

MONITORING REPORT

Mesa Verde Cactus Transplantation

For BIA Route N57 – Cudei Rd, San Juan County, NM

2004



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Introduction

On October 30, 1979, the U.S. Fish & Wildlife Service designated the Mesa Verde Cactus (*Sclerocactus mesae-verdae*) as Threatened throughout its entire range (44FR 62471 62474). It was listed Threatened because of its limited distribution and threats caused by habitat destruction. It is listed on the Navajo Endangered Species List as threatened (G3), because it is likely to become endangered within the foreseeable future on the Navajo Nation.

The Mesa Verde Cactus is restricted to San Juan Co, NM, and adjacent Montezuma Co, CO. It is estimated that at least 70% of Mesa Verde Cactus population occurs on Navajo Nation lands; at least 50 population sites are currently known from San Juan Co, NM, ranging from the Colorado border south to near Naschitti. *Sclerocactus mesae-verdae* occurs in salt-desert scrub communities, typically in the Fruitland and Mancos shale formations, but has also been found growing in the Menefee Formation overlaying Mancos shale. It is most frequently found on the tops of hills or benches and along slopes. Known populations occur between 4900 to 5500ft.

Methods

In the spring of 1995, the Navajo Natural Heritage Program transplanted 29 Mesa Verde Cacti from the BIA Route N57 right-of-way. All cacti were transplanted into 4 monitoring plots just outside the right-of-way, in close proximity to their original location and together with 22 naturally occurring cacti which would function as a control.

All naturally occurring cacti as well as the transplanted plants were mapped and tagged. Annual measurements include height (cm), diameter (cm), and the number of reproductive structures (flowers, buds, aborted flower/buds, immature/mature fruits), as well as vigor of each plant. Clumps of 5 or more cacti are considered to be one plant and only vigor and reproductive effort are recorded. This year's monitoring for transplanted and naturally occurring Mesa Verde Cacti (*Sclerocactus mesae-verdae*) at the Cudei Rd monitoring site was conducted on April 29, 2004.

Results

The drought year of 2002 was a devastating year for the Mesa Verde Cactus. While only 2 cacti were pronounced dead in 2003, 83% of the naturally occurring cacti and 89% of the transplanted cacti were considered to be in poor condition or likely dead. (Figures 1 & 2). Sixteen of the 18 surviving transplanted cacti were in poor condition; the remaining 2 were in good and fair condition. Ten of the 12 naturally occurring cacti were in poor condition while the remaining 2 were also in good or fair condition. In 2004 only 4 of the transplanted cacti were surviving and only 2 of the naturally occurring cacti were still alive (Table 3). None of the cacti survived in plots 3 and 4.

Following a severe drought of 2002, reproductive effort continued to be zero among the remaining transplanted and naturally occurring cacti (Table 1, Figures 3 & 4). None of the cacti in the 4 monitoring plots were reproductive in 2003 or 2004.

In 2004, the average diameter for the remaining cacti was mostly under 2 cm, only one of the cacti had a diameter larger than 3.5 cm (Table 2, Figure 5). Prior to 2002, naturally occurring cacti increased in diameter on average by 0.85 cm (1995 to 2001). Transplanted cacti increased in diameter by 0.4 cm (average) during the same time period.

Conclusion

The severe drought of 2002 had significant impact on the Mesa Verde Cactus population in the Shiprock area. At the Cudei monitoring site, the majority of transplanted as well as naturally occurring cacti died by 2004 due to drought related stressors. All of the cacti including those considered in good to fair vigor showed signs of insect damage. Drought stressed plants throughout the Shiprock area were observed to be hollowed out by cutworms in the spring of 2003.

Following the transplant in 1995, transplanted cacti had similar mortality rates to naturally occurring cacti. It took approximately 5 years to reach similar reproductive rates to those found among naturally occurring cacti. None of the cacti were reproducing from 2002 to 2004.

While Mesa Verde cacti have evolved with the disturbances caused by droughts and natural predators and combination of the two has proved to have severe consequences for the Mesa Verde Cactus populations in the Shiprock area. The Navajo Natural Heritage Program will not resume monitoring of the remaining 6 cacti at the Cudei monitoring site.

