

Wright's Marsh Thistle

(Cirsium wrightii)

2017 – 2021 Monitoring Report

Blue Hole and Ballpark Ciénegas

Santa Rosa, NM



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Prepared for the

U.S. Fish & Wildlife Service, Region 2

Albuquerque, NM

(USFWS Grant Award No. F21AP00078-00)

INTRODUCTION

Cirsium wrightii A. Gray (Wright's marsh thistle) is a wetland thistle that occurs in wet meadows associated with alkaline springs and seeps (ciénegas) primarily in New Mexico, and a few historic locations in Arizona and northern Mexico (Sivinski 2012). It is believed to be extirpated from all previously known locations in Arizona. Several historic locations in Mexico are also reported extirpated (Sanchez Escalante 2018a). However, *Cirsium wrightii* has recently been documented and was verified from one location in Mexico and one location from Texas (Nesom 2018; Sivinski 2018; Sanchez Escalante 2018b).

Cirsium wrightii is state listed endangered in New Mexico (19 NMAC 21.2) and was a Candidate for Federal Listing under the Endangered Species Act between 2010 and 2020 (75 FR 67925 67944). It was proposed for federal listing as threatened under the Endangered Species Act in 2020. NatureServe ranks *Cirsium wrightii* globally and state imperiled (G2/S2). The New Mexico Rare Plant Conservation Strategy gives the species an overall conservation rank of 'weakly conserved' due to moderate to high threat scores and a limited distribution (EMNRD – Forestry Division 2017). It is currently known from 8 locations within the State of New Mexico (Figure 1).

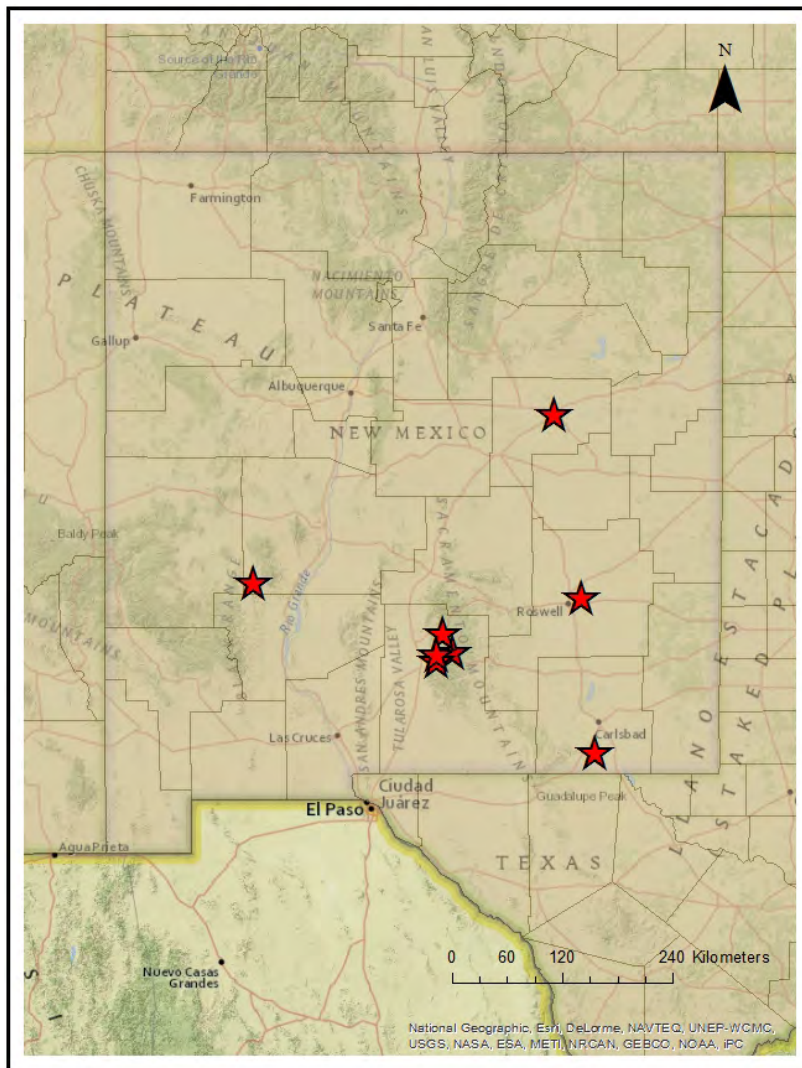


Figure 1. Extant distribution of *Cirsium wrightii* in New Mexico (Sivinski 2012).

