DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R6–ES–2022–0093; FXES11130900000–256–FF09E22000]

RIN 1018–BG56

Endangered and Threatened Wildlife and Plants; Removal of Colorado Hookless Cactus From the List of Endangered and Threatened Plants

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), are removing Colorado hookless cactus (*Sclerocactus glaucus*) from the Federal List of Endangered and Threatened Plants. Recent taxonomic studies have indicated that the currently listed entity is actually two species: *Sclerocactus glaucus* and *Sclerocactus dawsoniae* (previously identified as *S. dawsonii* in the proposed rule). When we use the common name "Colorado hookless cactus" or refer to "the species" in this final rule, we are referring to information or conclusions regarding both species (*S. glaucus* and *S. dawsoniae*) as the currently listed entity. When we are referring to information or analysis pertaining to one species, we will use the new scientific names of *S. glaucus* or *S. dawsoniae*. After a review of the best available scientific and commercial information,

we find that delisting Colorado hookless cactus is warranted. Our review indicates that the threats to the Colorado hookless cactus have been eliminated or reduced to the point that the species no longer meets the definition of an endangered or threatened species under the Endangered Species Act of 1973, as amended (Act). Accordingly, the prohibitions and conservation measures provided by the Act, particularly through sections 4 and 7, will no longer apply to the Colorado hookless cactus.

DATES: This rule is effective [**INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***].

ADDRESSES: This final rule is available on the internet at https://www.regulations.gov. Comments and materials we received are available for public inspection at https://regulations.gov at Docket No. FWS–R6–ES–2022–0093

Availability of supporting materials: This rule and supporting documents, including references cited, the 5-year review, the recovery outline, the species status assessment (SSA) report, the proposed delisting rule, and the post-delisting monitoring (PDM) plan, are available at https://www.regulations.gov at Docket No. FWS–R6–ES–2022–0093.

FOR FURTHER INFORMATION CONTACT: Nathan Darnall, Western Colorado Supervisor, U.S. Fish and Wildlife Service, Colorado Ecological Services Field Office, 445 West Gunnison Avenue, Grand Junction, CO 81501; telephone 970–628–7181. Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point-of-contact in the United

States.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, a species warrants delisting if it no longer meets the definition of an endangered species (in danger of extinction throughout all or a significant portion of its range) or a threatened species (likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range). The Colorado hookless cactus is listed as a threatened species, and we are delisting it. Delisting a species can be completed only by issuing a rule through the Administrative Procedure Act rulemaking process (5 U.S.C. 551 et seq.).

What this document does. We are delisting the Colorado hookless cactus because the species has recovered to the point at which it no longer meets the definition of an endangered or threatened species.

The basis for our action. Under the Act, we may determine that a species is an endangered species or a threatened species because of any of five 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. The determination to delist a species must be based on an analysis of the same factors.

Under the Act, we must review the status of all listed species at least once every 5 years. We must delist a species if we determine, on the basis of the best available scientific and commercial data, that the species is neither a threatened species nor an endangered species. Our regulations at 50 CFR 424.11(e) identify four reasons why we might determine a species shall be delisted: (1) The species is extinct, (2) the species has

recovered to the point at which it no longer meets the definition of an endangered species or a threatened species, (3) new information that has become available since the original listing decision shows the listed entity does not meet the definition of an endangered species or a threatened species, or (4) new information that has become available since the original listing decision shows the listed entity does not meet the definition of a species. Here, we have determined that the Colorado hookless cactus has recovered to the point at which it no longer meets the definition of an endangered species or a threatened species; therefore, we are delisting it.

Previous Federal Actions

Please refer to the proposed rule to delist the Colorado hookless cactus published on April 11, 2023 (88 FR 21582), for a detailed description of previous Federal actions concerning this species.

Peer Review

A species status assessment (SSA) team prepared the SSA report for Colorado hookless cactus to inform the 2021 5-year review and updated it in 2024. The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial data available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species.

In accordance with our joint policy on peer review published in the *Federal Register* on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing and recovery actions under the Act (https://www.fws.gov/sites/default/files/documents/peer-review-policy-directors-memo-2016-08-22.pdf), we solicited independent scientific review of the information

contained in the Colorado hookless cactus SSA report. As discussed in the proposed rule, we sent the SSA report to five independent peer reviewers and received three responses. The peer reviews can be found at https://www.regulations.gov. In preparing the proposed rule, we incorporated the results of these reviews, as appropriate, into the SSA report, which was the foundation for the proposed rule and this final rule. A summary of the peer review comments and our responses can be found in the proposed rule (88 FR 21582, April 11, 2023).

Summary of Changes From the Proposed Rule and Draft Post-Delisting Monitoring Plan

We considered all comments and information we received during the comment period on our proposed rule to delist Colorado hookless cactus (88 FR 21582, April 11, 2023). This consideration resulted in the following changes from the proposed rule and draft post-delisting monitoring (PDM) plan to this final rule and the updated PDM plan.

In this final rule, we changed the scientific name *Sclerocactus dawsonii* to *S. dawsoniae* based on taxonomic nomenclature standards and a recently published article establishing it as a new species (McGlaughlin and Naibauer 2024, entire).

In the proposed rule and SSA version 1.1, we reported a minimum population estimate of 103,086 plants for *Sclerocactus glaucus* with a 90 percent lower confidence level estimate of 68,120 plants (88 FR 21582 at 21592, April 11, 2023; Service 2022, p. 14). We now consider the 90 percent lower confidence value of 68,120 plants to be a better reflection of the minimum population estimate for the *S. glaucus* total population size than the mean estimate of 103,086 plants provided by the Bureau of Land Management (BLM) (Krening et al. 2021a, p. 8), as this allows us to be more conservative given the less comprehensive sampling in the study that produced these

estimates (as compared to the sampling effort from the *S. dawsoniae* study (see *Current Condition*; Service 2025, pp. 20–21)).

Similarly, in the proposed rule and SSA version 1.1, we reported a minimum population estimate of 31,867 and the 90 percent lower confidence level estimate of 21,058 plants for *Sclerocactus dawsoniae* (88 FR 21582 at 21592, April 11, 2023; Service 2022, p. 14). This minimum population estimate was derived using *S. glaucus* macroplot estimates as a surrogate for *S. dawsoniae* (Krening et al. 2021a, p. 8). We have updated in this rule the minimum population estimate for *S. dawsoniae* to 17,362 plants based on a BLM technical report that used *S. dawsoniae* data to derive the estimate (Krening and Holsinger 2024, entire). We consider the updated minimum population estimate to better reflect *S. dawsoniae*'s total population size. We also provide additional explanation of the BLM methodology to derive population estimates for both species. We note that the updated minimum population estimates do not necessarily reflect a change in the species' numbers per se, but rather an improvement in the accuracy of information about their population sizes.

In this final rule we have also provided additional information about protections afforded to BLM sensitive species, and livestock grazing effects to Colorado hookless cactus, in our pessimistic future scenario.

In this final rule, we no longer consider or rely on the protections identified in the 2012 livestock grazing programmatic biological opinion for Colorado hookless cactus (Service 2012, entire). Once this final rule goes into effect, the grazing terms and conditions identified in the biological opinion will not apply to *S. glaucus* or *S. dawsoniae*. Therefore, in this rule we do not mention the protections afforded to Colorado hookless cactus under the programmatic biological opinion, as these protections have no bearing on our determination of the status of the listed entity under the Act.

We have also revised the PDM plan by updating the baseline densities for both species with 2022 and 2023 trend monitoring data (Service 2024, entire). We and our partners will use the baseline densities to track the trend of the species over the PDM timeframe.

Summary of Comments and Recommendations

In the proposed rule published on April 11, 2023 (88 FR 21582), we requested that all interested parties submit written comments on the proposal by June 12, 2023. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. On April 10, 2023, we published a press release on our website inviting the public to comment. Newspaper notices inviting the general public to comment were published in the Grand Junction Daily Sentinel. We did not receive any requests for a public hearing. We received 13 public comments addressing the proposed rule, representing 10 individuals and 3 organizations. All substantive information received during the comment period has either been incorporated directly into this final determination or is addressed below.

Comment (1): Several commenters stated that invasive species can negatively affect survival and recruitment of Colorado hookless cactus and increase the risk of fire in the species' habitat, and that invasive species were underrepresented in the current and future condition analyses of Colorado hookless cactus. One commenter stated that we relied on optimistic measures to support delisting even though invasive species could have greater effects in the future.

Response (1): The commenters did not provide information to support their comment or suggestions for how to better represent the negative effects of invasive species in our analysis. The BLM Colorado hookless cactus technical assessment and

habitat condition analysis provide the best scientific and commercial data available to examine current invasive species levels within Colorado hookless cactus analysis units (AUs) and potential effects to the species (Krening and Dawson 2020, p. 35; Holsinger and Krening 2021, entire). According to this information, current invasive species levels do not negatively affect the species or habitat quality at the AU level. Only individual plants experience detrimental effects of invasive weeds in localized areas (Service 2025, pp. 16–21; Krening and Dawson 2020, p. 35). We also evaluated future increases in effects from invasive species in combination with other stressors (livestock grazing, off-highway-vehicle (OHV) use, oil and gas development, utility corridor development and climate change) in our pessimistic future scenario (see *Future Scenarios and Future Condition*).

While fire extent and severity may increase as invasive species cover increases, wildfires within the range of Colorado hookless cactus have resulted in only very localized impacts to both species. One example of a recent fire is the Logan Fire in the Roan Creek AU in 2023 that killed 11 plants (Freitag 2023, pers. comm.; Service 2025, pp. 37–38); this number represents far less than 1 percent of *S. dawsoniae* plants in an AU that has a minimum population estimate of 14,901. The Logan Fire was small in extent despite the high levels of invasive plant cover in the area (Service 2025, appendix 1). We expect both species will continue to experience localized effects from fire in the future. The majority of their habitat is sparsely vegetated; both species are widely dispersed across the landscape; and their ranges contain many barriers such as canyons, roads, and rivers that serve as firebreaks despite potential future increases in invasive species cover.

Comment (2): Several commenters stated that the BLM minimum population size estimates for Colorado hookless cactus are not reliable because the monitoring plot (macroplot) locations were subjectively selected by the researchers. One commenter

recommended that we carefully evaluate the validity of the study before delisting the species, and another commenter considered our reliance on the BLM population size estimates to delist Colorado hookless cactus to be arbitrary and capricious.

Response (2): We disagree with the commenters that the Colorado hookless cactus minimum population size estimates are arbitrary and capricious and not reliable. We used the *S. glaucus* minimum population size estimates reported in a published peer-reviewed journal article (Krening et al. 2021a, entire). The sampling methods and analysis in this study – rather than reliance on census counts – are commonly used for plants with large populations sizes (Elzinga et al. 1999, pp. 37–38, 61–88). In this final rule, we relied on the *S. dawsoniae* minimum population size estimates reported in a BLM Technical Note with *S. dawsoniae* data (Krening and Holsinger 2024, entire) that used the same methodology as the published study (Krening et al. 2021a, entire) and received internal peer review.

We consider the BLM methods and population estimates of Krening et al. 2021a (entire) and Krening and Holsinger 2024 (entire) to be better and more reliable than earlier methods and population estimates. The BLM methods have been peer reviewed, were systematically implemented rangewide, and provide minimum population estimates that are smaller than the actual population size. Earlier methods were not peer reviewed and were applied inconsistently across the species' range with data collected opportunistically from different sources. While macroplots were placed subjectively for both species, transect locations within macroplots were randomly selected and represent a variety of habitat conditions for Colorado hookless cactus according to the BLM's habitat condition index. We relied on the minimum population estimates that were conservatively based on the transect data (see *Current Condition*). We consider the *S. glaucus* and *S. dawsoniae* minimum population estimates to be reliable and the best scientific information available, and we are not aware of better estimates of population

size for the two species. Therefore, we continue to rely on the Colorado hookless cactus minimum population size estimates provided by the studies mentioned herein (Krening et al. 2021a, entire; Krening and Holsinger 2024, entire; Holsinger and Krening 2024, entire; Service 2025, pp. 13–14, 24–27). Furthermore, the PDM plan relies on the sampling protocols in Krening et al. (2021a, entire).

Comment (3): Several commenters stated that the SSA report and proposed rule downplayed the effects and future risk of oil and gas development on *S. dawsoniae* and failed to analyze the cumulative impacts of this and other stressors. The commenters considered widespread habitat degradation and a downward trend to be likely for *S. dawsoniae* because the entire population is subject to oil and gas leasing, there are producing wells throughout its range, and over half of its range is unprotected from development.

Response (3): We review the best scientific and commercial information available when conducting a threats analysis. The identification of factors that could impact a species negatively is not sufficient to compel a finding that listing (or maintaining a currently listed species) on the Federal Lists of Endangered and Threatened Wildlife and Plants is appropriate. In determining whether a species meets the definition of a threatened or endangered species, we must evaluate all identified threats by considering the species' expected response and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level, as well as the cumulative effect of the threats (see *Regulatory Framework*).

The commenters did not provide additional information to support their comment. As we discuss below, leased areas do not equate to areas of surface disturbance; only small subsets of these areas are actively being explored or developed (see *Stressors*). We evaluated current and future scenarios with the SSA framework, which analyzes the cumulative impact of stressors on the species (see *Cumulative Impacts).* We evaluated the

potential for increases in oil and gas development, along with other stressors, in the pessimistic future scenario, and found that the loss of resiliency for *S. dawsoniae* AUs will be modest and no major changes in redundancy or representation are expected (see *Future Scenarios and Future Condition*).

Comment (4): Two commenters questioned the protections afforded to Colorado hookless cactus by its designation as a BLM sensitive species. The first commenter cited an oil and gas project that resulted in the loss of 53 plants of another BLM sensitive species, Harrington's beardtongue (*Penstemon harringtonii*), as evidence of the limited protections that designation provides. The first commenter was concerned that we are considering only the species-level viability when evaluating the status of Colorado hookless cactus. The second commenter stated that we do not acknowledge the risk of losing the BLM 200-meter (m) 656 feet (ft) avoidance buffer for oil and gas development if Colorado hookless cactus is delisted.