References

- Atwood, D.N., J. Holland, R. Bolander, B. Franklin, D.E. House, L. Armstrong, K. Thorne, and L. England. 1991. Utah Threatened, Endangered, and Sensitive Plant Field Guide. U.S. Forest Service Intermountain Region, National Park Service, Bureau of Land Management, Utah Natural Heritage Program, U.S. Fish & Wildlife Service, Environmental Protection Agency, Navajo Nation, and Skull Valley Goshute Tribe.
- Benson, L. 1982. The Cacti of the United States and Canada. Stanford University Press, Stanford, CA.
- Heil, K., and J.M. Porter. 1994. *Sclerocactus* (Cactaceae): A Revision. Haseltonia No. 2: 20 - 46.
- New Mexico Rare Plant Technical Council. 1999. New Mexico Rare Plants. Albuquerque, NM. New Mexico Rare Plants Homepage.
<http://nmrareplants.unm.edu>
- Roth, D. 2001. Species account for *Sclerocactus mesae-verdae*. Navajo Natural Heritage Program, P.O. Box 1480, Window Rock, AZ 86515.
- Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado Rare Plant Field Guide. Prepared for the Bureau of Land Management, the U.S. Forest Service and the U.S. Fish & Wildlife Service by the Colorado Natural Heritage Program.
<http://www.cnhp.colostate.edu/rareplants/cover.html>
- USDI Bureau of Land Management. 1995. The Farmington District Endangered, Threatened, and Sensitive Plant Field Guide. Prepared by Ecosphere Environmental Services, Inc., Farmington, NM.
- U.S. Fish & Wildlife Service. 1984. Mesa Verde Cactus (*Sclerocactus mesae-verdae*) recovery plan. U.S. Fish & Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, NM.

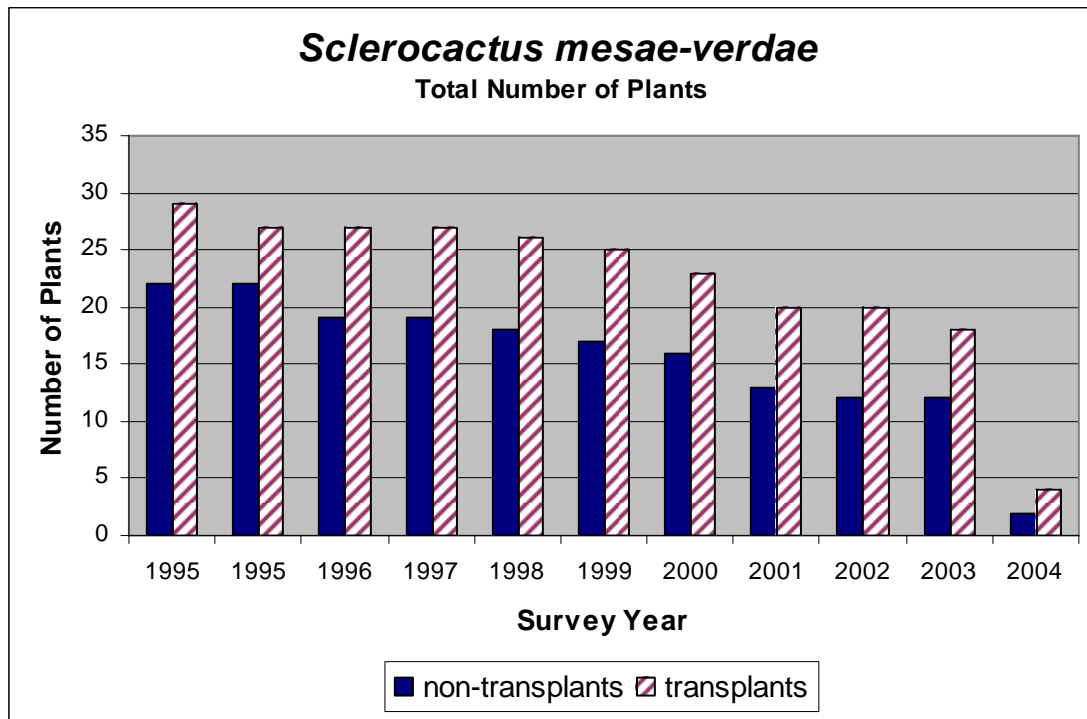


Figure 1. Total number of transplanted and non-transplanted *Sclerocactus mesae-verdae* plants from 1995 to 2004 in 4 monitoring plots near Cudei Rd., San Juan County, NM.