DESCRIPTION

Cirsium wrightii is a robust biennial or monocarpic perennial herb up to 2.5 m tall (NMRPTC 1999). It has large, somewhat succulent nearly glabrous leaves, 30 cm or more long, sinuate or pinnatifid, weakly prickly with short black spines. The stem leaves are sessile, strongly decurrent, gradually reduced in size up the stem. Flower heads are hemispherical, 2-3 cm across; with small, somewhat glandular phyllaries with papillose projections on the upper surface. Flowers are white or pink and terminate on thin branches in naked panicles. *Cirsium wrightii* flowers from August to October. Associated species include *Distichlis spicata* (saltgrass), *Sporobolus airoides* (alkali sacaton), *Phragmites australis* (common reed), *Sorghastrum nutans* (Indiangrass), *Schoenoplectus americanus* (chairmaker's bullrush), *Juncus balticus* (Baltic rush), *Muhlenbergia asperifolia* (alkali muhly), *Apocynum cannabinum* (dogbane), *Baccharis salicina* (Great Plains seep-willow), *Limonium limbatum* (southwestern sea lavender), *Flaveria chlorifolia* (clasping yellowtops), and *Solidago canadensis* (goldenrod). Other associated rare and endangered plants include *Helianthus paradoxus* (Pecos sunflower) and *Spiranthes magnicamporum* (Great Plains lady's tresses).

HABITAT AND DISTRIBUTION

Cirsium wrightii is found in wet, alkaline springs, seeps, and marshy edges of streams and ponds between 3,450 and 8,500 ft (NMRPTC 1999). In New Mexico it is found in Eddy, Chavez, Guadalupe, Otero, Sierra, and Socorro countries. In the Santa Rosa wetland complex plants occur scattered within an assortment of marshes, spring seeps, streams, and along the margins of various sinkhole lakes (USFWS 2015; Figure 2).



Figure 2. Habitat of *Cirsium wrightii* at Blue Hole Ciénega in Santa Rosa, NM.

Santa Rosa Ciénegas

Santa Rosa lies within a six-mile-wide sink caused by the dissolution of the underlying San Andres limestone and gypsum and the collapse of the overlying Santa Rosa Sandstone (Kelley 1972). The Santa Rosa sink region lies within the Rio Pecos valley of east-central New Mexico at an elevation of about 4,600 ft (Sivinski and Tonne 2011). The groundwater of this regional sink usually comes up in broad-area seeps that cause most of the soils to be saturated to the surface, creating expansive mid-elevation wetlands or ciénegas. The ciénegas of the Santa Rosa sink are among the most botanically diverse wetlands in the Southwest and contain several rare and endangered plant species including Wright's marsh thistle, Pecos sunflower (*Helianthus paradoxus*), and Great Plains lady's tresses (*Spiranthes magnicamporum*).

The Santa Rosa basin contains one the largest meta-populations of *Cirsium wrightii* in New Mexico (Sivinski 2012). As many as 23 scattered *Cirsium wrightii* sites have been documented in the Santa Rosa Basin. Thistle numbers in the Santa Rosa Basin were estimated between 12,000 and 16,000 individuals in 2012.

The 116-acre Blue Hole Ciénega Nature Preserve in Santa Rosa was acquired by the New Mexico Forestry Division in 2005 with funds from a USFWS Recovery Land Acquisitions grant and a mitigation settlement from the NM Department of Transportation. It is managed by the Forestry Division for the sole purpose of protecting and enhancing the federally listed threatened *Helianthus paradoxus* (Pecos sunflower) population and other rare and endangered wetland plants, including the state listed endangered *Cirsium wrightii*. Management actions and associated research inform the types of management and land uses that are compatible with this species on Blue Hole Ciénega and elsewhere, including the removal of livestock, the ongoing management of invasive woody species (tamarisk, Siberian elm, Russian olive) through cut and herbicide treatments, and prescribed fires (Roth and Austin 2021). The most recent prescribed burn occurred in early February of 2017.

The City of Santa Rosa owns and manages multiple ciénegas within City boundaries, including Ballpark Ciénega, which is located on the south side of Blue Hole Cienega, separated by HWY 91 (Figure 3). Most of this Ciénega (north and east sides) is artificially watered through runoff directed from a nameless spring at Milagro Ciénega which is located to the southwest of this location. All City ciénegas have been variously treated to remove invasive woody species since 2014, including mechanical removal cut and herbicide treatments, and prescribed fires (Roth and Austin 2021). Ballpark Ciénega was broadcast burned in early March of 2019.

