

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA



Seventeenth meeting of the Conference of the Parties
Johannesburg (South Africa), 24 September – 5 October 2016

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Transfer of fishhook cacti *Sclerocactus spinosior* ssp. *blainei* (= *Sclerocactus blainei*), *Sclerocactus cloverae* (CITES-listed synonym of *Sclerocactus parviflorus*), and *Sclerocactus sileri* from Appendix II to Appendix I, as per the outcome of the CITES Periodic Review of the Appendices, in accordance with Resolution Conf. 9.24 (Rev. CoP16), Annex 1, paragraph B) iii): Populations are restricted and are characterized by a high vulnerability to intrinsic and extrinsic factors and an observed, inferred, or projected decrease in the number of subpopulations and the number of individuals.

Nomenclature amendment to the Appendix-I listing of *Sclerocactus glaucus*, formerly treated as a complex, to three distinct species: *Sclerocactus glaucus*, *Sclerocactus brevispinus*, and *Sclerocactus wetlandicus* (the last two are CITES-listed synonyms of *S. glaucus*), as per the outcome of a Periodic Review of the Appendices. The three species continue to meet the criteria for Appendix I in accordance with Resolution Conf. 9.24 (Rev. CoP16), Annex 1, paragraph B) iii): Populations are restricted and are characterized by a high vulnerability to intrinsic and extrinsic factors and an observed, inferred, or projected decrease in the number of subpopulations and the number of individuals.

B. Proponent

The United States of America*

C. Supporting statement

1. Taxonomy

1.1 Class: Magnoliopsida

1.2 Order: Caryophyllales

1.3 Family: Cactaceae

1.4 Genus, species or subspecies, including author and year:

The scientific names *Sclerocactus blainei* (CITES-listed *Sclerocactus spinosior* ssp. *blainei*) and *Sclerocactus cloverae* (CITES-listed synonym of *Sclerocactus parviflorus*) will be used hereafter in this proposal.

Sclerocactus blainei S.L. Welsh & K.H. Thorne 1985

Sclerocactus cloverae K.D. Heil & J.M. Porter 1994

* The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.

Sclerocactus cloverae ssp. *brackii* K.D. Heil & J.M. Porter 1994

Sclerocactus cloverae ssp. *cloverae* K.D. Heil & J.M. Porter 1994

Sclerocactus sileri (L.D. Benson) K.D. Heil & J.M. Porter 1994

Nomenclature amendment to the Appendix-I listing of *Sclerocactus glaucus*:

Sclerocactus brevispinus K.D. Heil & J.M. Porter 1994

Sclerocactus glaucus (K. Schumann) L.D. Benson 1966

Sclerocactus wetlandicus F. Hochstätter 1989

1.5 Scientific synonyms:

Sclerocactus blainei: *Sclerocactus spinosior* (Engelmann) D. Woodruff & L.D. Benson ssp. *blainei* (S.L. Welsh & K.H. Thorne) Hochstätter; *Pediocactus spinosior* (Engelmann) ssp. *blainei* (S.L. Welsh & K.H. Thorne) Halda; *Pediocactus spinosior* (Engelmann) Halda var. *schlesseri* (K.D. Heil & S.L. Welsh) Halda; *Sclerocactus schlesseri* K.D. Heil & S.L. Welsh.

Sclerocactus cloverae: *Sclerocactus parviflorus* Clover & Jotter; *Pediocactus cloverae* (K.D. Heil & J.M. Porter) Halda; *Sclerocactus cloveriae* K.D. Heil & J.M. Porter; *Sclerocactus whipplei* (Engelmann & J.M. Bigelow) Britton & Rose ssp. *cloverae*; *Sclerocactus whipplei* (Engelmann & J.M. Bigelow) Britton & Rose var. *heilii* Castetter, P. Pierce & K.H. Schwerin; *Sclerocactus whipplei* ssp. *heilii* (Castetter, P. Pierce & K.H. Schwerin) D.R. Hunt; *Sclerocactus whipplei* var. *ilseae* Hochstätter; *Sclerocactus whipplei* var. *reevesii* Castetter, P. Pierce & K.H. Schwerin.

Sclerocactus cloverae ssp. *brackii*: *Sclerocactus parviflorus* ssp. *parviflorus* Clover & Jotter; *S. whipplei* ssp. *whipplei* (Engelmann & J.M. Bigelow) Britton & Rose; *Sclerocactus cloveriae* ssp. *brackii* K.D. Heil & J.M. Porter; *Sclerocactus cloveriae* ssp. *brackii* (K.D. Heil & J.M. Porter) Halda; *Pediocactus cloverae* (Heil & Porter) Halda ssp. *brackii* (Heil & Porter) Halda.

Sclerocactus cloverae ssp. *cloverae*: *Sclerocactus whipplei* ssp. *heilii* (Castetter, P. Pierce & Schwerin) Hunt.

Sclerocactus sileri: *Sclerocactus pubispinus* (Engelmann) D. Woodruff & L.D. Benson var. *sileri* L.D. Benson; *Pediocactus pubispinus* (Engelmann) D. Woodruff & L.D. Benson ssp. *sileri* (L.D. Benson) Halda; *Pediocactus whipplei* (Engelmann & J. M. Bigelow) Arp subsp. *busekii* (Hochstätter) Halda; *Sclerocactus whipplei* (Engelmann & J. M. Bigelow) Britton & Rose subsp. *busekii* Hochstätter.