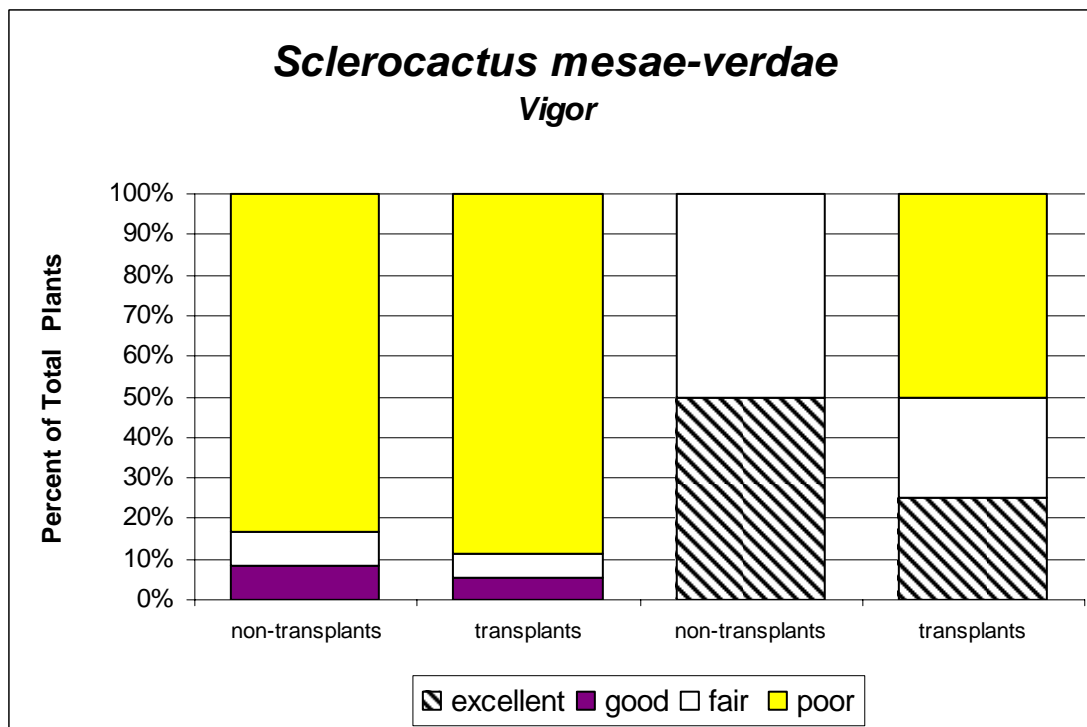


Figure 2. Percent of *Sclerocactus mesae-verdae* plants belonging to each of 4 vigor classes in 2003 and 2004 for transplanted and non-transplanted cacti in 4 monitoring plots along Cudei Rd., San Juan County, NM.