METHODS

To document the response of *Cirsium wrightii* to a prescribed fire in February of 2017 on Blue Hole Ciénega 5 monitoring transects were established prior to the fire in January of 2017, wherever plants occurred (Figure 3). An additional 3 transects were established on Ballpark Ciénega in November of 2018 to study the response to a prescribed fire in early March of 2019. Each transect measures 60 m x 4 m and is permanently marked by a metal t-post on either end. All permanent markers were mapped using a Garmin Monterra GPS. Annual monitoring occurs during the first 2 weeks of October, after the majority of plants are done flowering and plants

are senescent. Within each transect the number of flowering (senescent) plants is recorded. Plant rosettes are not counted due to the difficulty in finding small plants under the often thick thatch of associated rushes and grasses, without significant disturbance to the plants (Figure 6). Annual observations may include the observance of predators (insects, deer) or diseases, and the general vigor of plants in the transect, measured by average height of the plants. Other monitoring activities on Blue Hole Ciénega include an annual census of *Helianthus paradoxus* along 11 monitoring transects (Roth 2021), rainfall (since July 2016), and groundwater fluctuations (LeJeune 2018). Regular monitoring results will inform our understanding of thistle population fluctuations in response to management activities, rainfall, and groundwater fluctuations. A variety of management activities have been implemented at both cienégas, including the removal of livestock, mechanical removal of invasive woody species, multiple cut & herbicide treatments, hand pulling of resprouts, and several prescribed burns (Roth & Austin 2021).



Figure 3. Location of *Cirsium wrightii* monitoring transects on Blue Hole and Ballpark cienégas in Santa Rosa, NM.



RESULTS

Blue Hole Ciénega

The number of flowering plants within the transects dropped from 576 plants documented pre-fire to 321 flowering plants in the fall of 2017, 8 months post-fire (Figure 4). One year later the population recovered to some degree; 501 flowering plants were documented in the monitoring transects in October 2018. The number of flowering plants fell in 2019 and 2020, when only 235 and 190 plants were recorded in the 5 transects, less than half of the number recorded in 2017. In 2021 379 flowering plants were counted along the transect lines at Blue Hole Ciénega.