Sclerocactus brevispinus: *Sclerocactus wetlandicus* Hochstätter var. *ilseae* Hochstätter.

Sclerocactus glaucus: *Echinocactus glaucus* K. Schumann; *Echinocactus glaucus* Karw. Ex Pfeiff; *Echinocactus whipplei* var. *glaucus* (Schumann) J.A. Purpus; *Ferocactus glaucus* (K. Schumann) N.P. Taylor; *Pediocactus glaucus* (K. Schumann) Arp; *Sclerocactus whipplei* (Engelmann & J. M. Bigelow) Britton & Rose var. *glaucus* (K. Schumann) S.L. Welsh; *Sclerocactus franklinii* J.W. Evans.

Sclerocactus wetlandicus: *Pediocactus wetlandicus* (Hochstätter) Halda.

- 1.6 Common names: English: *Sclerocactus blainei*-Blaine's pincushion, Blaine's barrel cactus
Sclerocactus cloverae-New Mexico fishhook cactus
Sclerocactus sileri-Siler's fishhook cactus
Sclerocactus brevispinus-Pariette cactus
Sclerocactus glaucus-former name Unita Basin hookless cactus is now Colorado hookless cactus

Sclerocactus wetlandicus-Unita Basin hookless cactus
French: cacto
Spanish: cactus

1.7 Code numbers: Not applicable

2. Overview

The Cactaceae family was listed in the CITES Appendices when the Convention entered into force in July 1975. The genus *Sclerocactus* is comprised of slow-growing, short cylindrical, spiny succulent plants. The range of *Sclerocactus* is southwestern United States of America and northern Mexico, with the majority of species endemic to the United States America, including the species covered under this proposal.

The recommendation to transfer *S. blainei*, *S. cloverae*, and *S. sileri* from Appendix II to Appendix I, and to recognize *S. brevispinus* and *S. wetlandicus* as distinct species and to retain the two species and *S. glaucus* in Appendix I are based on the results of the CITES Periodic Review of *Sclerocactus* species in the United States conducted by the United States Scientific Authority. The results of the periodic review were presented at the 22nd meeting of the Plants Committee [Tbilisi, October 2015; PC22 Doc. 20.3.3 (Rev. 1)]. The Plants Committee adopted the recommendations of the Periodic Review Working Group (PC22 Com. 2) to transfer *S. blainei*, *S. cloverae*, and *S. sileri* from Appendix II to Appendix I, and to recognize and retain *S. brevispinus*, *S. glaucus*, and *S. wetlandicus* as distinct species in Appendix I (PC22 Sum 5 (Rev. 1)).

Sclerocactus blainei is known from 3 occurrences in the States of Nevada and Utah; the species conservation status is Critically Imperiled (NatureServe 2016). *Sclerocactus cloverae* is known from 21 to 80 occurrences in the States of Colorado and New Mexico, and the Navajo Nation in New Mexico; the species conservation status is Vulnerable (NatureServe 2016). *Sclerocactus sileri* is known from 10-12 occurrences in the State of Arizona; the species conservation status is Critically Imperiled (NatureServe 2015).

Sclerocactus blainei, *S. cloverae*, and *S. sileri* are threatened by the harvest of seeds and plants. The seeds are particularly vulnerable to harvest, which are more often collected than live plants because they are easy to carry and transport, and are not regulated under the CITES Appendix-II listing annotation. The harvest of even a small number of seeds or plants can adversely affect the species' reproductive potential and perhaps the long-term survival of these species. The three species are characterized by a high vulnerability to harvest due to their biological life history traits, habitat degradation, and predation, which are exacerbated by the effects of prolonged drought and climate change. The restricted distributions and small population sizes of the three species coupled with the persistent threats are the primary justification for the transfer of the species to Appendix I.

The accepted nomenclature for *S. blainei* and *S. cloverae* has changed since the inclusion of the species in the CITES Appendices, and the 1999 publication of the *CITES Cactaceae Checklist* 2nd ed. (Hunt 1999), the CITES Standard Reference for the family. Thus the *Checklist of CITES Species* and *Species+* will require amending to reflect the accepted nomenclature for these species.

Sclerocactus blainei is the valid scientific name for this species (Heil and Porter 2004; Porter and Prince 2011; Butterworth 2015), and the name officially recognized by the range States. At CoP12 (Santiago 2002), the United States submitted a proposal (CoP12 Prop. 47) to transfer *S. spinosior* ssp. *blainei* from Appendix II to Appendix I, which was withdrawn at the meeting due to concerns raised about the taxonomic status of the taxon. The nomenclature for this species has since been resolved (Heil and Porter 2004).

Sclerocactus cloverae is the valid scientific name for this species (Heil and Porter 2004; Porter and Prince 2011; Butterworth 2015), and the name officially recognized by the range States.

