

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



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Interpretation and implementation of the Convention

Species trade and conservation

Proposals for possible consideration at CoP17

AMENDMENT PROPOSAL FOR *SCLEROCACTUS* SPP.

1. This document has been submitted by the United States of America.*

Background

2. The United States of America assessed its native *Sclerocactus* taxa (family Cactaceae) under the guidelines of Resolution Conf. 14.8 (Rev. CoP16) on *Periodic Review of species included in Appendices I and II* (see PC22 Doc. 20.3.3). Based on the findings of the periodic review, the United States recommends the transfer of seven endemic *Sclerocactus* taxa from Appendix II to Appendix I in accordance with the Resolution Conf. 9.24 (Rev. CoP16).

A. Proposal

Transfer *Sclerocactus spinosor* ssp. *blainei* (= *Sclerocactus blainei*), *Sclerocactus cloverae* (CITES-listed synonym of *Sclerocactus parviflorus*), *Sclerocactus cloverae* ssp. *brackii* (CITES-listed synonym of *Sclerocactus parviflorus*), *Sclerocactus cloverae* ssp. *cloverae*, *Sclerocactus parviflorus* ssp. *havasupaiensis*, *Sclerocactus parviflorus* ssp. *terrae-canyonae*, and *Sclerocactus sileri* from Appendix II to Appendix I.

The seven taxa meet the biological criteria for listing in Appendix I in accordance with Article II, paragraph 1 of the Convention and meeting Criterion A i), ii), and v); B) iii) and iv; and C) ii) of Annex 1 of Resolution Conf. 9.24 (Rev. CoP16), as follows.

Criterion A, as wild populations are small and are characterized by an observed inferred or projected decline in the number of individuals; with each subpopulation being very small; and demonstrating a high vulnerability to intrinsic and extrinsic factors. Criterion B because 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. These taxa also meet Criterion C, as a marked decline in the size of populations is inferred due to a decrease in the quality of habitat; a high vulnerability to intrinsic and extrinsic factors; and a decrease in recruitment.

* 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.

In addition, there have been several taxonomic changes to the genus *Sclerocactus* since the 1999 publication of the CITES Standard Reference (*CITES Cactaceae Checklist* (Hunt 1999)). The CITES recognized taxonomy for *Sclerocactus* conflicts with the taxonomic treatments recognized in the United States for this genus. Accordingly, the CITES Species Database will require amending as noted in section 2, below.

B. Proponent

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: *Sclerocactus* Britton and Rose 1922

Sclerocactus blainei (S. L. Welsh & K. H. Thorne 1985), [CITES-listed *Sclerocactus spinosor* ssp. *blainei* (Welsh & Thorne) Hochstätter 1995]

Sclerocactus cloverae K. D. Heil & J. M. Porter 1994, [CITES-listed synonym of *Sclerocactus parviflorus* Clover & Jotter 1941]

Sclerocactus cloverae ssp. *brackii* K. D. Heil & J. M. Porter 1994, [CITES-listed synonym of *Sclerocactus parviflorus* Clover & Jotter 1941]

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

Sclerocactus parviflorus ssp. *havasupaiensis* (Clover) Hochstätter 1995

Sclerocactus parviflorus ssp. *terrae-canyonae* (K. D. Heil) K. D. Heil & J. M. Porter 1994

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

See Table 1 for the complete list of *Sclerocactus* taxa.

NOTE: The taxonomy of *Sclerocactus* has been revised since the publication of the CITES Cactaceae Checklist (Hunt 1999). The CITES Species Database will require amending as reported in Table 3 of Section 2, below.

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- 1.5 Scientific synonyms: See Table 1.
- 1.6 Common names: English: Fishhook cactus (See Table 1).
 French:
 Spanish:
- 1.7 Code numbers: Not applicable

2. Overview

The family Cactaceae, including the genus *Sclerocactus*, was listed in the CITES Appendices when the Convention entered into force on 1 July 1975. *Sclerocactus* are slow-growing, single-stemmed, perennial succulents, cylindrical in shape with hooked spines, which tend to be exceptionally cold and drought tolerant. The range of *Sclerocactus* is western United States and northern Mexico, with the majority of taxa native to the United States.

Due to the extensive geographic range of *Sclerocactus*, taxa occur across diverse edaphic environments and climatic gradients. Many *Sclerocactus* taxa are narrow endemics with limited ranges and distributions, and small population sizes (Anderson 2001; Hochstätter 2005; USFWS 2007, 2008, 2010, 2010a, 2010b, 2010c; Porter and Prince 2011; USFWS 2011, 2011a; Butterworth and Porter 2013; USFWS 2013; NatureServe 2015). Collection of specimens includes both seeds and plants. Taxa are characterized by a high vulnerability to collection 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 populations of the seven U.S. endemic taxa and the persistent threats are the primary justification for the transfer of these taxa to Appendix I.

The CITES-listed *Sclerocactus* taxa includes 31 taxa (9 Appendix-I taxa and 22 Appendix-II taxa), as recognized in the CITES Standard Reference (*CITES Cactaceae Checklist* 2nd ed. (Hunt 1999)). Since the 1999 publication of the CITES Standard Reference, there have been a number of taxonomic changes the genus. Thus, the CITES taxonomy conflicts with the current taxonomic treatments of *Sclerocactus* in the United States.

Table 2: This proposal seeks to amend the Appendices, as follows.

<i>Sclerocactus blainei</i> [CITES-listed synonym of <i>Sclerocactus spinosior</i> ssp. <i>blainei</i> .]	Transfer from Appendix II to Appendix I. Amend the CITES Species Database.
<i>Sclerocactus cloverae</i> [CITES-listed synonym of <i>Sclerocactus parviflorus</i>]	Transfer from Appendix II to Appendix I. Amend the CITES Species Database.
<i>Sclerocactus cloverae</i> ssp. <i>brackii</i> [CITES-listed synonym of <i>Sclerocactus parviflorus</i>]	Transfer from Appendix II to Appendix I. Amend the CITES Species Database.
<i>Sclerocactus cloverae</i> ssp. <i>cloverae</i>	Transfer from Appendix II to Appendix I. Amend the CITES Species Database.
<i>Sclerocactus parviflorus</i> ssp. <i>havasupaiensis</i>	Transfer from Appendix II to Appendix I.
<i>Sclerocactus parviflorus</i> ssp. <i>terrae-canyonae</i>	Transfer from Appendix II to Appendix I.
<i>Sclerocactus sileri</i>	Transfer from Appendix II to Appendix I.

The transfer of the seven taxa, as noted above, qualify for inclusion in Appendix I, according to criteria A i), ii), and v); Criteria B) iii) and iv); and Criterion C) i).

Sclerocactus blainei (CITES-listed as a synonym of *S. spinosior* ssp. *blainei*) is recognized as a full species in the United States (Heil and Porter 2004; Porter and Prince 2011; Butterworth 2015; NatureServe 2015). 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. *Sclerocactus blainei* is known from 3-10 occurrences with few plants, and is ranked nationally as critically imperilled (Nevada Natural Heritage Program 2001; Porter and Prince 2011; NatureServe 2015).

