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5- Year Review Short Form

Species Reviewed: Barneby reed-mustard (*Schoenocrambe barnebyi*)

Federal Register Notice Announcing Initiation of this Review: January 12, 2021. Endangered and threatened wildlife and plants; 5-year status reviews of seven species in the Mountain-Prairie Region (86 FR 2442).

Current Classification: Endangered

Current Recovery Priority Number: 17

This recovery priority number is indicative of a plant that is a species with a low degree of threat and low recovery potential.

Methodology used to complete this review:

The Utah Ecological Services Field Office completed this review on July 22, 2021. We used all pertinent literature and documents on file for this review, including new information obtained since 2011. The new information for Barneby reed-mustard includes survey and monitoring data and additional habitat protections afforded to one population (Sy's Butte/Hidden Splendor Mine) on Bureau of Land Management (BLM) and State of Utah lands under the 2019 John D. Dingell, Jr. Conservation Management, and Recreation Act (Public Law 116-9). The new information does not alter our understanding of the species' status and threats per the analyses contained in our previous status review (USFWS 2011).

Review Summary:

Barneby reed-mustard is a perennial herb in the mustard family (*Brassicaceae*) with sparsely leafed stems nine to 15 inches (in; 38 centimeters (cm)) tall arising from a woody root crown. Leaves are entire and smooth usually 3 in (7.6 cm) in length, 1 in (2.5 cm) wide, and alternately arranged on the stem. Plants produce light purple flowers with a predominately darker purple vein usually clustered in groups of two to eight flowers from late April to mid or late May (Welsh and Neese 1984). The species' accepted taxonomy (scientific name) is *Hesperidanthus barnebyi* (Integrated Taxonomic Information Systems (ITIS) 2021). We plan to issue a direct final rule in the Federal Register to announce the revised taxonomy under the Endangered and Threatened Species Act of 1973, as amended (Act). This action will not alter the regulatory protections afforded to the species or change its status and distribution (Hansen 2021).

Barneby reed-mustard is a narrow endemic (restricted to a certain place) species that occurs in south-central Utah in Emery and Wayne Counties. There are four known populations including one (Sy's Butte/Hidden Splendor) in the southern portion of the San Rafael Swell on BLM and State of Utah lands, and the other three populations (Fremont River, Sulphur Creek, and Horse Saddle) on National Park Service (NPS) lands in Capitol Reef National Park (USFWS 2011;

NatureServe Explorer 2021). Plants grow in xeric, fine-textured red clay soils rich in selenium and gypsum in the Moenkopi, Chinle, Cutler, Kaibab limestone, and Carmel Formations (Clark 1997, 1999, 2005a; NatureServe Explorer 2021). The species is associated with the mixed desert shrub community between 5,000 and 6,850 feet (1,524 and 2,088 meters) in elevation (USFWS 2011; NatureServe Explorer 2021). Plants primarily occupy cool, steep, north-facing slopes and occupy different aspects (e.g. east-facing) at higher elevations, potentially due to cooler temperatures (Clark 2005a). We have little information on the biology and life history of Barneby reed-mustard. Plants reproduce by seeds and the primary seed dispersal agents are gravity, wind, and rain (Welsh and Neese 1984). A reproductive ecology study of the closely related Shrubby reed-mustard (*Hesperidanthus suffrutescens*) identified that pollinators, especially bees, are needed for maximum reproduction, and there was strong evidence of pollen limitation on reproduction due to insufficient pollinator abundance or activity (Lewis and Schupp 2014). We recommend a similar study be performed for Barneby reed-mustard.

We listed Barneby reed-mustard as endangered throughout its range on January 14, 1992, under the Endangered Species Act of 1973 (Act), as amended (57 FR 1398). At the time of listing, there were two known populations (Sy's Butte/Hidden Splendor and Sulphur Creek) comprising approximately 2,000 plants. Threats to the species were mineral exploration and mining for uranium on BLM lands, and recreation on NPS lands.

In our last status review, we identified four populations comprising less than 3,000 plants (USFWS 2011). Mineral exploration and mining have not occurred in the Sy's Butte/Hidden Splendor population since the 1960s, and we therefore reduced the degree of this threat from moderate to low (USFWS 2011). We did not have additional information on recreation levels to re-evaluate the severity of related effects as a threat to Barneby reed-mustard (USFWS 2011). We also stated that small population size was not a threat but may increase the species' vulnerability to threats. Climate change has the potential to affect the species, but we lacked information regarding the species' response to climate factors (USFWS 2011). We also noted that the lack of scientific knowledge and monitoring information hindered the ability of land managers to effectively manage Barneby reed-mustard (USFWS 2011).

Barneby reed-mustard's status and threats have changed slightly since our last status review (USFWS 2011). The species has the same number of populations (four) and estimated total population size (less than 3,000 plants) that we reported in our last status review (Table 1; USFWS 2011). We now know that one site (Bulberry Spring) in the Sy's Butte/Hidden Splendor population is located on state lands open to mineral exploration and development that was previously identified as BLM lands (Table 1; Heil 1992). We also know of one additional site (Hidden Splendor Mine #2) containing 32 plants on BLM lands (Table 1; BLM 2015). The Sy's Butte/Hidden Splendor population slightly increased in size since 2011, from 150 to 215 plants (Table 1; USFWS 2011; BLM 2012, 2013, 2015). No recent monitoring or threat evaluations have been performed within the three populations (Fremont River, Sulphur Creek, and Horse Saddle) on NPS lands (Table 1; USFWS 2020). The three NPS populations were visited in 2021 to estimate plant abundance and identify stressors (Wheeler 2021). We expect to have the results of the 2021 field visits by the end of the calendar year. Field observations indicated that 2021 plant abundance was lower than reported in 1997 and 2005 and are most likely due to drought conditions (Table 1; Wheeler 2021).