Sclerocactus brevispinus and *S. wetlandicus* were formerly treated as a complex within *S. glaucus* (Benson 1966, 1982). This taxonomic classification is no longer supported based on the results of population genetic research (Porter *et al.* 2000; Porter *et al.* 2012), common garden studies (Welsh *et al.* 2003), and a re-evaluation of the morphological characteristics of *S. glaucus* (Heil and Porter 2004). Based on the results of the studies, *S. glaucus* complex was separated into the three distinct species (Heil and Porter 2004; USFWS 2009). In addition to the morphologically and genetically distinctiveness of the three species, the ranges of *S. brevispinus* and *S. wetlandicus* are geographically isolated from

S. glaucus. Whereas *S. glaucus* is endemic to Colorado, *S. brevispinus* and *S. wetlandicus* are endemic to Utah (Heil and Porter 2004; USFWS 2009; Porter and Prince 2011).

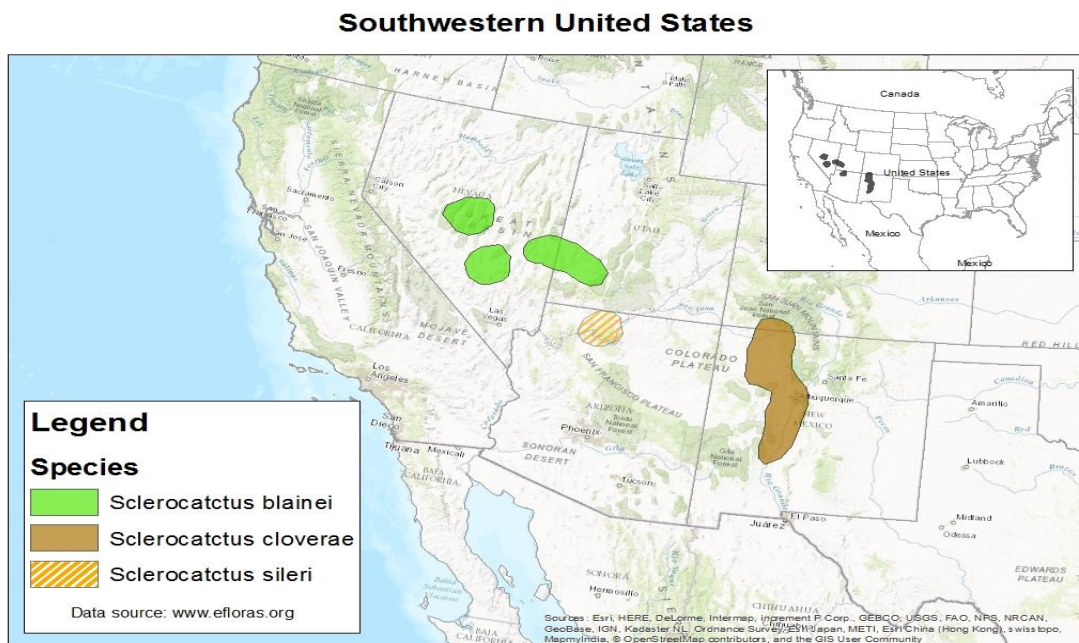
The taxonomic and nomenclature of *S. glaucus* as three distinct species is accepted by the range States and the *Flora of North America* (Heil and Porter 2004), as well as other publications and taxonomic databases (Utah Native Plant Society 2003-2015; Heil and Porter 2004; USFWS 2009; Butterworth and Porter 2013; Heil *et al.* 2013; Butterworth 2015). The three species are individually listed as Threatened under the United States Endangered Species Act of 1973, as amended. The IUCN Red List of Threatened Species categorizes *S. brevispinus* as Critically Endangered (Butterworth and Porter 2013). *Sclerocactus brevispinus*, *S. glaucus*, and *S. wetlandicus* are threatened by the harvest and trade of seeds and plants, and are characterized by a high vulnerability to harvest due to their biological life history traits, habitat degradation, and predation, which are exacerbated by the effects of prolonged drought and climate change. The restricted distributions and small population sizes of the three species coupled with the persistent threats are the primary justification to retain the three species in Appendix I.

The continual misclassification of *S. brevispinus* and *S. wetlandicus* as currently recognized under CITES, facilitates international trade in wild-harvested specimens of the species. Thus it is necessary that the CITES Appendices, the *Checklist of CITES Species* and *Species+* be amended to include *S. brevispinus* and *S. wetlandicus* as distinct species, not as synonyms of *S. glaucus*, and to retain the three species in Appendix I.

The six species are narrow endemics with small population sizes that are threatened by international trade, particularly the seeds of these species. Amending the CITES nomenclature for *S. blainei*, *S. brevispinus*, *S. cloverae*, *S. glaucus*, and *S. wetlandicus* and transferring *S. blainei*, *S. cloverae*, and *S. sileri* to Appendix-I would strengthen the regulation of the species from over-exploitation for international trade.

3. Species characteristics

3.1 Distribution



Sclerocactus blainei has a narrow distribution in Nevada and Utah, at 1500-1800 meters (m) (4921-5905 feet (ft)) elevation (Heil and Porter 2004; Porter and Prince 2011).

Sclerocactus cloverae occurs in Colorado and New Mexico including the Navajo Nation, at 1500-2200 m (4921-7217 ft) elevation (Heil and Porter 2004). The estimated range for *S. cloverae* is approximately 25,900 square kilometres (km²) (10,000 square miles (mi²)) (NatureServe 2016).

