REPORT FROM THE FIELD

September, 2016

By
Michael Powell

Normally, I discuss what actually happened during the just past spring wildflower season in the June edition of the newsletter so, not submitting an article in the last newsletter, I'll cover that topic first. The March, '16 newsletter contained a prediction that it was likely that this spring would have a poor showing of poppies. Unfortunately, that prediction turned out true. The season started out reasonably well with a moderate amount of poppy seeds germinating following the season's first major rainstorm in mid-October but, contrary to many seasons, we observed a very high young plant mortality leading up to the next major storm in early January. In the intervening two and a half months between the major storms, the Reserve had a total of only ¾ inches of rain and it appears that this was inadequate for the survival of the young poppy plants. It is possible that the lack of rainfall from the previous three drought years contributed to the demise of this year's young plants. The last three years had total rainfalls of only 1 ½, 4 ½, and just under 7 inches so even the deep soil could have been unusually dry and surface moisture quickly soaked away. For comparison, over the last nineteen years the average total nine month winter/spring seasonal rainfall has been a little over 9 inches. The other rather unexpected observation this year was the lack of additional poppy seed germination following both the early and late January major rain storms; the late January rain storm being the last major storm of the season. At this point, why Mother Nature decided not to replenish the plants that died earlier is pure speculation. Based solely on my memory, I would have expected to find seed germination following the January storms although we have observed the lack of seed germination following later season rain storms. We are currently going back through old data to confirm my memory so we might revisit this issue in a future article.

Back to the topic of this season's wildflower displays. Except for only a couple of small areas with denser poppy blossoms, the poppy blossoms were widely scattered; certainly not conducive to the swaths of solid poppy color we are so awed by. Even the filaree seemed to have a hard time surviving the long rainless period during November and December. The red tinted filaree leaves, indicative of plant stress, were widely seen throughout the Reserve. How many of these stressed filaree plants eventually survived is also an open question but it did not appear to be a good filaree year either. On the other hand, the fiddleneck seemed to do much better surviving the lack of rain and the Reserve's two primary invasive, annual grasses, red brome and cheatgrass, did wonderful.

With La Nina conditions now forming in the equatorial Pacific, the prediction for next spring's wildflower displays is currently open but, unlike El Nino conditions which almost always results in wetter winters, winter rain is more variable under La Nina conditions; some winters are indeed drier but other winters have actually been wetter than average. We can only hope for a wetter La Nina winter.

A major milestone has recently been achieved. After months of work, maybe even more than a year, the poppy researchers have now assembled an Excel based dataset that lists the Reserve's rainfall, maximum air temperature, and minimum air temperature for every day of the poppy seasons stretching back to September 1997; a total of nineteen winter/spring seasons. The

completed dataset allows the researchers to now document any long term changes to the Reserve's climate that could impact the quality of future poppy displays and begin to investigate how, or even if, the Reserve's poppies, and potentially other wildflower species eventually, have locally adapted to the Reserve's weather. The data in the dataset was obtained from the California Department Water Resources weather station located on the Reserve. Although it would be desirable to include data for even earlier dates, 1997 is the earliest data listed on the historical link to the weather station's website.

The first, most basic, step in analyzing the meteorological data is plotting each year's total seasonal rainfall and look for any trends in total rainfall over the years that data are available. Before showing this data, "seasonal" needs to be defined and justified. Normally, official rain years start 1 October of one year and end 30 September of the following year. Because the primary goal of our research efforts is a better understanding of the California poppy, we have focused our observations on the months that poppy plants are normally growing rather than extending them to a full year. It should be noted though that rarely occurring west valley summer thunderstorms have, apparently, triggered poppy seed germination and, in some cases, these germinated plants have survived into the fall months; adding to the fall/winter germinated plants. When the Poppy Reserve researchers started their field observations in 2003, 1 October was originally selected for the beginning of the poppy research season to be consistent with the official rain year but, after poppy seed germinating rainstorms occurred in several Septembers, the researcher's poppy season start was moved forward to 1 September. Although Reserve's poppy plants can continue to bloom through June and into July, 31 May was finally selected for the end of the focused poppy season. This date is a month or two past the peak poppy displays and June rainstorms are very rare; occurring only three times in the last nineteen seasons with the maximum rainfall being only 0.07 inches.

Having defined our selected poppy season, Figure 1 shows the seasonal rainfall for the nineteen seasons where data is available.

