Wright's Marsh Thistle

(*Cirsium wrightii*)

2017 – 2020 Monitoring Report

Blue Hole and Ballpark Ciénegas
Santa Rosa, NM

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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). *Cirsium wrightii* has recently been documented and 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 has been a Candidate for Federal Listing under the Endangered Species Act since 2010 (75 FR 67925 67944). In 2020 it was proposed for federal listing as threatened under the Endangered Species Act. 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).

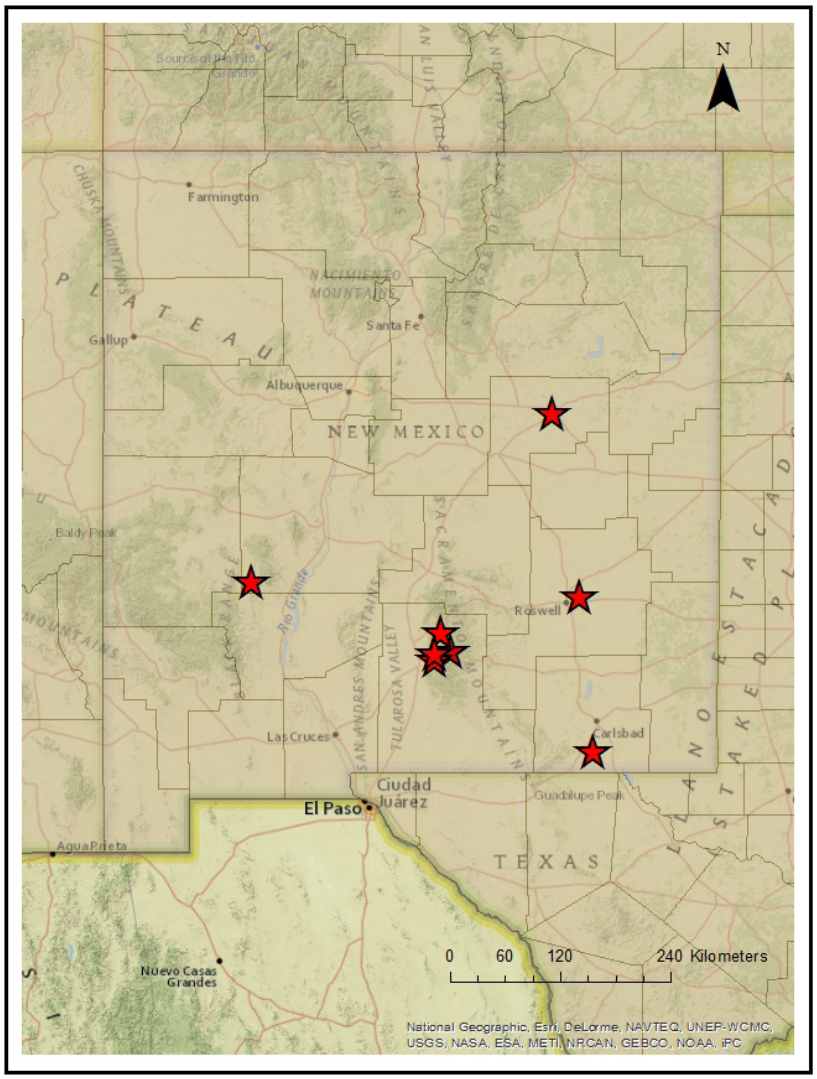

Figure 1. Extant distribution of *Cirsium wrightii* in New Mexico (Sivinski 2012).

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 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). It is found in Eddy, Chavez, Guadalupe, Otero, Sierra, and Socorro countries in New Mexico. 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 1,400 meters (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 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. The latest 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). All City ciénegas have been variously treated to remove invasive woody species since 2015, including mechanical removal cut and herbicide treatments, and prescribed fires. Ballpark Ciénega was 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 (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 plants is recorded. 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 2020), 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.

Figure 3. Location of *Cirsium wrightii* monitoring transects on Blue Hole and Ballpark ciénegas 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. However, 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.