Sclerocactus cloverae ssp. *brackii* has very restrictive distribution of approximately 100-250 km² (40-100 mi²) in New Mexico and the Navajo Nation in New Mexico (Navajo Nation Heritage Program 2001; Ferguson 2015; NatureServe 2016), at elevations between 1500-1900 m (4921-6233 ft) and possible as high as 2600 m (8530 ft) (Porter and Prince 2011).

Sclerocactus cloverae ssp. *cloverae* has a limited distribution in New Mexico and the Navajo Nation in New Mexico.

Sclerocactus sileri has a highly restrictive distribution in Arizona, approximately 1,000 km² (386 mi²) at 1600-1700 m (5249-5577 ft) elevation (Heil and Porter 2004; Porter and Prince 2011; Butterworth and Porter 2013). According to work by Porter and Prince (2011), this species is also found in the adjacent State of Utah.

3.2 Habitat

Sclerocactus blainei occurs primarily in open valley bottoms of the Great Basin shrub steppe ecoregion, in igneous or calcareous gravels, or sandy soil in mixed desert shrub and sagebrush plant communities, including greasewood (*Sarcobatus vermiculatus*), galleta grass (*Pleuraphis jamesii*), shadescale (*Atriplex confertifolia*), sagebrush (*Artemisia tridentate*), and rabbitbrush (*Ericameria nauseosa*) (Nevada Natural Heritage Program 2001; Heil and Porter 2004; Porter and Prince 2011).

Sclerocactus cloverae occupies varied habitats in the Colorado Plateau shrub-steppe biome (Porter and Prince 2011). Plants are nearly always found on gravelly or rocky ground, clay hills, mesas, and washes, desert grasslands, saltbush, sagebrush, and rabbit brush flats, pinyon-juniper woodlands (Heil and Porter 2004). Associated vegetation communities include desert grassland, open pinyon-juniper (*Pinus edulis*, *Juniperus osteosperma*) woodland, big sagebrush scrub (dominated by *A. tridentate*), shadscale desert (dominated by *Atriplex confertifolia*), and ponderosa pine (*Pinus ponderosa*) woodland (Heil and Porter 2004; Porter and Prince 2011).

Sclerocactus sileri occurs in sandstone to sandy soils of Moenave, Chinle, and Navajo Formations, in the Colorado Plateau steppe and pinyon-juniper (*P. edulis*, *J. osteosperma*) woodlands and grama (*Bouteloua* spp.) grasslands, with dropseed (*Sporobolus cryptandrus*), yucca (*Yucca* spp.), hedgehog cactus (*Echinocereus triglochidiatus*), sagebrush (*A. tridentate*), and snakeweed (*Gutierrezia sarothrae*) (Heil and Porter 2004; Porter and Prince 2011).

3.3 Biological characteristics

Sclerocactus are perennial, low-growing up to 45 centimeters (cm) (17.7 inches) tall and 10 cm (3.9 inches) wide, unbranched, cylindrical shaped spiny succulents. Species are mostly solitary, occasionally occur in clumps, and are exceptionally cold and drought tolerant (Heil and Porter 2004; Hunt *et al.* 2006; Porter and Prince 2011). Species are morphologically variable in growth form, and can vary in the number and density of spines (Hochstätter 2005; Porter and Prince 2011); there are three types of spines: radial, lower (abaxial) central, and upper (adaxial) central spines, defined by the form, size and position in the areole (Porter and Prince 2011).

Plants typically flower in the spring for approximately four weeks, with most species begin to flower in the juvenile phase. *Sclerocactus* are self-incompatible and require cross-pollination in order to set seeds, which mature in 4 to 6 weeks (Porter and Prince 2011). The fruits are fleshy to juicy, indehiscent, or becoming dry and open when mature (Hunt *et al.* 2006). Reproduction is by seed, which typically fall in the immediate vicinity of mature plants and germinate in the autumn. Seed dispersal is limited to movement of seeds by rainfall and wind. Seeds that germinate near “nurse” plants provide protection to seedlings against harsh winter weather and excessive sunlight during the early stages of growth (Hochstätter 2005).

Sclerocactus seeds have a hard outer coat which protects the viability of the seeds for a long time (Benson 1982). Although little is known about seed longevity in the wild, Hochstätter (2005) noted that *Sclerocactus* seeds can remain viable for 10 years or longer. It is possible that cacti species showing any kind of dormancy could form at least a short-term seed bank if seeds are able to avoid predation (Rojas-Arechiga and Vazquez-Yanes 2000). Seed dormancy ends once the environmental limitation (temperature, precipitation, or light) is removed (Rojas-Arechiga and Vasquez-Yanes

2000). Thus the loss of significant number of seeds, such as through predation or harvest, may greatly reduce the number of offspring (Anderson 2001).

