

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

SCIENTIFIC NAME: *Monadenia fidelis minor*

COMMON NAME: Dalles sideband snail

LEAD REGION: Interior Region 9 (Columbia-Pacific Northwest)

DATE INFORMATION CURRENT AS OF: December 10, 2020

STATUS/ACTION

Species assessment - determined either we do not have sufficient information on threats or the information on the threats does not support a proposal to list the species, and therefore it was not elevated to Candidate status

Listed species petitioned for uplisting for which we have made a warranted-but-precluded finding for uplisting (this is part of the annual resubmitted petition finding)

Candidate that received funding for a proposed listing determination; assessment not updated

New candidate

Continuing candidate

Listing priority number change

Former LPN: ____

New LPN: ____

Candidate removal: Former LPN: ____

A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

F – Range is no longer a U.S. territory.

- I – Insufficient information exists on taxonomy, or biological vulnerability and threats, to support listing.
- M – Taxon mistakenly included in past notice of review.
- N – Taxon does not meet the Act’s definition of “species.”
- X – Taxon believed to be extinct.

Date when the species first became a Candidate (as currently defined): N/A

Petition Information:

Non-petitioned

Petitioned; Date petition received: March 17, 2008

90-day substantial finding FR publication date: October 5, 2011

12-month warranted but precluded finding FR publication date: N/A

FOR PETITIONED CANDIDATE SPECIES:

- a. Is listing warranted (if yes, see summary of threats below)? N/A
- b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? N/A
- c. Why is listing precluded? N/A

PREVIOUS FEDERAL ACTIONS

On March 17, 2008, the U.S. Fish and Wildlife Service (Service) received a petition from the Center for Biological Diversity (CBD), Conservation Northwest, the Environmental Protection Information Center, the Klamath-Siskiyou Wildlands Center, and Oregon Wild, requesting that the Service list 32 species and subspecies of mollusks in the Pacific Northwest, including the Dalles sideband (*Monadenia fidelis minor*), as threatened or endangered under the Endangered Species Act (Act). The petition also requested that the Service designate critical habitat concurrent with listing. In an April 13, 2009 email, CBD requested that the petition be amended to include only 29 species and subspecies, due to taxonomic revisions. The request was treated as an amendment to the original petition. On October 3, 2011, the Service found that the petition presented substantial scientific or commercial information indicating that 26 of the 29 petitioned species or subspecies, including Dalles sideband, may be warranted for listing (76 FR 61826). To inform our status review, we completed the Species Status Assessment for the Dalles sideband (Service 2020, entire). This Species Assessment and Listing Priority Form constitutes our 12-month finding on the status of the Dalles sideband snail.

ANIMAL/PLANT GROUP AND FAMILY

Mollusca, Bradybaenidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE

Countries: United States

States/Territories: Oregon, Washington

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE

Countries: United States

States/Territories: Oregon (Wasco, Hood River, and Sherman Counties), Washington (Skamania and Lewis Counties)

LAND OWNERSHIP

The majority of Dalles sideband observations (70%) occur on Federal lands, primarily U.S. Forest Service and Bureau of Land Management lands. The remainder of known occurrences are distributed among state (2%) and private (28%) lands.

LEAD REGION CONTACT

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BIOLOGICAL INFORMATION

The Species Status Assessment (SSA) for the Dalles sideband (Service 2020, entire) provides a comprehensive overview of the taxonomy, life history, and ecology of the Dalles sideband snail, and provides the basis for our finding. The SSA evaluates species viability in the context of resiliency, redundancy, and representation (the 3 Rs), where resiliency is the ability of the species to withstand environmental stochasticity and disturbance within the normal range of variation, redundancy is the ability of the species to withstand catastrophic events, and representation is the ability of the species to adapt to near-term and long-term changes in its environment. The information presented below is summarized from the SSA. For additional details, please refer to the SSA report (Service 2020, entire).

Species Description

The Dalles sideband is a terrestrial snail (or “gastropod”—a term that collectively refers to members of the Gastropoda class) and is a smaller subspecies of the Pacific sideband (*Monadenia fidelis*). Though the Dalles sideband is taxonomically a subspecies, for simplicity any reference to the “species” within this document refers to the Dalles sideband unless specifically expressed otherwise.

The physical features differentiating this subspecies from the Pacific sideband include: shell width of 18 to 30 millimeters (mm) (.71 to 1.18 inches (in)), and shell height of 10 to 15 mm (.39 to .59 in); shells having 5.5 to 6 whorls (spirals); having a low to moderate shell spire (shell is wider than it is high); and the shell umbilicus (hollow space at center of whorls) being less than a quarter covered by the lip margin (as opposed to half-covered in other subspecies) (Jordan and Black 2014, p. 7). Other features that describe the Dalles sideband but may not be unique to this subspecies are the flesh color which is grayish-brown with bluish pigment granules, and shell color that has been described as mostly yellowish/white to mostly creamy or brown (Jordan and Black 2014, p. 7) (Figure 1).

Taxonomy

The *Monadenia* genus was originally established in 1895, and then the Dalles sideband type (*M. f. minor*) was later described near The Dalles, Oregon, in 1936 (Burke et al. 1999, Section 9, p. 2). The following is the accepted taxonomy of the Dalles sideband (NatureServe 2020a, no pagination):



Figure 1. Dalles sideband snail, Mt. Hood National Forest, photo credit: Elise Brown, Service.

Kingdom: Animalia
Phylum: Mollusca
Class: Gastropoda
Order: Stylommatophora
Family: Bradybaenidae
Genus: *Monadenia*
Species: *fidelis*
Subspecies: *minor*

The entire *Monadenia* genus is fairly diverse, and endemic to the Pacific Northwest of the United States. However, there has been speculation as to the taxonomic relationships between the multiple subspecies of *Monadenia fidelis*—including the

Dalles sideband. Some sources described a total of 18 subspecies under *Monadenia fidelis* (NatureServe 2020b, no pagination), with many color variations among the species and subspecies (Burke 2013, p. 139). Some found that there is no evidence that diet affects shell color (Roth 1981, p. 11), while others described how the color bandings and morphological variations among *Monadenia* spp. could be the result of environmental and geographic factors (Branson 1983, p. 351). To date, there is no definitive scientific determination regarding the cause of color variation in the *Monadenia* genus.

We relied upon the best science and expert opinion available to us at the time of completing our assessment of the Dalles sideband. While there have been questions raised about the clarity in distinction of the Dalles sideband and other subspecies of the Pacific sideband, there has not yet been persuasive evidence presented in the literature, or provided to us during expert elicitation or peer and partner review of our assessment, indicating that the Dalles sideband is not a valid subspecies. Further, to date there have been no proposals calling for a taxonomic revision of the Dalles sideband. Thus, for the purposes of our assessment, we relied on the best available science and proceeded with our analysis under the most generally accepted view among experts thus far that the Dalles sideband is a distinct subspecies (and therefore a listable entity under the Act). Further discussion on the taxonomy of the Dalles sideband can be found in our Species Status Assessment report (Service, 2020).

Life History

Although specific reproduction mechanisms for the Dalles sideband have not been documented, we used the basic information available for this larger classification of terrestrial snails (and specifically the *Monadenia* genus). Although researchers think that sexual reproduction is the norm (Jordan and Black 2014, p. 8), members in the *Monadenia* genus are hermaphroditic (individuals have both male and female reproductive organs, and often engage in cross-fertilization). In the case of cross-fertilization, both animals act as males and females at the same time during both courtship and copulation (Barker et al. 2001, p. 414). This can be an effective strategy to increase reproductive success (Kramarenko 2013, p. 120).