Sclerocactus cloverae, *S. cloverae* ssp. *brackii*, and *S. cloverae* ssp. *cloverae* are listed as synonyms of *Sclerocactus parviflorus* in the *CITES Cactaceae Checklist*. These endemic taxa are recognized in the United States as valid (Heil and Porter 2004; Porter and Prince 2011; Butterworth 2015; NatureServe 2015; New Mexico Rare Plants 2015). *Sclerocactus cloverae* ssp. *brackii* is an extremely restricted endemic in the State of New Mexico, where it is known from only a few occurrences. The taxon is State-listed as Endangered, and is ranked nationally as critically imperilled (NatureServe 2015). *Sclerocactus cloverae* and *S. cloverae* ssp. *cloverae* have restrictive distributions, and are ranked nationally as vulnerable (NatureServe 2015).

Sclerocactus parviflorus ssp. *havasupaiensis* has an extremely restrictive distribution, described as an area of 5 to 8 air-miles (8 to 12.8 kilometer) in size, and a small population size.

Sclerocactus parviflorus ssp. *terrae-canyonae* is a narrow endemic with a highly limited range and distribution, and a small population size. The national conservation status of this taxon is imperilled (NatureServe 2015).

Sclerocactus sileri is a narrow endemic with a highly limited range and distribution, and a small population size; there are 12 estimated occurrences with few plants. The national conservation status of this species is critically imperilled (NatureServe 2015).

Table 3: This proposal seeks to amend the CITES Species Database, as follows.

<i>Sclerocactus brevispinus</i> [A valid species, formerly recognized as a synonym of <i>Sclerocactus glaucus</i> .]	Remove <i>S. brevispinus</i> from the listing of <i>S. glaucus</i> ; include <i>S. brevispinus</i> as a separate listing. Retain in Appendix I.
<i>Sclerocactus wetlandicus</i> [A valid species, formerly recognized as a synonym of <i>Sclerocactus glaucus</i> .]	Remove <i>S. wetlandicus</i> from the listing of <i>S. glaucus</i> ; include <i>S. wetlandicus</i> as a separate listing. Retain in Appendix I.
<i>Sclerocactus erectocentrus</i> var. <i>acunensis</i> [A valid taxon, formerly recognized as a synonym of <i>Sclerocactus erectocentrus</i> .]	Remove <i>S. erectocentrus</i> var. <i>acunensis</i> from the listing of <i>S. erectocentrus</i> ; include <i>S. erectocentrus</i> var. <i>acunensis</i> as a separate listing. Retain in Appendix I.
<i>Sclerocactus erectocentrus</i> var. <i>erectocentrus</i> [A valid taxon, formerly recognized as a synonym of <i>Sclerocactus erectocentrus</i> .]	Remove <i>S. erectocentrus</i> var. <i>erectocentrus</i> from the listing of <i>S. erectocentrus</i> ; include <i>S. erectocentrus</i> var. <i>erectocentrus</i> as a separate listing. Retain in Appendix I.
<i>Sclerocactus intertextus</i> var. <i>dasyacanthus</i> [A valid taxon.]	Include <i>S. intertextus</i> var. <i>dasyacanthus</i> as a separate listing. Retain in Appendix II.
<i>Sclerocactus intertextus</i> var. <i>intertextus</i> [A valid taxon.]	Include <i>S. intertextus</i> var. <i>dasyacanthus</i> as a separate listing. Retain in Appendix II.
<i>Sclerocactus whipplei</i> ssp. <i>busekii</i> [Subsumed into <i>S. whipplei</i> , formerly recognized as a subspecies.]	Delete listing, include as synonym of <i>Sclerocactus whipplei</i> . Retain in Appendix II.
<i>Glandulicactus uncinatus</i> [Valid nomenclature, formerly recognized as <i>Sclerocactus uncinatus</i> and <i>S. uncinatus</i> ssp. <i>uncinatus</i>]	Amend the CITES Species Database.
<i>Glandulicactus uncinatus</i> ssp. <i>wrightiae</i> [Valid nomenclature, formerly recognized as <i>Sclerocactus uncinatus</i> ssp. <i>wrightiae</i>]	Amend the CITES Species Database.

Sclerocactus brevispinus and *S. wetlandicus* were originally treated as a “complex” within *S. glaucus* (Benson 1966 and 1982). This taxonomic classification is no longer supported by the results of genetic and morphological research. In 2004, the *Flora of North America* officially recognized the *S. glaucus* “complex” as three distinct species: *S. brevispinus*, *S. glaucus*, and *S. wetlandicus* (Heil and Porter). Scientific studies on population genetics (Porter et al. 2000; Porter et al. 2012), common garden experiments (Hochstätter 1993; Welsh et al. 2003), and a reevaluation of the morphological characteristics of *S. glaucus* resulted in the separation of the complex into the three distinct species (Heil and Porter 2004).

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*, which is endemic to the State of Colorado, whereas the other two species are endemic to the Uintah Basin in the State of Utah (Heil and Porter 2004; USFWS 2009; Porter and Prince 2011).

Recent research using chloroplast DNA sequences, revealed that the Colorado populations of *S. glaucus* have had a long history of reproductive isolation from the Utah populations of *S. brevispinus* and *S. wetlandicus*, and that AFLP genetic markers showed significant genetic divergence among the three species (Porter et al. 2012). By including the results of a morphological evaluation of the three taxa, the authors concluded that three sources of evidence all support the presence of three species and not a single panmictic species (Porter et al. 2012).

The *Flora of North America* (Heil and Porter 2004) and the regional *Flora of the Four Corners* (Heil et al. 2013), as well as other taxonomic treatments (Heil and Porter 2004; Butterworth 2015; NatureServe 2015), recognize *S. brevispinus*, *S. glaucus*, and *S. wetlandicus* as distinct species. The three species are listed independently as Threatened under the United States Endangered Species Act (Act) of 1973, as amended (USFWS 2007, 2009). *Sclerocactus brevispinus* is also classified as critically endangered by the IUCN Red List (Butterworth and Porter 2013).

The continual misclassification of *S. brevispinus* and *S. wetlandicus* under *S. glaucus* as currently recognized under CITES, facilitates trade in wild-collected specimens of these distinct species. Because trade in these species is detrimental to their survival, it is essential that the CITES Species Database lists the three species separately.

Sclerocactus erectocentrus var. *acunensis* is recognized as morphological distinct taxon in the United States, that is geographically restricted and locally sparse (Arizona Game and Fish Department 2013; USFWS 2013; Butterworth 2015; NatureServe 2015). This taxon (under its former name *Echinomastus erectocentrus* var. *acuíñensis*) is federally listed as Endangered under the Act (USFWS 2013).

Sclerocactus erectocentrus var. *erectocentrus* is recognized as morphological distinct taxon in the United States, that is geographically restricted and locally sparse (Arizona Game and Fish Department 2009; Butterworth 2015; NatureServe 2015).

Sclerocactus intertextus and the two infraspecific taxa are recognized as valid taxa in the United States (Zimmerman and Parfitt 2004; Porter and Prince 2011; Arizona Game and Fish Department 2015; Butterworth 2015; NatureServe 2015).

Sclerocactus whipplei ssp. *busekii* is not recognized as a valid taxon (Heil and Porter 2004; Hunt et al. 2006; Porter and Prince 2011; Butterworth 2015; NatureServe 2015).

