

observed poppy plants had to have germinated following the early November rainstorm and, clearly, had survived.

In mid-January and late February there were two major rainstorms, with 3 1/2 and 4 1/2 inches of rainfall respectively, and these storms contributed significantly to the seasonal total rainfall but likely did not result in significant amount of additional poppy seed germination. The 2022/23 rainy season concluded with a rather late significant rainstorm and a number of minor rainstorms; all of which depositing measurable amounts of rainfall.

Because of the strength of the November and December rainstorms, it would be expected that significant poppy seed germination should have occurred following all three of these rainstorms; which led to the expectation for an outstanding poppy display season. An inventory of a monitoring plot located on the east ridge that did not have any mature filaree or fiddleneck plants growing in it supported this expectation when a record number of young poppy plants was recorded; an estimated 300 to 400 compared to the previous record of 250 poppy plants in the one square meter plot.

There is some question if significant poppy seed germination occurred following the late March rainstorm even though it deposited 1.4 inches of rainfall. In the few past years where significant rainstorms occurred in March, little poppy seed germination was observed. It is possible that poppy seeds enter a dormancy in early spring to prevent seed germination because there is inadequate time for a plant to grow to maturity and disperse seeds before the soil dries due to hot summer temperatures. This possibility certainly deserves further investigation.

Even if the March rainstorm did not contribute additional poppy plants, it is clear that this spring's modest poppy displays was not due to a lack of rainstorms with rainfalls in that sweet spot for expected optimum poppy seed germination. What unfolded instead was rather modest poppy displays on the west side of the Reserve and better displays on the east side of the Reserve. The selective survival of the filaree and fiddleneck plants seem a viable explanation for what eventually unfolded.

Even though the Reserve only had rather modest patches of good poppy color this past spring, some other of the Reserve's plant species did have amazing spring displays, even if they were not as showy as poppy displays. Several will be briefly highlighted in this article. Probably the most impressive was the pygmy-leaved lupine. This smaller, annual lupine species has rather modest blossoms that are easily lost among the other vegetation background, see Figure 6, so they don't make the showy display that the Reserve's much appreciated perennial lupine plants do with their brighter and longer blossom stems.



FIGURE 6: PYGMY-LEAVED LUPINE

Because pygmy-leaved lupine seeds are co-germinators (along with the poppy seeds) following modest storms depositing approximately 1/2 inches of rainfall, these plants are found in most areas of the Reserve during almost all springs except in the most severe drought years; but seemingly never in large numbers. Even looking closely, only one or two plants of this species is/are typically found within a few feet of each other; probably similar to the easier seen blue dicks plants. This past spring appears to be uniquely different, at least in one area of the Reserve. In the area just to the west of the beginning of the eastern leg of the Reserve's North Poppy Loop trail, dense concentrations of the remnants of this species' plants were observed at the end of the spring wildflower season; visit timing did not coincide with this lupine's peak display. Even though their display was likely still muted and rather easily missed, it's still quite disappointing to have not witnessed this unique dense pygmy-leaved lupine display or determine if this high concentration of these plants also occurred elsewhere on the Reserve.

Before moving on, it is worth noting the lupine's unique leaf arrangement. As can be seen in Figure 6, the leaves of the Reserve's lupine species are arranged in multiple rosette clusters with six to eight leaves oriented in a radial pattern from the center point of the rosette, which is attached to the end of a stem. This leaf arrangement allows each rosette cluster to move throughout the day as each cluster independently tracks the sun; maximizing the plant's photosynthetic generation of its needed energy. This can also be seen in Figure 6 as all of the leaf rosettes are pointing in the same direction. If the Reserve's visitor has the time, it is worth spending a few minutes watching this display of Mother Nature's ingenuity as she strives for maximum efficiency.

The second plant species that was going to be discussed is the slender keel fruit, another early blooming species but, due to last spring's Reserve visitation schedule, the discussion would have been again mostly speculation. Suffice it to say that there was a large amount of slender keel fruit plants growing last spring and it seems possible that there could have again been a smaller patch, or two, of generalized color, similar to goldfield color, as was observed a few springs earlier on the south facing slope below the Lightning Bolt trail. Instead of the deep golden color of the goldfields, the whole slope was a solid paler, soft yellow from dense slender keel fruit plants.