Terrestrial gastropods generally start breeding in the spring (once the snow melts) or in the fall, and eggs hatch about one month after being laid (Frest and Johannes 1995, p. 37). There is currently no specific information on the process of oviposition (egg-laying) for the Dalles sideband, but the Pacific sideband will lay eggs (estimated ten at a time) in loose soils (Jordan and Black 2014, p. 8). Other terrestrial gastropods have been described as laying yolky eggs in humid places such as depressions in soil, underneath or in crevices of fallen logs, and under loose bark or fallen leaves on the forest floor (NatureServe 2020a, no pagination). After an incubation period (which is approximately one month), the snails hatch, and juveniles can be described as smaller anatomical versions of adult snails. *Monadenia* species become sexually mature in 2-3 years, with an approximate lifespan of 8-10 years (Frest and Johannes 1995, pp. 32, 37).

Pacific sidebands aestivate, or become dormant, once temperatures in the summer become too hot and dry, and they hibernate during colder months. Most terrestrial snails are active in the early morning or evening hours, when they emerge from refugia to forage for food (Sturm et al. 2006, p. 268).

Habitat and Resource Needs

The Dalles sideband has been found in a wide range of environments, usually associated with rock or talus substrate, including semi-dry landscapes, rocky/talus slopes, near springs or other localized water sources (Kelley et al. 1999, p. 37) and in conifer-dominated forests typical of the western Cascade Mountains, within the vicinity of streams or drainages (Jordan and Black 2014, p. 10). Observations of Dalles sideband have also been recorded in forests southeast of Mt. Hood (Hamer Environmental 2017, p. 3).

While the specific diet of juvenile and adult Dalles sidebands has not yet been documented, we used what is known of the general diet of members of the genus *Monadenia* as a surrogate for this subspecies. *Monadenia* species feed on various plant material, roots, fungus, microorganisms, and other organic matter (Jordan and Black 2014, p. 9). Food sources that contain the appropriate nutrients, especially calcium, are crucial for shell production (Hotopp 2002, p. 39).

Macrosite conditions (e.g., plant community, talus, riparian habitat, etc.) and microhabitat conditions (e.g. specific plants, soil chemistry, moisture) influence gastropods (Burke 2013, p. 15). Environmental conditions and thresholds specific to the Dalles sideband have not yet been identified in literature, however habitat conditions that support terrestrial snails, in general, can serve as a proxy for Dalles sideband habitat. Leaf-litter and loose soils are a critical microhabitat component for terrestrial snails, and support functions such as breeding, feeding, and sheltering (Steensma et al. 2009, p. 240). Large wood debris and rocks are other important components of snail habitat (Jordan and Black 2014, p. 8). Research on the Pacific sideband in British Columbia showed that this species seems to tolerate a wide range of microsite habitats within mixed deciduous and coniferous forests (Brown and Durand 2007, p. 12).

There is little information available on the specific resources that the Dalles sideband needs for survival (in all life stages); however, there is information available on the resource requirements for similar terrestrial gastropods, particularly those within the *Monadenia* genus. For example, most *Monadenia* species and subspecies depend upon talus slopes with high tree canopy cover to keep their habitats cool and moist, and also require loose soil, litter, moist crevices, downed trees for egg-laying (Perez and Cordeiro 2008, p. 20). Though there are no data currently available to indicate particular soil chemistry requirements specific to the Dalles sideband, we assume that, like other terrestrial gastropods, there are certain soil chemistry criteria including the availability of calcium that must be met to support the Dalles sideband (Jordan and Black 2012, p. 9). Furthermore, terrestrial gastropods are mostly comprised of water and are highly susceptible to desiccation, so proper levels of moisture and precipitation are important for the Dalles sideband, although specific ranges of moisture tolerance are not known (Barker 2001, p. 159).

Even though we have a lack of information on the demographic characteristics for the Dalles sideband, we expect that the capacity for populations to exchange genetic material depends upon habitat connectivity that allows individuals from different populations to mix. Factors that contribute to reduced habitat connectivity limit dispersal opportunities within and between occupied areas, and the loss of habitat connectivity is considered a threat to the Dalles sideband (Jordan and Black 2014, p. 12). We consider habitat connectivity for the Dalles sideband to be affected both by the availability of contiguous suitable habitat adjacent to occupied sites, and the presence (or absence) of major dispersal barriers. Dispersal barriers include major obstacles such as large bodies of water, glaciers, and paved highways (NatureServe 2020b, no pagination; Jordan and Black 2012, p. 21).

Based upon various literature sources, we determined that the most important needs for Dalles sidebands are sufficient moisture/precipitation, loose soils, sources of refugia (e.g., rocks/talus slope, logs, any kind of detritus, etc.), proper soil chemistry (especially calcium), and sufficient connectivity (because barriers can prevent dispersal for adults and juveniles) (Table 1).

Table 1. Individual resource needs by life stage (egg, juvenile, or adult) and activity (breeding (B), dispersal (D), feeding (F), and sheltering (S)), for the Dalles sideband snail.			
Resources	Life Stage		
	Egg	Juvenile	Adult
Refugia—rocks, logs, leaves	S	F, S, D	B, F, S, D
Detritus/decomposing vegetation		F, S	F, S
Moist surfaces/soil	S	F, S, D	B, F, S, D
“Moderate” air temperatures	S	F, D	B, F, D
Calcium/minerals in soil/food		F	F
Loose soil	S		

Historical and Current Range/Distribution

We are not aware of any efforts to document the precise range, distribution, and abundance of the Dalles sideband. Historically, there are very few records of the Dalles sideband but the original “type locality” from the late 1800s was recorded near The Dalles, Oregon (Burke 2013, p. 148). The Dalles sideband’s original distribution has been described as including parts of the eastern Columbia Gorge, in Wasco and Sherman counties in Oregon and Klickitat county in Washington; and as far east as the mouth of the John Day River (Frest and Johannes 1995, p.100).

Because much of the Dalles sideband’s preferred habitat in these areas has likely changed little over time, the current distribution may be the similar to the historical distribution (Jordan and

Black 2014, p. 15). This subspecies is currently known from over 174 observations in Wasco, Hood River, and Sherman counties in Oregon, as well as Skamania, and Lewis counties in Washington (Jordan and Black 2014, p. 9).

The Dalles sideband is designated as a “Survey and Manage” species under the Northwest Forest Plan (NWFP), and therefore many of the contemporary observations (i.e., post-1990s when the NWFP was established) are a result of “pre-disturbance” surveys on Federal lands required under the NWFP. Because surveys for the subspecies have primarily taken place only in those areas addressed by the NWFP “Survey and Manage” requirement, the Dalles sideband could occur in more locations than those that have been recorded thus far.

Population Estimates/Status

There is currently no information available on how to define a “population” of the Dalles sideband, or what the ideal population size is for the Dalles sideband. Available survey data are insufficient to estimate current abundance and distribution, or to provide a complete picture of occupancy. Thus, in order to help us understand the potential distribution of this species within its known range currently, we created a species distribution model.

We built the species distribution model by combining positive Dalles sideband occurrence data (174 records) with other spatial habitat data layers, focusing on the following environmental covariates: average soil moisture over 20 years (in inches), average evapotranspiration, and annual mean temperatures. The best available scientific information indicates that these variables are the most important habitat factors that support the species, and for which data were available. There were two other covariates (canopy cover and average annual precipitation) that we initially considered while developing the species distribution model, but because these were highly correlated with soil moisture and therefore duplicative of the soil moisture covariate, we removed them from the final model. In summary, the model used the environmental covariates associated with the positive occurrence records to predict potential distribution of the subspecies. This process resulted in a species distribution model that shows where within the modeled area the habitat contains the environmental characteristics associated with the Dalles sideband occurrence locations, and therefore indicating where on the landscape the Dalles sideband is most likely to be found (Figure 2).