3. Species characteristics

3.1 Distribution

The geographical range of *Sclerocactus* is the southwestern United States and northern Mexico, covering the Chihuahuan, Great Basin, Mojave, and Sonoran Deserts (Porter and Prince 2011). In the United States, *Sclerocactus* occur in the States of Arizona, California, Colorado, Nevada, New Mexico, Texas, and Utah, and on Tribal lands of the Navajo Nation (comprised of portions of northeastern Arizona, southeastern Utah, and northwestern New Mexico) and the Havasupai Indian Reservation (in Arizona). Taxa occur from 600 meters to 2,600 meters (1,968 feet to 8,530 feet) in elevation. Many species have narrow distributions, with certain species overlapping in some areas.

Sclerocactus blainei has a narrow distribution in western Utah and adjacent Nevada (Heil and Porter 2004; Porter and Prince 2011).

Sclerocactus cloverae occurs in the States of Colorado and New Mexico (Heil and Porter 2004). *Sclerocactus cloverae* ssp. *brackii* has a very restrictive distribution in Colorado and New Mexico within a 160 km (100 mile) area; *S. cloverae* ssp. *cloverae* also has a restrictive distribution in New Mexico and the Navajo Nation (Porter and Prince 2011).

Sclerocactus parviflorus ssp. *havasupaiensis* is known from an 5 to 8 air-mile (8 to 12.8 km) area within the Havasupai Indian Reservation, in the Grand Canyon, State of Arizona (Arizona Game and Fish Department 2003; Porter and Prince 2011).

Sclerocactus parviflorus ssp. *terrae-canyonae* has a limited range and distribution in the States of Arizona and Utah (Arizona Game and Fish Department 2015; Porter and Prince 2011).

Sclerocactus sileri has a highly restrictive range and distribution in northeast Coconino County and Kane County, in the States of Arizona and Utah, respectively (Heil and Porter 2004; Porter and Prince 2011).

See Table 4 for the distribution of all *Sclerocactus* taxa.

3.2 Habitat

Sclerocactus occupy a variety of unique ecological habitats on many different soils types, ranging from very gravely, sandy soils to heavy, alkaline clays, or gypsiferous soils, and are found on on both flat plateaus and steep cliff faces, clay hills, mesas, and washes (Heil and Porter 2004; Porter and Prince 2011).

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

Sclerocactus cloverae occupies varied habitats, but plants nearly always grow on gravely or rocky ground. Associated vegetation communities varies, and includes desert grassland, open pinyon-juniper ((*Pinus edulis*, *Juniperus osteosperma*) woodland, big sagebrush scrub (dominated by *Artemisia tridentata*), shadscale desert (dominated by *Atriplex confertifolia*), and ponderosa pine (*Pinus ponderosa*) woodland (Heil and Porter 2004; Porter and Prince 2011).

Sclerocactus cloverae ssp. *brackii* is found only on the sandy-clay, often cryptogamic, Nacimiento Formation (Ferguson 2015), soils derived from shales and sandstones, which are often high in gypsum (Porter and Prince 2011). The cactus grows in the Colorado Plateau Shrub Steppe biome, in salt desert scrub and open pinyon-juniper woodlands, associated with: *Atriplex confertifolia* (shadscale), *Stenotus armerioides* (mock bitterweed), *Hymenoxys ivesiana* (Ives bitterweed), *Opuntia erinacea* (prickly pear), *Yucca angustissima* (narrowleaf yucca) and *Ephedra* spp. (Mormon tea) (Porter and Prince 2011).

Sclerocactus cloverae ssp. *cloverae* is found in the San Jose, Nacimiento and possibly the Animas Formations, and Quaternary glacial outwash deposits. Associated vegetation is primarily Colorado Plateau shrublands, and is associated with steppe grassland, pinyon- juniper woodland, juniper savanna, but also in big sagebrush shrubland, shadscale scrub, and ponderosa pine (Porter and Prince 2011).

Sclerocactus parviflorus ssp. *havasupaiensis* is found in pinyon-juniper woodlands and sagebrush communities, on tan to red sandstone, sandy or sandy clay soils of the Supai Formation (Arizona Game and Fish Department 2003; Porter and Prince 2011).

Sclerocactus parviflorus ssp. *terrae-canyonae* is found on rocky sandstone, associated with pinyon-juniper woodlands and sagebrush communities (Porter and Prince 2011; Arizona Game and Fish Department 2015).

Sclerocactus sileri grow in sandstone to sandy soil of Moenave, Chinle, and Navajo Formations, in pinyon-juniper woodlands and grama (*Bouteloua* spp.) grasslands, often on mesa tops (Heil and Porter 2004; Porter and Prince 2011).

3.3 Biological characteristics

Plants are perennial, low-growing, single-stemmed, cylindrical shaped succulents, mostly solitary; occasionally occur in clumps (Heil and Porter 2004; Porter and Prince 2011). Species are morphological variable in growth form, and can vary in the number and density of spines (Hochstätter 2005; Porter and Prince 2011). Most members have 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 flower in the spring, based on elevation, for approximately four weeks; certain species flower a second time in late summer. Most taxa begin to flower in the juvenile phase. *Sclerocactus* taxa are typically self-incompatible and require cross-pollination. Pollinated flowers set seed, typically maturing in 4 to 6 weeks. The fleshy fruits are dry and dehisce (split open) when mature. Seeds fall in the immediate vicinity of the mature, reproductive plants. Seed dispersal is limited; movement of seeds is by rainfall and wind. Seeds germinate in the autumn, and subsequent seedlings survive the harsh winter weather in the shelter of the nurse plant (Hochstätter 2005).

3.3.1 Reproduction

Reproduce is by seed, which can remain viable for 10 years or longer (Hochstätter 2005). Seeds germinate at the base of the parent plant unless they are dispersed.

3.3.2 Mortality

In general, plants die of desiccation, diseases, and predation from small mammals and insects. Plants can die from the eating and tunneling activities of insects or from the introduction of fungus or disease. Drought causes physiological stress responses in plants, such as limiting photosynthesis and cell growth. Plants already stressed from drought conditions are more susceptible to insect attack and disease (Mattson and Haack 1987).

3.4 Morphological characteristics

The name *Sclerocactus* is derived from the Greek words *scleros*, meaning hard or cruel, and *cactus* meaning a spiny plant (Benson 1982).

Summary of the morphological characteristics of *Sclerocactus* is based on Heil and Porter (2004) and Porter and Prince (2011). Plants are pale to dark green, or bluish green, occasionally glaucous. Stems are unbranched, ovoid, globose, or depressed-globose, depressed hemispheroid, cylindroid to elongate cylindroid, rarely flat-topped, tuberculate or ribbed, spiny; and range in size from 1–40 centimeter (cm) long, 1.8–15 cm diameter (diam). Areoles are elliptic to pear-shaped, more or less extended beyond the spine-bearing portion, often with nectar glands. Central and lateral spines are 1–6 per areole and variable in color. Spines are usually of 2–3 distinct types and usually one or more hooked, rarely all lacking hooks, rarely flat and ribbon-like. Radial spines number 2–11 per areole, usually white or grey in color, 0.3–6 cm long, straight or curved. Flowers and fruits arise at the stem tips. Flowers are short funnel form to narrowly campanulate in shape, 1–6 cm. diam and 1–6.7 cm long. Flower color is variable among these taxa: yellow, pink, and purple. The floral tubes are naked or sparsely hairy, rarely with spines. Fruits are fleshy, cylindrical to subglobose in shape, and green in color; from 4.2–30 millimeter (mm) long to 3.5–21 mm diam in size. Fruits mature in 4 to 6 weeks, often turning red in color. Mature fruits are dehiscent and dry. Seeds are broadly oval, 5–3 mm long and 1.9–4.5 mm broad, brown or black in color. Seed-surface pattern is papillate-reticulate.

