



A GLIMMER OF HOPE REMAINS FOR THE FADING  
**BAKERSFIELD CACTUS**

Environmental scientists and conservationists are working to preserve what populations remain of the endangered Bakersfield cactus (*Opuntia basilaris* var. *treleasei*). The goal is to establish six new populations and to increase some of the smaller populations all around the Bakersfield area. There are only 33 sites left with populations of Bakersfield cactus, and half of the sites have fewer than 100 plants.



BY KIMBERLY HORG  
PHOTOS BY JOHN BATTISTONI

# CAN THIS BE THE LAST OF ITS KIND?

In the arid landscape surrounding Bakersfield, a grayish green cactus casts its distinctive silhouette against the blue horizon. Its thick oblong pads, like beaver-tails, lean at odd angles and aim their sharp bristles toward the expansive sky. In spring, the cactus sprouts a magenta flower that adds a splash of color to the muted hues of the desert landscape. In the past, this iconic plant covered vast regions of the southern San Joaquin Valley, but over the years its appearance has faded, alarming botanists and conservationists alike.

The process has been slow. The destruction of the cactus habitat started in the 1930s when tracts of cacti were eliminated by conversion to row crops and citrus groves. Residential development in parts of northeast Bakersfield added to the problem in recent years as well as petroleum production, which has further contributed to habitat loss and fragmentation in Oildale.

As a result of the precipitous decline in the numbers of Bakersfield cactus, the state and federal governments listed it as endangered in 1990. Today it is estimated that one-third of Bakersfield cacti have been eliminated and the remaining plants are in fragmented populations, mostly on private land.

Fortunately, this struggling succulent has gained the attention of environmental scientists from the California Department of Fish and Wildlife as well as

other conservation groups with dedicated botanists who are committed to saving the cactus from extinction.

Krista Tomlinson, a senior environmental scientist in CDFW's Central Region, has joined the effort to protect and preserve the Bakersfield cactus as well as other struggling plant species in the San Joaquin Valley region.

"What's important to realize is when you conserve habitats in the San Joaquin Valley for threatened and endangered species like the Bakersfield cactus, you are actually conserving habitat for numerous other sensitive, threatened and endangered species, as they often occupy the same habitat," she said.

She points out that in addition to habitat loss there are a number of other threats to the survival of the Bakersfield cactus including dumping, trespassing on conservation lands, off-highway vehicles and erosion from adjacent sand-mining operations. And, according to the 2006 U.S. Fish and Wildlife Service's five-year review, there are also new threats from climate change, air pollution, loss of pollinators, flooding and loss of genetic diversity.

Tomlinson is particularly concerned with the effects of habitat fragmentation on the cactus's genetic health.



Top photo, blooming clump of Bakersfield cactus (*Opuntia basilaris* var. *treleasei*). Photograph taken during routine property inspection at the Hart Park unit of the California Department of Fish and Wildlife Bakersfield Cactus Ecological Reserve.



An inspection of the perennial blossom found on this Bakersfield cactus from the Bakersfield Cactus Ecological Reserve shows dry fruit with the grayish-white color of its seeds. The splash of color comes only once a year in the spring.

“The impact of fragmentation to the genetic diversity will likely be the biggest daisy-chain effect, as there is only a fraction of Bakersfield cactus left in existence,” said Tomlinson. “Conservation is the key to protecting our natural resources and maintaining ecological diversity.”

Over the past two decades, retired CDFW botanist Dr. Ellen Cypher and her husband Dr. Brian Cypher have led conservation efforts to help restore new populations of the cactus. They have seen firsthand the damage caused by dumping, trespassing and off-road vehicle use. Because almost all of the known sites are on private land, the couple would like to see more protection to make up with what has been lost.

“We have both devoted our careers to the study and recovery of endangered species,” said Ellen Cypher. “We have observed habitat destruction and decline in Bakersfield cactus populations during the 24 years we have lived in Bakersfield. The cactus used to run for miles, but now a tiny fraction is left of what used to be out there. We wanted to try to begin reversing that process. Brian has been involved in projects to translocate endangered animals to unoccupied, suitable habitat and decided to try a similar approach with Bakersfield cactus.”

Ellen is the coauthor of two manuscripts on the subject that will be published in the *California Fish and Game Journal* this year. She is also the main author of the translocation manuscript, and Brian took the lead on writing the status survey manuscript. In addition, Ellen helped write the Bakersfield Cactus Recovery Plan that was finalized in 1998, and Brian is conducting a propagation study for the Endangered Species Recovery Program through California State University, Stanislaus.

“We are trying to make up for what was lost by getting new populations started at new locations. But it is sometimes hard to get people to care about the cactus because it is not warm and fuzzy,” said Ellen Cypher.

According to Tomlinson, CDFW’s overall conservation goal is to rebuild populations of threatened and endangered species, including the Bakersfield cactus, with the ultimate objective of removing them from the endangered species list. This starts by conserving lands that have existing populations or suitable habitats, then reintroducing or translocating the species to provide the opportunity for restoration.

Nearly 25 years ago, the Nature Conservancy began preservation efforts for Bakersfield cactus by purchasing a portion of Sand Ridge. Just recently, the Metropolitan Bakersfield habitat conservation plan implementation trust group voted to acquire an important piece of habitat in the Kern Bluff area.

But with every step forward there is a shuffle-step sideways.