In the absence of known population divisions, we defined analytical units at two scales. First, we delineated resiliency units (to help us measure the species’ ability to withstand stochasticity) by buffering each known Dalles sideband occurrence point by 1 kilometer (km) (0.6 miles), which is generally accepted to be the maximum dispersal range for terrestrial gastropods (NatureServe 2020a, no pagination). After applying this buffer on each occurrence point, any overlapping polygons were combined into a single resiliency unit. Using this approach, we identified 23

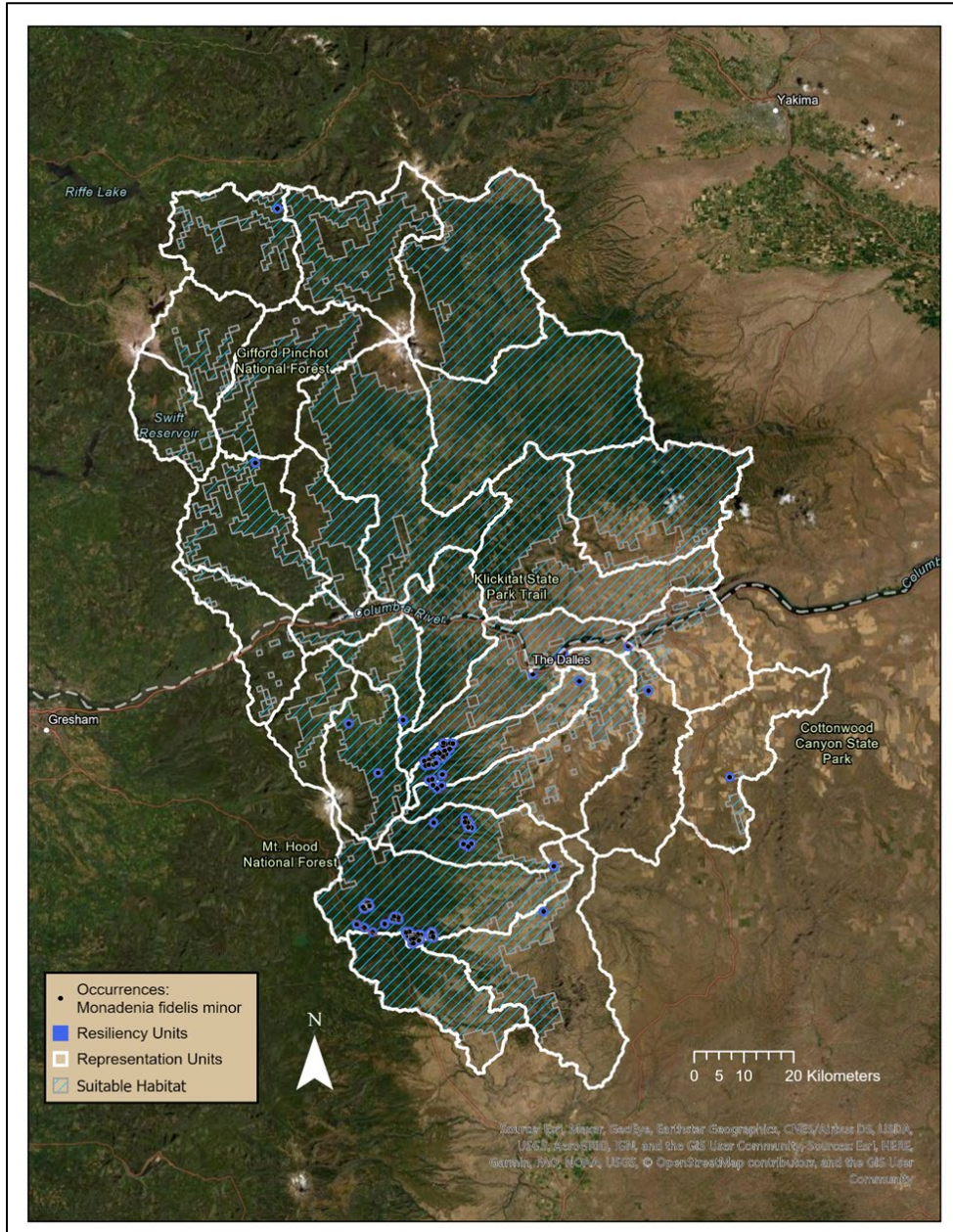


Figure 2. Known occurrences of Dalles sideband, modeled suitable habitat, and resiliency and representation unit boundaries.

resiliency units. We then delineated representation units by using the U.S. Geological Survey’s Watershed Boundary Dataset, sub-basin (HUC-10) level units. The HUC-10 Geographic Information System (GIS) spatial layer was overlaid on the mapped resiliency units, and these HUC-10 boundaries became the representation unit boundaries for our analysis, used to measure representation (the species ability to withstand environmental change) (Figure 2).

As previously mentioned, there are no data on demographic metrics, population delineations, or population health and abundance for the Dalles sideband. Considering its limited mobility, and its dependence on multiple environmental factors for each stage of its life cycle, suitable habitat conditions are very important for survival, reproduction, and dispersal of the Dalles sideband. Therefore, in the absence of any data to indicate population resiliency for the Dalles sideband, we consider habitat condition as an acceptable surrogate for the species resiliency in each resiliency unit.

SUMMARY OF BIOLOGICAL INFORMATION

The Dalles sideband is a small, terrestrial snail, and is a subspecies of the Pacific sideband snail (*Monadenia fidelis*). The Dalles sideband range is east of the Cascade Mountains in Oregon and Washington, primarily along the Columbia River corridor, extending east to the mouth of the John Day River. The species is known from over 174 observations, most of which are a result of surveys conducted prior to vegetation management, thinning, and timber projects on Federal lands. Occurrences have been documented near The Dalles, Oregon, with more recent detections on the Mount Hood National Forest in Oregon, and the Gifford Pinchot National Forest in Washington. The Dalles sideband has been identified in Wasco, Hood River, and Sherman counties in Oregon, as well as Skamania and Lewis counties in Washington.

The Dalles sideband inhabits forested environments, particularly those containing talus slopes and/or containing a high concentration of woody debris, leaves, or other refugia. It is also found in cool, moist habitat, near springs and riparian areas. While the specific diet of Dalles sideband has not been documented, other members of its genus are known to feed on various plant material, roots, fungus, microorganisms, and other organic matter (Jordan and Black 2014, p. 9).

THREATS

We define “threat” as any action or condition that is known to or is reasonably likely to negatively affect individuals of a species. This includes those 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 mere identification of “threats” is not sufficient to compel a finding that listing is warranted. Describing the negative effects of an action or condition (i.e., “threats”) in light of the exposure, timing, scale, and severity at the individual, population, and species levels provides a basis upon which to make our determination. In determining whether a species meets the definition of an “endangered species” or a “threatened species,” we consider the factors under section 4(a)(1) of the Act and assess the cumulative effect that the threats identified within the factors—as ameliorated or exacerbated by any existing regulatory mechanisms or conservation efforts—will have on the species now and in the foreseeable future.

We do this in the context of the SSA framework (Service 2016, entire) whereby we analyze the factors (stressors) that may negatively influence the viability of the species. Under the framework, the viability of a species is not affected by stressors that operate exclusively at the individual level; only when a stressor operates at a scope, magnitude, and intensity as to affect the resiliency of a population is it considered to influence the viability of the whole species. Therefore, only those stressors that appear to be operating at the population level are considered threats for the purposes of the status assessment. We also use the terms "influence factor," "risk factor," and "conservation measure." We generally define influence factor here as any physical, chemical, or biological alteration of the environment that can lead to an individual response. We think of risk factors and conservation measures as two types of influence factors, one leading to a negative individual response (risk factor) and one leading to a positive individual response (conservation measure).