Table 1. Barneby reed-mustard population summary.

Site Name	Agency	Elevation	Recent Year(s) Surveyed	Estimated Number of Plants
Sy's Butte/Hidden Splendor Mine Population				
Sy's Butte	BLM	5,807 ft. (1,770 m)	2009, 2012	54
Hidden Splendor Mine #1	BLM	5,000 ft. (1,524 m)	1999, 2009, 2012, 2013	Site could not be found after 1999
Hidden Splendor Mine #2	BLM	5,138 ft. (1,566 m)	2012, 2015	32
Bulberry Spring (NHP#2)	State	5,338-5,403 ft. (1,627-1,647 m)	1987, 2017	129
			Subtotal	215
Fremont River Population				
Fremont River #1	Capitol Reef	Not Available	1997	65
Fremont River #2	Capitol Reef	5,669-5,770 ft. (1,728-1,759 m)	1997	144
Fremont River #3	Capitol Reef	Not Available	1997	92
Fremont River	Capitol Reef	5,974-6,178 ft. (1,821-1,883 m)	1997	4
Cuts Ridge/Fremont River	BLM, Capitol Reef	6,646-6,850 ft. (2,026-2,088 m)	2004	108
			Subtotal	413
Sulphur Creek Population				
Sulphur Creek #1	Capitol Reef	5,533 ft. (1,717 m)	1997	326
Sulphur Creek #2	Capitol Reef	5,682 ft. (1,732 m)	1997	125
Sulphur Creek #3	Capitol Reef	5,873 ft. 1,790 m)	1997	13
Sulphur Creek #4	Capitol Reef	5,935 ft. (1,809 m)	1997	350
Upper Sulphur Creek	Capitol Reef	5,909-6,063 ft. (1,801-1,848 m)	1997	700
Sulphur Creek	Capitol Reef	5,741 ft. (1,750 m)	1997	3
Johnson Mesa/Sulphur Creek	Capitol Reef	6,575 ft. (2,004 m)	1997	109
			Subtotal	1,626
Horse Saddle				
Horse Saddle	Capitol Reef	6,362 ft. (1,939 m)	2005	92
			Subtotal	92
			TOTAL	2,346

The threat of mineral exploration and development in the Sy's Butte/Hidden Splendor population remains low and may be reduced once a portion of the population is included as designated wilderness under the 2019 John D. Dingell, Jr. Conservation Management, and Recreation Act (Public Law 116-9). The final wilderness boundary delineation and land exchange that is part of the 2019 Act is in progress and has not been finalized (Benson 2021; Bedingfeld 2021). Once complete, the state lands that contain Barneby reed-mustard are scheduled to transfer to the BLM as part of the land exchange. Within the population, there are two mine claims on BLM lands with prior existing rights to explore and develop mineral deposits (Anderson 2021). The two mining claims overlap with 8 acres (4 percent) of occupied habitat in the Sy's Butte/Hidden Splendor population, but we do not know how many plants are located within these lands (Lewinsohn 2021). There are no leases or planned mining activities on state lands where the species occurs at Bulberry Springs (Bedingfeld 2021). A recent mine closure in the historic Hidden Splendor mining area managed to avoid affecting the species (UDOGM 2015). There are no plans for additional mine closures or general maintenance (White 2021).

Recreation remains a threat to Barneby reed-mustard on NPS lands, although we do not have any current information on the effects from recreation for populations on NPS lands. The species' small population size is not a threat but may increase the species' vulnerability to threats. Climate change continues to have the potential to affect the species, but we lack consistent monitoring and information regarding the species' response to climate factors. The lack of scientific knowledge, monitoring, and survey information continues to hinder the ability of land managers to evaluate the status of Barneby reed-mustard and effectively manage populations to ensure their resiliency to stressors, drought conditions, and temperature extremes.

Recommendations on species status:

After reviewing the best available scientific information and recovery criteria, we conclude that Barneby reed-mustard remains an endangered species. The species' progress toward recovery has not changed since our last 5-year review (USFWS 2011). The delisting criteria for Barneby reed-mustard are not met. Therefore, we recommend no change in status to the species at this time.

Recommended future actions:

Based on recent discussions with other Federal agencies and partners, we recommend the following future actions: (1) avoid and minimize impacts from mineral exploration and development and other activities in occupied habitat; (2) develop a habitat suitability model for the species; (3) survey potential suitable habitat for occupancy; (3) establish demographic and population trend monitoring within all populations; (4) provide habitat protections through regulatory mechanisms or conservation plans; (5) evaluate reproductive success and pollinator limitations; (6) collect seeds and implement propagation efforts in horticulture facilities; (7) establish new populations; and (8) develop public awareness and appreciation for the species' conservation (USFWS 2020).

Approve: _____
Yvette Converse, Field Supervisor
Utah Ecological Services Field Office

Date: _____

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