3.5 Role of the species in its ecosystem

Plants are long-lived. The flowers, fruits, and seeds of *Sclerocactus* provide food for various 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 *Sclerocactus* are subject to livestock grazing by sheep and cattle (Porter and Prince 2011). Overgrazing can degrade habitat and facilitate the establishment of invasive plant species (Masters and Sheley 2001), which tend to be difficult to eradicate and outcompete native vegetation, including cacti. Habitats are vulnerable to prolonged drought in the southwestern United States and the effects of climate change.

4.2 Population size

Sclerocactus blainei is known from 3-10 occurrences with few plants (Nevada Natural Heritage Program 2001; Hochstätter 2005; Porter and Prince 2011; NatureServe 2015).

Sclerocactus cloverae is known from 21 to 80 occurrences comprised of approximately 10, 000 plants (NatureServe 2015).

Sclerocactus cloverae ssp. *brackii* is known from a few scattered small populations (Porter and Prince 2011).

The population size of *S. cloverae* ssp. *cloverae* is unknown, but is considered to be small in size.

The population size of *S. parviflorus* ssp. *havasupaiensis* is unknown, but is composed of small clusters of plants (Porter and Prince 2011).

Sclerocactus parviflorus ssp. *terrae-canyonae* is known from 6-20 occurrences (NatureServe 2015).

Sclerocactus sileri is known from 10-12 occurrences, with 2-10 plants per site (Porter and Prince 2011; Arizona Game and Fish Department 2003).

4.3 Population structure

The population structure of *Sclerocactus* is poorly known. There is no information available with regards to the population structure of these taxa.

4.4 Population trends

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

Sclerocactus sileri has 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). Noted threats are livestock, fires, off-highway-vehicle activity, and over collecting are major threats to the species (Butterworth and Porter 2013).

4.5 Geographic trends

Changes in temperature and rainfall amounts and patterns are likely to affect the long-term survival and distribution of *Sclerocactus*, particularly as many taxa occur in unique microhabitats. The southwestern United States in general is expected to warm more rapidly than other regions in the country (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 include impacts from oil and gas exploration and extraction activities, recreational off-road vehicle use, livestock trampling, as well as urbanization and wildfires in some areas (Porter and Prince 2011; Butterworth and Porter 2013; NatureServe 2015). Oil and gas development facilitates human access to plants by collectors. Drought and the effects of climate change negatively impact seedling recruitment and adult survivorship of these taxa.

Sclerocactus taxa are desirable for the international horticultural market, and are sought after by collectors (Anderson 2001; Lüthy 2001; Robbins 2003; Porter and Prince 2011). Populations are adversely affected by unauthorized and illegal collection of plants and seeds. The seeds of the seven taxa are particularly vulnerable to collection as they are not regulated under CITES due to Appendix-II listing annotation (i.e., # 4). Wild-collected seeds are offered on the Internet (e.g., <http://www.fhnavajo.com/newmexico.html>; <http://ralph.cs.cf.ac.uk/Cacti/locality.php?Locality=Supai>).

5.1 Habitat loss

Loss of habitat is due to oil and gas development, off road vehicle recreation, livestock grazing, and urban development in some areas (Porter and Prince 2011; NatureServe 2015).

5.2 Predation

A variety of small mammals, such as native ground squirrels, pack rats, rabbits, and mice, can severely damage or kill both mature and young cacti during times of drought when free water is unavailable (Kelly and Olsen 2011). A variety of insects [e.g., cactus weevils (*Gerstaeckeria* spp.), cactus longhorn beetles (*Moneilema* spp.)] are also known to feed on plants. Adult weevils feed externally on plants and the larvae feed internally (Burger and Louda 1995). Cactus longhorn beetle adults feed on the terminal buds of cacti, and the larvae burrow into stems or roots causing severing of damaged root and stem.

The interior flesh of plants provides both a nesting area and food source for beetles, weevils, and other insects. Plants that are stressed from prolonged drought are more susceptible to insect attack and disease (Mattson and Haack 1987).

5.3 Genetic isolation

Populations are mostly small, fragmented, and susceptible to genetic isolation.

6. Utilization and trade

6.1 Utilization in the United States of America

There is very little information available regarding the utilization of these seven *Sclerocactus* taxa in the United States. Because these taxa are uncommon, seeds and plants are be prized among specialist collectors and cacti hobbyists.

6.2 Legal trade

The United States reports to the CITES Secretariat trade data for shipments of artificially propagated Appendix-II cacti at the family level (i.e., Cactaceae); at the species level (e.g., *Sclerocactus erectocentrus*) for specimens of artificially propagated (source code "D") Appendix-I taxa; and at the species level for all wild-sourced specimens of Appendix-I and Appendix-II cactus species.

For the seven *Sclerocactus* taxa covered under this proposal, there is only CITES trade data for two species: *S. parviflorus* (which may include subspecies *havasupaiensis* and *terrae-canyonae*, plus synonyms *S. cloverae* and *S. cloverae* ssp. *brackii*); and *S. spinosor* (synonym *Sclerocactus spinosor* ssp. *blainei*). According to that data (from 2000 to 2008, the latest year reported), the United States exported two artificially propagated plants of *S. parviflorus*, and did not export or import any specimens of *S. spinosor*. The CITES trade data for all *Sclerocactus* species (from 2000 to 2012), shows that the United States imported one shipment of 833 specimens of artificially propagated Appendix-II *Sclerocactus* spp.; and one seized specimen of Appendix-I *Sclerocactus* spp. imported from Mexico.

It is important to note that trade in seeds of Appendix-II *Sclerocactus* species is not captured in the CITES Trade Database because seeds are exempt from CITES controls under the listing annotation (i.e., # 4) for Cactaceae. There are currently nine *Sclerocactus* taxa listed in Appendix I. From 2000-2014, the United States exported 192,484 seeds of Appendix-I *Sclerocactus* taxa under source code, "D." With the transfer of these seven taxa in Appendix I, the trade in seeds of these taxa will be regulated and monitored, which will provide a level of protection on wild populations of these taxa.

Sclerocactus taxa are desirable for the international horticultural market, and are sought by collectors (Lüthy 1999; Anderson 2001; Morefield pers. com. 2015; Porter and Prince 2011). Wild-collected seeds are offered on the Internet from web sites located in the Austria, the Czech Republic, Germany, Malta, and the Netherlands (e.g., <http://www.fhnavajo.com/newmexico.html>). Given the threats to these taxa, we are particularly concerned that the collection of seeds for commercial trade may negatively affect the long-term survival of these taxa.

6.3 Parts and derivatives in trade

There are no data to suggest that international trade is occurring in parts or derivatives.

6.4 Illegal trade

Although there is very little actual information available regarding the illegal collection of plants and seeds of the seven *Sclerocactus* taxa, these taxa continue to be prized among specialist collectors and cacti hobbyists. In particular, Butterworth and Porter (2013) reported that specimens of *S. sileri* in commercial trade are very likely to be collected from the wild. Wild-collected seeds are offered on the Internet (e.g., <http://www.fhnavajo.com/newmexico.html>; <http://ralph.cs.cf.ac.uk/Cacti/locality.php?Locality=Supai>).

