted to variable environmental conditions (representation) by spending most of their time in estivation to avoid desiccation or freezing during unfavorable conditions. Additionally, all historical habitat for the species is intact. Thus, after assessing the best available information, we conclude that the San Xavier talussnail is not in danger of extinction throughout all of its range. Therefore, we proceed with determining whether

the San Xavier talussnail is likely to become endangered within the foreseeable future throughout all of its ranges.

The population condition of the San Xavier talussnail is expected to improve into the foreseeable future, with both 25-year scenarios projecting an increase in mean annual precipitation (when compared with current mean annual precipitation) and showing the population in a high resilience condition. Climate conditions only reach a point where the active periods for San Xavier talussnail are affected in one scenario: 50 years under RCP 8.5. In this scenario, population resiliency is projected to be in moderate condition due to changes in mean maximum temperature and mean temperature change. However, the changes are very small and are not expected to decrease the viability of the species such that the species is in danger of extinction in the foreseeable future. The species' life history allows it to rebound after fires and other historical catastrophic events like mega droughts. Additionally, all historical habitat for the species remains intact currently, and there is no change of range projected in the future. We also expect that the adaptive capacity (representation) would remain the same as in the current condition because the species' life history allows it to rebound after fires and other historical catastrophic events like mega droughts. Sediment deposition from ground disturbing activities on White Hill could lead to interstitial space decline or loss, but this is unlikely due to conservation commitments in the conservation agreement. All historical habitat for the species remains intact, and our future scenarios do not project habitat loss into the future. Overall, conditions are likely either to maintain or improve in the foreseeable future for the San Xavier talussnail. After assessing the best available information, we conclude that the San Xavier talussnail is not likely to become endangered within the foreseeable future throughout all of its range.

#### *Status Throughout a Significant Portion of Their Ranges*

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. Having determined that the Pinaleño talussnail and the San Xavier talussnail are not in danger of extinction or likely to become so in the foreseeable future throughout all of their ranges, we now consider whether they may be in danger of extinction or likely to become so in the foreseeable future in a significant portion of their ranges—that is, whether there is any portion of the species' ranges for which it is true that both (1) the portion is significant; and (2) the species are in danger of extinction now or likely to become so in the foreseeable future in that portion. Depending on the case, it might be more efficient for us to address the “significance” question or the “status” question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range.

We evaluated the ranges of the Pinaleño talussnail and the San Xavier talussnail to determine if the species are in danger of extinction now or likely to become so in the foreseeable future in any portion of their ranges. Both the Pinaleño talussnail and the San Xavier talussnail are narrow

endemics that function as single, contiguous populations. The Pinaleño talussnail occurs within an area of approximately 25 square miles. Pinaleño talussnail habitat is well-connected throughout the Pinaleño Mountains, and we have no information supporting multiple populations of Pinaleño talussnail in the Coronado National Forest. The San Xavier talussnail occurs within a very small area of about 1.08 acres. Although a ravine bisects the range, there is suitable habitat between the two sections that may serve as a movement corridor. Thus, there is no biologically meaningful way to break the limited range for either species into portions, and the threats that the species face affect both species comparably throughout their entire ranges. As a result, there are no portions of the species' range where the species have a different biological status from their range-wide biological status. Therefore, we conclude that there are no portions of the species' range that warrant further consideration, and the species are not in danger of extinction or likely to become so in the foreseeable future in any significant portion of its range. This does not conflict with the courts' holdings in *Desert Survivors v. U.S. Department of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018), and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017) because, in reaching this conclusion, we did not apply the aspects of the Final Policy on Interpretation of the Phrase "Significant Portion of Its Range" in the Endangered Species Act's Definitions of "Endangered Species" and "Threatened Species" (79 FR 37578; July 1, 2014), including the definition of "significant" that those court decisions held to be invalid.

#### *Determination of Status*

Our review of the best available scientific and commercial information indicates that both the Pinaleño talussnail and the San Xavier talussnail do not meet the definition of an endangered species or a threatened species in accordance with sections 3(6) and 3(20) of the Act. Therefore, we find that listing the Pinaleño talussnail and the San Xavier talussnail is not warranted at this time. Our analysis for this decision applied our current regulations, portions of which were last revised in 2019. Given that we proposed further revisions to these regulations on June 22, 2023 (88 FR 40764), we have also undertaken an analysis of whether the decision would be different if we were to apply those proposed revisions. We concluded that the decision would have been the same if we had applied the proposed 2023 regulations. The analyses under both the regulations currently in effect and the regulations after incorporating the June 22, 2023, proposed revisions are included in our decision file.

#### COORDINATION WITH STATES

We coordinated with AGFD throughout the development of the SSA.

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