Response (4): We disagree with the first commenter that we can expect the loss of Colorado hookless cactus populations despite its designation as a BLM sensitive species. The example provided by the commenter identifies localized, not population-level, loss of Harrington's beardtongue. We assess the viability of Colorado hookless cactus at the population and species levels as described in the *Analytical Framework* section, below. We acknowledge that the avoidance buffer for Colorado hookless cactus on BLM lands will decrease from the 200 m (656 ft) applied to federally listed plant species to 100 m (328 ft) afforded to BLM sensitive species for oil and gas development and other surface-disturbing activities (see *Conservation Efforts and Regulatory Mechanisms*). In addition, BLM has discretion to relocate proposed energy development projects up to and beyond 200 m (656 ft) for BLM sensitive species in areas with a controlled surface use stipulation (see *Conservation Efforts and Regulatory Mechanisms*, below).

Comment (5): Several commenters provided a published journal article about dust effects to a federally listed plant in Utah outside of Colorado hookless cactus' range that estimated 2.5 tons of dust are deposited along a road corridor every year (Lewis et al. 2017, p. 431). Commenters stated that there is no substantive discussion or evaluation of dust effects to *S. dawsoniae* in the SSA report and proposed rule.

Response (5): We considered dust effects to both species in the SSA report as a stressor that is generated from multiple threats, including oil and gas development, OHV recreational use, and utility corridors. The best available information indicates that dust is not negatively impacting *S. glaucus* or *S. dawsoniae* at the population or species levels (Service 2025, pp. 17–18). The Lewis et al. (2017) paper specifically mentions the estimated dust deposition reported by the commenters is a generalization and was not measured. We note that the commenters provided information on dust effects for other species and locations but did not provide new information on dust within the ranges of *S. glaucus* or *S. dawsoniae* or dust effects specific to the two species.

Comment (6): Several commenters stated that our analysis in the SSA report and proposed rule underestimated the effects of livestock grazing on Colorado hookless cactus and ignored the best available science regarding this stressor. Commenters were concerned that livestock grazing may pose a demographic threat at the population level for Colorado hookless cactus because cattle can uproot and crush larger plants crucial to reproduction and cactus occurrences have been extirpated by concentrated sheep use. Additionally, several commenters stated that many grazing allotments within the Colorado hookless cactus' range do not meet BLM land health assessment standards.

Response (6): We considered the effects of livestock grazing to both species in the SSA report. Despite some grazing allotments within the two species' ranges not meeting BLM land health assessment standards, the best available information indicates that livestock grazing is not negatively impacting *S. glaucus* or *S. dawsoniae* at the

population or species level (see *Stressors*, below; Service 2025, pp. 16–19). The BLM rangeland health assessment standards are not tailored to Colorado hookless cactus; rather, they describe specific conditions needed for public land health, such as the presence of streambank vegetation and adequate canopy or ground cover (43 CFR part 4100, subpart 4180). In the pessimistic scenario in the SSA report, we considered the potential for increased impacts from livestock grazing into the future. Even in this scenario, we project high or moderate resiliency in all but one of the *S. glaucus* AUs and in both *S. dawsoniae* AUs. We note that the commenters provided information on livestock grazing effects for other species and locations but did not provide new information on livestock grazing within the ranges of *S. glaucus* or *S. dawsoniae* or evidence of livestock grazing effects specific to the two species.

Comment (7): One commenter stated that BLM would not provide any restrictions on their lands for livestock grazing if the two *Sclerocactus* species were delisted.

Response (7): We disagree with the commenter that BLM would not provide any restrictions on their lands for livestock grazing if the two species were delisted. BLM administers special land management designations called Areas of Critical Environmental Concern (ACECs). Across the range of *S. glaucus* and *S. dawsoniae*, BLM has 11 ACECs, including 5 totaling 18,093 acres (ac) (7,321 hectares (ha)) where livestock use is managed or prohibited to benefit listed and BLM sensitive species in all or part of the management area (the River Rims, Escalante Canyon, Adobe Badlands, Pyramid Rock, and Atwell Gulch ACECs; see *Stressors*). In addition, on lands without special designations, BLM includes standard permit terms and conditions for their livestock grazing permits such as seasonal utilization levels, reductions due to drought or fire, and other restrictions on open grazing (see *Conservation Efforts and Regulatory Mechanisms*). These measures are not dependent on the listed status of Colorado hookless cactus.

Comment (8): Two commenters stated that we did not consider any levels of increased livestock grazing in our pessimistic future scenario or the cumulative impacts from climate change, invasive species, oil and gas development, and OHV recreation.

Response (8): We included a plausible range of livestock grazing levels on BLM lands in our future scenarios, including an increase in effects from livestock grazing on Colorado hookless cactus habitat and individuals in the pessimistic future scenario. Even in this pessimistic scenario, *S. glaucus* is projected to maintain high or moderate resiliency for all but one AU, and *S. dawsoniae* is projected to maintain high or moderate resiliency in both AUs, along with continued redundancy and representation for both species. Regarding our evaluation of cumulative effects, see our response to *Comment (3)*, above.

Comment (9): One commenter stated that we failed to consider the well-known impacts of livestock grazing on biological soil crusts (BSCs) that influence water availability, nutrient cycling, and soil erosion in semi-arid high-elevation deserts; nor did we consider the severity of future drought conditions caused by climate change. However, the commenter acknowledged that BSCs are difficult to detect and their reductions by livestock grazing may not be readily apparent. The commenter provided supporting published literature on this topic (Duniway et al. 2018, entire; Belnap and Eldridge 2001, entire).

Response (9): We recognize the function of BSCs to promote soil stability and nutrient cycling, and we considered the published literature provided by the commenter. We agree with the commenter that BSCs may be difficult to detect; the best available information within Colorado hookless cactus' range identifies the amount of bare ground and native and invasive plant cover and no information on BSCs. The commenter does not provide additional information on BSCs' impact to Colorado hookless cactus, and we have no information to indicate that BSCs, or the lack thereof, are having lasting

population-level effects for the two species. We evaluated the effects of stressors that impact BSCs, such as livestock grazing or invasive species, as part of the habitat condition index metric in our SSA report. We evaluated water availability during the growing season with a water deficit metric. These two metrics provide two of the four scores in the current and future resiliency evaluation.

Comment (10): One commenter considered our cumulative effects evaluation to be inadequate because we determined that predation, herbicides, pesticides, and collection and commercial trade were not AU- or species-level threats, and thus were not addressed in the current or future resiliency analysis.

Response (10): While some of these threats to the species were identified in the initial 1979 listing rule or may be threats at a localized level, all of them are known to impact only individual plants and are less of a concern than originally suggested. Only threats that had the potential now or in the future to have AU- or species-level effects to either species were included in the resiliency analysis. The threats mentioned by the commenter are limited in magnitude such that they will not cause a measurable impact to either cactus species currently or in the future. More information on these stressors and how we considered them can be found in section 4.1 of the SSA report (Service 2025, pp. 16–19).

Comment (11): One commenter stated that we did not mention that Colorado OHV registrations have increased dramatically since 2000, which would lead to an increase in OHV use in the species' habitat. The commenter also stated that we did not evaluate the many possible indirect impacts of OHV use to Colorado hookless cactus. Further, the commenter stated that the exclusion of non-motorized recreation (mountain bikes, hiking, camping, etc.) as a stressor is backed with no direct evidence and may be criticized because the likelihood for these activities would coincide with OHV recreation.

Response (11): The purpose of the SSA is to gather and compile information on the status of these species to assess their current condition and project the species' future condition. The commenter did not provide information on how OHV use has changed in the species' range. Moreover, the commenter did not specify or provide information regarding any other possible indirect impacts of OHV use to the species that we did not evaluate. We evaluated the effects of OHV use that include plant loss or damage; soil compaction; and increased erosion, sedimentation, and dust in the SSA report (Service 2025, pp. 17–18). As we stated in our response to a peer reviewer (*Comment 2*) in the proposed rule (88 FR 21582 at 21584, April 11, 2023), we did not include non-motorized recreation (mountain bikes, hiking, camping, etc.) in our resiliency evaluation due to the relatively small footprint and localized impacts of these activities, BLM's general avoidance of Colorado hookless cactus when designing non-motorized trail routes, and the lack of species- or AU-level effects.

Comment (12): One commenter stated that our assertion in the proposed rule that collection is not causing population- or species-level effects to Colorado hookless cactus is counter to the species' final listing rule and justification for not designating critical habitat. The commenter claims that we are being arbitrary and capricious with respect to the threat of collection when we know the species is "highly desirable."

Response (12): We disagree with the commenter's claim that we were arbitrary and capricious in regard to our evaluation of the threat of collection for Colorado hookless cactus. As we stated in our response to a peer reviewer (*Comment 8*) in the proposed rule (88 FR 21582 at 21585, April 11, 2023), the best available information indicates that collection has not occurred at the level anticipated at the time of listing and is not having population- or species-level effects on either species (Krening and Dawson 2020, p. 36). Furthermore, given the taxonomic splits since listing between the two Utah *Sclerocactus* species and Colorado's *S. glaucus* and *S. dawsoniae*, the species mentioned

in the final listing rule (44 FR 58868, October 11, 1979) as prized by cactus collectors for its beautiful purplish-red flowers is now known to be Uinta Basin hookless cactus (*Sclerocactus wetlandicus*), not *S. glaucus* or *S. dawsoniae*. Finally, the Convention on International Trade in Endangered Species (CITES) is a regulatory mechanism that helps to prevent and enforce against the illegal collection and trade of protected species, including Colorado hookless cactus. CITES protections apply to all members of the cactus family (*Cactaceae*), and as such, *S. glaucus* or *S. dawsoniae* will receive protections after delisting under the Act (see *Conservation Efforts and Regulatory Mechanisms*).

Comment (13): One commenter stated that we did not demonstrate how conservation measures to protect Colorado hookless cactus would continue to be enforced and be effective post-delisting in the BLM National Conservation Areas (NCAs), Areas of Critical Environmental Concern (ACECs), and Wilderness Study Areas (WSAs).

Response (13): Protections for Colorado hookless cactus will remain in NCAs, ACECs, and WSAs regardless of its Federal listing status. These areas represent approximately 30 percent of the land in *S. glaucus* AUs and 41 percent of the land in *S. dawsoniae* AUs (see *Conservation Efforts and Regulatory Mechanisms*). Species-specific protections are afforded to Colorado hookless cactus in BLM's current Dominguez-Escalante NCA resource management plan (RMP), and 8 of 11 ACECs across the range of the species specifically reference the protection of Colorado hookless cactus as a foundational goal. Likewise, NCAs, ACECs, Wilderness Areas, and WSAs are designed to protect multiple resources, not only the Colorado hookless cactus. The 1964 Wilderness Act (Public Law 88-577) and the Federal Land Policy and Management Act (FLPMA; 43 U.S.C. 1782) afford protections to wilderness areas and WSAs and do not

allow for permanent disturbances. BLM manages these areas and will also manage for Colorado hookless cactus as a BLM sensitive species, affording both species protections.

Comment (14): Several commenters stated that the draft PDM plan's reliance on 17 macroplots provides insufficient monitoring of the two species and new or increasing site-specific stressors within their ranges. The commenters recommended that the PDM plan include rangewide monitoring of site-specific stressors across the two species' range, and that monitoring should begin prior to delisting.

Response (14): The PDM plan relies on the sampling protocols used in Krening et al. (2021a, entire), which are sufficient to detect rangewide trends for both species (see *Comment (2)).* We also consider the PDM sufficient to detect new or increasing stressors within the two species' ranges because BLM will provide information on newly approved, permitted, or implemented projects and impacts to Colorado hookless cactus on an annual basis (Service 2024, pp. 13–15). While the final PDM plan does not identify a specific mechanism to intervene following stressor impacts, it identifies actions that may be taken should monitoring indicate a substantial decline in the Colorado hookless cactus' density or distribution. These actions include meeting with conservation partners, extending the monitoring period, modifying monitoring practices, initiating a rangewide status assessment, or relisting Colorado hookless cactus, if warranted. During the PDM monitoring period, we will continue to work with our conservation partners to develop and implement an effective PDM plan for Colorado hookless cactus that includes an appropriate duration to detect trends, identifies potential and increasing stressors, and evaluates the impact of stressors. The monitoring identified in the PDM plan began before work began on this rulemaking action, starting in 2011 by BLM and in 2007 by the Denver Botanic Gardens (Krening et al. 2021b, p. 4; DePrenger-Levin and Hufft 2021, pp. 3–5; Service 2024, entire).

Comment (15): Two commenters were concerned that we relied on an unpublished genetic study (McGlaughlin and Naibauer 2021, entire) to inform the proposed delisting rule and noted that the genetic results have not been recognized by NatureServe.

Response (15): Since the publication of the proposed listing rule, the authors of the genetic study published their results in a peer-reviewed journal in December 2023 (McGlaughlin and Naibauer 2023, entire) and published the official species description for *S. dawsoniae* in 2024 (McGlaughlin and Naibauer 2024, entire). Because of the recency of this taxonomic split, there may be a delay in recognizing the Colorado hookless cactus (*S. glaucus)* and Dawson's hookless cactus (*S. dawsoniae*), on websites such as NatureServe (https://explorer.natureserve.org) and the Integrated Taxonomic Information System (https://www.usgs.gov/tools/integrated-taxonomic-information-system-itis). However, the information we relied upon in drafting this rulemaking action still constitutes the best available scientific information on these species' taxonomy.

Comment (16)*:* One commenter stated that we should not have confidence in BLM's ability to prevent livestock grazing from harming the Colorado hookless cactus because BLM has a long history of ignoring illegal grazing as identified in a 2016 U.S. Government Accountability Office (GAO) report.

Response (16): We have no information that illegal grazing is occurring in the Colorado hookless cactus' range (Lincoln 2025, pers. comm). The 2016 GAO report identifies 38 incidences of non-compliances in the State of Colorado, but the report does not identify the locations where unauthorized grazing is occurring. Therefore, we did not include this information in our SSA report. BLM's management plans allow it to include obligatory stipulations in its grazing permit renewals that require reductions in the number of livestock and adjustments to the timing, duration, and season of livestock use for the benefit of natural resources (see *Livestock Grazing,* below). BLM will address

impacts to Colorado hookless cactus from a variety of stressors, including livestock grazing, with additional monitoring and management interventions, as identified in the PDM plan (Service 2024, entire).