3.4 Morphological characteristics

Characteristic	<i>Sclerocactus blainei</i>	<i>Sclerocactus cloverae</i>	<i>Sclerocactus sileri</i>
Plant description	Central spines pubescent in young and early reproductive plants; lateral central spines 10-40 mm, usually terete, sometimes flattened and ribbon-like; adaxial central spine usually 1 per areole, 1.5-2.5 mm diam. Pink, purple or rarely white flowers, flowering late April-May.	Characterized by its very dense spines 4-6 and small (relative to <i>S. parviflorus</i>) purple flowers. Flowering late April-early June. The fruits are pink or magenta when mature.	Flowers yellowish, 2.5-3 cm; inner tepal margins crisped or minutely toothed; styles minutely but densely papillate; radial spines usually 6-8 per areole, to 15 mm. Flowering April and May.
Stems	0-3-branched, green to dark green, ovoid or cylindric (sometimes narrowly so), 3-15 × 2-8 cm; ribs (6-)13(-14), tubercles prominent on ribs.	Unbranched (occasionally 2-3-branched near base), green, ovoid to elongate-cylindric, 2.9-25(-35) × 2.8-12.5(-20) cm; ribs usually (11-)13(-15), well developed, tubercles evident on ribs.	Unbranched (2-branched), green, depressed-spheric to short cylindric, 4-8.5 × 3-5.5 cm; ribs usually (12-)13(-14), not well developed, tubercles prominent on low ribs.
Spines	Dense but not obscuring stems; radial spines 6-12(-16) per areole, spreading, white, 3-18 × 0.3-1.2 mm, pubescent; central spines (1-)3-6(-7) per areole, terete to angled, pubescent in young and early reproductive plants; abaxial central spines 1-3 per areole, tan to brown, reddish, or black, irregularly- or strongly-hooked, 20-55 mm; lateral spines (0-)2(-4) per areole, white, tan, red, or reddish brown, usually hooked, sometimes flattened and ribbon-like, 10-40 mm; adaxial spine 1 per areole, tipped white or dark, flattened and ribbon-like, (5-)35-60(-70) × 1.5-2.5(-3.5) mm.	Obscuring stems; radial spines 4-6 per areole, acicular, elliptic or rhombic in cross section, 19 × 1.3-2 mm; central spines 6-9 per areole, usually 8; abaxial central spine usually 1 per areole, porrect, straw colored to brown, highlighted with purple or red, terete or somewhat angled, hooked, (15-)30-46 × 1.5 mm; lateral central spines 5-8 per areole, similar to abaxial but slightly shorter and usually not hooked; adaxial central erect, white or straw colored, straight or curved, angled to flat, somewhat inconspicuous, triangular in cross section, 25-55 × 1-2 mm.	Obscuring stems or nearly so; radial spines 6-8(-12) per areole, acicular, elliptic in cross section, 5-15 × 0.5-0.8 mm; central spines 4-5 per areole; abaxial central spines 1-2 per areole, white, gray, or purplish tinged, turned or curving somewhat downward, angled, strongly hooked, slightly contorted, terete to angled, 12-35 × 0.5-1 mm; lateral central spines 2 per areole, similar to abaxial but slightly shorter, usually not hooked; adaxial central spines 1-2 per areole, erect, recurved, white to tan, strongly flattened, conspicuous, 13-40 × 0.8-2 mm.
Flowers	Funnelform to campanulate, 2-4 × 1.5-3 cm; outer tepals with reddish brown midstripes and violet-pink or reddish purple margins, usually oblanceolate, 15-20 × 6-10 mm, margins irregularly toothed, apex mucronate; inner tepals lavender to reddish purple, oblanceolate to narrowly oblanceolate, 15-20 × 4-6 mm, apex minutely	Narrowly funnelform to campanulate, 2.5-3.5(-4) × 1.6-3.1(-3.6) cm; outer tepals with greenish to purple with brownish midstripes, pink, purple, or whitish margins, larger ones oblanceolate, 10-18 × 4-7.5 mm, margins membranous and crisped or minutely toothed, apex mucronate; inner tepals purple, sometimes suffused with brown,	Funnelform to campanulate, 2.5-3 × 2-3 cm; outer tepals with brownish and yellowish margins, larger oblanceolate, 10-17 × 5-8 mm, apex mucronate, margins membranous, crisped or minutely toothed; inner tepals yellow, sometimes suffused with brown, largest tepals oblanceolate, 15-25 × 5-7

Characteristic	<i>Sclerocactus blainei</i>	<i>Sclerocactus cloverae</i>	<i>Sclerocactus sileri</i>
	toothed; filaments red-violet or pink; anthers yellow; styles minutely and sparsely papillate.	largest tepals oblanceolate, 15-22(-30) × 4-6 mm, margins irregularly toothed, apex mucronate; filaments white, tinged with pink to pink-purple; anthers yellow; ovary minutely papillate, appearing smooth.	mm, apex mucronate; filaments white to greenish white; anthers yellow; styles minutely but densely papillate.
Fruit	Dehiscent along 2-4 vertical slits, green to pink or pale red, barrel-shaped, 9-15 × 8-13 mm, dry; scales few, membranous, slightly scarious-margined.	Irregularly dehiscent or dehiscent through basal abscission pore, green to tan, sometimes suffused with pink, 7-15 × 5-12 mm, dry; scales few, membranous, scarious-margined, minutely toothed or fringed.	Dehiscent along 2-4 vertical slits, green, turning red to tan, ovoid, 8-25 × 8-14(-22) mm, dry; scales few, membranous, scarious-margined, minutely toothed or fringed.
Seeds	Black, 2-2.5 × 3-4 mm; testa with rounded papillae.	Brown or black, 1.2-2.5 × 1.9-3.5 mm; testa with rounded papillae.	Black to light brown, 2.7-3 × 2.2-2.5 mm; testa with rounded papillae.