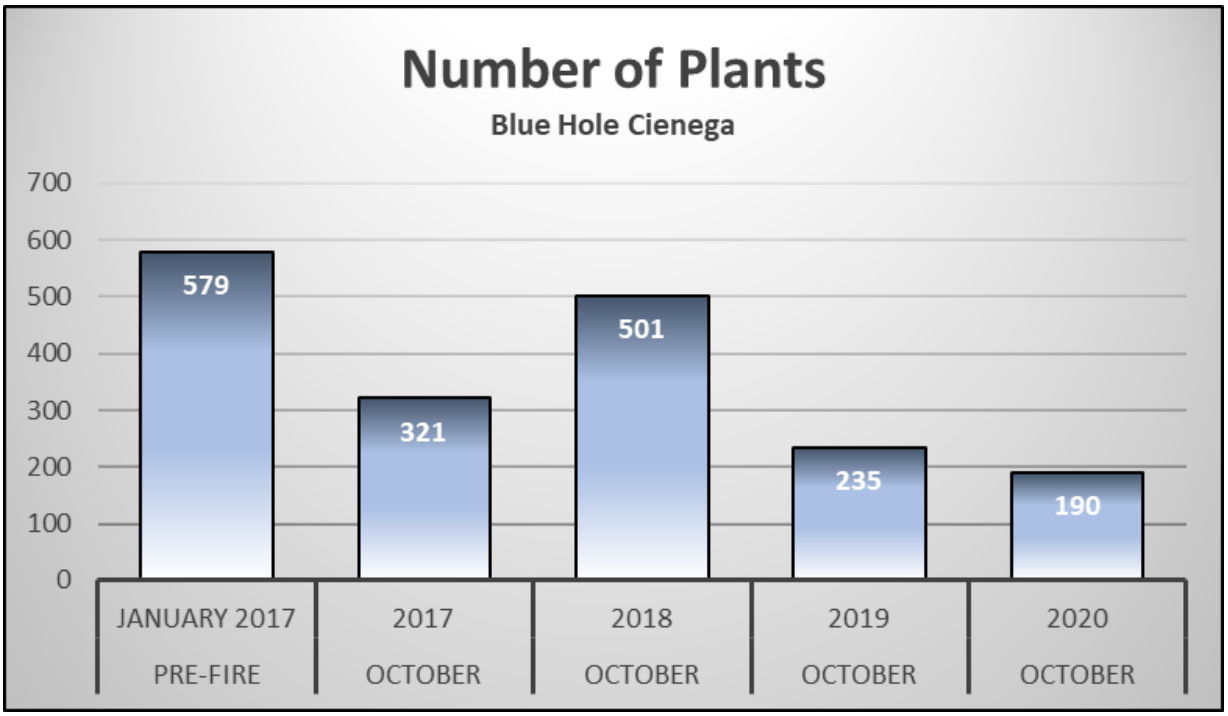

Figure 4. Number of flowering *Cirsium wrightii* plants in 5 monitoring transects pre- and post-fire at Blue Hole Ciénega, Santa Rosa, NM.

Ballpark Ciénega

The number of flowering plants within the transects dropped from 510 plants documented pre-fire to 244 flowering plants in the fall of 2019, 7 months post-fire (Figure 5). One year later the population recovered to some degree; 302 flowering plants were documented in the monitoring transects in October 2020.