Background

A thorough review of the taxonomy, life history, and ecology of the Colorado hookless cactus (*S. glaucus* and *S. dawsoniae*) is presented in the SSA Report Version 1.2 (Service 2025, entire). Colorado hookless cactus has undergone a series of taxonomic revisions since its original 1979 listing. When listed, the range of *Sclerocactus glaucus* was considered to include western Colorado and northeastern Utah (Uinta Basin hookless cactus complex). A reevaluation of morphological characteristics, phylogenetic studies, and common garden experiments led to the determination that the Uinta Basin hookless cactus complex was in fact three distinct species: *Sclerocactus glaucus* (Colorado hookless cactus), *Sclerocactus brevispinus* (Pariette cactus), and *Sclerocactus wetlandicus* (Uinta Basin hookless cactus) (Heil and Porter 2004, pp. 197–207; Hochstätter 1993, pp. 82–92). *Sclerocactus glaucus* was determined to be restricted to the Colorado and Gunnison River basins in western Colorado, while *Sclerocactus brevispinus* and *Sclerocactus wetlandicus* are limited to the Uinta Basin in eastern Utah. In 2009, the Service published a final rule recognizing and accepting this revised taxonomy of the three species and determined that all three species would continue to be listed as threatened (74 FR 47112, September 15, 2009). Most recently, in 2017, genetic studies identified three distinct regional groups of Colorado hookless cactus in Colorado: the northern, Grand Valley, and Gunnison River groups (Schwabe et al. 2015, p. 447; McGlaughlin and Ramp-Neale 2017, p. 5). The most recent genetic analyses, using Random Site-Associated DNA sequencing, determined that the northern group should be recognized as a distinct species, hereinafter *Sclerocactus dawsoniae*, or *S. dawsoniae*

(McGlaughlin and Naibauer 2023, p. 5). The Grand Valley and Gunnison River groups share connectivity and form a genetically cohesive group, which represents a second distinct species, hereinafter collectively referred to as *Sclerocactus glaucus*, or *S. glaucus* (McGlaughlin and Naibauer 2023, p. 5). Because of the recency of this taxonomic split, the currently listed entity is still considered to be the Colorado hookless cactus, which encompasses both *S. glaucus* and *S. dawsoniae*; thus, both *Sclerocactus glaucus* and *Sclerocactus dawsoniae* are the subjects of our SSA report and this final delisting rule.

Given the recent nature of this new taxonomic information, most literature on the species draws conclusions regarding both *S. glaucus* and *S. dawsoniae* without distinguishing between the two. Thus, when we use the common name "Colorado hookless cactus" in this final rule, we are referring to information or conclusions regarding both species (*S. glaucus* and *S. dawsoniae*). When we are referring to information or analysis pertaining to one species, we will use the new scientific names of *S. glaucus* or *S. dawsoniae*.

S. glaucus and *S. dawsoniae* are endemic cactus species found in the Colorado and Gunnison River basins and their tributary canyons in Garfield, Mesa, Montrose, and Delta Counties in western Colorado. The species occur on alluvial benches and colluvial slopes from 1,372 to 2,195 m (4,500 to 7,200 ft) in semi-arid high-elevation desert (Holsinger 2021, pers. comm.; Service 2025, p. 9). The species display a patchy, generalist distribution and have been found to grow primarily in small, discrete colonies of individuals in various upland desert habitats and communities (Krening and Dawson 2020, p. 18; Service 2025, p. 9).

For the purposes of analysis in our SSA report, we divided the ranges of *S. glaucus* and *S. dawsoniae* into analysis units (AUs). *S. glaucus* occurs in eight AUs in a range that extends approximately 2,802 square kilometers (km^2) (1,082 square miles (mi^2)) from the Grand Valley, through the high desert at the foot of the Grand Mesa, and

along the alluvial terraces of the Gunnison River and the Dominguez and Escalante Creek drainages to near Montrose. *S. dawsoniae* occurs over an area of approximately 505 km^2 (195 mi^2) in two AUs along the Colorado River from DeBeque downstream toward the Grand Valley and along the Roan and Plateau Creek drainages. BLM owns and manages approximately 72 percent and 68 percent, respectively, of the land that comprises the *S. glaucus* and *S. dawsoniae* AUs (Service 2025, pp. 19–22).

S. glaucus and *S. dawsoniae* are morphologically indistinguishable from each other and can be identified from one another only by genetic analysis or location. They are both leafless, flowering, stem-succulent plants with short, cylindrical bodies usually 3 to 12 centimeters (cm) (1.2 to 4.8 inches (in)) but up to 30 cm (12 in) tall and 4 to 9 cm (1.6 to 3.6 in) in diameter (Service 2025, pp. 7–8). The brown coloring of the spines on mature plants is unique to *S. glaucus, S. dawsoniae*, and *S. parviflorus*, as compared to other cactus species in the area (Service 2025, p. 7).

Colorado hookless cactus has three life stages: seeds, seedlings, and mature reproductive adults. Colorado hookless cactus plants are considered hardy, long-lived perennial species (i.e., high survival probabilities and low levels of recruitment) (BLM 2018, p. 15). Based on high observed seedling survival, once a seedling is established, there is a high probability of an individual persisting to reproductive stage (BLM 2018, p. 14; Service 2025, p. 13). Pollinator-assisted outcrossing (xenogamy) is the primary mode of genetic exchange for the Colorado hookless cactus (Janeba 2009, p. 67; Tepedino et al. 2010, p. 382; Service 2025, p. 8). Plants usually flower in late April and early May. Plants do not flower until they reach a diameter of more than 4 cm (1.6 in) (BLM 2018, p. 14); plants are likely at least 4 to 6 years old before they become reproductive and continue to flower throughout their relatively long life (DePrenger-Levin 2021, pers. comm.; Service 2025, p. 13). Colorado hookless cactus can live for many years, but their exact longevity is unknown.

Recovery Criteria

Section 4(f) of the Act directs us to develop and implement recovery plans for the conservation and survival of endangered and threatened species unless we determine that such a plan will not promote the conservation of the species. Under section 4(f)(1)(B)(ii), recovery plans must, to the maximum extent practicable, include objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions of section 4 of the Act, that the species be removed from the Lists of Endangered and Threatened Wildlife and Plants.

Recovery plans provide a roadmap for us and our partners on methods of enhancing conservation and minimizing threats to listed species, as well as measurable criteria against which to evaluate progress towards recovery and assess the species' likely future condition. However, they are not regulatory documents and do not substitute for the determinations and promulgation of regulations required under section 4(a)(1) of the Act. A decision to revise the status of a species or to delist a species is ultimately based on an analysis of the best scientific and commercial data available to determine whether a species is no longer an endangered species or a threatened species, regardless of whether that information differs from the recovery plan.

There are many paths to accomplishing recovery of a species, and recovery may be achieved without all of the criteria in a recovery plan being fully met. For example, one or more criteria may be exceeded while other criteria may not yet be accomplished. In that instance, we may determine that the threats are minimized sufficiently and that the species is robust enough that it no longer meets the definition of an endangered species or a threatened species. In other cases, we may discover new recovery opportunities after having finalized the recovery plan. Parties seeking to conserve the species may use these opportunities instead of methods identified in the recovery plan. Likewise, we may learn new information about the species after we finalize the recovery plan. The new

information may change the extent to which existing criteria are appropriate for identifying recovery of the species. The recovery of a species is a dynamic process requiring adaptive management that may, or may not, follow all of the guidance provided in a recovery plan.

A recovery plan for Colorado hookless cactus was not prepared due to lack of staff capacity; therefore, specific delisting criteria were not developed for the species. However, we developed a recovery outline for Colorado hookless cactus in 2010 (Service 2010, entire). A recovery outline is a succinct document that presents a preliminary recovery strategy and actions to direct recovery efforts for a newly listed species until a recovery plan is completed. Additionally, we reviewed the status of the species in the 2008 and 2021 5-year status reviews (Service 2008, entire; Service 2021, entire). In the 2008 review, we identified remaining threats to the species and actions that could be taken to make progress in addressing those threats and ensuring long-term management. One such recommendation was to conduct rangewide inventories and improve population monitoring (Service 2008, p. 4). Denver Botanic Gardens and BLM have closely monitored Colorado hookless cactus at multiple sites throughout its range since 2007 (DePrenger-Levin and Hufft 2021, entire; Krening et al. 2021b, entire). Based on over a decade of this rich monitoring data, BLM developed a method of estimating population size and trends in 2021 for *S. glaucus* (Krening et al. 2021a, entire) and in 2023 for *S. dawsoniae* (Krening and Holsinger 2024, entire), representing the best available scientific and commercial information for the species regarding total population size (Krening et al. 2021a, entire; Krening and Holsinger 2024, entire).

The 2010 recovery outline also included an initial action plan for the species' recovery that included actions such as (1) expanding comprehensive surveying to improve our understanding of trends; (2) establishing formal land management designations to provide for long-term protection of important populations and habitat; (3)

directing development projects to avoid cactus occurrences and incorporate standard conservation measures; (4) encouraging investigations into *Sclerocactus* species' vulnerability to climate change; and (5) resolving open taxonomic questions for the species. The Service and its partners have since accomplished all five of these actions.

Since 2010, BLM and the Denver Botanic Gardens have expanded their annual monitoring program to assess demographic trends and improve estimation of the species' population sizes; these estimates indicate there are substantially more Colorado hookless cactus plants on the landscape than were known at the time of listing and have changed our understanding of the degree to which the species are resilient to the threats apparent at the time of listing. As stated previously, BLM has also established multiple ACECs and an NCA that provide long-term protection to BLM sensitive plants and habitats. In the past 11 years, multiple assessments of the species' vulnerability to climate change have concluded that Colorado hookless cactus has low vulnerability to future climatic changes (Price 2018, appendix 3 of Krening and Dawson 2020, p. 60; Still et al. 2015, p. 116; Treher et al 2012, pp. 8, 52). Finally, as discussed at length above in this document, recent genetic research has determined that Colorado hookless cactus is in fact two separate species: *S. glaucus* and *S. dawsoniae*, thus resolving an open taxonomic question for the species, as identified by the recovery outline.

Regulatory and Analytical Framework

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and the implementing regulations in title 50 of the Code of Federal Regulations set forth the procedures for determining whether a species is an endangered species or a threatened species, issuing protective regulations for threatened species, and designating critical habitat for endangered and threatened species. On April 5, 2024, jointly with the National Marine Fisheries Service, the Service

issued a final rule that revised the regulations in 50 CFR part 424 regarding how we add, remove, and reclassify endangered and threatened species and what criteria we apply when designating listed species' critical habitat (89 FR 23919). That final rule is now in effect and is incorporated into the current regulations. Our analysis for this decision applied our current regulations. Given that we proposed delisting this species under our prior regulations (revised in 2019), we have also undertaken an analysis of whether the decision would be different if we had continued to apply the 2019 regulations and we concluded that the decision would be the same. The analyses under both the regulations currently in effect and the 2019 regulations are available on https://www.regulations.gov.

The Act defines an "endangered species" as a species that is in danger of extinction throughout all or a significant portion of its range, and a "threatened species" as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

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

effects or may have positive effects. The determination to delist a species must be based on an analysis of the same five factors.

We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term "threat" includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term "threat" may encompass—either together or separately—the source of the action or condition or the action or condition itself.

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

The Act does not define the term "foreseeable future," which appears in the statutory definition of "threatened species." Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis, which is further described in the 2009 Memorandum Opinion on the foreseeable future from the Department of the Interior, Office of the Solicitor (M–37021, January 16, 2009; "M-Opinion," available online at

https://www.doi.gov/sites/doi.opengov.ibmcloud.com/files/uploads/M-37021.pdf). The foreseeable future extends as far into the future as the U.S. Fish and Wildlife Service and National Marine Fisheries Service (hereafter, the Services) can make reasonably reliable predictions about the threats to the species and the species' responses to those threats. We need not identify the foreseeable future in terms of a specific period of time. We will describe the foreseeable future on a case-by-case basis, using the best available data and taking into account considerations such as the species' life-history characteristics, threat-projection timeframes, and environmental variability. In other words, the foreseeable future is the period of time over which we can make reasonably reliable predictions. "Reliable" does not mean "certain"; it means sufficient to provide a reasonable degree of confidence in the prediction, in light of the conservation purposes of the Act.

Analytical Framework

The SSA report documents the results of our comprehensive biological review of the best scientific and commercial data regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent our decision on whether the species should be delisted. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. To assess Colorado hookless cactus' viability, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency is the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years); redundancy is the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation is the ability of the species to adapt to both near-term and long-term changes in its physical and biological environment (for example, climate conditions, pathogens). In general, species viability will increase with increases

in resiliency, redundancy, and representation (Smith et al. 2018, p. 306). Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

The SSA process can be categorized into three sequential stages. During the first stage, we evaluated individual species' life-history needs. The next stage involved an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species' responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time, which we then used to inform our regulatory decision.

The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket FWS–R6–ES–2022–0093 on https://www.regulations.gov.

Summary of Biological Status and Threats

In this discussion, we review the biological condition of the species and its resources, and the threats that influence the species' current and future condition, in order to assess the species' overall viability and the risks to that viability. In addition, the SSA report (Service 2025, entire) documents our comprehensive biological status review for the species, including an assessment of the potential threats to the species.

The following is a summary of this status review and the best available information gathered since that time that has informed this decision.

Species Needs

Individuals of both species of Colorado hookless cactus need certain habitat factors, including shallow exposed sandy or shale soils of sedimentary parent material or gravelly deposits of river alluvium; a semi-arid, high-elevation desert climate (elevations from 1,200–2,000 m (3,937–6,561 ft) with 20–30 cm (8–12 in) of rain per year; and a period of deep cold during winter months to facilitate germination the following spring (Service 2025, pp. 8, 11–12). To be sufficiently resilient, populations, referred to as analytical units (AUs) of both species require survivorship and recruitment at rates that are able to sustain AUs, in addition to pollinator connectivity between individuals and clusters of plants within the AU. Adequately resilient AUs also contain enough individuals across each life stage (seed, seedling, and mature reproductive adult) to bounce back after experiencing environmental stressors such as intermediate disturbance, occasional drought, or intensive grazing.