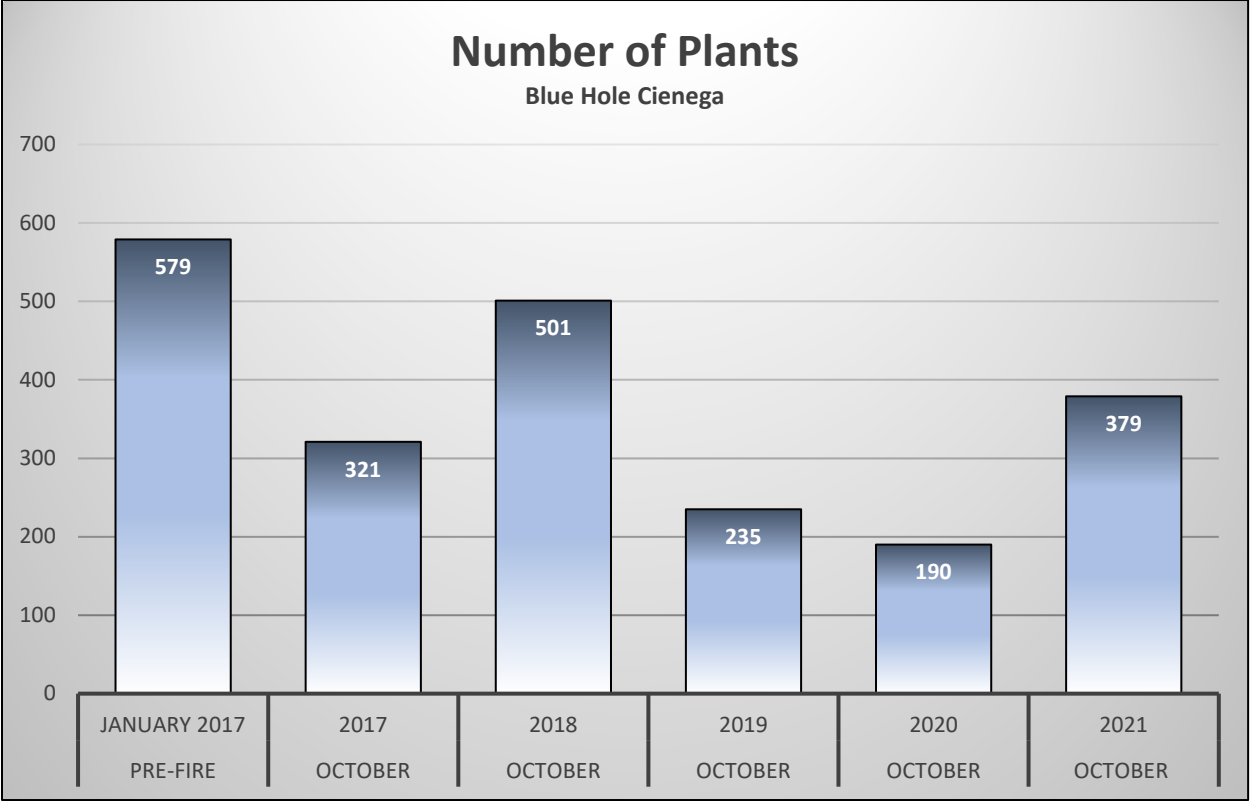


Figure 4. Number of flowering *Cirsium wrightii* plants in 5 monitoring transects pre- and post-fire at Blue Hole Ciénega, Santa Rosa, NM.

Ballpark Ciénega

The number of flowering plants within the transects dropped from 510 plants documented pre-fire in 2018 to 244 flowering plants in the fall of 2019, 7 months post-fire (Figure 5). The population has recovered since and the number of plants within the transects was at its highest in 2021 when 610 flowering plants were documented in the monitoring transects.

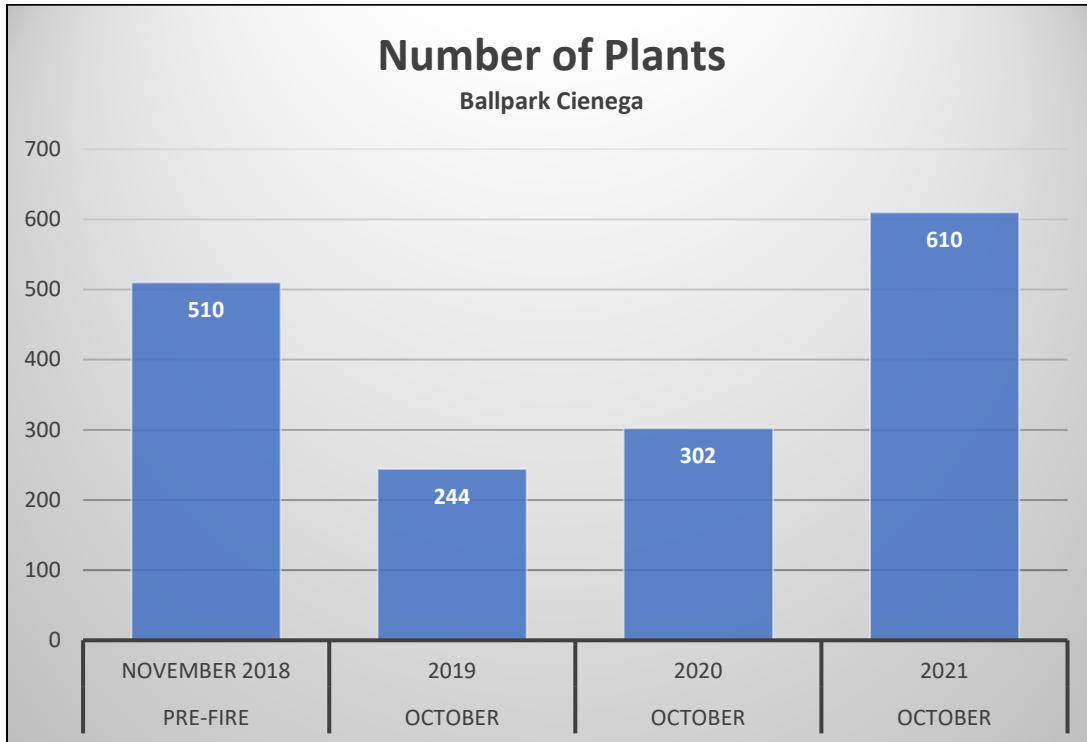


Figure 5. Number of flowering *Cirsium wrightii* plants in 3 monitoring transects pre- and post-fire at Ballpark Ciénega, Santa Rosa, NM.