These taxa are vulnerable to poaching and unregulated collection due to their restrictive distributions, small population sizes, and current and ongoing threats.

6.5 Actual or potential trade impacts

The genus *Sclerocactus* has been listed, as with all Cactaceae, in the CITES Appendices since 1975. As such, we do not anticipate significant trade or enforcement issues with amending the Appendices as described in this proposal.

7. Legal instruments

7.1 National

None of the seven taxa are protected under the U.S. Endangered Species Act. Taxa are known to occur on Federal lands of the National Park Service and the Bureau of Land Management (BLM); State lands; Tribal lands of the Navajo Nation and the Havasupai Indian Reservation; as well as private lands. In general, the existing regulatory mechanisms are not sufficient to reduce the impacts from collection, and to regulate the international trade of specimens of these taxa.

The State of Nevada regulates the harvest of *Sclerocactus blainei*. Collectors must obtain a State issued permit to harvest and transport plants. The State of Utah requires proof of ownership to harvest and transport native plants within the State. This species is protected as a Special Status Sensitive Species on lands managed by the BLM in Nevada, but it is not listed or protected on BLM lands in Utah (Porter and Prince 2011).

Sclerocactus cloverae ssp. *brackii* is listed as Endangered in the State of New Mexico; however, there are no regulatory restrictions for the collections of specimens (Porter and Prince 2011). The taxon is a candidate species for listing on the Navajo Nation's Endangered Species List. It is also protected as a BLM Special Status Sensitive Species.

Sclerocactus parviflorus ssp. *havasupaiensis* occurs within the Havasupai Indian Reservation, in Arizona. It is unclear whether the Reservation has any official regulations concerning this taxon.

Sclerocactus parviflorus ssp. *terrae-canyonae* and *S. sileri* are regulated in the State of Arizona under the Arizona Native Plant Law (Arizona Revised Statutes, Chapter 7, 2007), which regulates the

harvest of plants and seeds, and the transport of plants classified as “salvage restricted.” Collectors must obtain a State issued permit to harvest specimens from certain lands, and plants may not be moved off private property without contacting the Arizona Department of Agriculture (Arizona Revised Statutes 1999). *Sclerocactus parviflorus* ssp. *terrae-canyonae* is also fully protected within the National Park Service’s Navajo National Monument. *Sclerocactus sileri* is also listed as a Special Status Sensitive Species, which protects the species on lands managed by the BLM.

Taxa that are protected under State and Federal laws are protected by the Federal U.S. Lacey Act (P.L. 97-79, 95 Stat. 1073, 16 U.S.C. 3371-3378, as amended in 2008). Under this Act, it is generally 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 U.S.

Taxa that are protected under State and Federal laws are protected by the Federal U.S. Lacey Act (P.L. 97-79, 95 Stat. 1073, 16 U.S.C. 3371-3378, as amended in 2008). Under this Act, it is generally 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 U.S. State.

7.2 International

Sclerocactus, as with most all Cactaceae, are 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 Programs.

Sclerocactus blainei, *S. cloverae* ssp. *brackii*, and *S. sileri* occur on lands managed by the Bureau of Land Management (BLM), and are protected as Special Status Sensitive Species. According to BLM regulations, collection of “sensitive” plants 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 6840.06C.)

Sclerocactus parviflorus ssp. *terrae-canyonae* is fully protected within the National Park Service’s Navajo National Monument, in Arizona.

8.2 Population monitoring

Many of the taxa are monitored by the States’ and Navajo Nation’s Natural Heritage Programs, by the Bureau of Land Management, and the National Park Service.

8.3 Control measures

8.3.1 International

Other than CITES, there are no other international control measures for these taxa. Although the seven *Sclerocactus* taxa are subject to the trade controls of CITES Appendix II, the seeds of these taxa are exempted from CITES controls by the Appendix-II listing annotation.

8.3.2 Domestic

The seven taxa 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 the Convention on International Trade in Endangered Species of Wild Fauna and Flora, or listed pursuant to any State law that provides for the conservation of species threatened with extinction. According to the 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

Sclerocactus are considered difficult to grow in cultivation, and require specific environmental conditions in cultivation (Anderson 2001; Hochstätter 2005). Plants and seeds are relatively uncommon in commercial nursery production, with the exception of speciality cactus nurseries in the United States and Europe. *Sclerocactus* plants can be grafted on to *Echinocereus*, *Opuntia*, or *Pereskia* root stock, which makes plants easier to grow in cultivation (Hochstätter 2005).

8.5 Habitat conservation

There is limited protection of habitats on certain State and Federal lands, and the Navajo Nation. However, most habitats where these taxa occur are not protected for conservation purposes.

8.6 Safeguards

All international trade in *Sclerocactus* taxa will continue to be regulated under CITES.

9. Information on similar species

Identification of *Sclerocactus* taxa 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 vegetative 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 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*; however, the adaxial central spine morphology and dehiscence is much like that found in *S. pubispinus* and *S. spinosior* (Heil and Porter 2004).

Sclerocactus cloverae ssp. *brackii* can be confused with *S. cloverae* and subspecies *cloverae*, as well as with *S. parviflorus* (D. Roth pers. com. 2015).

Sclerocactus parviflorus ssp. *havasupaiensis* and *S. parviflorus* ssp. *terrae-canyonae* can be distinguished from *S. parviflorus* based on vegetative and floral differences. The flowers of the subspecies *havasupaiensis* are purple with whitish margins; upper central spines to 2 mm wide, numbering 4–8, with 3–5 hooked (Porter and Price 2011). Whereas the subspecies *terrae-canyonae* has yellow flowers and narrow upper central spines, 1.5 mm wide at base, and the spines do not obscure the stem (Heil and Porter 2001; Porter and Price 2011). Juvenile plants of *S. parviflorus* ssp. *terrae-canyonae* superficially resemble *S. polyancistrus*, but can be distinguished based on the form and arrangement of the central spines and radial spines (Hochstätter 2005).

10. Consultations

The United States consulted with the CITES Scientific Authority of Mexico (CONABIO), and nationally with range States. The United States will continue to consult with range States, Tribes, and Federal and State agencies to update the draft proposal, as appropriate.

11. Additional remarks

None.

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Table 1. Sclerocactus taxonomy and proposed amendments to the Appendices.

Grey shaded rows are Sclerocactus taxa proposed amendments to the Appendices.

Note: Taxa listed as recognized in the CITES Standard Reference (CITES Cactaceae Checklist 2nd ed. (Hunt 1999)), unless otherwise noted.

