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5- Year Review Short Form

Species Reviewed: Maguire primrose (*Primula maguirei*)

Federal Register Notice Announcing Initiation of this Review: April 12, 2019. Endangered and threatened wildlife and plants; 5-year status reviews of six species in the Mountain Prairie Region (84 FR 14965-14966).

Lead Region: DOI Regions 5 and 7, Marjorie Nelson, Chief, Division of Ecological Services, 303-236-4258.

Current Classification: Threatened

Current Recovery Priority Number: 5

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

Methodology used to complete this review:

The Utah Ecological Services Field Office completed this review on March 10, 2021. The Utah Ecological Services Field Office used all pertinent literature and documents on file for this review, including new information obtained since 2011. The only new information for Maguire primrose is the amended recovery criteria that we revised in 2019 to include quantitative delisting criteria that are compatible with the biodiversity principals of representation, resiliency, and redundancy (USFWS 2019; Shaffer and Stein 2000).

Review Summary:

Maguire primrose is a small perennial, herbaceous plant in the Primrose family (Primulaceae) that occupies dolomite cliff tops and rock faces in Logan Canyon, Cache County, Utah. Plants are small in stature, two to four inches (50 to 100 millimeters) tall, with oblong (oblanceolate) to broad-tipped (spatulate) leaves clustered around the base of the plant. Plants have reddish-lavender flowers and flowering occurs between mid-April to early June (USFWS 1990; USFWS 2011).

Maguire primrose reproduces sexually and relies on pollinators for maximum seed production (Bjerregaard and Wolf 2008; Davidson and Wolf 2011; Davidson et al. 2013). Plants also reproduce asexually by clonal growth of stems (ramets) using horizontal, underground stems (rhizomes). One genetically distinct individual (genet) may consist of one or more stems (ramets). Underground stems allow storage of water in times of drought and the clonal growth pattern contributes to recovery after periods of dormancy, such as during drought conditions (Kelso et al. 2009). The clonal nature of Maguire primrose also makes it difficult to identify individual plants in the field (Sibul 2006). As a result, plant abundance is based on counts of stem (ramet) clusters.

There are two Maguire primrose populations (Upper Canyon and Lower Canyon) in Logan Canyon on U.S. Forest Service lands. Maguire primrose's distribution reaches across a linear span of 10 miles within Logan Canyon, with occurrences aggregated in upper and lower portions of the canyon. The current

distribution is separated by six miles of unoccupied habitat in dolomite cliff tops and rock faces. Due to an environmental gradient in temperature and humidity within Logan Canyon, plants in the Lower Canyon population may bloom two to three weeks earlier than plants in the Upper Canyon population (Bjerregaard and Wolf 2008; Torti 2008; Davidson and Wolf 2009; Torti and Schen 2009). There is a narrow window (10 to 17 days) for gene flow by pollinators to occur between the two populations when they are both in flower (Bjerregaard and Wolf 2008; Davidson and Wolf 2009).

We listed Maguire primrose as threatened throughout its range on January 1, 1991 under the Endangered Species Act of 1973 (Act), as amended (56 FR 56882). The estimated total population size at that time was 340 plants (ramets) and the primary threats were rock climbing and rappelling activities of popular climbing routes in close proximity (within a few feet) to plants. In addition, over-collection and commercialization were contributing threats to the species. Highway construction was considered a potential threat.

Maguire primrose's status and threats have not changed since our last status review (USFWS 2011). The two populations in Logan Canyon each containing four sites comprise an estimated total population size of 4,000-20,000 plants (ramets), a much larger number than the 340 plants (ramets) we identified in our listing rule. The primary threat to the species is still recreational rock climbing. Over-collecting and commercial exploitation are no longer threats. Highway construction has not occurred and there are no proposed plans for construction. Therefore, we do not consider highway construction a threat to Maguire primrose. A future, potential stressor to the species may be mountain goats if the State of Utah's introduces them to Logan Canyon. The State is considering its course of action and we will evaluate this stressor as necessary in the future.

Overall, the U.S. Forest Service has actively managed potential rock-climbing effects with the implementation of site closures, outreach, and education to the rock-climbing community. Currently, the U.S. Forest Service monitors informal reports on the effect of rock-climbing activities to Maguire primrose on an infrequent basis with the following partners: the Utah Native Plant Society, and Utah State University professors and students (Winn 2021). Surveys are planned to detect occupancy in the less accessible locations of Logan Canyon using unmanned aerial systems (drones). Preliminary flights are scheduled for late Spring 2021 to collect data on the Upper Canyon population and confirm that plants are detectible using this technology. True color and infrared imagery will be collected for the entire Upper Canyon population and adjacent cliff face area at sufficient spatial resolution and quality to detect the presence and assess the abundance of Maguire primrose (Winn 2021).

In 2019, we amended the recovery criteria for Maguire primrose to provide a quantifiable approach to determine when Maguire primrose has recovered to the point that it may be delisted (USFWS 1990; USFWS 2019). The amended delisting criteria include the following:

1. Maintain at least two populations (Lower Canyon and Upper Canyon) at a level that demonstrates stable or increasing growth rate (lambda equal to or greater than 1) over a consecutive ten-year period. Population growth rates will be determined by a population viability analysis based on measures of plant abundance (measured by the number of ramets).
2. Plant abundance may fluctuate within individual sites, but the defined populations should have a stable or increasing growth rate over a ten-year time period. The ten-year period may start retroactively.