DISCUSSION

Unlike the positive impacts documented on plant abundance in response to fire for *Helianthus paradoxus* (Roth 2017 & 2020), *Cirsium wrightii* experienced an initial reduction in plant numbers following the fires, at both sites. *Helianthus paradoxus* is an annual plant, overwintering in the seedbank in the form of seeds, hence it is still dormant at the time of the fires in early February. The prescribed burn reduced the competition with perennial plant species, broke dormancy of sunflower seeds, and boosted available nitrogen in the soil, resulting in a significant increase of plants at Blue Hole and Milagro ciénegas. *Cirsium wrightii* is a biennial or monocarpic perennial plant (flowers once and dies). Plants survive as rosettes aboveground before flowering and are therefore more susceptible to fires (Figure 6). Whether rosettes recover from fire damage is unknown. Rosettes may be protected to some degree if they have not yet emerged from the thatch of other plants. Germination and establishment do not appear to be hindered by the thatch they grow under. The reduced number of flowering plants

documented post-fires is likely the result of direct impacts of the fire on overwintering seedlings and rosettes. Although plants ultimately recover from the impacts of fire, fire does not enhance population numbers for *Cirsium wrightii*. Prescribed fires used to manage Pecos sunflowers in the same habitat should be used with caution and should not be used more often than every 5 years to maintain both species. Prescribed fires should occur during the winter months, preferably during relatively wet conditions.



Figure 6. *Cirsium wrightii* flowering plants and rosettes emerging from a thick thatch of rushes at Ballpark Ciénega.

Measurable impacts in response to fires are not expected to be documented beyond 2 years post-fire. Ongoing monitoring is documenting significant population fluctuations at both sites. Although population numbers were down in 2019 and 2020, they increased significantly at both sites in 2021, in the absence of management manipulation. No clear pattern emerges with respect to the location of the transects. Despite an extremely dry winter in 2017/2018 (0.39 inches between November 1, 2017 and April 30, 2018. 100-year average for Santa Rosa = 3.39 inches), a significant number of flowering plants were found at both sites in the fall of 2018. These likely germinated and established prior to drought conditions. The low number of

flowering plants found the following year may have been the result of low germination and establishment of seedlings during the 2018 drought conditions. The number of flowering plants within the transects continued to be low in 2019 and 2020, despite an average rainfall year winter in 2018/2019 and an excellent rainfall winter during 2019/2020. However, the increase of flowering plants documented in 2021 is likely the result of seedling germination and establishment following the 2019/2020 winter. Hence population trends are clearly linked to rainfall patterns and may therefore be significantly impacted by climate change.

Cirsium wrightii requires waterlogged marshy substrates to thrive. Groundwater fluctuations were monitored at Blue Hole Ciénega between 2014 and 2019. In general, the water table rises to the surface during the winter months, between October and April. Prior to 2016 the water levels fluctuated considerably during the summer and early fall months, likely in response to monsoon rainfall amounts (Roth 2020). However, this pattern has not been documented since 2016, for unknown reasons. The water table remains low for all wells during the summer months, despite a very good monsoon rainfall year in 2017. The water table reached the surface for only a short period of time in the winter of 2016/2017 and remained low by February of 2017, despite above average rainfall amounts between November and April (7.64 inches). Since 2017, the groundwater no longer rises to the surface in 5 of the 10 well locations. Although extant plants looked similar along the transects between monitoring years, it is possible that ground water fluctuations may ultimately be no longer optimum for the establishment of *Cirsium wrightii* at Blue Hole Ciénega. Ballpark Ciénega is located adjacent to Blue Hole Ciénega but the two ciénegas are now bisected by HWY 91. They are likely hydrologically linked, although potential impacts created by the construction of the highway are unknown. In addition, Ballpark Ciénega is artificially watered by the channelization and redirection of the spring flow from Milagro Ciénega, which ultimately empties into Ballpark Ciénega. Still, hydrological changes occurring on Blue Hole Ciénega may also be impacting Ballpark Ciénega.

ACKNOWLEDGEMENTS

Funding for this project has been provided by the U.S. Fish and Wildlife Service, Region 2, Albuquerque, NM, through Section 6 Endangered Species grants, received from 2017 through 2021. Nick Jarvis and Carmen Austin of the EMNRD-Forestry Division helped with transect set-up and annual data collection.

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