1.4: Genus and species	1.4: Author and year	1.5: Synonym	1.6: Common name (English)	Proposed amendment to the Appendices
<i>Sclerocactus blainei</i> +*	S. L. Welsh & K. H. Thorne 1985	<i>Pediocactus spinosior</i> ssp. <i>blainei</i> *; NOTE: <i>Sclerocactus blainei</i> is incorrectly listed as <i>S. spinosior</i> ssp. <i>blainei</i> in the Checklist of CITES Species+*.	Blaine's fishhook cactus	Transfer from Appendix II to Appendix I. Amend the CITES Species Database
<i>Sclerocactus brevihamatus</i>	(Engelmann) D. R. Hunt 1991	<i>Ancistrocactus brevihamatus</i> ; <i>Echinocactus brevihamatus</i> ; <i>Pediocactus brevihamatus</i>	Engelmann's fishhook cactus	Retain in Appendix II.
<i>Sclerocactus brevihamatus</i> ssp. <i>brevihamatus</i>	(Engelmann) D. R. Hunt 1991	<i>Ancistrocactus brevihamatus</i> ; <i>Pediocactus brevihamatus</i>	shorthook fishhook cactus	Retain in Appendix II.
<i>Sclerocactus brevihamatus</i> ssp. <i>tobuschii</i>	(W. T. Marshall) N. P. Taylor 1995	<i>Mammillaria tobuschii</i> ; <i>Ancistrocactus tobuschii</i> ; <i>Ferocactus tobuschii</i> ; <i>Pediocactus brevihamatus</i> ssp. <i>tobuschii</i>	Tobusch fishhook cactus	Retain in Appendix I.
<i>Sclerocactus brevispinus</i> +*#e	K. D. Heil & J. M. Porter 1994	<i>Sclerocactus wetlandicus</i> var. <i>ilseae</i> + NOTE: <i>Sclerocactus brevispinus</i> is incorrectly listed as a synonym of <i>S. glaucus</i> in the Checklist of CITES Species+*#.	Pariette fishhook cactus	Retain in Appendix I. Amend the CITES Species Database.
<i>Sclerocactus cloverae</i> +*#	K. D. Heil & J. M. Porter 1994	<i>Pediocactus cloverae</i> +*; <i>Sclerocactus cloveriae</i> *; <i>Sclerocactus whipplei</i> var. <i>heilii</i> + NOTE: <i>Sclerocactus cloverae</i> is incorrectly listed as a synonym of <i>S. parviflorus</i> in the Checklist of CITES Species.	New Mexico fishhook cactus; clover eagle-claw cactus	Transfer from Appendix II to Appendix I. Amend the CITES Species Database.
<i>Sclerocactus cloverae</i> ssp. <i>brackii</i> +*#	K. D. Heil & J. M. Porter 1994	<i>Pediocactus cloverae</i> ssp. <i>brackii</i> #; <i>Sclerocactus whipplei</i> NOTE: <i>Sclerocactus cloverae</i> ssp. <i>brackii</i> is incorrectly listed as a synonym of <i>Sclerocactus parviflorus</i> in the Checklist of CITES Species.	Brack fishhook cactus	Transfer from Appendix II to Appendix I. Amend the CITES Species Database.
<i>Sclerocactus cloverae</i> ssp. <i>cloverae</i> +*#	K. D. Heil & J. M. Porter 1994		New Mexico fishhook cactus	Transfer from Appendix II to Appendix I. Amend the CITES Species Database.
<i>Sclerocactus erectocentrus</i>	(J. M. Coulter) N. P. Taylor 1987	<i>Echinocactus erectocentrus</i> ; <i>Echinocactus acuñaensis</i> ; <i>Echinomastus acuñaensis</i> ; <i>Neolloydia erectocentra</i> ; <i>Pediocactus erectocentrus</i>	Red-spine butterfly cactus	Retain in Appendix I.

1.4: Genus and species	1.4: Author and year	1.5: Synonym	1.6: Common name (English)	Proposed amendment to the Appendices
<i>Sclerocactus erectocentrus</i> var. <i>acuñensis</i>	(W. T. Marshall) Bravo 1980	<i>Sclerocactus erectocentrus</i> ; <i>Echinomastus acuñensis</i> ; <i>Echinocactus erectocentrus</i> var. <i>acuñensis</i> ; <i>Echinocactus erectocentrus</i> ssp. <i>acuñensis</i> ; <i>Neolloydia erectocentra</i> var. <i>acunensis</i>	acuña cactus	Retain in Appendix I. Amend the CITES Species Database.
<i>Sclerocactus erectocentrus</i> var. <i>erectocentrus</i>	(J. M. Coulter) N. P. Taylor 1987	<i>Sclerocactus erectocentrus</i> ; <i>Echinocactus erectocentrus</i> var. <i>acuñensis</i> ; <i>Echinocactus erectocentrus</i> ; <i>Neolloydia erectocentra</i>	acuña cactus	Retain in Appendix I. Amend the CITES Species Database.
<i>Sclerocactus glaucus</i>	(Schumann) L. D. Benson 1966	<i>Echinocactus glaucus</i> +; <i>Ferocactus glaucus</i> ; <i>Pediocactus glaucus</i> ; <i>Sclerocactus whipplei</i> var. <i>glaucus</i> + NOTE: <i>Sclerocactus brevispinus</i> and <i>S. wetlandicus</i> are incorrectly listed as synonyms in the Checklist of CITES Species+*# e.	Colorado hookless cactus	Retain in Appendix I. Amend the CITES Species Database.
<i>Sclerocactus intertextus</i>	(Engelmann) N. P. Taylor 1987	<i>Echinocactus intertextus</i> ; <i>Echinomastus intertextus</i>	white fishhook cactus	Retain in Appendix II.
<i>Sclerocactus intertextus</i> var. <i>dasyacanthus</i>	(Engelmann) Taylor 1987	<i>Echinomastus intertextus</i> var. <i>dasyacanthus</i> ; <i>Neolloydia intertexta</i> var. <i>dasyacantha</i>	fishhook cactus	Retain in Appendix I. Amend the CITES Species Database.
<i>Sclerocactus intertextus</i> var. <i>intertextus</i>	(Engelmann) Taylor 1987	<i>Echinomastus intertextus</i> var. <i>intertextus</i> ; <i>Neolloydia intertexta</i> var. <i>intertexta</i> ;	fishhook cactus	Retain in Appendix I. Amend the CITES Species Database.
<i>Sclerocactus johnsonii</i>	(Engelmann) N. P. Taylor 1987	<i>Echinomastus johnsonii</i> ; <i>Echinocactus johnsonii</i> ; <i>Neolloydia johnsonii</i>	Johnson's barrel cactus, eight-spine fishhook cactus	Retain in Appendix II.
<i>Sclerocactus mariposensis</i>	(Hester) N. P. Taylor 1987	<i>Echinomastus mariposensis</i> ; <i>Neolloydia mariposensis</i> ; <i>Pediocactus mariposensis</i>	Lloyd's mariposa cactus	Retain in Appendix I.
<i>Sclerocactus mesae-verdae</i>	(Boissevain & C. Davidson) L. D. Benson 1966	<i>Coloradoa mesae-verdae</i> ; <i>Echinocactus mesae-verdae</i> +; <i>Ferocactus mesae-verdae</i> ; <i>Pediocactus mesae-verdae</i>	Mesa Verde fishhook cactus	Retain in Appendix I.
<i>Sclerocactus nyensis</i>	Hochstätter 1992	<i>Pediocactus nyensis</i>	Nye County fishhook cactus	Retain in Appendix I.
<i>Sclerocactus papyracanthus</i>	(Engelmann) N. P. Taylor 1987	<i>Mammillaria papyracantha</i> +; <i>Pediocactus papyracanthus</i> ; <i>Toumeyia papyracantha</i>	Gramma grass cactus	Retain in Appendix I.
<i>Sclerocactus parviflorus</i>	Clover & Jotter 1941	<i>Echinocactus parviflorus</i> +; <i>Ferocactus parviflorus</i> +*; <i>Pediocactus parviflorus</i> +*; NOTE: <i>Sclerocactus cloverae</i> and	Small-flower fishhook cactus	Retain in Appendix II. Amend the CITES Species Database.

