Acuña Cactus

(*Echinomastus erectocentrus* var. *acunensis*)

5-Year Status Review:

Summary and Evaluation

Acuña cactus (*Echinomastus erectocentrus* var. *acunensis*) - Photo credit Theresa Condo, U.S. Bureau of Land Management

U.S. Fish and Wildlife Service

Arizona Ecological Services Office

Tucson, Arizona

February 2023

5-YEAR REVIEW

Acuña Cactus (*Echinomastus erectocentrus var. acunensis*)

1.0 GENERAL INFORMATION

1.1 Listing History

Species: *Echinomastus erectocentrus* var. *acunensis*
Date listed: October 1, 2013
FR citation(s): 78FR 60607
Classification: Endangered

Critical habitat/4(d) rule/Experimental population designation/Similarity of appearance listing: Six units of critical habitat totaling 7,501 hectares (18,535 acres) were designated in Maricopa, Pima, and Pinal Counties, Arizona on August 18, 2016 (81 FR 55265).

1.2 Methodology used to complete the review:

In accordance with section 4(c) (2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a 5-year review is to assess each threatened species and endangered species to determine whether its status has changed, whether it should be classified differently, or whether it should be removed from the List of Threatened and Endangered Wildlife and Plants. In 2022,the U.S. Fish and Wildlife Service (Service) evaluated the biology and status of the acuña cactus as part of a Species Status Assessment (U.S. Fish and Wildlife Service 2022a) that informed development of a Final Recovery Plan (U.S. Fish and Wildlife Service 2022b); both of those documents were used to inform this 5-year review.

1.3 FR Notice citation announcing the species is under active review:

Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 36 Species in Arizona, New Mexico, Texas, Utah, and Mexico. July 26, 2019. 84 FR 36113.

2.0 REVIEW ANALYSIS

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of "endangered species" or "threatened species." The Act defines an "endangered species" as a species that is "in danger of extinction throughout all or a significant portion of its range," and a "threatened species" as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Act requires that we determine whether a species meets the definition of "endangered species" or "threatened species" due to any of the five factors described below.

Section 4(a) of the Act describes five factors that may lead to endangered or threatened status for a species. These include: A) the present or threatened destruction, modification,

or curtailment of its habitat or range; B) overutilization for commercial, recreational, scientific, or educational purposes; C) disease or predation; D) the inadequacy of existing regulatory mechanisms; or E) other natural or manmade factors affecting its continued existence.

The identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In assessing whether a species meets either definition, we must evaluate all identified threats by considering the expected response of the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Service recommends whether the species meets the definition of an "endangered species" or a "threatened species" only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

2.1 Distinct Population Segment (DPS) policy (1996):

N/A

2.2 Updated Information and Current Species Status

2.2.1 Biology and Habitat:

In February 2022, a Species Status Assessment (SSA) for acuña cactus was released and in August 2022, a final Recovery Plan for acuña cactus was released (U.S. Fish and Wildlife Service 2022a, 2022b). These documents contained an extensive review of the species biology, taxonomy, distribution, ecology, trends, and threats. Within sections 2.2.1 and 2.2.2, we provide a summary of new information not previously presented in the 2013 listing rule, but which are present in the 2022 SSA and Recovery Plan. First, the entity *Echinomastus erectocentrus* var. *acunensis* is now further recognized as a valid taxon, as supported by additional morphological and genetic analysis (Baker and Porter 2016 p. 20, Fehlberg and Willis 2019 p. 14). Acuña cacti begin flowering and fruiting at roughly 5 years of age and are more vulnerable to drought prior to that age. Year-round precipitation is important not only for seedling survival, but also for plant growth and reproduction; the region has experienced drought for several decades (Bowers 2005 p. 421, Garfin et al. 2013 p. 3, 2014 p. 485, Williams et al. 2020 p. 314, Climate Assessment for the Southwest 2022 p. entire). The taxon is long lived, with one tracked individual at Organ Pipe Cactus National Monument (OPCNM) known to have survived to at least 42 years of age. Of the seven extant U.S. populations, the largest population containing approximately 2,300 individuals occurs within OPCNM. Across the entire range, including plants from one population in northern Mexico, 3,729 individual acuña cactus plants are known. Monitoring from within the OPCNM population from 1988 through 2022 indicates a general reduction in the number of

acuña cactus plants, with a peak in 1992 and lowest recorded number of acuña cactus plants in 2008. Large numbers of dead or dying individuals have been documented for most populations. In 2022, plots similar to those at OPCNM were initiated on Bureau of Land Management, Tohono O'odham Nation, and Barry M. Goldwater Range East lands. In addition, habitat modeling work has been initiated and refined to better understand the distribution of acuña cactus (Harris Environmental Group, Inc. 2013 p. 14, Abbate et al. 2018 p. entire, 2019 p. entire, Scobie and Mixan 2021 p. entire).

