5-YEAR REVIEW
Bakersfield cactus (*Opuntia treleasei = Opuntia basilaris ssp. treleasei*)

GENERAL INFORMATION:

Species: Bakersfield cactus (*Opuntia treleasei = Opuntia basilaris ssp. treleasei*)
Date listed: July 19, 1990
FR citation(s): 55 FR 29361
Classification: Endangered

State Listing:
The Bakersfield cactus was listed as endangered by the State of California in 1990.

BACKGROUND:

Most recent status review:

U.S. Fish & Wildlife Service (Service). 2011. Bakersfield cactus (*Opuntia treleasei = Opuntia basilaris* var. *treleasei*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento, California. Finalized September 2011. 41 pp.

FR Notice citation announcing this status review:

U.S. Fish and Wildlife Service (Service). 2019. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 58 Species in California, Nevada, and the Klamath Basin of Oregon. Federal Register 84:36116–36118. Published July 26, 2019.

ASSESSMENT:

Information acquired since the last status review:

This 5-year review was conducted by the U.S. Fish and Wildlife Service's (Service) Sacramento Fish and Wildlife Office. Data for this review were solicited from interested parties through a Federal Register notice announcing this review and the opening of a 60-day public comment period on July 26, 2019; however, we did not receive any information about this species from the public in response to the notice. We also contacted State and Federal agencies, species experts, universities, and other partners to request any data or information we should consider in our review. Additionally, we conducted a literature search, a review of information in our files, and obtained data from the California Natural Diversity Database (Diversity Database).

New occurrences of Bakersfield cactus have been added to the Diversity Database since our 2011 review (Diversity Database 2020). However, these occurrences are most likely due to increased survey efforts and do not change our understanding of the distribution of and threats to Bakersfield cactus. Many of the occurrences of Bakersfield cactus have not been surveyed multiple times, so population trends are unknown. A 2014 survey by B. Cypher *et al.* (2014), which covered a majority of known Bakersfield cactus occurrences, revealed the number of individuals at each occurrence location were declining and continued to face threats due to habitat loss and fragmentation. Another study in 2014 conducted by E. Cypher *et al.* (2014)

tested translocation success of Bakersfield cactus pads and clumps. They determined that translocated clumps (intact plants) were more successful than translocated pads, but the removal of clumps may cause more of an impact to source populations. This study also recommends that strategies such as cattle guards and supplemental watering are implemented to ensure success (Cypher, E. *et al* 2014). This information is helpful for future planting/reestablishment of Bakersfield cactus.

New genetic information about the Bakersfield cactus has come out since our last review. One study determined that while there is substantial variation within certain populations, the genetic variation among populations is low (Smith 2013). Another study, done as a partnership between the California Botanic Garden (Botanic Garden) and the Service's Palm Springs Office, was conducted to clarify the relationship between Bakersfield cactus and another, more wide-spread species of *Opuntia* (Botanic Garden 2017). The results of the genomic sequencing in this study confirmed that Bakersfield cactus is a distinct, highly divergent subspecies of *Opuntia basilaris.* The study also confirmed that Bakersfield cactus is restricted to the San Joaquin Valley (Botanic Garden 2017).

Threats

Habitat loss and fragmentation due to agricultural and urban development, oil, gas, and other mining exploration, the invasion of non-native grasses, off-road vehicle use, climate change, and extreme weather events continue to be a threat to Bakersfield cactus throughout its range. Climate change is of special concern on private lands protected from development. Climate change has the potential to alter the timing and synchronicity of ecosystem processes, including the germination, growth, and pollination of Bakersfield cactus. Climate change will likely affect the structure, composition, and productivity of plant communities. Table 1 below summarizes the distribution of Bakersfield cactus occurrences by land ownership. Development projects that are subject to sections 7 and 10 of the Federal Endangered Species Act (Act) typically include habitat compensation, which can reduce the severity of overall habitat loss typically associated with these projects. Habitat compensation can occur via a variety of mechanisms, including the purchase of credits at approved conservation banks or through permittee responsible mitigation.

Table 1. Number and percentage of Bakersfield cactus (*Opuntia basilaris ssp. treleasei*) occurrences by land ownership type. Data from the Diversity Database (2020).