Current Influence Factors

We considered all potential stressors to the Dalles sideband, which were mostly based on data available specific to the *Monadenia* genus or the parent species *Monadenia fidelis*, as little information on threats specific to the subspecies exists. We considered all potential stressors, including those listed in the petition (e.g., vegetation control using chemical herbicides, livestock grazing, recreation, and overcollection), as well as others cited in the literature (e.g., competition from exotic gastropods, predation, invasive plants, and land use changes). These stressors may have negative effects on individuals, but we found no evidence that they are having a negative effect at the population level. Therefore, due to the lack of evidence that these factors impact populations of the Dalles sideband, we did not carry them through our analysis of current and future conditions, but instead focused on what we found to be the most important population-level stressors to the Dalles sideband: drought and wildfire (as influenced by climate change), and forest management.

Drought

Low rainfall, higher air temperatures, and increased soil moisture evaporation rates, can all contribute to "drought" conditions within an ecosystem. Because sufficient moisture is one of the most important needs for the Dalles sideband (though specific amounts are unknown), we expect that drought, especially severe or prolonged drought, is likely a significant population-level stressor. Desiccation is the primary reason for terrestrial snail mortality, even if habitat remains undisturbed (Frest and Johannes 1995, p. 23). According to the National Drought Mitigation Center, the counties in Oregon and Washington where the Dalles sideband occurs, have recently been experiencing drought conditions ranging from moderate to severe, or extreme intensity (United States Drought Monitor 2020, no pagination). There is evidence that mean annual temperatures have increased in the United States from the past several decades, which have

manifested in altered hydrologic patterns, such as snowpack melting earlier in the spring, and extended drought during the summer (Van Mantgem et al. 2009, p. 523). These extensive drought conditions can also contribute to fire occurrences on the landscape, which can also negatively impact Dalles sideband populations (Nicolai and Ansart 2017, p. 7). We discuss the impacts of fire on Dalles sideband in the subsequent section (see *Wildfire*, below).

Wildfire

The Dalles sideband is very susceptible to fire, both through direct mortality, and indirectly from the resulting habitat changes (Jordan and Black 2014, p. 13). Terrestrial gastropods most likely aestivate during the majority of the fire season (Sturm et al. 2006, p. 266), perhaps reducing their susceptibility to direct fire-related mortality, at least for lower intensity and lower severity wildfires. However, indirect effects of fire to the species habitat include the reduction and modification of organic substrates and residues that serve as sources of food, nutrients, and sheltering (Burke 2020, pers. comm.). Fire also changes microclimate, such as through heating of bare soil, which increases soil evaporation (Nicolai and Ansart 2017, p. 7).

Wildfires across the western United States from 1984 to 2011 were becoming more common, larger in scale, and of higher intensity, when compared to historical fire regimes (Dennison et al. 2014, p. 2928). Changes in firefighting practices over time (e.g., more frequent use of intentional burning to clear fuels as a fire suppression tactic) and an increase in human development and/or recreation within Dalles sideband habitat, may increase the incidence of fire in Dalles sideband habitat (Dennison et al. 2014, p. 2932). Although wildfires are a natural part of the ecosystem where the Dalles sideband resides, increased frequency, intensity, and duration of fires this will amplify the impact of this stressor into the future.

Forest Management

Forest management refers to all activities associated with thinning, timber salvage, clear cutting, brush clearing (e.g., along roads, trails, campgrounds, etc.), herbicide application, road building, and slash piling. These activities, especially those that remove vegetation, can result in direct mortality of the Dalles sideband, but can also degrade its habitat by altering the microclimate (temperature and moisture), forest floor vegetation, litter composition, large woody debris abundance, soil permeability, and habitat connectivity (Ovaska et al. 2016, p. 273). For example, timber harvest can significantly modify habitat characteristics by decreasing available moisture, and increasing exposure to the sun, resulting in hotter and drier forest floor conditions that are detrimental to terrestrial gastropods (Frest and Johannes 1995, p. 55).

Additionally, forest management activities may lead to increased isolation of terrestrial gastropod populations. These activities may fragment large sections of contiguous, suitable habitat, creating patches of unsuitable habitat interspersed between patches of suitable habitat.

Fragmented habitat may restrict the snail's ability to disperse, ultimately resulting in reduced connectivity between populations, thereby increasing the risk of extirpation (Jordan and Black 2012, p. 15). However, there is uncertainty around these assumptions, because dispersal barriers for the Dalles sideband are not specifically known.

Climate Change

Changes in forest composition and structure, as well as macro- and microhabitat variables, resulting from climate change may impact habitat and resource availability for the Dalles sideband. Between 1895 and 2011, temperatures in the Northwest rose an average of 0.72° Celsius (C) (1.3° Fahrenheit (F)) and are expected to continue to warm from 0.11°C to 0.6°C (0.2°F to 1.0°F) per decade (Mote and Salathe 2010, p. 1; Mote et al. 2014, p. 489). Changes in precipitation, on the other hand, are expected to be variable, with increases or decreases depending on the locale; this local variation makes forecasting precipitation changes more challenging (Mote et al. 2014, p. 489).

While specific impacts from climate change to the Dalles sideband have yet to be demonstrated, many terrestrial gastropod's life history patterns are very sensitive to changes in climate conditions within their areas of endemism (Frest and Johannes 1995, p. 25). For example, changes in local temperatures can affect aestivation and hibernation patterns, while a reduction in soil moisture and precipitation can reduce the snail's skin moisture and its ability to secrete mucus (Nicolai and Ansert 2017, p. 2). Furthermore, the snail's limited mobility inhibits its ability to escape unfavorable environmental conditions.

We referred to fine resolution, regional, predictive climate models, which account for local terrain and other factors affecting weather and environmental variables (e.g., snow cover, cloudiness, soil moisture, and circulation patterns), for our analysis of climate change impacts in the Pacific Northwest (Salathe et al. 2010, entire). These downscaled models show that throughout the range of the Dalles sideband, predicted increases in mean annual temperature range from 2.1°C to 2.9°C (3.9°F to 5.4°F) by the year 2050 (Hegewisch et al. 2020). Mean monthly maximum temperatures are predicted to rise by 3.0°C to 4.5°C (5.4°F to 8.1°F) by 2099 (Lenihan et al. 2008, p.18). Localized climate models for the Pacific Northwest agree with the global climate models in projecting warmer, drier summers (Mote et al. 2014, p. 489), and warmer, wetter autumns and winters (Mote et al. 2014, p. 497), which will likely result in diminished snowpack and earlier snowmelt (Mote et al. 2014, p. 489), and an increase in extreme heat waves (Mote et al. 2019, p. 1063) and wildfires (Mote et al. 2014, p. 489) in this region.

Current Condition and the 3 Rs

As previously described, we used Dalles sideband occurrence points to inform a species distribution model, where we used a 1-km buffer around occurrence points to define resiliency

units, resulting in a total of 23 resiliency units. To define representation units, we used HUC-10 watershed units that encompassed the geographic boundary of the area containing all the resiliency units. When we identified representation units, we looked at all potential habitat from our species distribution model, meaning that some HUC-10 watersheds were included as representation units even if they didn't have Dalles sideband observations associated with them, as long as the watersheds were contiguous between representation units with known occupancy (Figure 2). This resulted in 27 representation units, which cover the area of the known range of the Dalles sideband in Oregon and Washington. However, for our assessment of resiliency, redundancy, and representation, we focused only on the 13 representation units that contained the 23 resiliency units we identified based on Dalles sideband occurrence data (Table 2).

Table 2. Number of Dalles sideband resiliency units in each occupied representation unit.