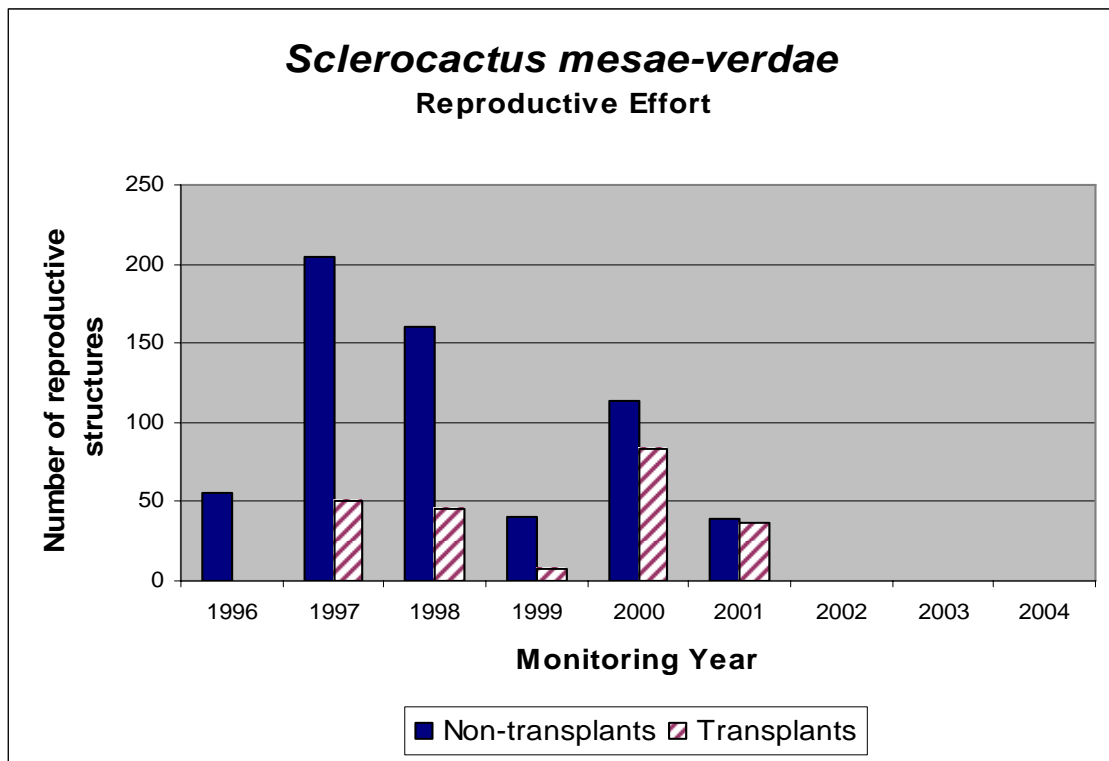


Figure 3. Number of reproductive structures found on transplanted and non-transplanted *Sclerocactus mesae-verdae* plants in 4 monitoring plots along Cudei Rd., San Juan County, NM, from 1996 to 2004.

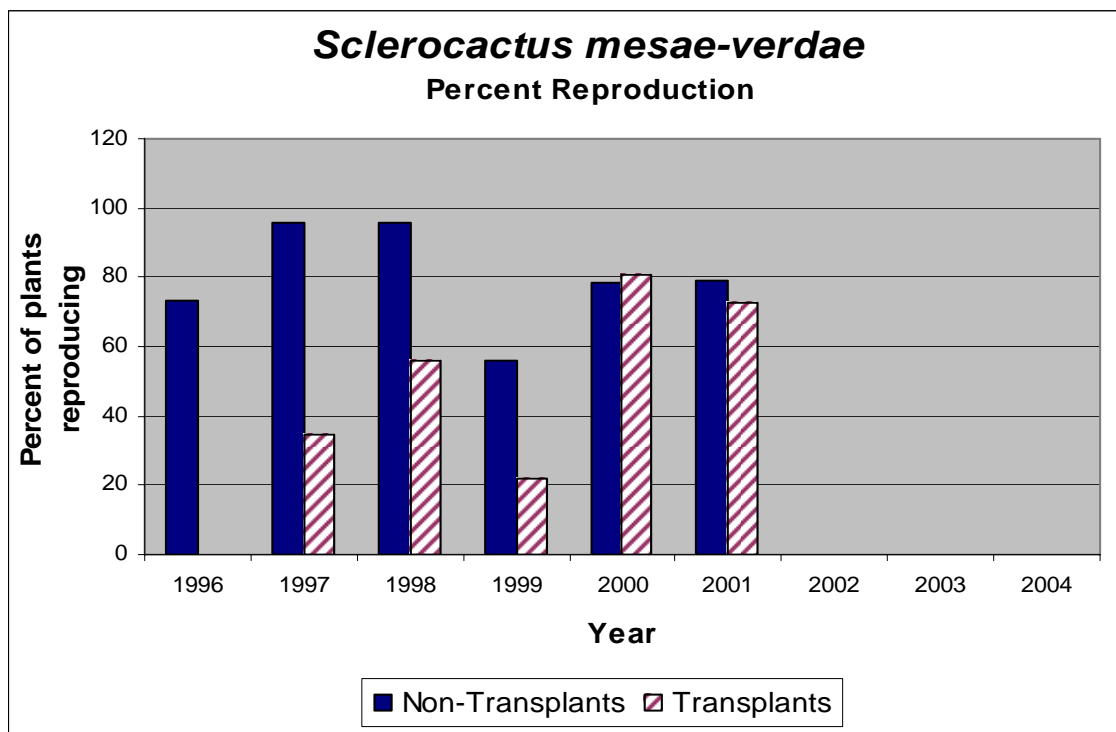


Figure 4. Percent of the total number of transplanted and non-transplanted *Sclerocactus mesae-verdae* plants reproducing in 4 monitoring plots along Cudei Rd., San Juan County, NM, from 1996 to 2004.