	Public land	**Private, protected land**	**Private land**	**Multiple ownership types**
Number of occurrences	3	7	29	12
Percentage of all occurrences	6%	14%	57%	24%

Conservation

Habitat Conservation Plans

Habitat Conservation Plans are planning documents required as part of an application for an incidental take permit. They describe the anticipated effects of the proposed taking; how those impacts will be minimized, or mitigated; and how the Habitat Conservation Plan is to be funded. Habitat Conservation Plans can apply to both listed and non-listed species, including those that are candidates or have been proposed for listing. Regional Habitat Conservation Plans develop large-scale conservation strategies within a specific region that are designed to conserve functional ecological systems and the covered species that depend on them. Such Habitat Conservation Plans aim to avoid a fragmented conservation landscape by working with local land use authorities and a designated implementing entity to conserve, enhance, and manage a preserve system. Project-level Habitat Conservation Plans are designed to fully offset the impacts associated with the permitted activity by contributing to a larger conservation design.

Being included as a covered species under a Habitat Conservation Plan can result in habitat being set aside and managed for the species as mitigation for impacts associated with covered activities, such as planned urban development, within the Habitat Conservation Plan permit area. In addition to mitigation, avoidance, minimization, and other conservation measures (e.g. monitoring, seasonal work windows, habitat management, etc.) are implemented. Habitat Conservation Plans can also utilize banks, in-lieu fee programs, or other mechanisms to preserve habitat in perpetuity and contribute to a regional conservation strategy.

The following are Habitat Conservation Plans that include Bakersfield cactus and the year the permit for the Habitat Conservation Plan was issued: PG&E San Joaquin Valley Operations & Maintenance Habitat Conservation Plan 2007, Nuevo-Torch 1999, Kern Water Bank 1997, and Metropolitan Bakersfield 1994. More information about Habitat Conservation Plans that include Bakersfield cactus as a covered species can be found at: https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=7799

Recovery Permits

Recovery permits, also referred to as 10(a)(1)(A) permits, allow scientists to take listed species as a means to ultimately contribute to the recovery of the listed species. The data acquired from some actions covered under recovery permits (e.g., occurrence, abundance, distribution, etc.) allow the Service to make informed decisions for the species that will enhance their survival and recovery. Recovery permits can be issued for activities that directly aid the recovery of a species, such as seed banking, reintroductions, habitat restoration, removal or reduction of threats, and educational programs. The Service's recovery permitting program aids in the conservation of listed species by ensuring permittees have adequate field experience and qualifications for conducting activities with the target listed species and, for most species, ensures that permittees are following standardized protocols while surveying. The recovery permitting application process ensures that scientific proposals are crafted using the recommended actions laid out in the Recovery Plan for the target species. Minimum qualifications and species specific protocols can be found at: https://www.fws.gov/sacramento/es/Permits/.

The Santa Barbara Botanical Garden has used a recovery permit to collect and store seeds of Bakersfield cactus for future research and conservation needs.

Other conservation projects

Several Bakersfield cactus conservation and restoration projects have occurred since the 2011 5-year review. One project sought to expand the number and size of Bakersfield cactus populations (Cypher, B. *et al* 2015). The results of this project are recommendations on Bakersfield cactus propagation and translocation, as well as outreach materials and strategies. Another project has the goal of establishing a new population of Bakersfield cactus on protected land within its range (The Nature Conservancy 2018). This project is ongoing and will inform future translocation and establishment efforts. A third conservation project is occurring on Wind Wolves Preserve and seeks to test propagation, translocation, and restoration methods while ensuring the survival of a large population of Bakersfield cactus (Carrillo *et al.* 2019). This project is on one of the largest occurrences of Bakersfield cactus, which was severely damaged by a 2011 lightning fire. All of the aforementioned projects will help inform conservation and restoration efforts in the future.

Conclusion:

After reviewing the best available scientific information, we conclude that Bakersfield cactus (*Opuntia basilaris ssp. treleasei*) remains an endangered species. The evaluation of threats affecting Bakersfield cactus under the factors in 4(a)(1) of the Act and analysis of the status of Bakersfield cactus in our 2011 5-year review remains an accurate reflection of its current status.

RECOMMENDATIONS FOR FUTURE ACTIONS:

1. Protect existing habitat in the San Joaquin Valley for Bakersfield cactus.
2. Survey both extant and extirpated occurrences that have not been visited in the past few years to determine the status of these occurrences. Conduct yearly surveys at extant locations utilizing a standardized methodology to determine trends in the range-wide status as well as population/occurrence abundance.
3. Determine suitable management methods for reducing nonnative annual grasses and increasing native perennials, including Bakersfield cactus, and communicate the benefits of such management to rangeland owners.

Field Supervisor, Sacramento Fish and Wildlife Office

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LITERATURE CITED

[Diversity Database] California Natural Diversity Database. 2020. Natural Heritage Division. California Department of Fish and Wildlife, State of California. Element Occurrence Reports for *Opuntia basilaris ssp. treleasei*. Unpublished cumulative data current to January 2020.

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