2.2.2 Threats Analysis (threats, conservation measures, and regulatory mechanisms):

As determined in the Species Status Assessment, there are many threats to acuña cactus and its habitat. The loss or reduction of habitat (Factor A) is a complicated threat in that there are many sources, both historical and current, that impact acuña cactus habitat. These include border activity, mining activity, urban development activity, livestock activity, and nonnative plant invasion and alteration of fire regimes, all of which have led to changes in acuña cactus habitat. Illegal collection (Factor B) is known to occur in acuña cactus populations and could be very impactful to small populations in particular. Seed predation or herbivory by vertebrates or invertebrates during the flowering and fruiting season (Factor C) can impact acuña cactus reproduction and uprooting by unknown sources kills individual plants (Factor C). Even though predation, herbivory, and uprooting may be natural phenomena, when coupled with other threats, they can have a greater impact on the species, especially on small populations. Disease (Factor C), and inadequacy of existing regulatory mechanisms (Factor D), are not known to threaten acuña cactus at this time. Drought and climate change impact acuña cactus germination, growth, and reproduction (Factor E). In addition, low numbers and limited distribution, which characterize half of the extant acuña cactus populations, reduce resiliency and increase risks to populations from all threats and limit recruitment and genetic diversity (Factor E).

2.3 Synthesis:

Acuña cactus is known historically from eight populations in Arizona, United States, and one population in Sonora, Mexico. Of these nine populations, one is believed to be extirpated, and four contain fewer than 50 individuals. Threats such as drought, increased temperatures, nonnative plant invasion, herbivory, uprooting, urban development, and border activity have increased since the species was listed in 2013 (U.S. Fish and Wildlife Service 2013 p. entire). In all populations that have been monitored, the population trend is declining, and most populations contain large numbers of dead or dying individuals. Therefore, after reviewing the best available scientific information, we conclude that acuña cactus remains an endangered species. The evaluation of threats affecting the species under the factors in 4(a)(1) of the Act and analysis of the status of the species in our 2021 SSA remain an accurate reflection of the species current status. While conservation partners in the U.S. and Mexico are implementing valuable recovery actions with very limited staff and funding resources, recovery actions for acuña cactus remain largely unfunded and

unimplemented. In light of this, there are ample opportunities ahead to support acuña cactus recovery.

3.0 RESULTS

3.1 Recommended Classification:

No change is needed

3.2 New Recovery Priority Number:

No change recommended

Brief Rationale:

See discussion above and in the SSA and the RP (U.S. Fish and Wildlife Service 2022a, 2022b)

3.3 Listing and Reclassification Priority Number: N/A

Reclassification (from Threatened to Endangered) Priority Number:
Reclassification (from Endangered to Threatened) Priority Number:
Delisting (Removal from list regardless of current classification) Priority Number:

Brief Rationale:

N/A

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

A full suite of recovery actions is included in the 2022 Acuna Cactus (*Echinomastus erectocentrus* var. *acunensis*) Final Recovery Plan (Service 2022, entire). We continue to recommend all the actions be implemented to recover the species. In addition to these needed actions, there are many information gaps regarding the life history and status of the acuña cactus that, if known, could aid in its recovery. The following is a list of known information gaps and research needs for acuña cactus.

i. Surveys – Additional acuña cactus surveys in Arizona and Mexico are needed to determine distribution and status across the entire range. There is a possibility that more plants occur on the TON, in Mexico, and in other remote areas of Arizona's Sonoran Desert. Difficulty, however, lies in the inaccessibility and researcher safety concerns within these areas. It is possible that the use of drones, scent detection dogs, or other innovative methods may assist in this endeavor, given landowner permissions are attained.

ii. Biology – With regard to acuña cactus, there are many unknowns involving the need for nurse plants, rocks, or moss, as well as mycorrhizae, for seedling development

and growth. Also, microhabitat requirements are not well understood, including aggregate size and soil stability. In addition, plant – animal interactions are largely not understood for this species. For example, to what degree do cattle, burros, horses, peccary, or other mammals' impact acuña cactus? What is the range-wide cause of uprooting? What are the impacts from small mammals given current and projected drought? Are snout moth (*Yosemitia graciella*) larvae, cactus weevils (*Gerstaeckeria* spp.), cactus longhorn beetles (*Moneilema gigas*), and other insect herbivores changing in number, phenology, and impact to acuña cactus with ongoing drought and increasing temperatures?

iii. Genetics – Additional work is needed applying the recently developed genetic markers, or markers with greater resolution such as ddRAD markers, with a focus on the two varieties of *Echinomastus erectocentrus*, including populations not yet sampled from Mexico and individuals and populations where gene flow is suspected or possible in the present or recent past.

iv. Introductions – Studies are needed to determine the best methods for successful acuña cactus site restoration and population augmentation or introduction. For example, what are the best introduction locations for this species? Can plants be grown in the field with direct seeding under protective wire mesh? How can germination of directly sown seeds be improved when seeds require wet years for germination and initial seedling survival?

v. Management – Determine the best land management practices for habitat and pollinator health. Determine the best methods for promoting public awareness of the plant, its habitat and biological needs.

5.0 REFERENCES

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U.S. FISH AND WILDLIFE SERVICE

5-YEAR REVIEW of Acuña Cactus (*Echinomastus erectocentrus* var. *acunensis*)

Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: N/A

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service, Arizona Ecological Services Office

Approve HEATHER WHITLAW Digitally signed by HEATHER WHITLAW Date: 2023.02.13 08:05:54 -07'00'