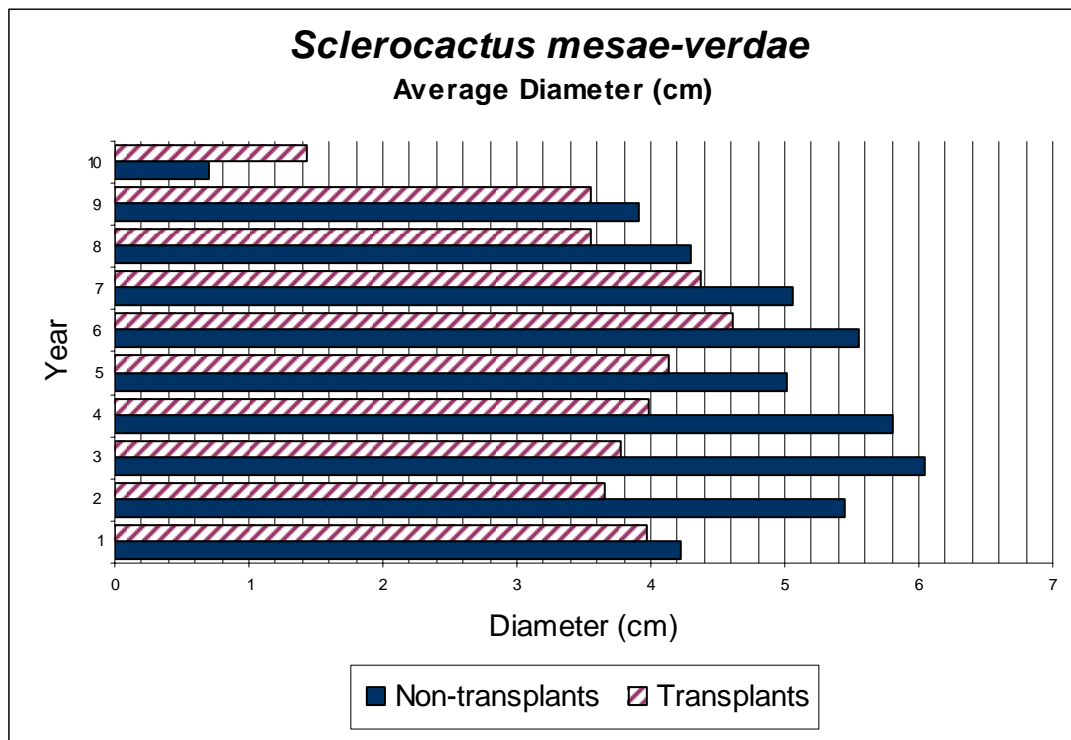


Figure 5. Average diameter changes for transplanted and non-transplanted *Sclerocactus mesae-verdae* plants in 4 monitoring plots along Cudei Rd. San Juan County, NM, from 1995 to 2004.

Table 1. Total reproduction among transplanted and non-transplanted *Sclerocactus mesae-verdae* plants near Cudei Road, April 2004.

TRANSPLANTS

Plot #	Post Flower	Bud	Flower	Immature Fruits	Mature Fruits	Aborted Flowers	Total rep. Effort
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

NON-TRANSPLANTS

Plot #	Post Flower	Bud	Flower	Immature Fruits	Mature Fruits	Aborted Flowers	Total rep. Effort
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

Table 2. Average height, and diameter of transplanted and non-transplanted *Sclerocactus mesae-verdae* plants near Cudei Road, April 2004.

TRANSPLANTS

Plot #	Total # of plants	Avg Height cm	Avg Diam.cm
1	2	2.5	3.85
2	2	1.6	1.9
3	0	0	0
4	0	0	0

NON-TRANSPLANTS

Plot #	Total # of plants	Avg Height cm	Avg Diam.cm
1	1	1.5	2
2	1	0.8	0.8
3	0	0	0
4	0	0	0

Table 3. Total number of surviving transplanted and non-transplanted *Sclerocactus mesae-verde* plants in 4 monitoring plots along Cudei Rd., San Juan Co., NM, from 1995 to 2004.

A. TRANSPLANTS

Plot Number	April 1995	August 1995	April 1996	April 1997	May 1998	April 1999	May 2000	May 2001	April 2002	April 2003	April 2004
1	6	6	6	6	6	6	6	5	5	5	2
2	7	6	6	6	5	4	3	3	3	1	2
3	9	9	9	9	9	9	8	7	7	7	0
4	7	6	6	6	6	6	6	5	5	5	0
Total	29	27	27	27	26	25	23	20	20	18	4

B. NON-TRANSPLANTS

Plot Number	April 1995	August 1995	April 1996	April 1997	May 1998	April 1999	May 2000	May 2001	April 2002	April 2003	April 2004
1	4	4	4	4	3	3	3	2	1	2	1
2	7	7	6	6	6	6	6	6	6	5	1
3	8	8	7	7	7	6	5	4	4	4	0
4	3	3	2	2	2	2	2	1	1	1	0
Total	22	22	19	19	18	17	16	13	12	12	2