1.4: Genus and species	1.4: Author and year	1.5: Synonym	1.6: Common name (English)	Proposed amendment to the Appendices
		<i>S. cloverae</i> ssp. <i>brackii</i> are incorrectly listed as synonyms of <i>S. parviflorus</i> in the Checklist of CITES Species.		
<i>Sclerocactus parviflorus</i> ssp. <i>havasupaiensis</i>	(Clover) Hochstätter 1995	<i>Pediocactus parviflorus</i> ssp. <i>havasupaiensis</i> ; <i>Sclerocactus havasupaiensis</i>	Havasupai devil's-claw cactus	Transfer from Appendix II to Appendix I.
<i>Sclerocactus parviflorus</i> ssp. <i>intermedius</i>	(Peebles) K. D. Heil & J. M. Porter 1994	<i>Sclerocactus intermedius</i> ; <i>Pediocactus parviflorus</i> ssp. <i>intermedius</i>	intermediate fishhook cactus	Retain in Appendix II.
<i>Sclerocactus parviflorus</i> ssp. <i>parviflorus</i>	Clover & Jotter 1941	<i>Ferocactus parviflorus</i> ; <i>Pediocactus parviflorus</i>	Small-flower fishhook cactus	Retain in Appendix II.
<i>Sclerocactus parviflorus</i> ssp. <i>terrae-canyonae</i>	(K. D. Heil) K. D. Heil & J. M. Porter 1994	<i>Pediocactus parviflorus</i> ssp. <i>terrae-canyonae</i> ; <i>Sclerocactus terrae-canyonae</i>	Long-spine fishhook cactus	Transfer from Appendix II to Appendix I.
<i>Sclerocactus polyancistrus</i>	(Engelmann & J. M. Bigelow) Britton & Rose 1922	<i>Echinocactus polyancistrus</i> +*; <i>Ferocactus polyancistrus</i> ; <i>Pediocactus polyancistrus</i>	Mojave or mohave fishhook cactus	Retain in Appendix II.
<i>Sclerocactus pubispinus</i>	(Engelmann) L. D. Benson 1966	<i>Echinocactus pubispinus</i> +*; <i>Ferocactus pubispinus</i> ; <i>Pediocactus pubispinus</i>	Great Basin fishhook cactus	Retain in Appendix I.
<i>Sclerocactus scheeri</i>	(Salm-Dyck) N. P. Taylor 1987	<i>Ancistrocactus megarhizus</i> ; <i>Ancistrocactus scheeri</i> ; <i>Echinocactus scheeri</i> +*; <i>Ferocactus scheeri</i> ; <i>Pediocactus scheeri</i>	Scheer's fishhook cactus	Retain in Appendix II.
<i>Sclerocactus sileri</i>	(L. D. Benson) K. D. Heil & J. M. Porter 1994	<i>Sclerocactus pubispinus</i> var. <i>sileri</i> +*; <i>Pediocactus pubispinus</i> ssp. <i>sileri</i>	Siler's fishhook cactus	Transfer from Appendix II to Appendix I.
<i>Sclerocactus spinosior</i>	(Engelmann) D. Woodruff & L. D. Benson 1976	<i>Ferocactus spinosior</i> ; <i>Pediocactus spinosior</i>	Desert valley fishhook cactus	Retain in Appendix II.
<i>Glandulicactus uncinatus</i> #	(Galeotti ex Pfeiff.) Blackberg	<i>Sclerocactus uncinatus</i> , <i>S. uncinatus</i> ssp. <i>uncinatus</i> , <i>Ancistrocactus uncinatus</i> *; <i>Echinocactus uncinatus</i> *; <i>Ferocactus uncinatus</i> *; <i>Glandulicactus uncinatus</i> *; <i>Pediocactus uncinatus</i> *	brown-flowered hedgehog, Chihuahuan fishhook cactus	Under revision by Mexico, findings to be reported at PC22.
<i>Glandulicactus crassihamatus</i> #	(F. A. C. Weber) Blackberg	<i>Sclerocactus uncinatus</i> ssp. <i>crassihamatus</i> <i>Ancistrocactus crassihamatus</i> *; <i>Ferocactus crassihamatus</i> *; <i>Glandulicactus crassihamatus</i> *; <i>Ferocactus mathssonii</i> *; <i>Glandulicactus mathssonii</i> *	brown-flowered hedgehog	Under revision by Mexico, findings to be reported at PC22.
<i>Glandulicactus wrightii</i> #	(Engelmann) Ferguson	<i>Sclerocactus uncinatus</i> ssp. <i>wrightii</i>	Chihuahuan fishhook cactus, Wright's fishhook cactus	Under revision by Mexico, findings to be reported at PC22.

1.4: Genus and species	1.4: Author and year	1.5: Synonym	1.6: Common name (English)	Proposed amendment to the Appendices
<i>Sclerocactus unguispinus</i>	(Engelmann) N. P. Taylor 1987	<i>Echinomastus durangensis</i> ; <i>Neolloydia durangensis</i> ; <i>Thelocactus durangensis</i> ; <i>Echinocactus unguispinus</i>	fishhook cactus	Under revision by Mexico, findings to be reported at PC22.
<i>Sclerocactus warnockii</i>	(Benson) N. P. Taylor 1987	<i>Echinomastus warnockii</i> ; <i>Neolloydia warnockii</i> ; <i>Pediocactus warnockii</i>	Warnock's fishhook cactus	Retain in Appendix II.
<i>Sclerocactus wetlandicus</i> ⁺ [#] ©	Hochstätter 1989	<i>Pediocactus wetlandicus</i> ⁺ NOTE: <i>Sclerocactus wetlandicus</i> is incorrectly listed as a synonym of <i>S. glaucus</i> in the Checklist of CITES Species ⁺ [#] © .	Uinta Basin hookless cactus	Retain in Appendix I. Amend the CITES Species Database.
<i>Sclerocactus whipplei</i>	(Engelmann & J.M. Bigelow) Britton & Rose 1922	<i>Echinocactus whipplei</i> ; ⁺ [*] <i>Ferocactus whipplei</i> ; <i>Pediocactus whipplei</i> ; <i>Sclerocactus whipplei</i> spp. <i>busekii</i> [*]	Whipple's fishhook cactus	Retain in Appendix II. Amend the CITES Species Database to include synonym <i>Sclerocactus whipplei</i> ssp. <i>busekii</i> Hochstätter
<i>Sclerocactus whipplei</i> spp. <i>busekii</i>	Hochstätter	<i>Sclerocactus whipplei</i> [*] NOTE: <i>Sclerocactus whipplei</i> spp. <i>busekii</i> is recognized as a synonym of <i>S. whipplei</i> . [*]	Great Basin fishhook cactus	Amend the CITES Species Database.
<i>Sclerocactus wrightiae</i>	L. D. Benson 1966	<i>Ferocactus wrightiae</i> ; <i>Pediocactus wrightiae</i>	Wright's fishhook cactus	Retain in Appendix I.

+ Taxonomy recognized by the Flora of North America (<http://www.efloras.org>).

* Taxonomy recognized by the Integrated Taxonomic Information System (ITIS; <http://www.itis.gov>).

Porter and Prince (2011).

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Table 4. Sclerocactus taxa distribution and conservation status.

Note: Grey shaded rows are Sclerocactus taxa proposed amendments to the Appendices.