At their first transplantation site at Bena, just 10

small plants and 25 flat green stems of the cactus, called pads, were planted. The second transplantation effort at Sand Ridge was a more successful effort. However, in December of 2010 the clumps of cacti they had transplanted were destroyed when the land was bulldozed for conversion to a citrus grove. The Cyphers excavated what they could from under a pile of sand, but most of the clumps fell apart during the process. They were only able to transplant 26 small plants and 28 pads to an area of the Sand Ridge set aside as the Bakersfield Cactus Ecological Reserve managed by CDFW.

Because the cactus' propagation is not completely understood, there is some trial and error that goes along with the translocation process. Over the years the Cyphers have learned a great deal about what factors contribute to the survival of transplanted cacti and which factors can guarantee a disaster.

What the Cyphers learned from their combined efforts are small plants are preferable to pads for translocation. Large plants disarticulate during the process so pads have lower survival rates, but larger, heavier pads tend to grow faster and have higher survival rates. Pads should be placed upright in pots and allowed to develop roots prior to out-planting. Control of competitors is essential and watering during the first one or two summers increases survival rates.

During the fall of last year, with the necessary permits and permissions, a team of scientists collected about 400 pads from both public and private land. The plants are being allowed to grow for nine months in a protected facility and will then be transplanted this fall. The goal is to establish six new populations and to increase some of the smaller populations all around the Bakersfield area. There are only 33 sites left with populations of Bakersfield cactus, and half of the sites have less than 100 plants.

In addition to gathering cacti for transplanting, the team also went to as many locations as possible to evaluate the conditions of the various populations. Samples of cacti from these sites were then given to Paul Smith, a researcher at California State University, Bakersfield's Department of Biology, who analyzed the samples to determine the genetic differentiation of the remaining populations. Smith's study is important in determining where the collected and salvaged cactus pads should go.

Smith explained that genetic data can be useful for recovery efforts of endangered species, because it can identify populations that have lost genetic variation and have become inbred. In order to circumvent the deleterious effects of inbreeding and improve the hardiness of a particular population, it is helpful to introduce genetically different individuals from other populations. But, this approach has its risks; research shows that transplanting individuals that are "too" genetically different from the target population can

also be harmful.

In addition to maintaining genetic diversity of cactus populations, managing non-native grasses is another challenge. Non-native grasses are not compatible with the Bakersfield cactus.

"Native grasses don't cause a threat to the Bakersfield cactus, because they evolved together. But non-native grasses are another story. They compete for water resources and they create a large amount of fuel that can feed wildfires," said Ellen Cypher. "We recommend removing non-native grass within a couple feet of each spot where the cactus will be transplanted and then managing the overall site to reduce grass cover. Livestock grazing is the most practical means for long-term management of non-native grasses."

Fire has been another difficult challenge in the efforts to rebuild the cactus population. In 2011, a fire at the Wind Wolves Preserve at the southern end of the San Joaquin Valley destroyed nearly 1,000 plants (clumps) of Bakersfield cactus. In 2012 efforts began to help restore the population. Over the years, fires have also damaged other populations of cactus including at Sand Ridge.

Another important factor to consider when transplanting cactus is water. The Cyphers have found that if there is average or greater rainfall during the winter months, the transplants and any new growth are more likely to survive through the following summer.

"It is very possible to establish new populations," Brian Cypher said. "What needs to be done other than transplanting is to find out how the weather will have an effect on the new growth."

Considering the plant's need for water, climate change is a concern for these researchers and there are many unknowns.

"There are still many research needs in order to understand sensitive San Joaquin Valley species and

## The Basics of the Bakersfield

The Bakersfield cactus is a perennial and its magenta flowers bloom once a year in spring, depending on temperature and rain. The plant can grow up to 14 inches high and 33 feet across. Small leaves are produced on the youngest pads of beavertail cacti, the sister variety to Bakerfield cactus. It has dry fruits, the size and shape of small eggs, and may have grayish-white seeds. The lifespan of wild plants is yet to be determined, but clumps in cultivation at the Rancho Santa Ana Botanic Garden in Claremont survived for 48 years. The only animal that is a threat is a destructive exotic moth species that isn't seen in California.

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the intricacies of their ecosystem function in addition to new research questions that arise in light of climate change that will absolutely have an impact on conservation strategies. These are aspects we cannot

dismiss and the need to maintain and improve these ecosystems are a certain need now and will be a certain need in the future as these changes in our climate play a role in ecosystem function," Tomlinson said.

CDFW's five highest priority actions

over the next five years are to protect populations within Bakersfield city limits, work with willing land owners to establish a conservation easement, complete the draft Department of Water Resources Habitat Conservation Plan, conduct census of known populations and monitor known populations and determine suitable management methods for reducing non-native annual grasses and increasing native perennials. The key component of the five-year plan is acquiring habitat in order to protect it from further development.

"In addition to conserving these habitats for the species themselves, conservation has a benefit to us. Conserving these historic landscapes is conserving our heritage," Tomlinson said. "Retaining these lands also has a great benefit to us such as ground water recharge, greenhouse gas reduction, protection of oil and natural gas, ecosystem function for wildlife, including game species and many more benefits."

For more information, visit the U.S. Fish and Wildlife Service's endangered species website, [www.fws.gov/endangered/species/index.html](http://www.fws.gov/endangered/species/index.html). 🐾

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A native digger bee (*Anthophora urban*) emerges from the closed blossom of a Bakersfield cactus (*Opuntia basilaris* var. *treleasei*).

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