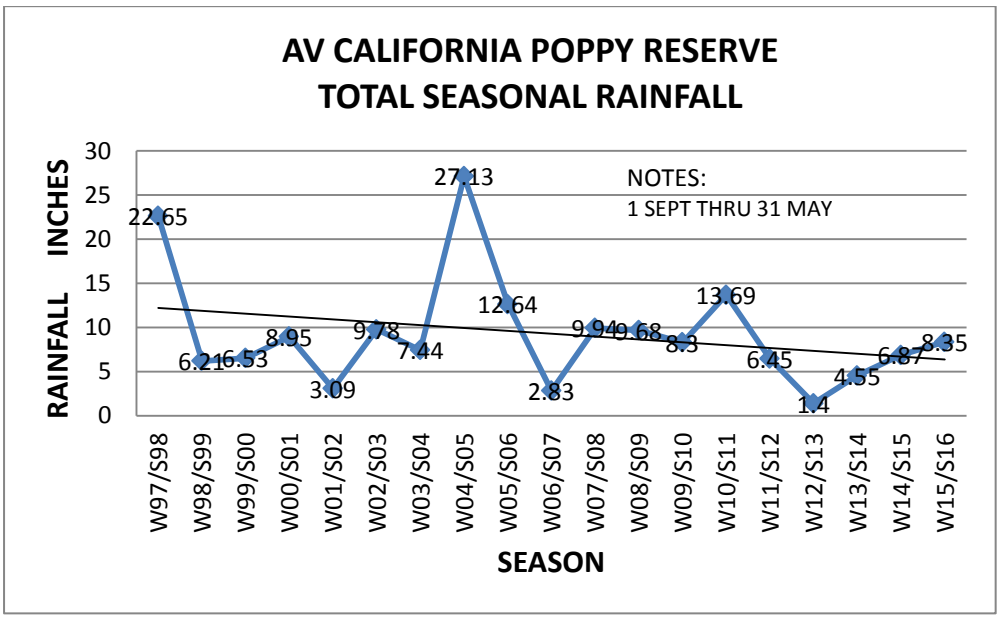

FIGURE 1

A “best fit” linear trend line is shown on the figure. This trend line shows an apparent decrease in the seasonal rainfall over the last nineteen years. The unusually large total rainfall for the 1997/98 season, one of the historically strongest El Nino winters, significantly contributes to the observed downward trend but, even when this season is removed from the dataset, the last eighteen years still show a slight downward trend. Only a few more years of data will show how much the recent drought years are contributing to the apparent downward trend in total rainfall. Figure 1 data clearly shows why the wide naturally occurring variation in seasonal rainfall requires many years of data before any true trends can be teased out of the data.

With the above discussion focused on possible trends in the seasonal total rainfall, the obvious question is “Why is total rainfall important?” The researchers’ field observations have shown, in general terms, how various meteorological factors affect the quality of the spring poppy displays. The researchers have seen how unusually warm temperatures in the early spring as well as extreme winter cold snaps have adversely impacted the developing poppy plants and the subsequent quality of their spring displays. The researchers have also observed how three rainfall parameters have influenced the poppy displays. One parameter is the intensity of individual rainstorms, the second is the timing of the storms and the last is total seasonal rainfall amounts. Storm intensity determines how many poppy seeds germinate. Storm timing impacts the young poppy plants survival rates. Finally, total seasonal rainfall influences how large the surviving poppy plants eventually grow to (what’s really important for display quality is how many open blossoms each plant has at any time) and how long the plants survive into the late spring and summer months. Plant survival length is important because each matured blossom-generated fruit adds poppy seeds to the soil’s seed bank ready for the next season.

To even have a possibility of correlating meteorological conditions with the quality of poppy displays beyond the current “in general terms”, the poppy displays themselves have to be better defined and quantified. The researchers are currently hard at work on developing criteria to quantify the evaluation of the poppy displays but this is very complex and will likely take months to achieve any results. Eventually, the researchers will be asking for assistance from the collective memories and photographs of the readers of the PR/MDIA newsletter.

Right now each long time visitor to the Poppy Reserve uses their own internal yardstick to say “This year has outstanding poppy displays” or “this year has ok displays” or “the poppy displays this year are poor”. The goal is to develop a list of quantified criteria that anyone can apply to categorize the quality of each year’s poppy displays. Then the researchers can attempt to determine the meteorological conditions that result in the criteria for each category of display. Besides relying on memories or general photographs, there are a number of methods to document the poppy displays. Based on an analysis of a satellite image taken of the Poppy Reserve at the near peak of the 2003 poppy season (by my yardstick, an outstanding poppy display year) there is a high probability that GIS, Geographic Information System, has the needed tools to easily quantify and then categorize the poppy displays. Unfortunately, obtaining satellite images specifically at the peak of the poppy displays is both expensive and difficult. With the continuing development of drone capabilities, it might soon be possible to use lower cost drones to obtain the digital imagery that the GIS tools require. Because of drones’ lower operating costs, it might even be possible to weekly map the Reserve’s poppy displays to better determine their color peak and document how the peak color shifts location with time. A third possible option is to use digital photographs taken

at a few selected permanently fixed locations on the Reserve giving panoramic coverage of the Reserve. Establishing these fixed locations this winter is one goal of the researchers. At least in the future, the Reserve's poppy displays will be better, and more consistently, documented.

This seems a good place to end this posting. In future postings, additional characteristics of the Reserve's meteorological conditions and if the Reserve's poppy population has adapted to the local weather characteristics will be further discussed so check the website again in three months.