* Heil, K. D., and J. M. Porter. 2004. *Sclerocactus*. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. Vol. 4. On-line at: www.efloras.org.

3.5 Role of the species in its ecosystem

Sclerocactus species tend to be long-lived in their ecosystem. The flowers, fruits, and seeds of plants provide food for a variety of small mammals and insects. Plants also provide a source of moisture to wildlife. Flowers are pollinated by a broad assemblage of native bees and other insects including ants and beetles (Porter and Prince 2011).

4. Status and trends

4.1 Habitat trends

Habitats for the three species are subject to livestock grazing by cattle and sheep, and recreational off-road vehicle use (Porter and Prince 2011). Over-grazing can degrade habitat and facilitate the establishment of invasive plant species (Masters and Sheley 2001), which can be difficult to eradicate and can outcompete native species including *Sclerocactus* species. Habitats are vulnerable to prolonged drought and the effects of climate change.

4.2 Population size

Sclerocactus blainei is known from 3 occurrences in Nevada and Utah (NatureServe 2016). The conservation rank of *S. blainei* is Critically Imperiled (NatureServe 1999).

Sclerocactus cloverae is known from 21 to 80 occurrences in Colorado, New Mexico, and the Navajo Nation in New Mexico. The species grows in scattered and relatively dense groups of plants (NatureServe 2016). The conservation rank of *S. cloverae* is Vulnerable (NatureServe 1999).

Sclerocactus cloverae ssp. *bracki* is known from 6 to 20 occurrences in New Mexico and the Navajo Nation in New Mexico (NatureServe 2016). The subspecies occurs in dispersed, small populations, each limited in size and restricted distribution (Porter and Prince 2011). The conservation rank of the subspecies *bracki* is Critically Imperiled (NatureServe 1995).

Sclerocactus cloverae ssp. *cloverae* is known from approximately 40 sites in New Mexico and the Navajo Nation in New Mexico (NatureServe 2016). The conservation rank of this subspecies is Vulnerable (NatureServe 1995).

Sclerocactus sileri is known from 12 occurrences (2 are historical) with 2-10 plants per site (NatureServe 2016). The conservation rank of this species is Critically Imperiled (NatureServe 2015). The IUCN Red List of Threatened Species category for *S. sileri* is Vulnerable (Butterworth and Porter 2013).

4.3 Population structure

There is no information available with regards to the population structure of the three species.

4.4 Population trends

The declining rainfall and prolonged drought conditions in southwestern United States have impacted seedling recruitment and adult survivorship of *Sclerocactus* (Porter and Prince 2011). Projections of future climate in the region include continued drought and warming winters, which will continue to affect seedling recruitment and adult survivorship of *Sclerocactus* species into the future.

Sclerocactus sileri exhibits a decreasing population trend with an estimated 25% population reduction in the last eight years and is very likely to reach 30% in the next four years if the threats continue to affect the population in the same manner (Butterworth and Porter 2013). There is no information available with regards to population trends of *S. blainei* and *S. cloverae*.

4.5 Geographic trends

Changes in temperature and rainfall amounts and patterns are likely to affect the long-term survival and distribution of the three species. The southwestern United States in general, is expected to warm more rapidly than other regions in the United States (Porter and Prince 2011). The consequences of climate change (e.g., persistent or prolonged drought conditions, increased precipitation during normally dry seasons, changes in community assemblages, or changes in nonnative species abundance and vigor) will affect long-term persistence of *Sclerocactus* (Porter and Prince 2011).

5. Threats

Threats to *S. blainei*, *S. cloverae*, and *S. sileri* include impacts from oil and gas exploration and extraction activities, recreational off-road vehicle (ORV) use, livestock trampling, collection of specimens, loss of habitat, and insect parasitism (Ferguson 2015; Porter and Prince 2011; Butterworth and Porter 2013; NatureServe 2015). Oil and gas development and ORV use facilitates access to plants by collectors. Prolonged drought has impacted seedling recruitment and adult survivorship of *Sclerocactus* taxa in the southwestern United States (Porter and Prince 2011).

These species are desirable for the international horticultural market, and are sought after by collectors (Anderson 2001; Lüthy 2001; Robbins 2003; Porter and Prince 2011; Butterworth and Porter 2013). Populations are adversely affected by unauthorized and illegal harvest of plants and seeds. The seeds are particularly vulnerable to harvest, which are more often collected than live plants because they are easy to carry and transport, and are not regulated under the CITES Appendix-II listing annotation. The harvest of even a small number of seeds or plants can adversely affect the species' reproductive potential and perhaps the long-term survival of the species (Anderson 2001).

The threats are exacerbated by the species' inherent vulnerability from stochastic events at any time because of their endemism, small numbers of individuals and populations, and restricted distributions.

6. Utilization and trade

6.1 National utilization

The three species are affected by the harvest of specimens for the horticulture trade. Because the species are uncommon, seeds and plants are sought after by cacti collectors and hobbyists.

6.2 Legal trade

The CITES trade data for *Sclerocactus* spp. is almost all reported as seeds and artificially propagated live plants, with a small amount of wild exports reported in 1998, 2005, 2008, and 2009,

and a significant amount of root stock exported in 2000 from the Republic of Korea (Sajeva et al. 2012).