The number of AUs across the landscape influence redundancy of Colorado hookless cactus. AUs, synonymous with populations, include many cactus individuals and were delineated by natural geological and ecological features and management boundaries within each species' range (Service 2025, pp. 6–8). More AUs across the range of each species increase each species' ability to withstand catastrophic events. Individuals and AUs inhabiting diverse ecological settings and exhibiting genetic or phenological variation add to the level of representation across the species' ranges. The greater diversity observed in genetics, habitats, and morphology, the more likely Colorado hookless cactus is to be able to adapt to change over time. Thus, both species need (1) a sufficient number and distribution of sufficiently resilient AUs to withstand catastrophic events (redundancy) and (2) a range of genetic, morphologic, and habitat variation that allows the species to adapt to changing environmental conditions (representation) (Service 2025, pp. 15–16). The SSA report provides additional detail on the species' individual-, population-, and species-level needs (Service 2025, pp. 10–16).

Stressors

In our SSA, we evaluated stressors and other actions that can positively or negatively affect Colorado hookless cactus at the individual, AU (population), or species levels, either currently or into the future (Service 2025, pp. 16–19). A wide variety of stressors may influence the resiliency of Colorado hookless cactus, either by directly affecting individuals or by reducing the quality and quantity of habitats.

Stressors that have the potential to present AU-level effects for both species include livestock use, invasive species, oil and gas development, OHV recreational use, development and maintenance of utility corridors, and the effects of global climate change (Krening and Dawson 2020, p. 30; Service 2025, pp. 16–19). We determined that oil shale deposit development and gold mining, predation, herbicide and pesticide application, or collection and commercial trade are not threats to the existence of the species (even though they were identified as such in the 1979 listing rule), so we do not discuss them in detail in this rule (Service 2025, pp. 16–19).

Additionally, approximately 30 percent of the land in *S. glaucus* AUs and 41 percent of the land in *S. dawsoniae* AUs have special BLM land management designations in the form of NCAs, ACECs, a WSA, and a Wilderness Area. These designations limit or exclude the authorization of certain land uses, and some designations were specifically created for the conservation of natural resources. The protections provided by these management designations are not contingent upon the species' federally listed status, and these designations help to facilitate the maintenance and recovery of cactus occurrences because they are areas where Colorado hookless cactus is not likely to be disturbed or adversely altered by land-use actions (Krening and Dawson 2020, p. 26). Eight of 11 ACECs specifically reference the protection of Colorado hookless cactus as a foundational goal. We discuss the specific protections each of these areas provides, and the ways in which they reduce specific stressors, under the

relevant stressors below; we also discuss these conservation measures further under Conservation Efforts and Regulatory Mechanisms. While the majority of the remaining habitat is on private lands, approximately 28 percent for *S. glaucus* and 32 percent for *S. dawsoniae*, we do not have reliable information for Colorado hookless cactus on private lands. Since the private lands are interspersed with BLM lands, we assume that the stressors are the same on BLM and private lands (Service 2025, pp. 20–22).

Livestock Use

BLM owns and manages approximately 72 percent and 68 percent, respectively, of the land that comprises *S. glaucus* and *S. dawsoniae* AUs (Service 2025, pp. 19–22). While approximately 5 percent of this habitat excludes or manages for livestock use for the purposes of minimizing impacts to Colorado hookless cactus, nearly all habitat that occurs on BLM lands allows for livestock use. Moderate to heavy domestic livestock grazing has been observed to cause physical damage to *Sclerocactus* plants through trampling; however, on rare occasions do cattle directly trample or dislodge cactus plants (Service 1990, p. 11). We have no information to indicate that cattle browse on individual *Sclerocactus* plants since their spines generally make them undesirable livestock forage (Dawson 2025, entire; Hornbeck 2025, entire). A study on another federally listed cactus, *S. wrightiae*, found that cacti density increased more rapidly in a fenced plot excluded from cattle grazing than in an unfenced plot with a reduced cattle stocking rate (Clark and Clark 2007, p. 21). Overgrazing (the continued heavy grazing beyond the recovery capacity of forage plants) by domestic livestock can have a negative impact on North American xeric (very dry and low humidity) ecosystems (Jones 2000, p. 158). For example, overgrazing can facilitate the establishment of invasive species like *Bromus tectorum*, known as cheatgrass (Masters and Sheley 2001, p. 503; DiTomaso et al. 2016, p. 435), which are difficult to eradicate and tend to outcompete native vegetation, including cacti.

Currently, BLM manages livestock activities to protect sensitive plants in the Adobe Badlands, River Rims, and Escalante Canyon ACECs (BLM 2017, p. 240, p. 258; Krening and Dawson 2020, p. 28; Service 2025, pp. 19–22). In the Atwell Gulch ACEC, BLM excludes livestock grazing entirely on 2,600 ac (1,052 ha), and in the Pyramid Rock ACEC, no livestock grazing is allowed (Krening and Dawson 2020, p. 29; Service 2025, pp. 20–22). BLM monitoring indicates that livestock are not present in these protected areas (Krening and DePrenger-Levin 2023, entire). BLM's management plans allow it to include obligatory stipulations in its grazing permit renewals that require reductions in the number of livestock and adjustments to the timing, duration, and season of livestock use for the benefit of natural resources; such changes in grazing permits would primarily affect future grazing intensity in the Cactus Park (*S. glaucus*), Devil's Thumb (*S. glaucus*), Gunnison River East (*S. glaucus*), Roan Creek (*S. dawsoniae*), and Plateau Creek AUs (*S. dawsoniae*).

Currently, livestock use is affecting individual plants in localized areas and is not resulting in population-level effects based on stable or increasing population-level trends (Service 2025, pp. 18–19; Krening and DePrenger-Levin 2023, entire); however, these effects could increase in the future if no corrective action is taken to address future problem areas. Thus, we included an analysis in the SSA to examine the species' potential response to future changes and increases to this stressor (Service 2025, pp. 28–36).

Invasive Species

Invasive weeds, including *Bromus tectorum* (cheatgrass) and *Halogeton glomeratus* (halogeton), are prevalent on BLM and private lands within the range of Colorado hookless cactus (Krening and Dawson 2020, p. 35). Invasive weeds alter the ecological characteristics of cactus habitat, making it less suitable for the species (Service 1990, p. 11). In addition, invasive annual weeds are often able to outcompete perennial

native species for the essential nutrient nitrogen under drought conditions (Everard et al. 2010, pp. 85, 93–94). However, despite their prevalence throughout the range of Colorado hookless cactus species, individual plants experience extreme detrimental effects of invasive weeds only in localized areas (Service 2025, pp. 16–22; Krening and DawsonBLM 2020, p. 35).

Currently, invasive vegetation affects only individual Colorado hookless cactus plants; invasive species are not causing any broad-scale reductions in recruitment or survival in entire AUs. However, the effects of invasive vegetation could increase in the future if infestations expand or if treatments become less effective. Thus, we included an analysis in the SSA to examine the species' potential response to future changes and increases to this stressor (Service 2025, pp. 16–22, 28–36).

Oil and Gas Development

Oil and gas development can also affect Colorado hookless cactus plants and habitat. Increased surface disturbance from wells, roads, and pipelines for oil and gas projects can fragment or destroy habitat; disturb individuals; increase erosion, soil compaction, and sedimentation; destroy pollinator habitat; increase airborne dust and subsequent dust accumulation on cacti, which can increase tissue temperature and reduce photosynthesis, thus decreasing plant growth, vigor, and water use efficiency; indirectly increase recreational access to habitat through increased road construction; and increase invasive vegetation because of the associated surface disturbances (Service 2010, pp. 6–7).

For *S. glaucus*, only 5 percent of the AUs (19,365 ac (7,837 ha) of 379,348 total ac (153,517 ha) of habitat) are within BLM lands leased for oil and gas (BLM 2021, unpaginated). This proportion is higher for *S. dawsoniae*; 58 percent of the area within AUs are leased for oil and gas development on BLM lands (65,384 ac (26,419 ha) of 112,723 total ac (45,617 ha) of habitat) (BLM 2021, unpaginated). However, leased areas

do not equate to areas of surface disturbance; even if these areas are leased for oil and gas development, only small subsets of these areas are actually being actively explored or extracted (Colorado Oil and Gas Conservation Commission (COGCC) 2022a, unpaginated). Moreover, oil and gas development does not occur throughout all of the species' ranges; for *S. glaucus*, active wells are only in the Devil's Thumb AU (one active well site), North Fruita Desert AU (10 active well sites), Whitewater AU (26 active well sites), and a very small portion of the Palisade AU (one active well site) (COGCC 2022b, unpaginated). For *S. dawsoniae*, while oil and gas development occurs in both AUs (Roan Creek (60 active well sites) and Plateau Creek (51 active well sites)), 42 percent of these AUs are not leased for oil and gas development (COGCC 2022b, unpaginated; BLM 2021, unpaginated). Additionally, there are no new or pending permits to drill new oil and gas wells within either species' range; however, as we describe in more detail below, development could increase within portions of *S. dawsoniae*'s range in the future (COGCC 2022c, unpaginated; COGCC 2022d, unpaginated).

Additionally, BLM's resource planning documents include conservation measures to minimize adverse impacts of natural resource extraction to listed and sensitive species, including the Colorado hookless cactus; these measures include limiting oil and gas development within a 100-m (328-ft) buffer around any currently occupied or historically occupied Colorado hookless cactus habitat, when possible and with some exceptions (Krening and Dawson 2020, p. 34; BLM 2015a, p. B-13; BLM 2015b, p. B-22; BLM 2020, p. B-9). While these limitations and buffers are not obligatory, BLM applies them, with certain exceptions, to BLM sensitive species, which *S. glaucus* and *S. dawsoniae* will become once Colorado hookless cactus is removed from the List of Endangered and Threatened Plants (see *Conservation Efforts and Regulatory Mechanisms*). Even without the protections given to BLM sensitive species, based on our analysis of Colorado Oil

and Gas Conservation Commission (COGCC) data, current oil and gas extraction is relatively limited throughout the range of both species compared to the amount of occupied habitat (COGCC 2022a, unpaginated; COGCC 2022b, unpaginated; COGCC 2022c, unpaginated; COGCC 2022d, unpaginated). Moreover, due to their biology and life history characteristics, both species are relatively resilient to nearby disturbance (as we discuss further in our analysis of Current Condition below).

Furthermore, approximately 30 percent of the land in *S. glaucus* AUs and 41 percent of the land in *S. dawsoniae* AUs have special BLM land management designations in the form of NCAs, ACECs, a WSA, and a Wilderness Area, which further protect the species from the impacts of oil and gas development (Service 2025, pp. 16–22). The protections provided by these management designations are not contingent upon the species' federally listed status, and these designations help to facilitate the maintenance and recovery of cactus occurrences because they are areas where neither the Colorado hookless cactus is likely to be disturbed nor will its habitat be adversely altered by land-use actions (Krening and Dawson 2020, p. 26). All 30 percent of the areas within *S. glaucus* AUs that have special land management designations include stipulations that either withdraw lands from oil, gas, and mineral development, implement "no-surface-occupancy" stipulations, or prohibit surface-disturbing activities (Service 2025, pp. 19–22). Therefore, no new oil and gas activity is permitted in almost 30 percent of *S. glaucus*'s range (with the exception of portions of the Devil's Thumb AU); these areas where no new oil and gas activity is permitted coincide with over half (over 56 percent) of the estimated *S. glaucus* occurrences (Service 2025, pp. 14, 21–22). Similarly, all 41 percent of the areas within *S. dawsoniae* AUs that have special land management designations include no-surface-occupancy stipulations that limit oil and gas development in these portions of the species' range.

Thus, currently, oil and gas development is affecting only a small proportion of individual Colorado hookless cactus plants, due to limited leasing and development and BLM's protective measures; however, the effects of oil and gas development could increase in the future. Nevertheless, given the variable oil and gas potential (none, low, medium, and high potential) of the area, and the protections outlined above, the only AUs where oil and gas development could plausibly increase in the future are the Roan Creek and Plateau Creek AUs (*S. dawsoniae*) with high oil and gas potential (BLM 2024, entire; Service 2025, p. 30). Thus, we included an analysis in the SSA to examine the species' potential response to future changes in this stressor (Service 2025, pp. 28–36).

Off-Highway Vehicle Recreational Use

Off-highway vehicle (OHV) use can cause soil compaction and erosion, which can physically damage habitat, the surrounding plant community, and the hydrology of the area. OHVs can also carry invasive and introduced plants to new sites and present a risk of spilled contaminants, such as oil spills, gasoline, and grease. OHV use can also injure or kill above-ground plants or cause direct harm to plants through accumulation of dust. OHV use can create especially negative impacts when users travel off designated routes (Service 2025, pp. 16–19).

The relatively barren nature and other topographical features of Colorado hookless cactus habitat make it desirable to OHV users (Krening and Dawson 2020, p. 38). Even though OHV recreation is popular and widespread within Colorado hookless cactus habitat, there is little evidence of direct negative impacts to plants (Service 2010, p. 8; Krening and Dawson 2020, p. 38).

