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Population dynamics of Sonoran Desert saguaro cactus (*Carnegiea gigantea*) at the Desert Laboratory (Tucson, Arizona)

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Abstract. The saguaro cactus (*Carnegiea gigantea*) is one of the most iconic perennials in the Sonoran Desert. The ecological importance of this species has motivated studies that explored its physiological adaptations to deserts, factors controlling its recruitment and distribution, and changes in its population density and extent over time. The population of saguaros on Tumamoc Hill (Tucson, Arizona) is one of the best studied. Saguaros on and nearby Tumamoc Hill were mapped in 1908, and in 1964 R. M. Turner and J. R. Hastings established four 250-m wide plots within the original census area. Plots were established on the north-, south-, east-, and west-facing slopes of Tumamoc Hill, and each plot extends from the top to the base of the hill. Plots were resurveyed in 1970, 1987, 1993, and between 2010 and 2012. In this Data Paper, we present all information associated with this monitoring program, which includes digital versions of Spalding's original 1908 saguaro map as well as information regarding individual saguaros located in each of the four plots. Collected data include plant height, number of branches, and plant condition, as well as plant location. Starting in 1993, we also noted the identity and condition of plant species growing in close proximity to each saguaro. The archived data set described here contains information pertaining to >5800 saguaros.

Past analyses of these data include reconstructions of regeneration patterns from observed age structures and the determination of the average height-specific growth rates for plants on each slope. The findings from these studies have broadened our understanding of the relationship between saguaro regeneration patterns and climate. These data have also provided pivotal information regarding regional trends of saguaro populations throughout the Sonoran Desert. As a group, the Tumamoc Hill censuses constitute one of the longest spatially explicit monitoring efforts for a single species in the world. They provide an observational baseline for future comparisons relating individual growth and population demographics to rising CO₂ levels, climate change, vegetation change, or changes in other biotic or abiotic factors.

Key words: *Carnegiea gigantea*; long-term monitoring; permanent plots; population dynamics; saguaro cactus; Sonoran Desert; spatially explicit data.

The complete data sets corresponding to abstracts published in the Data Papers section of the journal are published electronically in *Ecological Archives* at <http://esapubs.org/archive> (the accession number for each Data Paper is given directly beneath the title).