The CITES trade data from 2000 to 2014 (the latest year reported), shows trade in two of the three species: *S. parviflorus* (CITES-listed synonyms *S. cloverae*, *S. cloverae* ssp. *brackii*); and *S. spinosior* (it is unknown whether trade included *S. spinosior* ssp. *blainei* (= *Sclerocactus blainei*). In 2002, the United States exported two artificially propagated live plants of *S. parviflorus* to Japan. With regard to non-range countries, the Czech Republic exported three shipments (2000, 2001, and 2006) totalling 29 live artificially propagated specimens of *S. parviflorus*, and three shipments (2000, 2001, and 2002) for a total of 115 live artificially propagated specimens of *S. spinosior*. Malta reported exports of both species totalling six live artificially propagated specimens. The Netherlands reported the export of one shipment (2008) of 108 live artificially propagated specimens of *S. parviflorus*. The United States imported of one shipment (2000) of 833 live artificially propagated specimens of Appendix-II *Sclerocactus* spp. (not reported at the species-level) from Canada.

It is important to note, that trade in seeds of Appendix-II cacti, except cacti native to Mexico, are not regulated under CITES, whereas seeds of Appendix-I cacti are regulated under CITES. For example, from 2000 to 2014, the United States exported 368,568 seeds of Appendix-I *Sclerocactus* species under source code "D." With the transfer of the three species to Appendix I, trade in seeds will be regulated and monitored, which will increase the level of protection for species' populations.

Sclerocactus species are desirable for the international horticultural market, and are sought by collectors (Lüthy 1999; Anderson 2001; Morefield pers. com. 2015; Porter and Prince 2011) in particular seeds are more often harvested than live plants. There is an active market for seeds of rare cacti, including these species, on the Internet (e.g., <http://www.eBay.com>; <http://www.fhnavajo.com/newmexico.html>;

<http://ralph.cs.cf.ac.uk/Cacti/finder.php?Plant=Sclerocactus+cloverae>).

6.3 Parts and derivatives in trade

Other than seeds, there are no data to suggest that international trade is occurring in parts or derivatives.

6.4 Illegal trade

The three species are vulnerable to illegal harvest due to their restrictive distributions, small population sizes, and current and ongoing threats. Although there is very little actual information available regarding the illegal harvest of plants and seeds of these species, because the three species are uncommon they are sought after by collectors and hobbyists. Morefield (*in litt.* 2015) reports poaching of specimens of *S. sileri*, and Butterworth and Porter (2013) reported that specimens of *S. sileri* in commercial trade are very likely to be wild-harvested. Wild-harvested seeds are offered on the Internet (e.g., <http://www.eBay.com>; <http://www.fhnavajo.com/newmexico.html>; <http://ralph.cs.cf.ac.uk/Cacti/>).

6.5 Actual or potential trade impacts

The genus *Sclerocactus*, under the family listing of Cactaceae, has been listed in the CITES Appendices since 1975. Therefore, we do not anticipate significant trade or enforcement issues with the transfer of the three species to Appendix I.

7. Legal instruments

7.1 National

The three species are not protected under the U.S. Endangered Species Act of 1973. The species are known to occur on Federal lands of the Bureau of Land Management (BLM); State lands; Tribal lands of the Navajo Nation; and private lands. In general, the existing regulatory mechanisms are not sufficient to reduce the impacts from wild-harvest of specimens and to regulate the international trade of seeds of the three species.

The State of Nevada regulates the wild-harvest of specimens of *S. blainei*. Collectors must obtain a State issued permit to harvest and transport plants of this species. The State of Utah requires proof of ownership to collect and transport native plants within the State. *Sclerocactus blainei* is designated by the BLM as a Special Status Sensitive Species on lands managed by the BLM in Nevada. However, the species is not designated as such on BLM lands in Utah.

Sclerocactus cloverae ssp. *brackii* is listed as Endangered in New Mexico and the Navajo Nation (New Mexico Rare Plants 2005; Navajo Nation Heritage Program 2008). The subspecies is also protected as a Special Status Sensitive Species on BLM lands in New Mexico.

Sclerocactus sileri is regulated in Arizona under the Arizona Native Plant Law (Arizona Revised Statutes), which regulates the harvest of plants and seeds, and the transport of plant species classified as “salvage restricted.” Collectors must obtain a harvest permit from the Arizona Department of Agriculture (ADA), and plants may not be moved from private property without contacting the ADA (Arizona Revised Statutes). *Sclerocactus sileri* is listed as a Special Status Sensitive Species on lands managed by the BLM in Arizona (BLM 2010).

Plant species that are protected under State and Federal laws are protected by the U.S. Lacey Act (P.L. 97-79, 95 Stat. 1073, 16 U.S.C. 3371-3378, as amended in 2008). Under the Lacey Act, it is prohibited to import, export, transport, sell, receive, acquire, purchase, or engage in the interstate commerce of any plant taken, possessed, transported or sold in violation of any relevant law, treaty, or regulation of the United States, any relevant Indian tribal law, any relevant foreign law, or any relevant law or regulation of a State.

7.2 International

The genus *Sclerocactus*, under the family listing of Cactaceae, is listed in the CITES Appendices.