BLM's resource planning documents include conservation measures to minimize adverse impacts of land use to listed and sensitive species, including the Colorado hookless cactus (BLM 2015a, pp. 49, 102–105; BLM 2015b, pp. 26, 101–103, 123, 145, 147, 150; BLM 2015c, p. M-25; BLM 2020, pp. II-87, I-4–I-10). In their Travel

Management Plans for the Grand Junction and Uncompahgre Field Offices, BLM identified multiple routes for closure to protect sensitive areas (BLM 2015c, p. M-24; BLM 2020, p. I-7). These two travel management plans cover the entirety of *S. glaucus*'s range and the majority of *S. dawsoniae*'s range. While the resource management plan for the Colorado River Valley Field Office, which covers the remainder of *S. dawsoniae*'s range, does not contain a travel management plan specifically, it includes strategies for "Comprehensive Trails and Travel Management," including limiting recreational use to designated routes (BLM 2015b, pp. 102–104). Additionally, as stated previously in this document, approximately 30 percent of the land in *S. glaucus* AUs and 41 percent of the land in *S. dawsoniae* AUs have special BLM land management designations in the form of NCAs, ACECs, a WSA, and a Wilderness Area, which further protect the species from the impacts of OHV use by limiting routes within 200 m (656 ft) of sensitive plants or prohibiting all motorized travel (Krening and Dawson 2020, pp. 27–29; Service 2025, pp. 19–22). For example, when the Dominguez-Escalante NCA was created in 2009, which covers 210,172 ac (85,053 ha) within the Dominguez-Escalante, Gunnison River East, and Cactus Park AUs, 268 miles of routes were closed to mechanized and motorized travel, which includes the use of OHVs (BLM 2017, p. 282; Krening and Dawson 2020, p. 27).

As human populations continue to grow in the areas surrounding Colorado hookless cactus, demand for OHV recreation is likely to continue to increase. However, BLM would be able to add routes only in areas outside of the aforementioned ACECs, WSA, and Wilderness Area. Any increases in designated OHV routes would occur as a result of land use planning processes that would comply with the stipulations of the FLPMA and the National Environmental Policy Act (Krening and Dawson 2020, p. 38). Given the protections detailed above, and the accessibility of certain areas to OHV users, the only AUs where OHV use could plausibly increase in the future are the North Fruita

Desert, Devil's Thumb, Gunnison Gorge, and Whitewater AUs (*S. glaucus*) (Service 2025, p. 30). The area represented in these four AUs constitutes approximately half of *S. glaucus*' AU range, but it is unlikely that OHV use would occur across the entire area of these AUs. Through similar processes, BLM may also choose to close areas to recreation or access if necessary to protect sensitive resources (Krening and Dawson 2020, p. 38). It is plausible that implementation of travel management plans could lead to route closures in *S. glaucus* AUs (Devil's Thumb, Gunnison Gorge, Whitewater, Palisade, Dominguez-Escalante, North Fruita Desert) and *S. dawsoniae* AUs (Plateau Creek, and Roan Creek AUs).

Thus, currently, OHV use is affecting only a small proportion of individual Colorado hookless cactus plants; however, the effects of OHV use could increase in the future if recreational opportunities expand. Therefore, we included an analysis in the SSA to examine the species' potential response to future changes in this stressor (Service 2025, pp. 28–36).

Development and Maintenance of Utility Corridors

The installation and maintenance of utility corridors can result in damage, loss, or relocation of plants; fragmentation of habitat; and increases in invasive species (Krening and Dawson 2020, p. 34; Service 2025, pp. 17–19). Multiple transmission lines occur within Colorado hookless cactus habitat and "approximately 1,200 plants have been transplanted in association with these projects" (Bio-Logic 2008 as cited in Krening and Dawson 2020, p. 34). While every AU has a utility corridor within it, most corridors intersect only a small portion of the AU. Additionally, some of these utility lines are along already-disturbed corridors (e.g., major highways).

In addition to the limited scope of utility corridor development and maintenance within Colorado hookless cactus habitat, federally protected areas further limit the impacts that utility corridor development can have on the species. Six of the seven

ACECs within *S. glaucus*' range and all four of the ACECs within *S. dawsoniae*'s range include right-of-way exclusion or avoidance areas (Service 2025, pp. 19–22).

Based on practical locations for utility corridors, and on these protections, it is plausible that development could increase in the energy corridor that intersects the Whitewater, Devil's Thumb, and Cactus Park AUs and along the I–70 corridor in the Palisade AU (Service 2025, p. 30). It is also plausible that developers could replace an existing powerline with a larger structure in the Devil's Thumb and Whitewater AUs to increase capacity, which could cause significant ground disturbance (Service 2025, p. 30). Finally, developers could build additional pipelines in the Roan Creek and Plateau Creek AUs (Service 2025, p. 30).

Thus, currently, development and maintenance of utility corridors are affecting only individual Colorado hookless cactus plants, partly due to BLM's avoidance and mitigation measures; however, the effects of this stressor could increase in the future if development expands. Therefore, we included an analysis in the SSA to examine the species' potential response to future changes in this stressor.

Climate Change

Climate change may affect long-term survival of native species, including *Sclerocactus*, especially if longer or more frequent droughts occur. Within the range of Colorado hookless cactus, under lower emission scenarios, summer maximum temperature is expected to increase 4 °F (2.2 °C) and under higher emission scenarios summer maximum temperature is expected to increase 10 °F (5.6 °C) by mid-century, compared to the historical average between 1971 and 2000 (North Central Climate Adaptation Science Center and CIRES 2021, unpaginated). Extreme droughts, like those that occurred in 2002 and 2018, could also become more frequent by mid-century. Historically, droughts of this scale did not occur with this frequency within the range of the species (North Central Climate Adaptation Science Center and CIRES 2021,

unpaginated). By mid-century, under lower emissions scenarios, these extreme droughts could occur two to three times per decade or, under higher emissions scenarios, eight to nine times per decade (North Central Climate Adaptation Science Center and CIRES 2021, unpaginated).

In addition, invasive annual weeds are often able to outcompete perennial native species for the essential nutrient nitrogen under drought conditions (Everard et al. 2010, pp. 85, 93–94). Drought conditions could further hinder BLM's efforts to control invasive weeds and restore native vegetation, which is already difficult due to the extreme environment of the Colorado and Gunnison River basins (Service 1990, p. 11).

Climate change vulnerability analyses concluded that Colorado hookless cactus likely has low vulnerability to climate change (Krening and Dawson 2020, pp. 43–44); however, these analyses predated the taxonomic split of Colorado hookless cactus and thus analyzed the range that contains both *S. glaucus* and *S. dawsoniae*. First, NatureServe's Climate Change Vulnerability Index (CCVI), which evaluates species' vulnerability to climate change based on multiple factors, indicated that Colorado hookless cactus was "not vulnerable" or "presumed stable" rangewide, meaning the number of plants or range extent is not likely to increase or decrease considerably by mid-century (Treher et al. 2012, pp. 8, 52). Second, a combination of CCVI and species distribution modeling (SDM) methods indicated that Colorado hookless cactus "will not be vulnerable to climate change" within the next 30 years (Still et al. 2015, p. 116). This analysis predicted that the Colorado hookless cactus' range could shift or increase under projected changes in climate given the Colorado hookless cactus has no dispersal constraints and vast areas of suitable habitat beyond known occurrences (Still et al. 2015, p. 116). Finally, an additional SDM effort, which aimed to predict changes to the species' range under five different future climate scenarios, concluded that climate change does not present a threat, because all but one model indicates that either no range contraction

will occur or that range extent will expand by midcentury (Price 2018, appendix 3 of Krening and Dawson 2020, p. 60).

Although multiple different models predict the Colorado hookless cactus has low vulnerability to climate change, Colorado Natural Heritage Program's (CNHP) CCVI suggested that Colorado hookless cactus is extremely vulnerable to climate change given "(1) natural and anthropogenic barriers to movement; (2) likelihood of short seed dispersal distances; (3) lack of variation in annual precipitation in occupied habitat over last 50 years; (4) potential increase in climate influenced disturbances within its habitat, (5) potential for wind and solar energy development within its range, and (6) pollinator specificity" (CNHP 2015, p. 533). Although the weight of research indicates both species likely have low vulnerability to climate change, given the uncertainty that this CNHP study introduced, we included an analysis in the SSA to examine the species' potential response to future changes in this stressor.

Conservation Efforts and Regulatory Mechanisms

Positive actions, in the form of conservation efforts such as land protections and regulations, have reduced sources of habitat degradation, and multiple agencies, volunteers, and community members are committed to the conservation and preservation of Colorado hookless cactus. BLM owns and manages approximately 72 percent and 68 percent, respectively, of the land that comprises *S. glaucus* and *S. dawsoniae* AUs (Service 2025, pp. 19–22). The majority of the remaining habitat is privately owned; less than 1 percent is owned by State or local governments (Service 2025, p. 19).

Within the range of the Colorado hookless cactus, BLM has included conservation measures in its resource planning documents to minimize adverse impacts of land use to listed and BLM sensitive species, including the Colorado hookless cactus (Krening and Dawson 2020, p. 26). For example, BLM RMPs for the Colorado River Valley, Grand Junction, and Uncompahgre field offices (the three BLM field offices

within the range of the species) include restrictions on surface-disturbing activities for BLM sensitive species, such as controlled surface use stipulations 100 m (328 ft) away from occupied habitat, and the ability to move a project more than 200 m (656 ft) away from occupied habitat (BLM 2015a, B-39; BLM 2015b, B-30; BLM 2020, B-21). In addition, the RMPs have motorized recreation restrictions, energy development restrictions, and grazing management; provisions for research to aid in better understanding the effects of stressors on the species and guide conservation efforts; and provisions for habitat improvements and vegetation management (e.g., reducing encroachment of woody species, fuels management, closing of livestock allotments, or maintaining rangeland health standards) (Service 2025, pp. 19–22, 28–36; BLM 2015a, pp. 41, 68; BLM 2020, p. II-24).

Even without the protections of the Act, both species would remain BLM sensitive species for at least 10 years (BLM 2008, entire; Dawson 2023, pers. comm.). Beyond this timeframe, they may remain BLM sensitive species as long as they meet either of the following criteria: (1) either species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species' range; or (2) either species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in the area would be at risk (BLM 2008, entire; Dawson 2023, pers. comm.).

Once delisted, or if *S. glaucus* or *S. dawsoniae* are removed from BLM's sensitive species list, the measures specific to listed and sensitive species in these RMPs would no longer apply (e.g., buffers around oil and gas development). However, the majority of measures in these RMPs are not unique to Colorado hookless cactus, but rather provide protections for resources in NCAs and ACECs and for other BLM sensitive species

where the species occur. While these conservation measures are not obligatory, BLM implements them to meet the goals and objectives identified in RMPs, unless there are waivers, exceptions, or modifications for a specific project, for effective land management and rangeland health as required under FLPMA (43 U.S.C. 1701 et seq.). Continued responsible management of the landscapes in which the Colorado hookless cactus occurs, even if not directed specifically towards the species, will still provide benefit.

Further, approximately 30 percent of the land in *S. glaucus* AUs and 41 percent of the land in *S. dawsoniae* AUs have special BLM land management designations in the form of NCAs, ACECs, a WSA, and a Wilderness Area (Service 2025, pp. 19–22). These designations limit or exclude the authorization of certain land uses, and some designations were specifically created for the conservation of natural resources; of 11 ACECs across the species' range, 8 specifically reference the protection of Colorado hookless cactus as a foundational goal. The protections provided by these management designations are not contingent upon the species' federally listed status, and these designations help to facilitate the maintenance and recovery of cactus occurrences, because they are areas where Colorado hookless cactus is not likely to be disturbed or adversely altered by land-use actions (Krening and Dawson 2020, p. 26). We discuss the specific protections each of these areas provides under the relevant stressors above.

The BLM RMP for the Dominguez-Escalante NCA identifies Colorado hookless cactus as a priority species and includes species-specific protections that will continue into the future under the existing RMP. The species-specific protections include controlling noxious weeds, minimizing livestock use in Escalante Canyon, reducing route density within 200 m (656 ft) of Colorado hookless cactus occurrences, and limiting trail development and permitted activities in known habitat. BLM will continue monitoring and have a conservation goal that at least 80 percent of populations show evidence of

recruitment. Species-specific restrictions will also be applied within 100 m (328 ft) of any known occurrences for Colorado hookless cactus as long as it is a BLM sensitive species, in addition to the protections described above (BLM 2017, pp. II., 34–35). The NCA contains the Dominguez Canyon WSA and the Dominguez Canyon Wilderness.

BLM designates ACECs under FLPMA (43 U.S.C. 1702(a), 1712(c)(3)). ACECs do not have an expiration date, and removing an ACEC designation is not simple. A withdrawal of an ACEC can be made only by the Office of the Secretary (43 U.S.C. 1714); additionally, the ACECs that include *S. glaucus* and *S. dawsoniae* habitat were designated to protect multiple species and resources in addition to the Colorado hookless cactus (Service 2025, table 6, pp. 19–22). Likewise, NCAs, WSAs, and Wilderness Areas are designated to protect multiple resources, not only the Colorado hookless cactus (1964 Wilderness Act (Public Law 88-577)). Therefore, it is unlikely that these special management designations will change in the coming decades.

We describe each of these BLM areas with special management designations, and the specific protections they provide, in table 6 of the SSA report (Service 2025, pp. 19–22) and in table 2 of the 5-year status review (Service 2021, pp. 10–11). The current condition of the species provides insight into the effectiveness of these protected areas; all but one of the *S. glaucus* AUs and both *S. dawsoniae* AUs have high resiliency, including moderate to high habitat condition (see *Current Condition*, below; Service 2025, pp. 26–27). This conclusion demonstrates that both due to the species' natural hardiness and to these land protections and other conservation efforts, stressors are not currently meaningfully affecting the species' survival and growth.

No regulatory mechanisms or conservation efforts protect Colorado hookless cactus on private, State, or local lands.

International trade in all *Sclerocactus* species is regulated by the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), an

international agreement ratified by most countries worldwide since 1975. The purpose of CITES is to regulate the international wildlife trade to safeguard certain species from over-exploitation. *S. glaucus* is currently listed as an Appendix I species under CITES and will remain an Appendix I species after delisting under the Act. Trade in Appendix I species is permitted only in exceptional circumstances. Under CITES, exporters must obtain a permit for international shipment of specimens. Because Appendix I applies to the cactus family (*Cactaceae*), *S. dawsoniae* is also considered an Appendix I species (CITES 2024, entire; Leuteritz 2024, entire). More information on CITES can be found at: https://cites.org/eng/disc/how.php.

