Time to Restore: New Mexico

SUPPORTING POLLINATOR RESTORATION

When restoring land to support pollinators, managers aim to select a mix of species that support pollinators throughout their periods of activity. This guide provides information on the timing of flowering and fruiting of nectar plants in New Mexico and information on which species are most suitable for future climate conditions.

SHIFTS IN PHENOLOGY OF NECTAR PLANTS

Multiple factors can influence the timing of flowering, including warmth, freeze events, winter chill, rainfall, and daylength. Generally, researchers have documented earlier flowering in many flowering plants (United Nations Environment Programme, Frontiers 2022).

RESTORATION IN ACTION IN NEW MEXICO

Several organizations and community groups are involved in pollinator restoration in New Mexico. The Bosque Ecosystem Monitoring Program (BEMP), which leads Time to Restore efforts in New Mexico, partners with City of Albuquerque Open Space, Candelaria Preserve, Rio Grande Nature Center, Sevilleta Long-Term Ecological Research, and Whitfield Wildlife Conservation Area on phenology and pollinator monitoring. The Pueblo of Santa Ana and Pueblo of Sandia are also involved in restoration and monitoring.

In the 2022-23 school year, 36 schools and groups were involved in phenology monitoring to help further restoration efforts focusing on species sensitivity to climate change.

While little phenology research has been carried out in the region, authors of studies in other locations have reported a large shift in the timing of events, such as common milkweed, *Asclepias syriaca*, in the Midwest and Northeast shifting 7 days earlier with each °F warming (Howard 2018). Other research found a different pattern between spring and fall-flowering species in the Southeastern Coastal Plain, with spring species flowering 3-4 days earlier per °F of warming. In the same study, fall flowering shifted slightly earlier with warmer spring temperatures and later with warmer summer temperatures at a rate of 2 days per °F (Pearson 2019). Under experimental warming, flowering of prairie plants occurred 2-10 days earlier (Wittington et al 2015).

FUTURE CLIMATE IN NEW MEXICO

The following are projections for the South Central region for mid-century (2036-2065; Dixon et al 2020); ranges represent the low (Representative Concentration Pathway 2.6) and high (RCP 8.5) emissions scenarios.

- Average high temps increase 2.6-5.2°F
- Average low temps increase 2.2-4.6°F
- Increase of 10.5-24.3 very hot days (over 100°F), particularly in Southern and Eastern New Mexico
- Increase of 2.1-4 heatwaves a year , particularly in Eastern New Mexico
- Decrease of 13-26.1 days below freezing
- Decrease in 0.1-4.3% in total annual rainfall, particularly in Southeastern New Mexico
- Increase in length of dry spells by 0.1-1.2 days

More climate projections from the SC CASC can be found at: southcentralclimate.org/resources/climate-projections.

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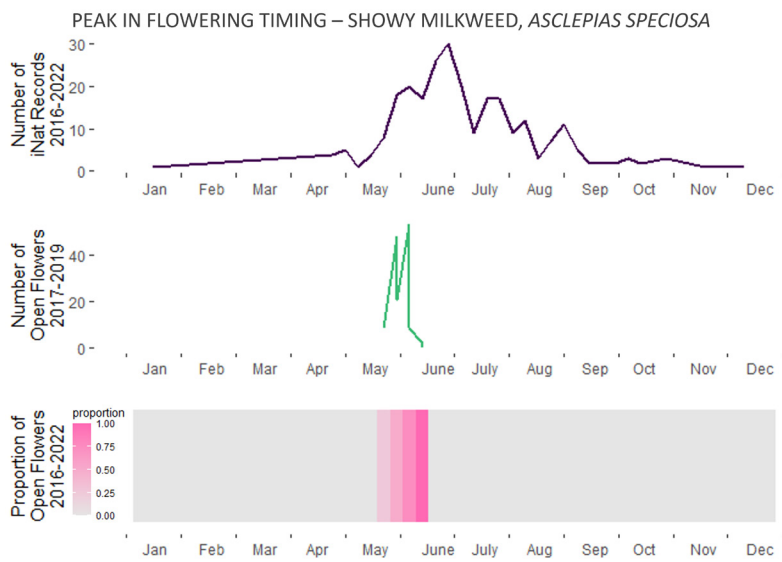
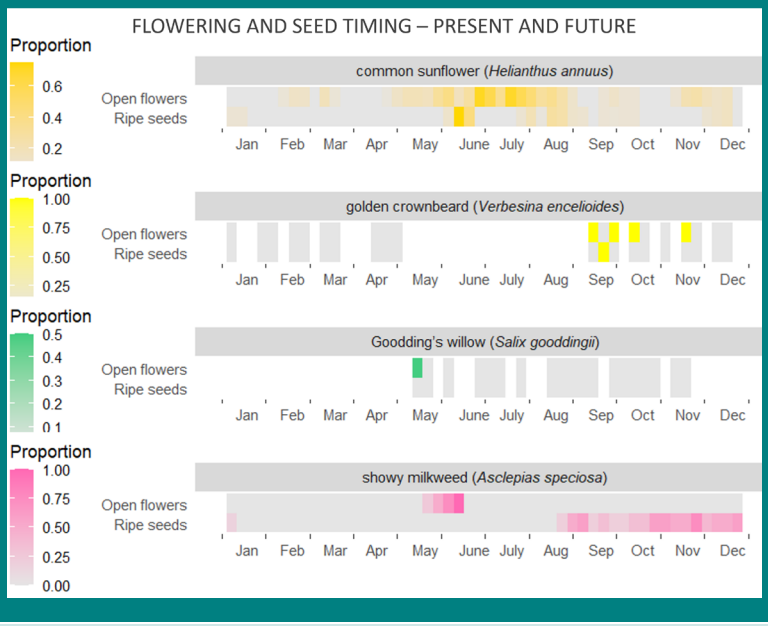


We compiled data collected via iNatualist and *Nature's Notebook* on flowering and seed timing in Time to Restore priority species. The graph at left shows the timing of open flowers as well as the peak in activity of showy milkweed, *Asclepias speciosa,* in New Mexico.

Top: Presence records contributed to iNaturalist, which show the magnitude of observations collected on this species across 2016-2022. Middle: Number of open flowers observed in *Nature's Notebook* 2017-2019. Bottom: Proportion of open flowers in *Nature's Notebook* 2016-2022.

We also created linear models to determine climate cues to flowering and seed timing, presented below. Visit the StoryMap linked from the Time to Restore webpage (usanpn.org/TimeToRestore) to learn more about our methods.



Based on our national-scale analysis of climate cues combined with climate projections from the SC CASC, we project the following changes to life cycle stages by mid-Century (2036-2065):

Common sunflower, *Helianthus annuus*
Open flowers onset - 9-19 days earlier
Flowering peak onset - 10-20 days earlier, may depend on latitude

We did not have sufficient data to identify climate cues for Golden crownbeard, *Verbesina encelioides*, Goodding's willow, *Salix gooddingii*, or showy milkweed, *Asclepias speciosa*.

This calendar displays data collected in NM and TX.

Projections for species not included in community calendar above

Species	Life Cycle Stage	Projected shift
wild bergamot, *Monarda fistulosa*	Open Flowers Onset	0.1-1 days later
	Flowering Peak Duration	0.02-3 days shorter
	Ripe Fruit Onset	3-5 days earlier
	Fruit Peak Onset	1-10 days later
	Fruit Peak Duration	0.1-1 days longer
eastern purple coneflower, *Echinacea purpurea*	Open Flowers Onset	7-14 days earlier
	Flowering Peak Onset	6-11 days earlier
	Ripe Fruit Onset	2-10 days earlier
	Fruit Peak Onset	7-13 days earlier
	Fruit Peak Duration	9-17 days longer
buttonbush, *Cephalanthus occidentalis*	Open Flowers Onset	5-10 days earlier
	Flowering Peak Onset	3-5 days earlier
swamp milkweed, *Asclepias incarnata*	Open Flowers Onset	7-14 days earlier
	Flowering Peak Duration	4-8 days longer
	Ripe Fruit Onset	0.5-1 days later
	Fruit Peak Onset	4-8 days earlier
silver maple, *Acer saccharinum*	Open Flowers Onset	5-15 days earlier (latitude)
	Flowering Peak Onset	8-13 days earlier
	Ripe Fruit Onset	7-13 days earlier
	Fruit Peak Onset	3-5 days earlier
cardinal flower, *Lobelia cardinalis*	Open Flowers Onset	10-19 days later
	Flowering Peak Onset	0.11-1.14 days earlier
	Flowering Peak Duration	10-18 days longer

References:

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