ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract **Element Code:** PDCAC05022
Data Sensitivity: Yes

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Echinocactus horizonthalonius* var. *nicholii*
COMMON NAME: Nichol Turk's Head Cactus, Nichol's Turk's-head cactus, Nichol's Turk's head cactus, Nichol turkshead, Nichol's echinocactus, Blue Barrel, Devil's Head, Horse Crippler
SYNONYMS: *Echinocactus horizonthalonius* subs. *nicholii*
FAMILY: Cactaceae

AUTHOR, PLACE OF PUBLICATION: L. Benson, The cacti of Arizona, 23, 175, f. 6.2-6.3 3rd edition. 1969.

TYPE LOCALITY: Southwest of Silver Bell, Silver Bell Mts., Arizona.

TYPE SPECIMEN: HT: POM-311314. L. Benson 16663, 3 July 1966.

TAXONOMIC UNIQUENESS: Variety *nicholii* is 1 of 2 varieties of the widespread Chihuahuan *Echinocactus horizonthalonius* Lemaire, and is an isolated variety in Arizona and Sonora. The most recent genetic study of this taxon suggests there is molecular evidence to recognize *E. horizonthalonius* subs. *nicholii* as a unique entity (Vargas-Luna et al. 2018).

DESCRIPTION: Small, single stem, blue-green to gray-green succulent globose barrel cactus, up to 51 cm (20 in) in height and 20 cm (8 in) in diameter. Often, several seedlings around the base gives appearance of small clumps. Juvenile stem grows primarily with an increase in diameter; adult stem grows primarily vertically. Eight ribs on plant; ribs spiral on some older plants. Each areole consists of three robust central spines (one curving downward, two upward) about 2.5 cm (1.0 in) long; five radial spines 1.9 cm (0.76 in.) long. Flower pink (magenta) to bright purple, 5-7 cm (2-3 in.) long, developing bud and immature fruit white wooly. Mature fruit briefly fleshy pink, soon drying brown. Seed longer than broad, 3.3-4.3 x 1.25 mm.

AIDS TO IDENTIFICATION: The only small, blue-green, eight-ribbed barrel cactus in Arizona; 8 spines per areole. In all Arizona populations, variation is found among adult plants in rib number, spine length, width, and shape (recurved, straight, or twisted), and flower color. Mature adults of var. *nicholii* have short cylindrical stems with curved spines and pink to crimson flowers, rather than the depressed stems, straight spines, and light pink flowers of var. *horizonthalonius* (USDI FWS 2019).

ILLUSTRATIONS:
Line drawings (Lucretia B. Hamilton, *in* Benson 1982: fig. 758 and USFWS).

Line Drawing (M.S., *in* Falk et al. 2001)
Color photos of plant and habitat (R. Bellsey, *in* Falk et al. 2001)
Color photo of flowering plant (Brooks/TNC, *in* Falk et al. 2001)

TOTAL RANGE: In the U.S the Nichol Turk's Head Cactus (NTHC) consists of three populations in Arizona, and one Sierra del Viejo, Sonora, Mexico (Falk, Jenkins, et al 2001).

RANGE WITHIN ARIZONA: Three populations are located in Arizona on land administered by the Bureau of Land Management (BLM), Arizona State Trust, the Tohono O'odham Nationand private lands (USDI, FWS 2009). Found in Koht Kohl Hill and the Waterman Mountains in Pima County, and in the Vekol Mountains in southwestern Pinal County. At present, permanent habitat protection of 2,368 acres has been accomplished at one site where the cactus occurs on BLM land in the Waterman Mountains but the status of the cactus in the other populations is unknown; sufficient population surveys have not been conducted (USDI, FWS 2009).

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Succulent perennial.

PHENOLOGY: Germination occurs in mid-summer. Vegetative growth is primarily from March through May. Flowering usually occurs in late-April to mid-July but can flower as late as November. Mass flowering of a population occurs 2 to 3 days after the first warm-weather rain. Flowers open 10 am to 5 pm for one day; two days, if cool and overcast. Flower number coupled to number of areoles produced and dependent on a combination of summer and rain distribution.

BIOLOGY: Very slow growing plants; requires ten year to become reproductive. Pollinated by many species of bees and butterflies. Seeds dispersed by birds, mammals, and rainwater. Average of 200 seeds produced per plant per year. Mean age 25, 25, 25, 28, 30, 40, 45, 45, and 50 years for nine studied populations: age estimated using BLM permanent plot growth rates (Schmalzel and Francisco, 2000.). Maximum age estimated to be 85 to 95 years (Schmalzel and Francisco, 2000.). Populations on parent rock differ demographically from bajada populations in density, fecundity, survivorship and probably recruitment. Shaded plants grow, flower, and survive at lower rates than plants in open. Erosion along bajadas appears to increase both seedling survival and adult mortality.

HABITAT: Habitat is characterized by open vegetation, few trees and scattered low shrubs (Phillips et al. 1979). Found in bedrock habitat at higher elevations; gravelly bajadas with limestone clasts at lower elevations (Van Devender 1994).

ELEVATION: 2,000 - 3,600 ft. (610 - 1,098 m).

EXPOSURE: On all exposures (N, S, E, W); substrate a more critical requirement.

SUBSTRATE: Pennsylvanian and Permian lime siltstones (Schmalzel and Francisco, 2000). Soil texture talus chips (Phillips et al. 1979). At higher elevations, inhabits bedrock habitat, and gravelly bajadas with limestone clasts at lower elevations (Van Devender 1994).