Taxa	Range	IUCN listing	Population trend	National/State designation (ND) and conservation status (CS)*
<i>Sclerocactus blainei</i>	USA (NV, UT)	Not ranked	Unknown	CS: Critically imperiled.
<i>Sclerocactus brevihamatus</i>	USA (TX)	Least concern	Stable	CS: Vulnerable.
<i>Sclerocactus brevihamatus</i> ssp. <i>brevihamatus</i>	Mexico, USA (TX)	Not ranked	Unknown	MX: Not ranked. USA: CS: Vulnerable.
<i>Sclerocactus brevihamatus</i> ssp. <i>tobuschii</i>	USA (TX)	Not ranked	Unknown	ND: Endangered; TX State-listed endangered.
<i>Sclerocactus brevispinus</i>	USA (UT)	Critically endangered	Decreasing	ND: Threatened; CS: Critically imperiled.
<i>Sclerocactus cloverae</i>	USA (CO, NM)	Not ranked	Unknown	CS: Vulnerable.
<i>Sclerocactus cloverae</i> ssp. <i>brackii</i>	USA (NM, NN)	Not ranked	Unknown	NM State-listed as endangered; NN-listed as endangered; CS: Critically imperiled.
<i>Sclerocactus cloverae</i> ssp. <i>cloverae</i>	USA (NM, NN)	Not ranked	Unknown	CS: Vulnerable.
<i>Sclerocactus erectocentrus</i>	Mexico, USA (AZ, NM)	Least concern	Stable	MX: Not ranked. USA: CS: Vulnerable.
<i>Sclerocactus erectocentrus</i> var. <i>acuñensis</i>	Mexico, USA (AZ)	Not ranked	Decreasing	MX: ND-Endangered, as <i>Echinomastus erectocentrus</i> var. <i>acuñensis</i> . USA: ND: Endangered, as <i>E. erectocentrus</i> var. <i>acuñensis</i> ; CS: Critically imperiled.
<i>Sclerocactus erectocentrus</i> var. <i>erectocentrus</i>	USA (AZ)	Not ranked	Unknown	CS: Not ranked.
<i>Sclerocactus glaucus</i>	USA (CO)	Least concern	Stable	ND: Threatened; CS: Imperiled.
<i>Sclerocactus intertextus</i>	Mexico, USA (AZ, NM, TX)	Least concern	Stable	MX: Threatened, as <i>Echinomastus intertextus</i> USA: CS: Apparently secure

Taxa	Range	IUCN listing	Population trend	National/State designation (ND) and conservation status (CS)*
<i>Sclerocactus intertextus</i> var. <i>dasyacanthus</i>	Possibly Mexico, USA (NM, TX)	Not ranked	Unknown	USA: Texas- CS: Critically imperiled.
<i>Sclerocactus intertextus</i> var. <i>intertextus</i>	Mexico USA (AZ, NM, TX)	Not ranked	Unknown	MX: CS: Not ranked. USA: CS: Not ranked
<i>Sclerocactus johnsonii</i>	USA (AZ, CA, NM, UT)	Least concern	Unknown	CS: Vulnerable.
<i>Sclerocactus mariposensis</i>	Mexico, USA (TX)	Least concern	Stable	MX: Threatened as <i>Echinomastus mariposensis</i> . USA: ESA: Threatened, as <i>E. mariposensis</i> ; State-listed Threatened; CS: Imperiled.
<i>Sclerocactus mesae-verdae</i>	USA (CO, NM, NN)	Least concern	Stable	ND: Threatened; NM State & NN-ND: Endangered; CS: Imperiled
<i>Sclerocactus nyensis</i>	USA (NV)	Endangered	Decreasing	CS: Critically imperiled.
<i>Sclerocactus papyracanthus</i>	USA (AZ, NM, NN, TX)	Least concern	Stable	CS: Apparently secure.
<i>Sclerocactus parviflorus</i>	USA (AZ, CO, NM, NN, NV, UT)	Least concern	Stable	CS: Apparently secure.
<i>Sclerocactus parviflorus</i> ssp. <i>havasupaiensis</i>	USA (HIR (AZ)	Not ranked	Unknown	CS: Not ranked.
<i>Sclerocactus parviflorus</i> ssp. <i>intermedius</i>	USA (AZ, CO, NM, NN, UT)	Not ranked	Unknown	CS: Vulnerable.
<i>Sclerocactus parviflorus</i> ssp. <i>parviflorus</i>	USA (AZ, CO, NM, NV, UT)	Not ranked	Unknown	CS: Apparently secure.
<i>Sclerocactus parviflorus</i> ssp. <i>terrae-canyonae</i>	USA (AZ, UT)	Not ranked	Unknown	CS: Imperiled.
<i>Sclerocactus polyancistrus</i>	USA (CA, NV)	Least concern	Stable	CS: Apparently secure.
<i>Sclerocactus pubispinus</i>	USA (NV, UT)	Least concern	Unknown	CS: Apparently secure.
<i>Sclerocactus scheeri</i>	Mexico, USA (TX)	Least concern	Stable	MX: Not ranked. USA: CS: Apparently secure.
<i>Sclerocactus sileri</i>	USA (AZ)	Vulnerable	Decreasing	CS: Critically imperiled.

Taxa	Range	IUCN listing	Population trend	National/State designation (ND) and conservation status (CS)*
<i>Sclerocactus spinosior</i>	USA (UT)	Least concern	Stable	CS: Imperiled.
<i>Sclerocactus uncinatus</i>	Mexico, USA (NM, TX)	Least concern	Stable	MX: ND: Threatened, as <i>Glandulicactus uncinatus</i> . USA: CS: Vulnerable.
<i>Sclerocactus uncinatus</i> ssp. <i>crassihamatus</i>	Mexico	Not ranked	Unknown	Under revision by Mexico, findings to be reported at PC22.
<i>Sclerocactus uncinatus</i> ssp. <i>uncinatus</i>	Mexico	Not ranked	Unknown	Under revision by Mexico, findings to be reported at PC22.
<i>Sclerocactus uncinatus</i> ssp. <i>wrightii</i>	Mexico, USA (NM, TX)	Not ranked	Unknown	MX: Under revision, report out at PC22. USA: CS: Vulnerable.
<i>Sclerocactus unguispinus</i>	Mexico	Least concern	Stable	Not ranked.
<i>Sclerocactus warnockii</i>	Mexico, USA (TX)	Least concern	Stable	MX: Not ranked. USA: CS: Apparently secure.
<i>Sclerocactus wetlandicus</i>	USA (UT)	Least concern	Stable	ND: Threatened; CS: Vulnerable.
<i>Sclerocactus whipplei</i>	USA (AZ, NN, UT)	Least concern	Stable	CS: Imperiled.
<i>Sclerocactus wrightiae</i>	USA (UT)	Near threatened	Unknown	ND: Endangered; CS: Imperiled.

Range States: United States: AZ=Arizona; CA=California; CO=Colorado; HIR=Havasupai Indian Reservation; NN= Navajo Nation; NV= Nevada; NM= New Mexico; TX= Texas; UT= Utah.

The IUCN Red List of Threatened Species (<http://www.iucnredlist.org>).

USA: ESA= Endangered Species Act of 1973, as amended (<http://www.fws.gov/endangered/>).

USA: Conservation status ranked by NatureServe (<http://explorer.natureserve.org>).