Cumulative Effects

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

For example, to assess current resiliency, we used a condition category table (see *Current Condition* below) to analyze how livestock use, invasive species, oil and gas development, OHV recreational use, development and maintenance of utility corridors, and the effects of global climate change, taken together, may influence habitat condition, survivorship, population size, and water availability. Similarly, we analyzed how changes in these stressors, when considered together, may influence habitat condition, survivorship, population size, and water availability in the future. We also considered

how these same stressors may affect the species' current and future redundancy and representation.

Current Condition

In our SSA report, we evaluate current condition by examining current levels of resiliency in the eight *S. glaucus* AUs and two *S. dawsoniae* AUs, and implications for redundancy and representation. Here, we summarize our evaluation of current condition for resiliency, redundancy, and representation. Additional detail regarding our analysis is provided in the SSA report (Service 2025, pp. 22–28).

Resiliency

We describe the resiliency for each of the 10 AUs in terms of the habitat and demographic factors needed by the Colorado hookless cactus (Service 2025, pp. 10–16, 22–28). We developed a categorical model to calibrate resiliency based on the range of habitat and demographic conditions in each AU. In a categorical model, we first identify resource or demographic factors that contribute to the species' resiliency; typically, these factors align with the individual resource needs and population-level needs we identified in the SSA analysis. We then define threshold values for each identified resource or demographic factor that represent high, moderate, or low levels of that factor. Finally, we evaluate whether the current levels of each resource or demographic factor in an AU fall within the predetermined thresholds for a high, moderate, or low score for the category; we then average these scores for each category to develop an overall current resiliency score for each AU.

For Colorado hookless cactus, our categorical model assessed the resiliency of each AU by evaluating (1) the condition of habitat in each AU based on an index that evaluates a number of habitat factors including invasive species cover, bare ground, native perennial cover, the relative size of the AU, and the probability of occurrence based on a BLM habitat suitability model (Holsinger and Krening 2021, p. 5); (2) the

summer water deficit, a proxy for drought and soil moisture that approximates the availability of water; (3) survival rates for each species, calculated from long-term monitoring data collected by BLM and the Denver Botanic Gardens; and (4) a minimum population size estimate for each AU provided by BLM (Service 2025, pp. 22–24). We selected these habitat and demographic factors based on their importance to the species' resiliency and because we could evaluate them relatively consistently across all 10 AUs. We then used this categorical model as a key to evaluate resiliency for each AU by systematically evaluating the current condition of each habitat and demographic factor. The AUs with higher overall resiliency are at less risk from potential stochastic events, such as climatic variation, than AUs with lower overall resiliency. Our SSA report provides additional detail regarding the methodology we used to evaluate resiliency for each of the 10 AUs (Service 2025, pp. 22–28).

When measured against the metrics outlined in our categorical model (Service 2025, pp. 22–24), all but one of the *S. glaucus* AUs have high resiliency. This finding is due to the large estimated number of individuals in each AU, high levels of survivorship, adequate habitat resources, and a current summer water deficit (averaged over the past decade) that is similar to the historical average. The only AU that does not have high resiliency is the Palisade AU, which has moderate resiliency overall due to its extremely small population size and moderate score for the habitat condition index. This AU is considerably smaller in area than the other AUs. A major highway (U.S. Interstate 70) and the Colorado River also cut through this AU, fragmenting the habitat. Additionally, a high proportion of this AU is on private and State lands, which contain existing forms of development (e.g., truck stop, shooting range, power plant) that present additional stressors to the species and its habitat (Lincoln 2021, pers. comm.).

Both *S. dawsoniae* AUs have high resiliency (see table 1 below). This score is due to the high estimated number of individuals in each AU, high levels of survivorship, high

and moderate availability of habitat features that support the species, and a current summer water deficit that is similar to the historical average. The stressors operating in the Plateau Creek AU and the Roan Creek AU are comparable, but the Plateau Creek AU is geographically smaller, which partly influences its lower rating for the population size category (Lincoln 2021, pers. comm.).

Rangewide monitoring efforts have demonstrated a stable trend over recent years and have also provided a detailed understanding of demographic features and population dynamics. Across their limited ranges, both species of Colorado hookless cactus are relatively abundant, which contributes to the high levels of resiliency in all but one AU. At the time of listing in 1979 (prior to current taxonomic revisions – See **Background** for discussion of taxonomy), it was thought that the combined total for what are now considered to be four separate species (*S. glaucus, S. dawsoniae, S. brevispinus, and S. wetlandicus*) consisted of approximately 15,000 individual plants in both Colorado and Utah (44 FR 58868, October 11, 1979). After the taxonomic split in 2009, estimates from CNHP suggested there were approximately between 19,000 and 22,000 plants for the total rangewide number of individuals in both species (*S. glaucus* and *S. dawsoniae*), based on observations within element occurrence records, which do not represent a total count of plants for the entire range of the species (Service 2025, pp. 13–14). However, as we discuss below, we now know that there are many more plants than previously reported.

BLM conducted a novel sampling-based procedure to estimate the minimum population size of *S. glaucus* from 16 sampled macroplots across the species' range that encompass a variety of different habitat conditions informed by a species-specific habitat index (Krening et al. 2021a, entire). They estimated the total minimum population size for the taxon by applying the average minimum plant density estimate of the sampled macroplots to *S. glaucus'* total rangewide occupied habitat acreage. To provide a

conservative rangewide estimate across all landownerships (BLM, private, State, and local lands), BLM applied the 90 percent lower confidence level value as the minimum population size for each AU. Despite their conservative approach, this method produced a population size estimate for the species that is much higher than previous estimates (Krening et al. 2021a, entire).

BLM conducted a similar procedure to estimate the minimum population size for *S. dawsoniae* (Krening and Holsinger 2024, entire; Service 2025, pp. 20–21). BLM estimated minimum plant densities in 30 sampled macroplots using the same methods as the *S. glaucus* study described above. BLM did not apply the 90 percent lower confidence level value as the minimum population size for each *S. dawsoniae* AU because of the increased sample size and spatially balanced design (Krening and Holsinger 2024, entire).

Using this sampling-based procedure to determine the minimum number of plants in each AU, *S. glaucus* has a minimum population estimate of at least 68,120 plants (90 percent lower confidence level estimate), and *S. dawsoniae* has a minimum population estimate of 17,362 plants (Service 2025, p. 14; Krening et al. 2021a, p. 8; Krening and Holsinger 2024, entire). Based on the most recent (2023) BLM monitoring report for the species, both species demonstrate an increasing trend compared to the baseline density (Krening and DePrenger-Levin 2023, pp. 6–7).

Table 1—Resiliency of *S. glaucus* and *S. dawsoniae*

[Based on current demographic, distribution, and habitat conditions in the species' AUs (Service 2025, pp. 26–28).]

Species	Analysis unit	Habitat condition index	Survivorship	Minimum population size	Summer water deficit*	Overall AU resiliency score
S. glaucus	Whitewater	High	High	High	High	High
	Palisade	Moderate		Low	High	Moderate
	Dominguez-Escalante	High		High	High	High
	North Fruita Desert	Moderate		Moderate	High	High
	Devil's Thumb	High		Moderate	High	High
	Cactus Park	High		High	High	High
	Gunnison Gorge	Moderate		Moderate	High	High
	Gunnison River East	High		High	High	High
S. dawsoniae	Plateau Creek	Moderate	High	Moderate	High	High
	Roan Creek	High		High	High	High

*Note: "High" in summer water deficit refers to a high resiliency rating, rather than a high water deficit.

Redundancy

Redundancy describes the number and distribution of AUs, such that the greater the number and the wider the distribution of the AUs, the better the Colorado hookless cactus can withstand catastrophic events. The plausibility of catastrophic events also influences species' redundancy; if catastrophic events are unlikely within the range of the species, catastrophic risk is inherently lower. We are unaware of any plausible activity or naturally occurring event that would constitute a catastrophic event for Colorado hookless cactus. For example, fire is not a common occurrence in *S. glaucus* or *S. dawsoniae* habitat as this habitat lacks the fuels to sustain a burn, though increased invasive species presence could elevate this risk (Service 2025, p. 28). Additionally, the range of *S. glaucus* and *S. dawsoniae* contains natural and humanmade barriers (i.e., rivers, canyons, highways) that would constrain the spread of any catastrophic fire throughout the entire range of Colorado hookless cactus. Redundancy for narrow endemic species is intrinsically limited; however, *S. glaucus* plants are distributed broadly across the range of the species in eight AUs, providing redundancy throughout its relatively small geographic range. With only two AUs, *S. dawsoniae* redundancy is limited; however, as a narrowly endemic plant, it has likely always had a small range and limited redundancy, and there has not been a known decrease in redundancy compared with its historical range. Additionally, given the lack of plausible catastrophic events across the range of *S. glaucus* and *S. dawsoniae*, even the narrow range of *S. dawsoniae* does not introduce appreciable catastrophic risk.

Representation

S. glaucus and *S. dawsoniae* exhibit some ecological and morphological variability, coupled with low to moderate genetic diversity among AUs (McGlaughlin and Naibauer 2021, p. 22). Inbreeding is not an immediate concern for either species (McGlaughlin and Naibauer 2021, p. 22). Additionally, *S. glaucus* demonstrates

sufficient connectivity, which results in ongoing and recent genetic exchange (McGlaughlin and Naibauer 2021, p. 2). *S. dawsoniae* is genetically isolated and diverged from *S. glaucus*; all genetic analyses support that *S. dawsoniae* is a distinct entity (McGlaughlin and Naibauer 2024, entire).

Future Scenarios and Future Condition

In our SSA report, we forecasted the resiliency of *S. glaucus* and *S. dawsoniae* AUs and their redundancy and representation to mid-century (the mean of projections for 2040 to 2069) using a range of plausible future scenarios. After mid-century, the changes in climate conditions that different climate models and emissions scenarios project begin to diverge widely (Rangwala et al. 2021, p. 4); in other words, the spread of potential projected temperature increases broadens substantially after mid-century. Therefore, we focused our analysis of future condition on mid-century to avoid the large uncertainty in climate change at the end of the twenty-first century (Rangwala et al. 2021, p. 4). We also selected this timeframe because we can make reliable predictions regarding changes in other stressors to *S. glaucus* and *S. dawsoniae*, such as land management. This timeframe encompasses at least one revision to BLM resource management plans and is biologically meaningful to *S. glaucus* and *S. dawsoniae* for us to begin to understand the response of ecosystems to those changes.

We used future climate models downscaled to the ranges of *S. glaucus* and *S. dawsoniae*, in combination with forecasted changes in the location and intensity of stressors, to develop three future scenarios and evaluate the condition of *S. glaucus* and *S. dawsoniae* under each of those scenarios. By capturing a range of plausible future scenarios, we can assume that actual future conditions will likely fall somewhere between these projected scenarios. Detailed descriptions of each scenario are available in the SSA report (Service 2025, pp. 28–36).

As many of the stressors that affect *S. glaucus* and *S. dawsoniae* occur on BLM lands, future scenarios were developed with input from BLM about plausible changes in the location and intensity of stressors on BLM land. Given some level of uncertainty about the conditions that will occur by mid-century, these scenarios represent three future conditions—optimistic, continuation, and pessimistic—to capture the plausible range of future conditions the species may experience. Therefore, our evaluation of future conditions presents a plausible range of expected species responses. While the metrics used to assess the current resiliency of *S. glaucus* and *S. dawsoniae* AUs are quantitative, we do not have a reliable way to quantitatively forecast these metrics into the future. Instead, future conditions are expressed qualitatively, using the results of our current condition analysis as the baseline. Species experts used professional judgment to predict how the species and their habitats would respond to each future scenario (Krening 2021, pers. comm.).

Optimistic. In the optimistic scenario, the overall resiliency of each AU for both species remains the same as the current condition. Although the overall resiliency of each AU does not change, the resiliency of the Plateau Creek (*S. dawsoniae*) and Devil's Thumb (*S. glaucus*) AUs increases slightly due to higher ratings for habitat conditions and population size, respectively. Under this scenario, decreases in activities such as grazing and OHV use (consistent with current stipulations in BLM grazing permits and travel management plans) that degrade *S. glaucus* and *S. dawsoniae* habitat allow for passive restoration, which leads to improved habitat conditions in the Plateau Creek AU and an increase in population size in the Devil's Thumb AU. Summer water deficit is expected to slightly decrease, meaning more water is available for germination, growth, and reproduction. Redundancy and representation for *S. dawsoniae* increase under this scenario, as compared to the current condition, due to an increase in resiliency in the

Plateau Creek AU. Redundancy and representation of *S. glaucus* also increase slightly under this scenario due to an increase in resiliency in the Devil's Thumb AU.

Continuation. In the continuation scenario, we expect resiliency, redundancy, and representation to remain relatively unchanged from the current condition. Resiliency of the Palisade AU (*S. dawsoniae*) is moderate; resiliency of all other AUs is high. Despite the increase in water deficit as compared to historical conditions under this scenario (meaning that less water would be available to the plants), this slight decrease in water availability would have minimal impact because it is well within the range of variability that *S. glaucus* and *S. dawsoniae* have historically experienced.

Pessimistic. In the pessimistic scenario, hot and dry conditions may negatively affect survivorship and recruitment of the species. Water deficit is more than one standard deviation higher than the historical mean, meaning that, on average, less water is available to support germination, growth, and reproduction. Under the pessimistic scenario, although BLM land management direction and special land management designations do not change, continued ground disturbance and habitat degradation may occur. This projection could be driven by several factors: Livestock grazing without corrective action for impacts to the range may lead to increased impacts to habitat and plant communities; and increasing OHV use (due to increased demand from population growth), increasing demand for oil and gas development and utility corridor development, and an increase in invasive plant species may negatively affect the amount and quality of habitat available and reduce survival rates and overall population sizes, leading to a decrease in resiliency in the Whitewater, Palisade, North Fruita Desert, Devil's Thumb, Cactus Park, Gunnison Gorge, and Gunnison River East AUs (*S. glaucus*) and in the Plateau Creek AU (*S. dawsoniae*). Overall, one *S. glaucus* AU is in high condition, six *S. glaucus* AUs are in moderate condition, and one is in low condition. *S. dawsoniae* has one AU in high condition and one AU in moderate condition.