8. Species management

8.1 Management measures

The States’ and the Navajo Nation’s Natural Heritage Programs track and protect the location data of all *Sclerocactus* taxa tracked by the respective Programs. *Sclerocactus cloverae* and the two subspecies are managed on the Navajo Nation.

Sclerocactus blainei, *S. cloverae* ssp. *brackii*, and *S. sileri* occur on lands managed by the Bureau of Land Management (BLM). According to BLM regulations, the collection of Special Status Sensitive Species may be permitted only for scientific or educational purposes, or conservation or propagation of the species, and must be authorized by a BLM permit (BLM Manual section 6840.06C). Few (1-3) occurrences of *S. cloverae* ssp. *brackii* are appropriately protected and managed (NatureServe 2016).

8.2 Population monitoring

The States’ and the Navajo Nation’s Natural Heritage Programs, and by the Bureau of Land Management are responsible for monitoring populations within their jurisdictions.

8.3 Control measures

8.3.1 International

Other than CITES, there are no other international control measures for the three species. Although the species are subject to the trade controls of CITES Appendix II, the seeds are exempt from CITES controls under the Appendix-II listing annotation.

8.3.2 Domestic

Sclerocactus species are protected by the U.S. Lacey Act, which makes it unlawful to possess any wild plant (including roots, seeds, and other parts) that is indigenous to any State and which is either listed in an Appendix to CITES, or listed pursuant to any State law that provides for the conservation of species threatened with extinction. According to this Act,

it is unlawful to import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce any wild plant (including roots, seeds, and other parts) taken, possessed, transported, or sold in violation of any State law or regulation. It is also unlawful to import, export, transport, sell, receive, acquire, or purchase any wild plant (including roots, seeds, and other parts) taken or possessed in violation of any U.S. law, treaty, or regulation or in violation of Indian tribal law (U.S. Lacey Act).

8.4 Captive breeding and artificial propagation

The genus *Sclerocactus* is considered to be difficult to grow in cultivation, and plants require specific soil and environmental conditions in cultivation (Anderson 2001; Hochstätter 2005). Seed germination is also prone to be low. Artificially propagated plants are often grafted at the seedling stage on to root stock of other cactus genera (e.g., *Echinocereus*, *Opuntia*, *Pereskia*) to produce more vigorous adult plants (Hochstätter 2005).

8.5 Habitat conservation

There is limited protection of habitats on State, Federal, and the Navajo Nation lands where populations are known to occur.

8.6 Safeguards

The three species are listed in Appendix-II, which regulates the trade in plants. The transfer of the species to Appendix I would strengthen the regulation of the species from over-exploitation for international trade.

9. Information on similar species

Identification of *Sclerocactus* species can be difficult for non-experts as taxa can be confused with other members within the genus and closely related genera.

Sclerocactus blainei is similar looking to *S. pubispinus* and *S. spinosior*, but can be distinguished based on morphological and floral differences. The upper central spine is longer than those of *S. pubispinus* and *S. spinosior* and the flowers are larger (Heil and Porter 2004; Porter and Price 2011). The species differs from *S. parviflorus* in having longer upper central and hooked central spines and larger seeds (Benson 1982). The central spine number varies, and the number of hooked spines may be as many as six, which is characteristic of *S. polyancistrus* (Heil and Porter 2004). *Sclerocactus blainei* can also have long ribbon-like spines reminiscent of *S. papyracanthus* (Heil and Porter 2004; Porter and Price 2011).

Sclerocactus cloverae and *S. sileri* are similar looking to *S. whipplei* and *S. parviflorus*, but can be distinguished by their morphological features. *Sclerocactus cloverae* can be distinguished from *S. whipplei* based on stem length, the number of central spines, and color of the tepals (Porter and Price 2011). The floral morphology and flower color of *S. sileri* is similar to *S. whipplei*, and differs from *S. whipplei* and *S. parviflorus* which have fruits with basal dehiscence (Heil and Porter 2004).

10. Consultations

The Scientific Authority of the United States of America consulted with all range States (Arizona, Colorado, Navajo Nation, Nevada, New Mexico, and Utah) regarding the transfer of *S. blainei*, *S. cloverae*, and *S. sileri* from Appendix II to Appendix I. In addition, public comments were solicited through a public notice (Federal Register 2015).

As part of its Periodic Review of the genus *Sclerocactus*, the United States of America submitted a draft proposal to transfer the three species from Appendix II to Appendix I at the 22nd meeting of the Plants Committee (Tbilisi, October 2015; PC22 Doc. 20.3.3). The Plants Committee adopted the recommendations of the Periodic Review Working Group (PC22 Com. 2) to transfer *S. blainei*, *S. cloverae*, and *S. sileri* from Appendix II to Appendix I and to recognize and retain *S. brevispinus*, *S. glaucus*, and *S. wetlandicus* as distinct species in Appendix I [PC22 Sum 5 (Rev. 1)].

11. Additional remarks

Sclerocactus blainei, *S. cloverae*, and *S. sileri* are narrow endemics with limited distributions and small population sizes. The harvest of seeds for international trade may adversely affect the populations' reproductive potential and perhaps long-term survival of the three species. Appendix-I listing would strengthen the regulation of the three species from over-exploitation for international trade.

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