

Supplementary Material

Nurse Rocks as a Minimum-Input Restoration Technique for the Cactus *Opuntia basilaris*

Table S1. Physical surface substrate characteristics of undisturbed and disturbed *Opuntia basilaris* habitat

Figure S1. Images of undisturbed and disturbed *Opuntia basilaris* habitat

Figure S2. Examples of experimental microsites with transplanted *Opuntia basilaris* flowering or with vegetative growth

Table S1. Soil properties from an undisturbed reference and adjacent disturbed *Opuntia basilaris* habitat at a site in the Sonoran Desert, California, USA. Soil compaction was assessed using the success of 30 measurements per habitat (Undisturbed, n=30; disturbed, n=18). For other soil properties, soil texture, bulk density (BD), pH and electric conductivity (EC), soils were collected from four locations (0 – 5 cm deep) in each habitat. Mean and standard error in parentheses are presented.

Property	Undisturbed	Disturbed
Compaction (kg/cm ²)	2.0 (0.2)	3.6 (0.2)
Sand (%)	64.9 (1.9)	63.7 (3.1)
Silt (%)	26.7 (0.7)	29.3 (1.6)
Clay (%)	8.4 (1.3)	6.9 (1.7)
BD (< 2 mm mass and volume)	1.2 (0.1)	1.0 (0.3)
BD (incl > 2 mm volume)	0.7 (0.1)	0.6 (0.2)
> 2 mm mass (%)	58.0 (6.8)	69.1 (9.3)
> 2 mm volume (%)	40.7 (5.1)	46.1 (1.5)
Percent > 4 mm gravel mass	86.3 (2.4)	74.8 (7.6)
Percent > 4 mm gravel volume	89.4 (1.2)	87.6 (4.2)
pH	7.7 (0.1)	7.7 (0.1)
EC (μS/cm)	397.7 (86.4)	1415.0 (400.6)



Figure S1. (A) The west slope of the northeast section of Earp Hill, an isolated fan remnant on US Bureau of Land Management Land, California, in which varnished surface materials were scraped from surfaces in the 1940s – 1950s. Photograph taken in May 2021. (B, C, F) Examples of the disturbance toward the top of Earp Hill. Photographs taken in April 2020. (D) Example of a deeper disturbance as a cut into the side slope of Earp Hill. Photograph taken in April 2020. (G – J) Examples of cover of substrates in undisturbed (G, H) and adjacent disturbed (I, J) habitat. Photographs taken in 2017. Photo Credits: L.P. Chiquoine.

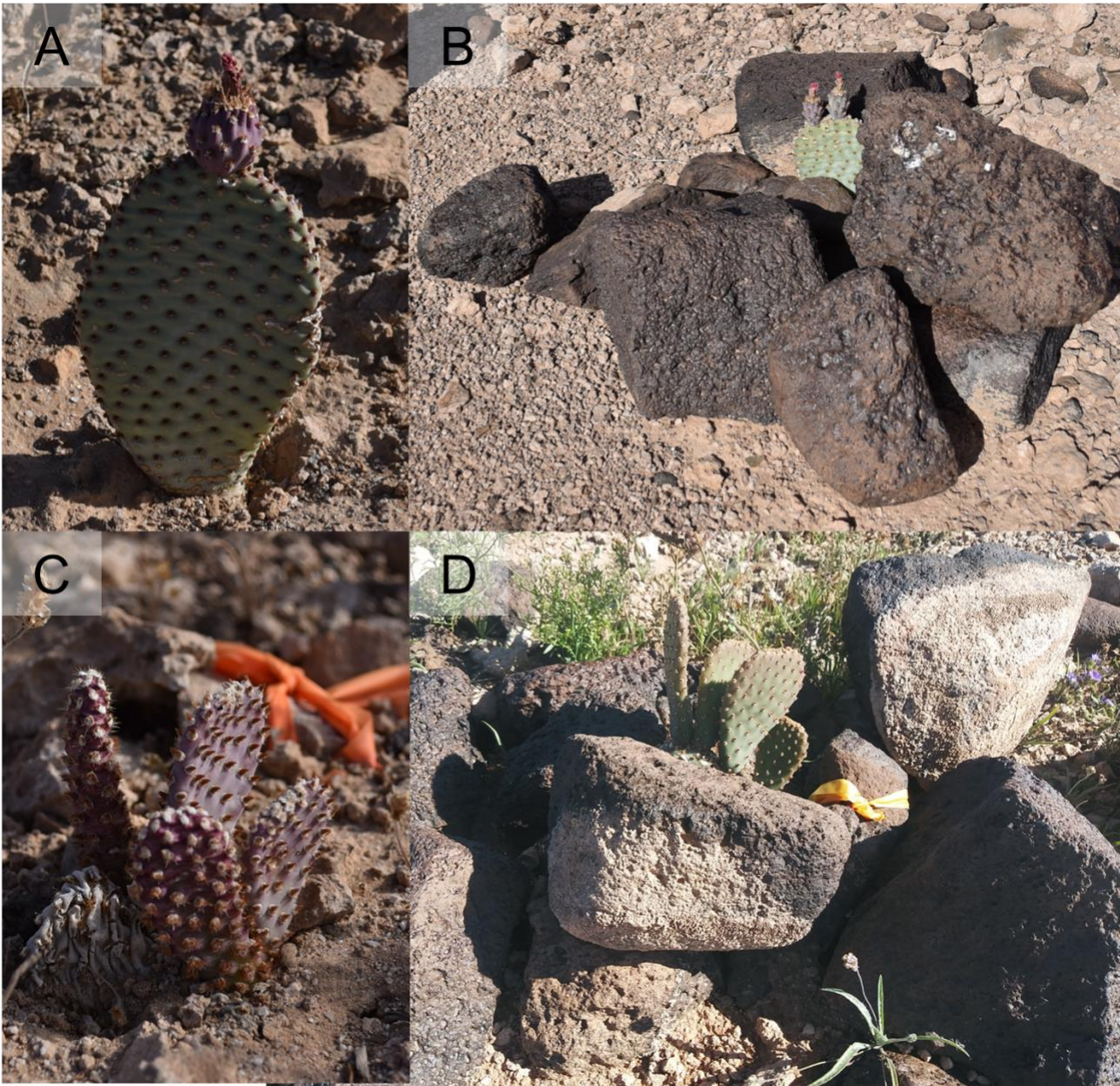


Figure S2. Examples of open (A, C) and rock (B, D) microsites in disturbed (top) and undisturbed (bottom) habitats. Photographs also show examples of functional responses measured, which included flowering (A, B) and vegetative propagation (C, D). Photographs taken in April 2020, 15 months after transplanting rooted *Opuntia basilaris* plants. Photo Credits: L.P. Chiquoine.