Redundancy and representation of *S. glaucus* decreases slightly in this scenario due to the decrease in resiliency in all but one AU; although no AUs are expected to be extirpated, each AU contains multiple clusters of plants, and some diversity within AUs could be lost. However, even in the most pessimistic plausible scenario, all but 1 of the 8 AUs are expected to have at least 500 to 10,000 plants, thereby preserving much of the species' redundancy and representation. Despite high and moderate resiliency of the two *S. dawsoniae* AUs, representation and redundancy are lower than under the optimistic and continuation scenarios and under current condition due to the Plateau Creek AU's moderate resiliency; this AU had high resiliency under all other scenarios. With only two known *S. dawsoniae* AUs, the loss of one of these AUs due to catastrophic, natural, or human-caused events would cause a severe loss of redundancy and representation of the species; however, loss of either AU is not expected, even under the pessimistic scenario. As with *S. glaucus*, some variation within AUs could be reduced under this scenario; however, ecological, morphological, and genetic variation will continue to be represented by the multiple AUs across *S. dawsoniae*'s range.

Determination of Colorado Hookless Cactus (*S. glaucus* and *S. dawsoniae*) Status

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 an endangered species or a threatened species. The Act defines an "endangered species" as a species in danger of extinction throughout all or a significant portion of its range, and a "threatened species" as a species 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 an endangered species or a 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.

When we listed the Colorado hookless cactus as threatened on October 11, 1979, we identified the potential development of oil shale deposits and gold mining (Factor A), off-road vehicle use (Factor A), collecting pressure (Factor B), livestock grazing (Factor C), and an inadequacy of existing regulatory mechanisms (Factor D) as threats to the existence of the species (44 FR 58868, October 11, 1979). In our SSA, we evaluated these stressors and additional stressors that were identified after the time of listing. Much more is presently known about the species' stressors than at the time of listing.

Several of the stressors identified in the original listing decision are no longer relevant. Given the taxonomic changes, and thus range extent changes, that the species has undergone in the past 40 years, oil shale and tar sands development and hybridization are no longer relevant stressors (Service 2025, p. 16). Additionally, collection from the wild has not occurred at the level anticipated at the time of listing; collection is not having population- or species-level effects on either species (Krening and Dawson 2020, p. 36). Thus, stressors that could influence both species of the Colorado hookless cactus at the AU or species scale include livestock use (Factor A), invasive species (Factor A), oil and gas development (Factor A), OHV recreational use (Factor A), development and maintenance of utility corridors (Factor A), and the effects of global climate change (Factor A). Although livestock grazing was categorized as a stressor under Factor C at the time of listing, we believe that the effects of livestock grazing are better characterized by Factor A. The spines on cactus plants generally make them undesirable forage to livestock; however, livestock can degrade habitat conditions by trailing through and trampling habitat. Only on rare occasions do cattle directly trample or dislodge cactus plants.

We also evaluated a variety of conservation efforts and mechanisms across the 10 AUs of both species that either reduce or ameliorate stressors or improve the condition of habitats or demographics. These conservation efforts and mechanisms include five BLM RMPs that, taken together, cover the range of the species. They include motorized recreation restrictions, energy development restrictions, and grazing management; research to aid in better understanding the effects of stressors on the species and guide conservation efforts; and habitat improvements and vegetation management (Service 2025, pp. 19–22, 28–36). With 72 percent of *S. glaucus* and 68 percent of *S. dawsoniae* AU acres occurring on BLM land, BLM's implementation of the regulatory mechanisms in their resource planning documents on all of their lands within the range of the species (Factor D) has helped to address the stressors we identified under Factors A and B. While we cannot attribute the currently high resiliency of both species (*S. glaucus* and *S. dawsoniae*) to one specific conservation measure, this high resiliency demonstrates the amelioration of relevant stressors and the adequacy of the existing regulatory mechanisms, both due to the combination of conservation measures in place and the hardiness of the plants (having a demonstrated ability to tolerate nearby disturbance).

In addition to the implementation of measures that minimize impacts to the Colorado hookless cactus on all BLM lands, approximately 30 percent of the land in *S. glaucus* AUs and 41 percent of the land in *S. dawsoniae* AUs have special BLM land management designations (Factor D), which further limit or exclude the authorization of certain land uses and further help to facilitate the maintenance and recovery of cactus occurrences, because they are areas where Colorado hookless cactus occurrences are not likely to be disturbed or adversely altered by land-use actions (Krening and Dawson 2020, p. 26). The protections provided by these management designations are not contingent upon the species' federally listed status.

Status Throughout All of Its Range: Sclerocactus glaucus

Currently, seven of the eight *S. glaucus* AUs have high resiliency, and one AU has moderate resiliency (Service 2025, pp. 26–28). The highly resilient AUs have high estimated numbers of individuals, high levels of survivorship, adequate habitat resources, and a current water deficit that is similar to the historical average. One AU has moderate resiliency due to its extremely small population size and moderate score for the habitat index; this AU covers a considerably smaller area than the other AUs. Rangewide monitoring has shown a stable trend for Colorado hookless cactus, with no indication of widespread decline. This monitoring has also informed our understanding that *S. glaucus* is currently much more abundant than originally estimated at the time of listing in 1979. At the time of listing, and prior to the taxonomic splits between the 2 Utah *Sclerocactus* species and Colorado's *S. glaucus* and *S. dawsoniae*, it was thought that the combined total for the now 4 species consisted of approximately 15,000 individual plants in both Colorado and Utah; now, the minimum population estimate for *S. glaucus* alone is 68,120 plants (90 percent lower confidence level).

We are unaware of any plausible activity or naturally occurring event that would constitute a catastrophic event for this species. Thus, while the species is a narrow endemic with a small range compared to wide-ranging species, *S. glaucus*'s relatively large range for a narrow endemic, with eight AUs, and the lack of plausible catastrophic events reduce catastrophic risk for this species, thereby enhancing redundancy. The individuals within and among the AUs also exhibit genetic, ecological, and morphological diversity, contributing to the species' representation.

Moreover, our understanding of the species' stressors has changed since the time Colorado hookless cactus was listed. Multiple identified stressors are no longer relevant to the species, given past taxonomic changes and subsequent changes in the geographic range of the species (i.e., oil shale and tar sands development) or because they are not occurring at a scale anticipated at the time of listing (i.e., collection). We also have found

that, while OHV use and invasive species have the potential to detrimentally impact Colorado hookless cactus, they have caused only minor, localized impacts (Krening and Dawson 2020, pp. 35, 38). Oil and gas development occurs in only a small portion of three of the eight *S. glaucus* AUs.

Since Colorado hookless cactus was listed, the BLM land in the species' range now includes NCAs, ACECs, a WSA, and a Wilderness Area (Service 2025, pp. 19–22). These designations limit or exclude the authorization of certain land uses, and most of these designations specifically reference the protection of Colorado hookless cactus as a foundational goal. The protections provided by these management designations are not contingent upon the species' federally listed status, and these designations have helped to facilitate the maintenance and recovery of cactus occurrences, because they are areas where Colorado hookless cactus is not likely to be disturbed or its habitat adversely altered by land-use actions (Krening and Dawson 2020, p. 26). While we cannot attribute the currently high resiliency of all but one AU to one specific conservation measure, this high resiliency demonstrates the amelioration of relevant stressors, both due to the combination of conservation measures in place and the hardiness of the plant (which has shown an ability to tolerate nearby disturbance).

Given the currently high level of resiliency in seven of the eight *S. glaucus* AUs and moderate resiliency of one AU, the additional plants we now know to occur throughout the species' range, the lack of significant imminent stressors, and the low likelihood of catastrophic events, we find that *S. glaucus* currently has sufficient ability to withstand stochastic and catastrophic events, and to adapt to environmental changes.

For the purposes of our analysis of the species' future condition, we defined the foreseeable future for both *S. glaucus* and *S. dawsoniae* to mid-century (the mean of 2040 to 2069). After mid-century, the changes in climate conditions that different climate models and emissions scenarios project begin to diverge widely (Rangwala et al. 2021, p.

4); in other words, after mid-century, there is a wide variability in temperature projections among different climate models. This variability makes future conditions beyond the mid-century difficult to reliably assess. Therefore, we focused our analysis of future condition on mid-century to avoid the large degree of uncertainty in how climate change is projected to manifest at the end of the twenty-first century (Rangwala et al. 2021, p. 4). We also selected this timeframe because it allows us to reliably predict changes in species' stressors and land management and is biologically meaningful to both species for us to begin to understand the response of ecosystems to those changes.

By mid-century, we anticipate a range of plausible future conditions for *S. glaucus*. Under the optimistic scenario, the condition of the species is likely to improve over the current condition, with resiliency projected to increase slightly in one *S. glaucus* AU. BLM's closure of certain OHV routes and effective implementation of changes in grazing permit stipulations would lead to decreased grazing and OHV pressures, causing improved habitat conditions and an increase in the number of individuals in the AU (Service 2025, pp. 31–32). In the continuation scenario, we expect resiliency, redundancy, and representation to remain relatively unchanged from the current condition, because stressors and conservation efforts would remain very similar to what the species is currently experiencing.

In the pessimistic scenario, although BLM management planning documents and special land management designations do not change, grazing without corrective action for impacts to the range, an increase in OHV use, increased demand for utility corridor development, an increase in invasive plant species, and a considerable decrease in water availability due to climate change may negatively affect the amount and quality of habitat available, and reduce survival rates and overall population sizes. This is the only scenario in which the condition of *S. glaucus* is projected to decline: One AU's resiliency remains high, six AUs decrease from high to moderate resiliency, and one AU decreases to low

resiliency. Even under this pessimistic scenario, the species maintains moderate levels of survival and high or moderate habitat condition in the majority of AUs, despite increasing stressors. In all three scenarios, all eight AUs will remain extant, thereby continuing to contribute to the redundancy and representation of the species.

Given these future projections of resiliency, redundancy, and representation to mid-century, *S. glaucus* could experience a slight decrease in viability under one of the three future scenarios (the pessimistic scenario); however, even in this most pessimistic scenario, all AUs will remain extant and seven of the eight AUs will have moderate to high resiliency.

Two factors support this consistently moderate to high future resiliency: BLM conservation actions and the species' biological characteristics. First, the high to moderate resiliency of *S. glaucus* AUs is, in part, due to land protections and regulations implemented by BLM (Factor D) that will continue to be implemented into the future, even in the absence of protections afforded by the Act, as described under Conservation Efforts and Regulatory Mechanisms above. These protections will continue to limit the potential effects of stressors on *S. glaucus* in the future.

Second, independent of future BLM management, the species' biological characteristics moderate its response to increasing stressors. *S. glaucus* is a habitat generalist, which means the species is not constrained to a specific habitat niche; the species' flexible resource requirements increase its resiliency to potential future increases in stressors and its ability to adapt to future change (representation). This determination is evidenced by *S. glaucus*' past ability to maintain high survivorship and resiliency, even in the face of ongoing stressors that the Service originally determined could lead to decline (e.g., OHV use, invasive species). Additionally, multiple modeling efforts have concluded that Colorado hookless cactus likely has low vulnerability to climate change, given its dispersal capabilities and opportunities for expansion into vast areas of suitable

habitat (Krening and Dawson 2020, pp. 43–44). Although conditions could become considerably drier under the pessimistic climate scenario, *S. glaucus* is hardy and already adapted to arid environments. Individuals of this species live many decades and have maintained healthy recruitment and survival, even through droughts and other climatic variation in the past (BLM 2018, pp. 14–15; Hegewisch and Abatzoglou 2020, entire). These characteristics allow the species to maintain moderate survivorship and resiliency, even under the pessimistic scenario.

After evaluating threats to the species and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, the species currently has sufficient levels of resiliency, redundancy, and representation, and is anticipated to maintain sufficient levels under each of the future scenarios, such that *S. glaucus* will be able to withstand stochastic events, catastrophic events, and environmental change now and into the foreseeable future. Thus, after assessing the best available information, we conclude that *S. glaucus* is not in danger of extinction now or likely to become so in the foreseeable future throughout all of its range.

Status Throughout All of Its Range: Sclerocactus dawsoniae

Currently, both *S. dawsoniae* AUs have high resiliency (Service 2025, pp. 26–28). The highly resilient AUs have moderate to high estimated numbers of individuals (i.e., a minimum population estimate of 17,362 plants total), high levels of survivorship, high and moderate condition of habitat features, and a current water deficit that is similar to the historical average. These high current levels of resiliency reduce the current extinction risk for *S. dawsoniae* because they lower the risk to the species from stochastic variation. Rangewide monitoring has shown a stable trend for *S. dawsoniae*, with no indication of widespread decline and greater abundance than originally estimated. When Colorado hookless cactus was listed in 1979 and prior to the taxonomic splits between the

2 Utah *Sclerocactus* species and Colorado's *S. glaucus* and *S. dawsoniae*, it was thought that the combined total for the now 4 species consisted of approximately 15,000 individual plants in both Colorado and Utah; now, the minimum population estimate for *S. dawsoniae* plants alone is 17,362.

Additionally, the two AUs and the individuals within the AUs exhibit ecological and morphological variability (McGlaughlin and Naibauer 2021, p. 22), contributing to the representation of the species. In terms of redundancy, we are unaware of any plausible activity or naturally occurring event that would constitute a catastrophic event for this species. Given the lack of plausible catastrophic events across the range of *S. dawsoniae*, even its narrow range (two AUs) does not introduce appreciable catastrophic risk.

Moreover, our understanding of stressors to the Colorado hookless cactus has changed since the time of the original listing rule (44 FR 58868; October 11, 1979). Multiple identified stressors are no longer relevant to the species, given past taxonomic changes and subsequent changes in the geographic range of the species (e.g., oil shale and tar sands development) or because they are not occurring at a scale anticipated at the time of listing (i.e., collection). We also have found that, while OHV use and invasive species had the potential to detrimentally impact the species, they have caused only minor, localized impacts (Krening and Dawson 2020, pp. 35, 38).