PLANT COMMUNITY: Paloverde-Cactus (*Cercidium-Opuntia*) Shrub community. Dominant associated species include: *Ambrosia deltoidea* (triangle bursage), *Carnegiea gigantean* (saguaro cactus), *Encelia farinosa* (white brittlebush), *Fouquieria splendens* (Ocotillo), *Krameria grayi* (white ratany), *Opuntia acanthocarpa* (stag-horn cholla), *Opuntia phaeacantha* (New Mexican prickly-pear), *Parkinsonia microphylla* (Little-leaf paloverde), and *Tiquilia canescens* (woody tiquilia). Associated species include: *Dasylirion* sp., *Fouquieria* sp., *Jatropha* sp., *Mammillaria lasiacantha* (lace-spine nipple-cactus), and *Parkinsonia* sp. (paloverde).

POPULATION TRENDS: T. Peebles (unpubl. Notes, and Kearney and Peebles. 1951 p. 573) thought *E. horizonthalonius* was introduced around mines by Mexican-American miners. Van Devender (1990), and Anderson and Van Devender (1991) identified one *E. horizonthalonius* seed from a packrat midden dated at 22,400 years B. P. in the Waterman Mountains. This demonstrates long-persistence of *E. horizonthalonius* for the Waterman Mountains. Benson's first edition of The Cacti of Arizona designated the Slate, Silver Bell, and Sawtooth Mountains as localities for *E. horizonthalonius* and C.H. Lowe (pers. comm. to B. Martin, 1997) remembers the plant from Twin Peaks (north end of Tucson Mountains). These localities were unvouchered and are either in error or represent interesting extirpations within the last 100 years.

In 2018, six NTHC areas in the Waterman Mountains were visited by BLM and USFWS biologists to assess the status of the taxon. In total, 541 live plants and 240 dead plants were observed. Plant numbers in the north plot appeared relatively stable from 1988-2018, but plant numbers in the south monitoring plot had decreased by approximately half since the area was last surveyed in 1999. Additional searches on the Waterman Mountain's southern slopes supported declining population trends. Plants on the Tohono O'odham Nation were last visited in 1999, but habitat between the Waterman Mountains and the Tohono O'odham nation is homogeneous. Biologists assume plants on Vekol Mountain slopes and possibly Koht Kohl Hill have likely also declined (USDI, FWS 2021).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: LE (USDI, FWS 1985)
[PE USDI, FWS 1980]
[PE USDI, FWS 1976]
[PTN-E USDI, FWS 1975]

STATE STATUS: Highly Safeguarded (ARS, ANPL 1999)
[Highly Safeguarded (ARS, ANPL 1993)]

OTHER STATUS: None

MANAGEMENT FACTORS: Many threats identified in the Recovery Plan and 5-Year Status Review have been successfully mitigated in the Waterman Mountains population. The Ironwood Forest National Monument has withdrawn from all forms of mineral extraction and recreational off-road vehicle use. Habitat disturbance associated with cross-boarder activity has been reduced in the Waterman Mountains. Bufflegrass has been effectively controlled, and there has been no observed or documented evidence of illegal collection of NTHC on the Waterman Mountains (USDI, FWS 2019).

Direct human interference is the most significant ongoing threat to the populations. This includes collecting, off road vehicles, copper mining and urbanization. Subsequent erosion after disturbances is highly damaging to these cacti. Cactus collection for profit and seed collection by commercial nurseries may still pose a potential threat to NTHC; illegally collected specimens have been observed in landscaped areas in the Silver Bell Mountains and in gardens of mining companies (USDI, FWS 2009). Depredation by herbivores (such as desert bighorn sheep, javelina, and rabbits) has been identified as a threat; wildlife may depend more heavily on the cactus for moisture during drought conditions (McIntosh et al. 2007; USDI, FWS 2009; USDI, FWS 2019)). Climate change presents a threat, due to increased temperatures and aridity (USDI, FWS 2019).

PROTECTIVE MEASURES TAKEN: A recovery plan was written in 1986 by the USFWS, however, no formal management plan has been implemented. Establishment of the Iornwood Forest National Monument in 2000 protected 906.5 ha (2,240 ac) of habitat.from mineral extraction and recreational off-road vehicles (BLM 2011, BLM 2013) The Bureau of Land Management manages the Agua Dulce Grazing Allotment to promote NTHC conservation (USDI, FWS 2019). Efforts to control buffelgrass in NTHC habitat in the Waterman Mountains has been highly successful, and the threat to nearby NTHC is considered eliminated (USDI, FWS 2019). The BLM has acquired 148.9 ha (368 ac) of 22.5 ha (550 ac) of land within occupied habitat, and continues to pursue acquisition of remaining private acreage (USDI, BLM 2011).

SUGGESTED PROJECTS: Detailed germination studies are needed, along with research on reproductive biology and ecology, demographic patterns and habitat requirements to aid in conservation efforts. Most of the efforts to document the cactus have occurred in the Waterman Mountains, Arizona; further studies on the other populations are needed to gain a stronger understanding of the current species abundance and condition (USDI, FWS 2009). Analysis of the amount, distribution, and suitability of NTHC habitat is also needed.

LAND MANAGEMENT/OWNERSHIP: BIA - Tohono O'odham Nation; BLM - Tucson Field Office; State Land Department; Private.

SOURCES OF FURTHER INFORMATION

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Robert Schmalzel – Oracle, Arizona.
Tom Van Devender - Arizona-Sonora Desert Museum, Tucson.

ADDITIONAL INFORMATION:

Clay May (Pima Community College, Tucson) has collected data for many years from *E. horizonthalonius* plants growing on the Schuk Toak District, Tohono O'odham Nation and on private patented land in the Waterman Mountains. Researchers should not cite these data without explicit permission from the Tohono O'odham Nation and private landowners.

Van Devender has seeds 22,000 years old (at that time, Arizona Desert Scrub) from rat middens (Van Devender and Bertelsen 1994).

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