State	Representation Units (HUC-10)	Number of Resiliency Units
Oregon	Cedar Island-Deschutes River	1
	East Fork Hood River	2
	Eightmile Creek	3
	Fifteenmile Creek	1
	Grass Valley Canyon	1
	Hood River	1
	Mill Creek-Columbia River	2
	Spanish Hollow-Columbia River	1
	Tygh Creek	3
	White Horse Rapids-Deschutes River	2
	White River	4
Washington	Wind River	1
	Lower Cispus River	1

Because we had no records of Dalles sideband in some of the representation (watershed) units, we deemed it inappropriate to include these units of unknown occupancy in our evaluation of species viability, though they are useful in portraying the potential distribution of the species throughout the region in which it is known to exist.

Because there is a lack of quantitative data available to define thresholds required by the Dalles sideband for each of its habitat components, we used qualitative condition ratings for habitat and demographic factors. Considering the Dalles sideband's limited mobility, we assume suitable micro-site conditions are very important for survival, and therefore habitat condition can be an

acceptable proxy for species resiliency in each “population,” or resiliency unit. We used the percentage of suitable habitat (as defined by the species distribution model) to rate the habitat condition for each resiliency unit. Population connectivity (the demographic factor) was rated based on the presence of potential dispersal barriers within each representation unit, as well as whether or not suitable habitat was available within a 1-km radius of each resiliency unit. However, because the Dalles sideband is hermaphroditic which can allow for reproduction even in cases where dispersal is limited, we determined that habitat suitability is likely to be slightly more consequential to the Dalles sideband’s resiliency than is habitat connectivity. Therefore, the overall condition rating of each resiliency unit took on the rating of the habitat factor if the habitat factor and demographic factor were consecutive (i.e., for “High/Moderate” and “Low/Moderate” pairings) (Table 3).

Table 3. Categorical definitions used to assess the current condition of Dalles sideband resiliency units.

	Habitat Factor	Demographic Factor
Condition Category	Modeled Habitat Suitability	Habitat Connectivity
HIGH	> 75% of resiliency unit contains suitable habitat	No barriers intersecting representation units (major bodies of water, highways), and is contiguous with at least 1 km of suitable habitat outside resiliency unit
MODERATE	25% - 75% of resiliency unit contains suitable habitat	At least one barrier intersecting representation unit, but resiliency unit is contiguous with 1 km outside suitable habitat
LOW	< 25% of resiliency unit contains suitable habitat	At least one barrier intersecting representation unit, and <1 km of contiguous suitable habitat outside resiliency unit

Resiliency is the ability of a population to withstand stochasticity. According to the best available science and occurrence data that we could use to inform our model, the current condition of the Dalles sideband is characterized by 19 highly resilient populations and four moderately resilient populations (Figure 3). The Dalles sideband possesses the ability to reproduce both sexually and asexually, which may contribute to reproductive success, and an increased propensity to maintain high levels of resiliency.

Representation is the ability of the species to adapt to change, and is often measured by examining ecological, phenotypic, and genetic diversity within the species. Due to the multiple uncertainties regarding the Dalles sideband’s genetics, reproductive rates, population structure,

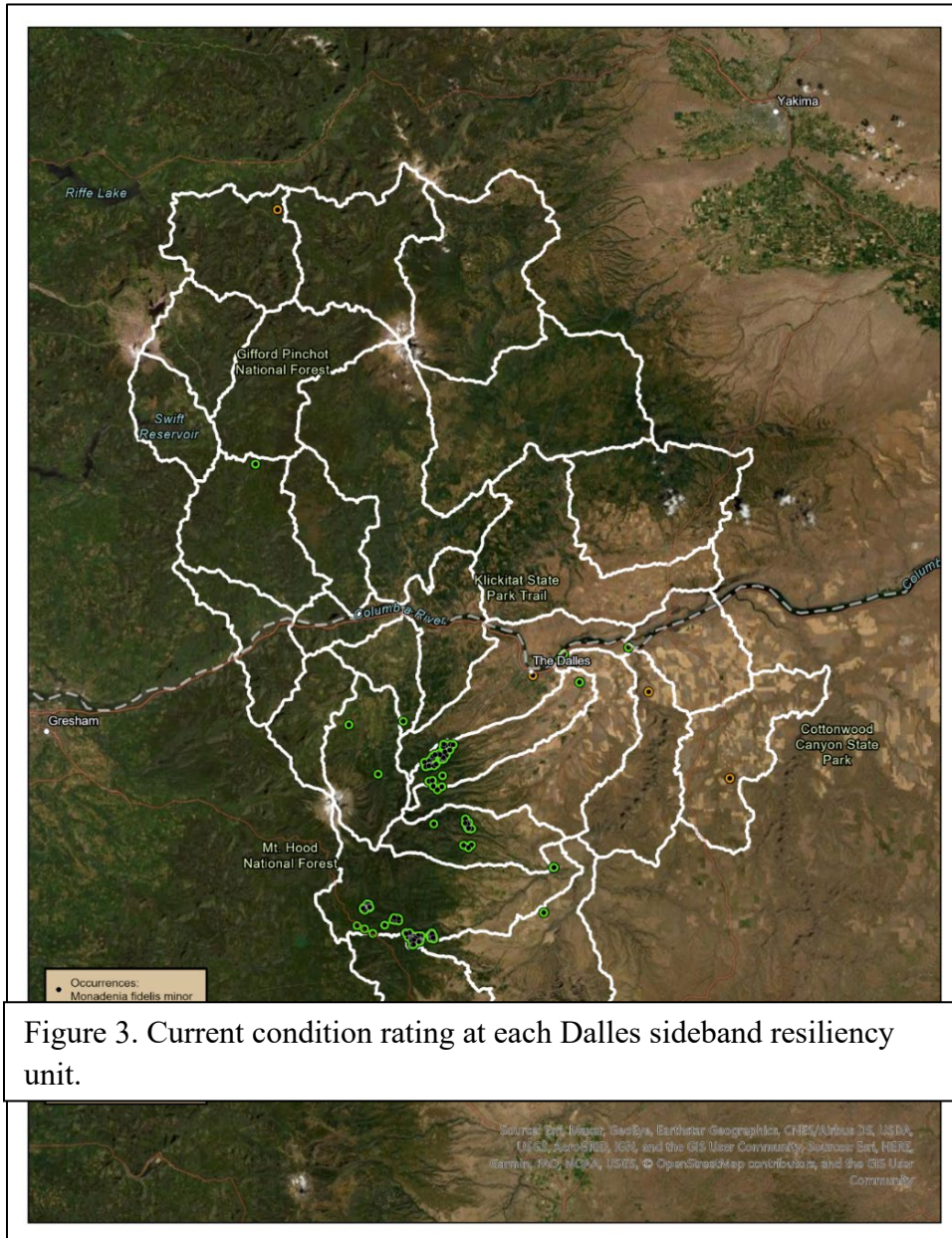


Figure 3. Current condition rating at each Dalles sideband resiliency unit.

and other life history traits, some limited assumptions are inherent in our analysis of representation.

There does seem to be a fair amount of phenotypic diversity among individuals of Dalles sideband, as well as among other subspecies of the Pacific sideband. Further, the geographic range of the Dalles sideband spans approximately 185 km north-to-south and 117 km east-to-west, traversing a variety of forested landscape types on the east side of the Cascade crest at elevations ranging

from 610 to 1525 meters. This apparent breadth of phenotypic and ecological diversity, along with the distribution of resiliency units among the occupied representation (watershed) units (Table 2), indicates an adequate degree of representation among members of this subspecies in lieu of any genetic information to the contrary.