3. Maintain an estimated range-wide total population size at constant or greater than 4,000 individuals for a five-year minimum period. This population estimate is based on a measure of the number of ramets identified in criterion 1, above. The five-year period may start retroactively.

4. The species produces viable seeds within the two populations (Lower Canyon and Upper Canyon) over a consecutive ten-year period. Viable seeds (recorded as the presence of seeds with mature embryos) should be documented at all eight extant sites within the two populations. This measure does not need to be recorded on an annual basis but should be recorded every two or three years over a ten-year period. The ten-year period may start retroactively.

5. Long-term habitat protections are in place for the two populations (Lower Canyon and Upper Canyon) to protect Maguire primrose from rock climbing and other potential threats with the U.S. Forest Service via long-term management agreements, conservation agreements, or memoranda of understanding (MOU) in accordance with their authorities. Species management would include outreach and education efforts to climbing audiences that would continue to build community support for long-term protections.

6. The two populations (Lower Canyon and Upper Canyon) represented in an ex-situ seed managed collection according to the Center for Plant Conservation guidelines (Guerrant et al. 2004). The ex-situ seed collection should contain existing levels of genetic diversity (or representation) of the two populations and should take place over a ten-year period.

Recommendations on species status:

After reviewing the best available scientific information and recovery criteria, we conclude that Maguire primrose remains a threatened species. The species' progress toward recovery has not changed since our last 5-year review (USFWS 2011). The delisting criteria for Maguire primrose 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) Maintain a comprehensive database on surveys and monitoring for the species that includes plant survivorship, growth and reproduction and the presence of threats and stressors; (2) Continue to assess population trends and strengthen monitoring protocols, analysis, and reporting; (3) Conduct additional surveys to refine our understanding of total population size, trend and reproduction for the Lower and Upper Logan Canyon populations; and (4) Develop a conservation agreement to provide long-term habitat protections (USFWS 2019).

The suite of recommended future actions identified in the previous 5-year review still provides the full list of recommendations until we obtain additional information (USFWS 2011).

Approve: YVETTE CONVERSE Digitally signed by YVETTE CONVERSE Date: 2021.03.10 08:37:50 -07'00' **Date:** March 10, 2021

Yvette Converse, Field Supervisor
Utah Ecological Services Field Office

References

Bjerregaard, L. and P.G. Wolf. 2008. Strong genetic differentiation among neighboring populations of a locally endemic primrose. Western North American Naturalist 68(1): 66-75.

Davidson, J.B., and P.G. Wolf. 2009. Breeding system characterization of *Primula maguirei*: a threatened, cliff dwelling, narrow endemic plant, preliminary results. Fifth Southwest Rare Plant Conference Changing Landscapes in the Southwest, Salt Lake City, UT. March 16-20, 2009.

Davidson, J.B. and P.G. Wolf. 2011. Natural History of Maguire Primrose, *Primula cusickiana var. maguirei* (Primulaceae). Western North American Naturalist 71(3): 327-337.

Davidson, J.B., S.L. Durham, and P.G. Wolf. 2013. Breeding system of the threatened endemic *Primula cusickiana var. maguirei* (Primulaceae). Plant Species Biology: DOI: 10.1111/1442-1984.12029. 9 pp.

Guerrant, E.O., P.L. Fielder, K. Havens, M. Maunder. 2004. Revised genetic sampling guidelines for conservation collections of rare and endangered plants, Appendix 1. In E.O. Guerrant, K. Havens, and M. Maunder (Eds.), Ex Situ Plant Conservation: Supporting Species Survival in the Wild (pp. 419-441). Island Press.

Kelso, S., P.M. Beardsley, and K. Weitemier. 2009. Phylogeny and biogeography of *Primula sect. parryi* (Primulaceae). Int. J. Plant Sci. 170(1):93-106.

Shaffer, M.L., B.A. Stein. 2000. Safeguarding our precious heritage. In B.A. Stein, L.S. Kutner, J.S. Adams (Eds.), Precious Heritage: the status of biodiversity in the United States. Oxford University Press.

Sibul, A. 2006. Final report for the 2006 survey effort for Maguire primrose (*Primula maguirei*). Red Butte Garden, Salt Lake City, Utah. 11 pp. +appendices.

Torti, S.D. 2008. *Primula maguirei*: the establishment of long-term survey quadrats. Cost-share agreement between the Forest Service and Sylvia Torti. 19 pp. +appendices.

Torti, S.D., and G. Schen. 2009. *Primula maguirei*: a second year survey of long-term quadrats. Cost-share agreement between the Forest Service, Sylvia Torti, and Greta Schen. 8 pp. +appendices.

U.S. Fish and Wildlife Service. 1990. Maguire primrose (*Primula maguirei*) recovery plan. U.S. Fish and Wildlife Service, Denver, CO. 13 pp.

U.S. Fish and Wildlife Service (USFWS). 2011. *Primula maguirei* (Maguire primrose) 5-year review: Summary and evaluation. U.S. Fish and Wildlife Service, Utah Field Office, West Valley City, UT. 30

U.S. Fish and Wildlife Service (USFWS). 2019. Amendment to the Recovery Plan for *Primula maguirei* (Maguire primrose). U.S. Fish and Wildlife Service, Denver, CO. 11 pp.

Winn, Patricia. 2021. "RE: Maguire primrose information request." Email to Annette Maes (USFWS) on 1/26/2021. U.S. Forest Service Botanist, Wasatch-Cache National Forest, Utah. 5 pages.