Since Colorado hookless cactus was listed, NCAs, ACECs, a WSA, and a Wilderness Area have been designated on BLM land where the species occurs (Service 2025, pp. 19–22). These designations limit or exclude the authorization of certain land uses, and most of these designations specifically reference the protection of Colorado hookless cactus as a foundational goal. The protections provided by these management designations are not contingent upon the species' federally listed status, and these designations have helped to facilitate the maintenance and recovery of cactus

occurrences, because they are areas where Colorado hookless cactus is not likely to be disturbed or adversely altered by land-use actions (Krening and Dawson 2020, p. 26). While we cannot attribute the currently high resiliency of both AUs to one specific conservation measure, this high resiliency demonstrates the amelioration of relevant stressors, both due to the combination of conservation measures in place and the hardiness of the plant (which has shown an ability to tolerate nearby disturbance).

By mid-century (the foreseeable future), we anticipate a range of plausible future conditions for *S. dawsoniae*. Under the optimistic scenario, the condition of the species improves, with resiliency expected to increase slightly in one *S. dawsoniae* AU due to decreased grazing and OHV pressures, causing improved habitat conditions. In the continuation scenario, we expect resiliency, redundancy, and representation to remain relatively unchanged from the current condition, as stressors and conservation efforts remain very similar to what the species is currently experiencing. In the pessimistic scenario, although BLM management planning documents and special land management designations do not change, continued livestock grazing without corrective action for impacts to the range, increasing demand for oil and gas development and utility corridor development, and an increase in invasive plant species will cause ground disturbance and habitat degradation that is projected to negatively affect the species, which would cause a decrease in resiliency in one of the two *S. dawsoniae* AUs. Additionally, only under this pessimistic scenario does water availability drop considerably below the historical average (i.e., more than one standard deviation). This is the only scenario in which we foresee resiliency decreasing for either of the species' two AUs; one AU's resiliency remains high, and one AU decreases to moderate resiliency. Even in the pessimistic scenario, survivorship in both AUs remains high. In all three scenarios, both AUs will remain extant, thereby continuing to contribute to the redundancy and representation of the species.

Given these future projections of resiliency, redundancy, and representation to mid-century, *S. dawsoniae* could experience a slight increase in extinction risk under one of the three future scenarios; however, even in the pessimistic scenario, both AUs will remain extant with moderate to high resiliency. Two factors support this moderate to high future resiliency: BLM conservation actions and the species' biological characteristics. First, this high to moderate resiliency of *S. dawsoniae* AUs is, in part, due to land protections and regulations implemented by BLM (Factor D) that will continue to be implemented into the future even in the absence of protections afforded by the Act, as described under Conservation Efforts and Regulatory Mechanisms above. These protections will continue to limit the potential effects of stressors on *S. dawsoniae* in the future.

Second, independent of future BLM management, the species' biological characteristics moderate its response to increasing stressors. Like *S. glaucus*, *S. dawsoniae* is a habitat generalist, which means the species is not constrained to a specific habitat niche; the species' flexible resource requirements increase its resiliency to potential future increases in stressors and its ability to adapt to future change (representation). This finding is evidenced by *S. dawsoniae*'s past ability to maintain high survivorship and resiliency, even in the face of ongoing stressors that the Service originally determined could lead to decline (e.g., OHV use, invasive species). Additionally, multiple modeling efforts have indicated that Colorado hookless cactus likely has low vulnerability to climate change, given its dispersal capabilities and opportunities for expansion into vast areas of suitable habitat (Krening and Dawson 2020, pp. 43–44). Although conditions could become considerably drier under the pessimistic climate scenario, *S. dawsoniae* is hardy and already adapted to arid environments. Individuals of this species live many decades and have maintained healthy recruitment and survival, even through droughts and other climatic variation in the past (BLM 2018,

pp. 14–15; Hegewisch and Abatzoglou 2020, entire). These characteristics would allow *S. dawsoniae* to maintain high survivorship and moderate to high resiliency, even under the pessimistic scenario.

After evaluating threats to the species and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, the species currently has sufficient levels of resiliency, redundancy, and representation, and is anticipated to maintain sufficient levels in each of the plausible future scenarios, such that *S. dawsoniae* will be able to withstand stochastic events, catastrophic events, and environmental change now and within the foreseeable future. Therefore, after assessing the best available information, we conclude that *S. dawsoniae* is not in danger of extinction now or likely to become so in the foreseeable future throughout all of its range.

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 within the foreseeable future throughout all or a significant portion of its range. Having determined that *S. glaucus* and *S. dawsoniae* are not in danger of extinction or likely to become so in the foreseeable future throughout all of their range, we now consider whether either may be in danger of extinction (i.e., endangered) or likely to become so in the foreseeable future (i.e., threatened) in a significant portion of its range—that is, whether there is any portion of the species' range for which both (1) the portion is significant; and (2) the species is in danger of extinction 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 *S. glaucus* and *S. dawsoniae*, we choose to address the status question first. We began by identifying portions of the range where the biological status of the species may be different from their biological status elsewhere in their range. For this purpose, we considered information pertaining to the geographic distribution of (a) individuals of the species, (b) the threats that the species face, and (c) the resiliency condition of populations.

For *S. glaucus*, we evaluated the range of the species to determine if the species is in danger of extinction now or likely to become so in the foreseeable future in any portion of its range. The range of a species can theoretically be divided into portions in an infinite number of ways. We focused our analysis on portions of the species' range that may meet the definition of an endangered species or a threatened species. For *S. glaucus*, we considered whether the threats or their effects on the species are greater in any biologically meaningful portion of the species' range than in other portions such that the species is in danger of extinction now or likely to become so in the foreseeable future in that portion. We examined the following threats: livestock use, invasive species, oil and gas development, OHV use, development and maintenance of utility corridors, and climate change, including cumulative effects.

Livestock use, invasive species, OHV use, development and maintenance of utility corridors, and climate change occur uniformly across the species' range; there are no portions of the species' range where these stressors occur more intensely. Oil and gas development is occurring in only three AUs (North Fruita Desert, Whitewater, and Palisade AUs), so this threat may be elevated in this area. However, despite this development activity, the North Fruita Desert and Whitewater AUs currently have high resiliency and are expected to maintain this high resiliency under two of three future scenarios. Under the pessimistic scenario, North Fruita Desert and Whitewater AUs have moderate resiliency. Oil and gas development is occurring in only a small portion of the

Palisade AU (there is only one active well site across more than 9,269 ac (3,751 ha)), and, while this AU has moderate resiliency currently and could drop to low resiliency under the pessimistic scenario, this possible change is due to the AU's small size and thus inherently low number of plants, not due to oil and gas development. Thus, even though oil and gas development may be concentrated in these AUs, it is not producing a species' response that would indicate the plants therein are in danger of extinction now or in the foreseeable future.

Moreover, although the Palisade AU has a low population size and is the only AU to rank low in resiliency in any future scenario, the AU occupies the smallest area of any *S. glaucus* AU and contributes the least to the species' redundancy and representation. Therefore, this AU is not considered to be a biologically meaningful portion of the species' range where threats are impacting individuals differently from how they are affecting the species elsewhere in its range such that the status of the species in that portion differs from its status in any other portion of the species' range.

Overall, we found no biologically meaningful portions of *S. glaucus*' range where threats are impacting individuals differently from how they are affecting the species elsewhere in its range such that the status of the species in that portion differs from its status in any other portion of the species' range.

Therefore, we find that the species is not in danger of extinction or likely to become so within the foreseeable future in any significant portion of its range. This does not conflict with the courts' holdings in *Desert Survivors* v. *Department of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018) and *Center for Biological Diversity* v. *Jewell*, 248 F. Supp. 3d. 946, 959 (D. Ariz. 2017) because, in reaching this conclusion, we did not apply the aspects of the Final Policy on Interpretation of the Phrase "Significant Portion of Its Range" in the Endangered Species Act's Definitions of

"Endangered Species" and "Threatened Species" (79 FR 37578, July 1, 2014), including the definition of "significant" that those court decisions held to be invalid.

For *S. dawsoniae*, we evaluated the range of the species to determine if the species is in danger of extinction now or likely to become so in the foreseeable future in any portion of its range. The range of a species can theoretically be divided into portions in an infinite number of ways. We focused our analysis on portions of the species' range that may meet the definition of an endangered species or a threatened species. For *S. dawsoniae*, we considered whether the threats or their effects on the species are greater in any biologically meaningful portion of the species' range than in other portions such that the species is in danger of extinction or likely to become so within the foreseeable future in that portion. We examined the following threats: livestock use, invasive species, oil and gas development, OHV use, development and maintenance of utility corridors, and climate change, including cumulative effects.

Overall, the threats to this species are uniformly distributed throughout its range, and we did not identify a significant concentration of threats or the species' response to those threats that would increase extinction risk in any portion. Oil and gas development occurs in both AUs, as does livestock use, OHV use, invasive species infestation, and development and maintenance of utility corridors. The small range of the species will not experience substantially different temperature or precipitation changes as a result of climate change.

We found no biologically meaningful portions of *S. dawsoniae*'s range where threats are impacting individuals differently from how they are affecting the species elsewhere in its range such that the status of the species in that portion differs from its status in any other portion of the species' range.

Therefore, we find that the species is not in danger of extinction or likely to become so within the foreseeable future in any significant portion of its range. This

finding does not conflict with the courts' holdings in *Desert Survivors* v. *Department of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018) and *Center for Biological Diversity* v. *Jewell*, 248 F. Supp. 3d. 946, 959 (D. Ariz. 2017) because, in reaching this conclusion, we did not apply the aspects of the Final Policy on Interpretation of the Phrase "Significant Portion of Its Range" in the Endangered Species Act's Definitions of "Endangered Species" and "Threatened Species" (79 FR 37578, July 1, 2014), including the definition of "significant" that those court decisions held to be invalid.

Determination of Status

Based on the best scientific and commercial data available, we determine that *S. glaucus* and *S. dawsoniae* do not meet the definition of an endangered species or a threatened species in accordance with sections 3(6) and 3(20) of the Act. In accordance with our regulations at 50 CFR 424.11(e)(2) currently in effect, *S. glaucus* and *S. dawsoniae* have recovered to the point at which they no longer meet the definition of an endangered species or a threatened species. Therefore, we are removing Colorado hookless cactus (*S. glaucus* and *S. dawsoniae*) from the Federal List of Endangered and Threatened Plants.

Effects of This Rule

This rule revises 50 CFR 17.12(h) by removing Colorado hookless from the Federal List of Endangered and Threatened Plants. On the effective date of this rule (see **DATES**, above), the prohibitions and conservation measures provided by the Act, particularly through sections 7 and 9, will no longer apply to this species. Federal agencies will no longer be required to consult with the Service under section 7 of the Act in the event that activities they authorize, fund, or carry out may affect Colorado hookless cactus (*S. glaucus* and *S. dawsoniae*).

There is no critical habitat designated for this species, so there will be no effect to 50 CFR 17.96.

Post-delisting Monitoring

Section 4(g)(1) of the Act requires us, in cooperation with the States, to implement a monitoring program for not less than 5 years for all species that have been recovered. Post-delisting monitoring (PDM) refers to activities undertaken to verify that a species delisted due to recovery remains secure from the risk of extinction after the protections of the Act no longer apply. The primary goal of PDM is to monitor the species to ensure that its status does not deteriorate, and if a decline is detected, to take measures to halt the decline so that proposing it as endangered or threatened is not again needed. If at any time during the monitoring period data indicate that protective status under the Act should be reinstated, we can initiate listing procedures, including, if appropriate, emergency listing.

We have prepared a PDM plan for Colorado hookless cactus (*S. glaucus* and *S. dawsoniae*). We published a notice of availability of a draft PDM plan with the proposed delisting rule (88 FR 21582, April 11, 2023), and we addressed all comments to the plan under **Summary of Comments and Recommendations** and revised the draft PDM plan according to the information we received. Therefore, we consider the plan final. As discussed in the proposed rule, the PDM plan: (1) Summarizes the status of Colorado hookless cactus (*S. glaucus* and *S. dawsoniae*) at the time of proposed delisting; (2) describes frequency and duration of monitoring; (3) discusses monitoring methods and potential sampling regimes; (4) defines what potential triggers will be evaluated to address the need for additional monitoring; (5) outlines reporting requirements and procedures; (6) proposes a schedule for implementing the PDM plan; and (7) defines

responsibilities. It is our intent to work with our partners toward maintaining the recovered status of Colorado hookless cactus (*S. glaucus* and *S. dawsoniae*).

Required Determinations

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951, May 4, 1994), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), the President's memorandum of November 30, 2022 (Uniform Standards for Tribal Consultation; 87 FR 74479, December 5, 2022), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with federally recognized Tribes and Alaska Native Corporations on a government-to-government basis. In accordance with Secretaries' Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. We notified the Ute Mountain, Jicarilla Apache Nation, Southern Ute, Ute Mountain Ute, and Navajo Nation Tribes of our recommendation to delist the Colorado hookless cactus in our 5-year status review in 2021, and of the proposed delisting rule (88 FR 21582, April 11, 2023). We did not receive comments from Tribes, and we are not aware of any Tribal interests or concerns associated with this final determination.

References Cited

A complete list of references cited in this rulemaking is available on the internet at https://www.regulations.gov and upon request from the Colorado Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this rule are the staff members of the Fish and Wildlife Service's Species Assessment Team and the Colorado Ecological Services Field Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Plants, Reporting and recordkeeping requirements, Transportation.

Signing Authority

Paul Souza, Regional Director, Region 8, Exercising the Delegated Authority of the Director of the U.S. Fish and Wildlife Service, approved this action on April 24, 2025, for publication. On May 21, 2025, Paul Souza authorized the undersigned to sign the document electronically and submit it to the Office of the Federal Register for publication as an official document of the U.S. Fish and Wildlife Service.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

§ 17.12 [Amended]

2. In § 17.12, amend paragraph (h) by removing the entry for "*Sclerocactus glaucus*" under Flowering Plants from the List of Endangered and Threatened Plants.

Madonna Baucum,
Regulations and Policy Chief,
Division of Policy, Economics, Risk Management, and Analytics of the Joint Administrative Operations,
U.S. Fish and Wildlife Service.

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