Redundancy is the ability of the species to withstand catastrophic events, and appears to be adequate for the Dalles sideband, given that the 23 “populations” or resiliency units are distributed across 13 representation units throughout the known range of the subspecies. However, available data indicate only where positive survey occurrences are documented, and

we are therefore limited in what we can assume about absence in areas where no positive survey data are documented. There is a deficit of positive survey results in modeled suitable habitat in Washington, leaving the assessment of redundancy somewhat lacking there. In summary, the extent to which the species occurs in modeled suitable habitat within the range where no observations of the species have been made, and the abundance of the species where there is occurrence data, is largely unknown.

The current condition of the Dalles sideband appears to be defined by high resiliency among most populations, and sufficient redundancy and representation for the species, based on the best available science. However, the general lack of abundance, life history, and distribution data on the Dalles sideband were unavoidable limitations for this analysis.

Future Influence Factors

While there are multiple potential risk factors for the Dalles sideband, we focused on the variables we could most accurately forecast based on the data and models available, and our knowledge of management at each of the sites. These variables include the risk factors previously described (i.e., forest management, drought, and wildfire), and climate change projections for temperature, precipitation, and wildfire risk. To analyze future conditions, we considered how those specific risk factors might combine to affect suitable habitat quality and connectivity for the species, as we lack the information to determine how specific degrees of change in the risk factors will impact the species.

Climate Change

To evaluate the effect of climate change on the future viability of the Dalles sideband, we used projections of climatic variables, and considered how these projected changes might affect future conditions for the species. Specifically, we considered how the projected increase in air temperature would impact soil temperature and moisture, and the risk of wildfire.

Downscaled climate projections were available for our analysis from the U.S. Geological Survey National Climate Change Viewer (Alder and Hostetler 2015, entire). The National Climate Change Viewer is based on the average of 30 models, which can be used to project changes in air temperature and precipitation.

Forecasts indicate that continued climate change will have long-term and variable impacts on forest habitat at local and regional scales (Mote et al. 2008, entire). Locally, this could involve changes that influence habitat suitability for the Dalles sideband. Regionally, availability of habitat may decrease due to advances or retreats of entire vegetative communities. Researchers expect some ecosystems to become more water-limited, more sensitive to variability in temperature, and more prone to disturbance (McKenzie et al. 2009, p. 319). On the cooler,

moister, west side of the Cascades, the summer water deficit is projected to increase two- to three-fold over current conditions, while summer water deficits in the Eastern Cascades may increase to a lesser extent (Elsner et al. 2009, entire). There is evidence that the productivity of many high-elevation forests, where low summer temperature and winter snowpack limits the length of the growing season, is increasing in the Pacific Northwest as temperatures rise, thereby potentially increasing the elevation of the tree line (Case and Peterson 2009, p. 2753). Conversely, productivity and tree growth in many low-elevation Pacific Northwest forests is likely to decrease due to the longer, warmer summers (Case and Peterson 2009, p. 2753). This may result in a change in species composition, or reduction in the acreage of existing low-elevation forests.

Higher temperatures and decreased precipitation levels are predicted to increase the risk of wildfire, insect outbreaks, and tree diseases, resulting in changes to forest ecosystems (Mote et al. 2014, p. 495). If the predicted transformation of forests also changes Dalles sideband microhabitat, then climate change may affect this species, though we are not able to specifically quantify the magnitude of the potential impact on the species. The combination of ambient temperature and available moisture likely influence activity patterns, and possibly the distribution of the Dalles sideband. However, we do not know the temperature gradient boundaries tolerated by the species, or the amount of moisture required for its survival. Given the wide range of temperature and moisture gradients where the Dalles sideband occurs, they may be able to tolerate climatic changes over time. Alternatively, microhabitat conditions may be influencing activity and distribution of the Dalles sideband, such that we cannot make reliable predictions on its behavior and distribution based on ambient temperature and annual moisture.

A warmer climate in the Pacific Northwest will likely affect forests by changing soil moisture, and increasing the frequency and intensity of disturbances like wildfire (McKenzie et al. 2009, p. 319). In the case of the Dalles sideband, important life history activities are likely timed to climatic patterns, and the associated moisture level and temperature of the soil and surface substrate (Frest and Johannes 1995, p. 25). Precipitation can influence moisture levels and gastropod activity patterns, but of all the climate variables we considered, future precipitation patterns fluctuate the most and show the least overall change (Service 2020, Appendix II, p. 82). Further, because our habitat suitability model showed that precipitation was highly correlated with soil moisture, we did not consider this variable on its own in our analysis of future scenarios. However, we consider the risk of drought (to which precipitation contributes) and its future impacts on the species. Likewise, since wildfire frequency and intensity is dependent on a combination of temperature, precipitation, and drought, it is also difficult to forecast; however we can be reasonably certain that as temperature increases over time, the risk of wildfire, and wildfire intensity and duration, will also increase over time. Therefore, for our analysis of future condition of the Dalles sideband, we focused on the projected risk of drought due to changes in

air temperature and soil moisture, and the risk of wildfire, because climate models demonstrate clear trends in these metrics over time.

Forest Management

Most of the Dalles sideband's occurrence records are located on federally-managed lands, likely due to its status as a Survey and Manage species under the NWFP. As a result, locations for which we have the highest amount of confidence regarding the presence of this species are also the locations at which active forest management is occurring. Because the U.S. Forest Service and Bureau of Land Management both have multi-resource usage missions, we assume that they will continue to actively manage forest habitats accordingly into the future. However, while the National Forests in which the Dalles sideband is currently known to occur are still following Survey and Manage protocols for this species, many Forest Service land management plans are currently being re-evaluated (Spies et al. 2019, p. 1). As such, even though the impact of forest management practices on the Dalles sideband may be partially mitigated by Survey and Manage protocols currently, there is uncertainty as to the degree to which these impacts will be managed into the future.

Activities involved with forest management can result in loss of canopy cover and ground-level disturbance, leading to the loss of forest litter, ground-level vegetation, and large woody debris. All of these changes can negatively affect habitat suitability for the Dalles sideband by removing food and shelter resources, creating hotter and drier microclimate conditions, and decreasing habitat connectivity. However, as previously described, we have limited ability to predict exactly how forest management activities will change in the future, so in our analysis we generally considered whether they will increase, decrease, or continue at current rates.

Future Condition

We considered a future timeline for this analysis based upon the extent into the future we could reasonably rely on projections of the variables under consideration, given the data and models available to us. Global climate models project changes in global temperature, and the associated climatic changes, based on potential future scenarios of greenhouse gas concentrations in the atmosphere (i.e., Representative Concentration Pathway (RCP)). A best-case scenario, RCP 4.5, assumes major near-future cuts to carbon dioxide emissions, while a status quo scenario, RCP 8.5, assumes the current practices continue with no significant change (Ternado et al. 2020, p. 10). These RCPs represent upper and lower boundaries of what can be expected for the future effects of climate change (Ternado et al. 2020, p. 17).

Because there is a lag time between the present and the resulting effects of present emissions on future climate, global climate model projections are very similar until about mid-century. Around mid-century the climate change projections start to greatly diverge, as our near-future actions

begin to manifest in our future climate. Since we cannot predict how the global community will respond to climate change, there is inherent uncertainty in climate change projections past this mid-century period. Therefore, we chose the time period out to about mid-century to assess the future conditions for the Dalles sideband. Downscaled climate projections from the U.S. Geological Survey National Climate Change Viewer that most closely fit our mid-century future timeframe were available out to year 2069 for our analysis.

Considering the major influence factors to Dalles sideband (i.e., wildfire, drought, and forest management activities), we developed three plausible future scenarios to analyze, with the changes in the major threats reflected in the resulting changes we would expect to see in our condition metrics (habitat suitability and habitat connectivity) (Table 4). These scenarios are meant to cover a large breadth of future conditions that could occur among Dalles sideband populations, and all of these scenarios may not be equally plausible.

Table 4. Future scenarios used to estimate future conditions at each Dalles sideband resiliency unit.