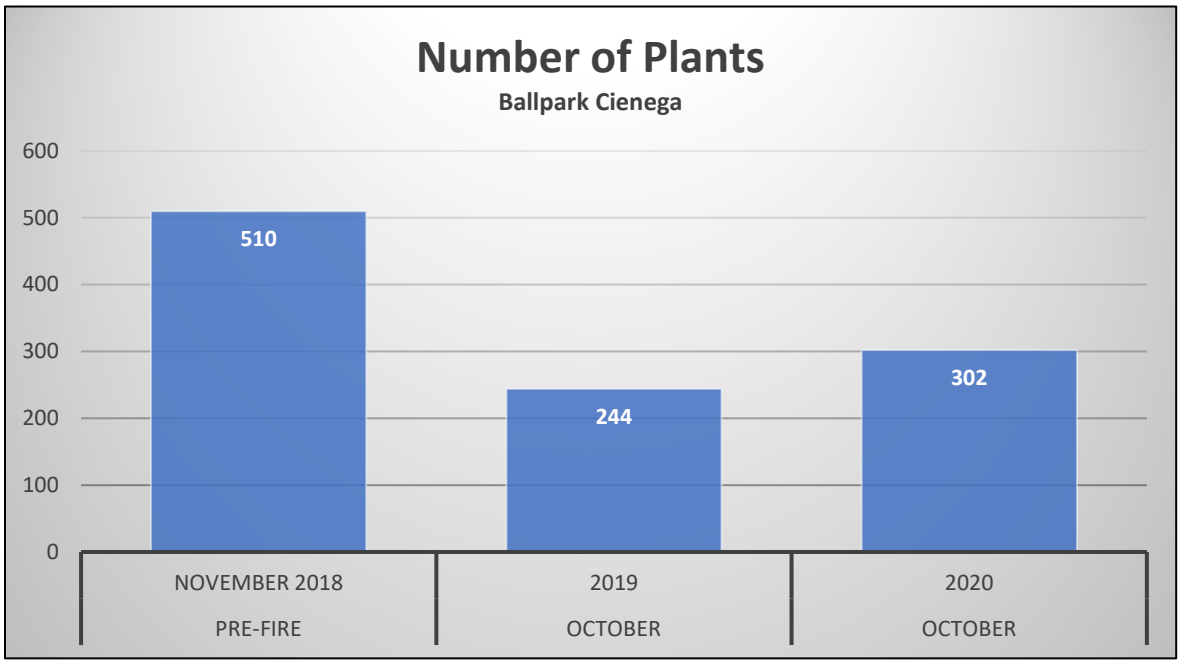

Figure 5. Number of flowering *Cirsium wrightii* plants in 3 monitoring transects pre- and post-fire at Ballpark Ciénega, Santa Rosa, NM.

DISCUSSION

Unlike the positive impacts documented on plant abundance in response to fire for *Helianthus paradoxus* (Roth 2017 & 2020), *Cirsium wrightii* experienced a 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 biennial or monocarpic perennial plant (flowers once and dies). Plants survive as rosettes aboveground before flowering and are therefore more susceptible to fires. Whether rosettes would recover from fire damage was unknown. 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 recovered largely within a year of the fires, fire does not appear to enhance population numbers for *Cirsium wrightii*. However, ongoing monitoring has documented a continued decline in the thistle population at Blue Hole Ciénega that can no longer be explained strictly by the impacts of

the 2017 prescribed burn. The number of plants within the 5 transects has dropped significantly since January 2017, ranging from 38 to 96% among the 5 transects. No clear pattern emerges with respect to the location of the transects. Lower numbers of plants documented in 2018 may be compounded by the extremely dry winter of 2017/2018 (0.39 inches between November 1, 2017 and April 30, 2018. 100-year average for Santa Rosa = 3.39 inches), possibly impacting the survival of seedlings and rosettes that may have germinated and established in response to the fire in 2017. However, measurable impacts in response to fires are not expected to be documented beyond 2 years post-fire and it is unclear why the number of flowering plants within the transects continued to decline in 2019 and 2020, despite an average rainfall year winter in 2018/2019 and an excellent rainfall winter during 2019/2020. Population trends beyond the initial year post-fire at Ballpark Ciénega are still unclear.
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 2019). 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 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. Individual plants usually respond to drought conditions by exhibiting stunted growth forms. Plants at drier sites tend to be significantly smaller than those in waterlogged sites. Although extant plants looked similar along the transects between monitoring years, it is possible that ground water fluctuations are no longer optimum for the establishment of *Cirsium wrightii* at Blue Hole Ciénega. Ballpark Ciénega is located adjacent to Blue Hole Ciénega and the two ciénegas are likely hydrologically linked, although potential impacts created by the construction of the highway are unknown. Still, hydrological changes occurring on Blue Hole Ciénega may also be impacting Ballpark Ciénega.

Clearly plants do not respond positively to fire. However, it is too early to determine a long-term population trend following the initial decline post-fire. Additional monitoring is required to determine population trends and determine a cause for a potential decline if the observed declines are not cyclical.

ACKNOWLEDGEMENTS

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