The third highlighted plant species is actually three species; the three non-native mustard plant species known to grow on the Reserve. Two of the three species are ranked as invasive and one is considered to be a particularly significant management challenge. During this past spring, large masses of all three species were observed growing along the edge of the recently extended ADA paved walkway; in some areas, almost completely blocking the pavement. It is unknown how much the high seasonal rainfall and how much the soil disturbance which occurred during the walkway construction contributed to the quantity of plants. It is well documented that all three mustard species prefer disturbed soil. In any case, this large crop of mustard has the potential of spreading seeds throughout the Reserve and could represent a significant future ecological threat to the Reserve. Early control and, ideally, the elimination of this outcropping of mustard plants should be the focus of a targeted management effort. To assist this management effort, a future posted article will focus on a better understanding of the characteristics of these non-native mustard species.

As discussed in this article, the quality of this past spring's poppy displays was likely influenced by an unusual early season weather driven event; the mortality of young poppy plants due to an extended period of no significant rainstorms but the survival of competing filaree and fiddleneck plants. There is now the potential that the 2024 spring wildflower season might also be similarly influenced by an unusual weather event. In this case, the August rainfall deposited by the remnant of Hurricane Hilary. This article will conclude with a brief description of what has recently been occurring on the Reserve as the result of that rainstorm and what that might mean for next springs poppy displays.

Although we see the landfall of Hurricane Hilary as a unique, once-in-a-hundred-year event, it is not clear that Mother Nature has the same viewpoint. It is fairly common for the Reserve to receive rainfall in July, August, and September from summer thunderstorms and, at least on a small scale, that rainfall can be quite significant. Even last year, the Reserve received its first significant rainstorm in early September; not that much later than the 20 August rainfall this summer. The remnant of Hilary deposited 4.29 inches of rainfall at the Reserve's maintenance yard which is probably more than what the typical thunderstorm deposits but is certainly not the highest amount of rainfall ever documented for the Reserve. The record is 5.9 inches of rainfall that occurred during a seven day "atmospheric river" rainstorm from 17 February to 23 February 2005.

Before discussing what germinated as the result of the remnant of Hurricane Hilary, its impact on existing summer and autumn blooming plants will be covered. The remnant of Hilary appears to have given a much needed drink to all the plants that have already been growing; all the plants are looking really healthy with vibrant colors. It is interesting to note that the blossoms on the turkey mullein and vinegar weed plants still appear to have peaked and are now fading. No new blossoms, or buds, were observed on these species. There are new buds on the autumn blooming perennial aster and milkweed plants but these plants, once they start to bloom, typically put out new buds throughout the remainder of their life cycle until they go dormant. It will be interesting to track how the autumn season continues to unfold now, after a good shot of soil moisture.

Because equivalent strength storms have previously had observable impacts on the Reserve's ant population, it is worth noting that a number of what appeared to be recently inactive ant colonies were observed, and documented, during the 6 September Reserve visit. The colonies that were still active were particularly active; even during the day's 86 °F peak temperature. Based on past observations, the ants were expected to be in their cool underground colonies at this time of day and only come out later in the afternoon when the temperature had started to decrease.

An unusually large number of dragonflies were also observed during the 6 September Reserve visit. It can't be confirmed but it appeared there might have been several different species; possibly a large, blue bodied dragonfly, and a second large dragonfly species with red and black wings. The majority appeared to be medium sized and tan colored but, when the sunlight shined on them, they glistened with golden filaments.

Now to the new plant growth. Contrary to last year where the 10 September rainstorm, depositing 0.8 inches of rain, resulted in a large amount of fiddleneck seed germination, very few young fiddleneck plants were observed during the 6 Sept. '23 Reserve visit. Because the visitation was more than two weeks after the Hilary rainstorm, the seed's cotyledons would have been expected to have already emerged and, therefore observable, if there had been any fiddleneck seed germination. Filaree plants more than made up for the lack of fiddleneck plants. A massive amount of filaree seeds did germinate following the rainfall from the remnant of Hilary. In some areas of the Reserve, it is almost a carpet of young filaree plants, see Figure 7.



FIGURE 7: YOUNG FILAREE PLANTS IN MONITORING PLOT M2

Even though, as discussed earlier in this article, pygmy-leaved lupine is most typically part of the community of seeds which germinate following a season's first significant rainstorm, no young pygmy-leaved lupine plants were observed during the 6 September visit.