Scenario #1	Scenario #2	Scenario #3
No change in Wildfire	Increased Wildfire	Increased Wildfire
No change in Drought	Increased Drought	Increased Drought
No change in Forest Management	Increased Forest Management	Decreased Forest Management

It is extremely unlikely that the risk of wildfire (including high intensity fires and the risk of drought) will decrease from the present into the future, as demonstrated in the best-case climate change scenario (RCP 4.5). Thus, the most optimistic plausible future scenario we considered (Scenario 1) is that the risk of wildfire and drought continue unchanged from the present into the future.

The climate prediction datasets available to model our future conditions have a resolution of 4 km (2.5 miles), which is suitable for landscape-scale analysis, and generalized conclusions about the effects of climate change. However, these data are at too coarse of a scale for the differentiation between fine-scale future conditions to identify refugia at scales relevant to the species (i.e., down to 1 km).

We expect climate change to negatively affect the macro- and microhabitat conditions required by the Dalles sideband, and that the severity of change will be greater under a higher emissions

scenario (RCP 8.5) than under a lower emissions scenario (RCP 4.5). However, because we lack information on how much habitat change the Dalles sideband can tolerate, and what threshold levels of change will result in significant effects to the species, it is currently impossible for us to quantitatively differentiate between the effects of climate change under a low emissions scenario (RCP 4.5) and a high emissions scenario (RCP 8.5). Therefore, considering the significant magnitude of change occurring under even a lower emissions scenario (RCP 4.5), we assume that both emissions scenarios will result in negative effects on the species and its habitat, at different unquantifiable levels of severity, out to mid-century.

To project the future condition of each unit, we considered the current condition of each unit and incorporated the changes to both habitat quality and habitat connectivity expected from our three scenarios to arrive at an overall future condition for each unit. While we lack data to project future impacts to population connectivity (e.g., new infrastructure developments in national forests that impede dispersal), we presumed that increased drought and wildfire could fragment habitat, and therefore would result in decreased connectivity. Similarly, as we are unable to determine specific thresholds of change that will impact habitat based on future scenarios, we project generally how anticipated changes in threats will affect habitat condition at each site (i.e., general increase or decrease in habitat condition). As such, some sites may have a range of possible future conditions (e.g. moderate-low or high-moderate).

Future condition is described categorically, as listed below:

- High: The site will retain high habitat quality and connectivity, as defined in Table 3.
- High-Moderate and Moderate: Considering the two factors contributing to site conditions, as described in Table 3, overall conditions will deteriorate to a certain degree, but may not lower the relatively high condition of the site by an entire order of magnitude. The result is a population in intermediate or better condition (i.e., habitat, and by proxy the population, may be less robust but still maintains adequate resiliency).
- Moderate-Low and Low: The two factors contributing to site condition deteriorate further, but may not lower the intermediate condition of the site by an entire order of magnitude. The result is a population in intermediate to low condition (i.e., habitat, and by proxy the population, is either more vulnerable to stochasticity, or could decline to a vulnerable condition with additional stressors).

With the information available for this assessment, we anticipate the future resiliency to decline

in Scenario 2 and 3 at all 23 resiliency units (Table 5). Though we are unable to predict the severity of these declines and whether or not there will be a loss of any resiliency units (i.e., local extirpation), we anticipate that the lower level of resiliency at all units will make the Dalles sideband more vulnerable, to some degree, to stochastic events.

Table 5. Summary of current and future condition of Dalles sideband resiliency and representation units.

Representation Unit Name	Resiliency Unit	Current Condition	Future Condition Scenario 1	Future Condition Scenario 2	Future Condition Scenario 3
(1) Cedar Island-Deschutes River (CIDR)	CIDR 1	Moderate	Moderate	Moderate-Low	Moderate-Low
(2) East Fork Hood River (EFHR)	EFHR 1	High	High	High-Moderate	High-Moderate
	EFHR 2	High	High	High-Moderate	High-Moderate
(3) Eightmile Creek (EC)	EC 1	High	High	High-Moderate	High-Moderate
	EC 2	High	High	High-Moderate	High-Moderate
	EC 3	High	High	High-Moderate	High-Moderate
(4) Fifteenmile Creek (FC)	FC 1	High	High	High-Moderate	High-Moderate
(5) Grass Valley Canyon (GVC)	GVC 1	Moderate	Moderate	Moderate-Low	Moderate-Low
(6) Hood River (HR)	HR 1	High	High	High-Moderate	High-Moderate
(7) Mill Creek-Columbia River (MCCR)	MCCR 1	Moderate	Moderate	Moderate-Low	Moderate-Low
	MCCR 2	High	High	High-Moderate	High-Moderate
(8) Spanish Hollow-Columbia River (SHCR)	SHCR 1	High	High	High-Moderate	High-Moderate
(9) Tygh Creek (TC)	TC 1	High	High	High-Moderate	High-Moderate
	TC 2	High	High	High-Moderate	High-Moderate
	TC 3	High	High	High-Moderate	High-Moderate
(10) White Horse Rapids-Deschutes River (WHRDR)	WHRDR 1	High	High	High-Moderate	High-Moderate
	WHRDR 2	High	High	High-Moderate	High-Moderate
(11) White River (WhR)	WhR 1	High	High	High-Moderate	High-Moderate
	WhR 2	High	High	High-Moderate	High-Moderate
	WhR 3	High	High	High-Moderate	High-Moderate
	WhR 4	High	High	High-Moderate	High-Moderate
(12) Lower Cispus River (LCR)	LCR 1	Moderate	Moderate	Moderate-Low	Moderate-Low
(13) Wind River (WiR)	WiR 1	High	High	High-Moderate	High-Moderate

Future representation for the Dalles sideband snail is difficult to project because we do not have enough information to predict the probability of persistence of any particular unit. In general, we expect that the projected temperature increases, changes in timing and intensity of precipitation, and soil moisture decreases, will lead to increased risk of drought and wildfire, which will result in less suitable habitat and the potential loss of individuals. Therefore, with fewer individuals and less suitable habitat, we expect a decreased capacity for phenotypic and ecological diversity among members of the subspecies.

The future condition of resiliency units will decrease over time, and if this decline results in the

loss of any population units, then distribution (and thereby redundancy) will be reduced over time. While we have a general expectation for landscape-level changes to negatively impact habitat conditions in the future, we do not have enough information to say for certain if declining future conditions will result in a loss of any populations, and ultimately result in a reduction in redundancy.

Overall, we expect resiliency, redundancy, and representation of the Dalles sideband to decline by the middle of the century under the future scenarios, which may result in the extirpation of some populations, but we expect the species will continue to sustain populations on the landscape throughout its historical range and maintain overall viability.

SUMMARY OF THREATS

The primary stressors affecting the Dalles sideband's biological status include habitat loss and fragmentation due to forest management, drought, wildfire, and any effects of climate change on these factors. Currently the species has multiple populations in good or moderate condition that are distributed across its current and historical range, and that occupy a diversity of ecological settings. The projected effects of habitat loss, rising temperatures, and increased fire risk and drought will likely reduce the number of populations in good or moderate condition. However, the species will likely maintain adequate levels of resiliency, redundancy and representation to remain viable in the foreseeable future.

CONSERVATION MEASURES

With the implementation of the NWFP in 1994, logging on federal U.S. Forest Service and Bureau of Land Management lands was reduced (Spies et al. 2019, p. 3). A large portion (80 percent or more) of the NWFP area was placed in reserve land allocations, where thinning to conserve and develop forest with old growth, late-successional, and more fire-resilient characteristics, was emphasized. Standards and guidelines of the NWFP included requirements for downed wood, buffers for riparian areas, and conservation measures for canopy cover in northern spotted owl (*Strix occidentalis caurina*) suitable habitat (Molina et al. 2006, p. 307). The Survey and Manage program that was a result of the NWFP requires surveys for many rare or little-known species in their suitable habitats, and protection buffers around the locations where such species are recorded (Molina et al. 2006, p. 311). The Dalles sideband is currently classified as a "Category A" species under the NWFP, which ensures that "pre-disturbance" surveys are conducted for most habitat-disturbing activities, and if the species is detected, buffers are placed around individuals and their habitat (Huff 2020, pp. 1-2). Additionally, the majority of recorded observations of Dalles sideband snail occur on federal lands, including those with habitat-protection measures already in place (such as National Wilderness Areas, or the

Columbia Gorge National Scenic Area) (Huff 2020, p. 2). All of these regulatory conservation measures have resulted in substantially more conservation of habitat characteristics considered necessary to support the Dalles sideband (such as downed wood and soil moisture) compared with that which existed prior to the NWFP implementation.

FINDING

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 meets the definition of “endangered species” or “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 a species meets the definition of “endangered species” or “threatened species” because of any 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.

Status Throughout All of Its Range

In our SSA (Service 2020, entire), we evaluated all potential threats to the Dalles sideband, including those listed in the petition (see “Current Influence Factors”). We found that climate-mediated changes in wildfire and drought (Factor E) and forest management (Factor A) constitute the primary threats to the species. We found no evidence that overutilization for commercial, recreational, scientific, or educational purposes (Factor B), or predation or disease (Factor C), constitute threats to the species. We also found that existing regulatory mechanisms (Factor D) are adequate to help ameliorate existing threats to the species.

The Dalles sideband is known from 174 confirmed occurrences from Wasco, Hood River, and Sherman Counties in Oregon; and Skamania and Lewis Counties in Washington. Most of these records are limited to a positive occurrence reports documented during surveys of Federal lands prior to forest management projects. Therefore, we were not able to determine population abundance or trends. In the absence of this information, we assessed the resiliency, redundancy and representation of the subspecies in the context of current and future threats.

Resiliency is a population’s ability to withstand stochastic events. We determined that the Dalles

sideband appears to be highly resilient among most of its known populations. Among the 23 resiliency units, 19 are currently rated in “high” condition, and four are rated in “moderate” condition.

Representation is the ability of the species to adapt to change. The Dalles sideband demonstrates some phenotypic diversity, and though its range is rather narrow it spans a relatively diverse set of ecological conditions and landscape types. The apparent phenotypic and ecological diversity among individuals of the Dalles sideband indicate adequate representation for this subspecies despite the lack of knowledge we have on its genetic diversity.

Redundancy is the species ability to withstand catastrophes. The presence of many Dalles sideband resiliency units in high and moderate condition, spanning multiple representation units that occur throughout its known historical range, indicates an adequate degree of redundancy for this subspecies. As such, a catastrophic event is unlikely to cause the species to become extinct across its entire range within the timeframe considered for this analysis.

In summary, the best available information does not indicate that the Dalles sideband is presently in danger of extinction throughout its range. Therefore, we conclude that the Dalles sideband does not meet the definition of an endangered species.

Having found that the Dalles sideband is not in danger of extinction throughout its range, we next evaluated whether the species is in danger of extinction in the foreseeable future throughout its range. Under the Act, a threatened species is any species that is “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range” (16 U.S.C. § 1532(20)). The term foreseeable future extends only so far into the future as the Services can reasonably determine that both the future threats and the species’ responses to those threats are likely (84 FR 44753). The key statutory difference between a threatened species and an endangered species is the timing of when a species may be in danger of extinction, either now (endangered species) or in the foreseeable future (threatened species). For the purposes of this determination, we consider the foreseeable future to be the timeframe from the present to about mid-century (or to 2069 given available data sets), as that is the timeframe for which we can most reliably predict changes in climate that influence two of the three major threats we analyzed for the Dalles sideband (wildfire and drought).

To assess the viability of the Dalles sideband in the foreseeable future, we considered the effects of drought, wildfire, forest management, and climate change on the species habitat requirements under three plausible future scenarios. With the information available for this assessment, we anticipate the future resiliency to decline for all 23 resiliency units under two of the three plausible future scenarios we considered. However, we are unable to predict the severity of these

declines within each resiliency unit, or to compare declines among units. While we cannot predict if there will be a loss of any resiliency units, we anticipate that any decrease in resiliency will generally make populations more vulnerable to stochastic events. Future representation is also difficult to project because we lack information to predict the probability of persistence of any particular representation unit. However, the capacity for diversity among individuals (representation) is expected to decrease with the decline in condition of resiliency units (and potential loss of individuals). Similarly, if expected declines in resiliency result in the loss of any population units, then distribution (and thereby redundancy) may be reduced over time as well. In general, we expect that the resources relied upon by the species will diminish in quantity and quality as stressors affecting them increase in the future. This will likely lead to declines in resiliency, redundancy, and representation by some degree by the middle of the century, potentially resulting in the extirpation of some populations. However, because current resiliency, redundancy, and representation appear to be relatively high for this species, despite these potential declines we expect that the Dalles sideband will maintain multiple, well-distributed, viable populations across most of its known range at about mid-century.

After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we determine that the Dalles sideband is not in danger of extinction now, or likely to become so in the foreseeable future, throughout all of its range, and therefore does not meet the definition of a threatened species

Status Throughout a Significant Portion of Its Range

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 Dalles sideband is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we now consider whether it may be in danger of extinction or likely to become so in the foreseeable future in a significant portion of its range—that is, whether there is any portion of the species’ range for which it is true that both (1) the portion is significant; and, (2) the species is 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.

In undertaking this analysis for Dalles sideband, we choose to address the status question first — we consider information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species is endangered or threatened.

We considered whether the threats are geographically concentrated in any portion of the Dalles sideband's range at a biologically meaningful scale. We examined the following potential threats: wildfire, drought, forest management, and climate change. We found no concentration of threats in any portion of the Dalles sideband's range at a biologically meaningful scale. Specifically, future projections of climate-induced increases in wildfire and drought risk are fairly consistent across the relatively narrow range of the Dalles sideband. Similarly, because the entire range of the subspecies falls within the boundaries covered by the Northwest Forest Plan, forest management practices that could impact the Dalles sideband are also consistent across its range. Therefore, no portion of the species' range can provide a basis for determining that the species is in danger of extinction now or likely to become so in the foreseeable future in a significant portion of its range, and we find the species is not in danger of extinction now or likely to become so in the foreseeable future in any significant portion of its range. This is consistent with the courts' holdings in *Desert Survivors v. Department of the Interior*, No. 16-cv-01165-JCS, 2018 WL 4053447 (N.D. Cal. Aug. 24, 2018), and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d , 946, 959 (D. Ariz. 2017).

Determination of Status

Our review of the best available scientific and commercial information indicates that the Dalles sideband does not meet the definition of an endangered species or a threatened species in accordance with section 3(6) and 3(20) of the Act. Therefore, we find that listing the Dalles sideband as an endangered or threatened species under the Act is not warranted at this time.

COORDINATION WITH STATES

We solicited data and information from the natural resource agencies from both the states of Washington and Oregon, and subsequently received data and information from the Washington Department of Fish and Wildlife.

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:

Acting Hugh Morrison	 Digitally signed by Hugh Morrison Date: 2021.06.14 10:09:54 -07'00'	6/14/21
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Regional Director, U.S. Fish and Wildlife Service		Date

Concur:

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Principal Deputy Director, Exercising the Delegated Authority of the Director, U.S Fish and Wildlife Service	Date

Do not concur:

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Principal Deputy Director, Exercising the Delegated Authority of the Director, U.S Fish and Wildlife Service	Date

Director's Remarks:

Date of annual review:
Conducted by: