REPORT FROM THE FIELD
SEPT '18

By
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With
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I most typically end my "Report From The Field" postings with encouraging everyone to continue to visit the Poppy Reserve during the off-season times. For once, I'll start this posting with the same encouragement. This change is primarily prompted by a recent LA Times newspaper article reporting on the health benefits of silence; something the Reserve is noted for.

During the 1990's when we were opposing both a proposed next door wind turbine power plant facility and a race track proposed to be located on the north side of Fremont Butte, a survey was conducted of the Reserve's visitors. The survey gave short descriptions of both proposed projects as well as possible home construction. Unexpectedly, even though the race track would not be seen, only heard, the strongest visitor opposition was for the race track and not the visual blight from 300 foot tall wind turbines along the west, south, and east boundaries of the Reserve. The unexpected survey results gives strong evidence how much the Reserve's silence is valued by Reserve volunteers and visitors alike. So, besides the pure enjoyment of viewing the different plants species that can be seen blooming throughout most years and the health benefits from hiking the Reserve's trails, simply sitting and basking in the silence can provide health benefits by itself.

According to the Times article, recent research has shown a number of health benefits for silence and has even called noise pollution a "modern plague". It has shown that noise pollution, unwanted noise, can increase stress levels causing suppression of the immune system and increase risks of heart disease, diabetes, and inflammation. Noise pollution can cause changes in social behavior and annoyance. In children, noise pollution can effect reading comprehension and even raise blood pressure. Research with mice have shown that noise stimuli, including silence, increase neuron cells in mice brains but silence singularly has a lasting effect.

The good news is that research has also shown that being in tranquil environments can repair some of the adverse health effects of noise pollution and might even aid cell regeneration as long as you embrace the silence by turning off your cell phone and not ruminating about your problems. Walking

the Reserve's trails while enjoying the flora and fauna seems an ideal way to "embrace the silence". An alternative is to partake in the twice monthly "forest bathing" sponsored by the LA County Arboretum and Botanic Gardens but that costs $35 and the Poppy Reserve visits are a lot less expensive.

The secondary reason for changing the format of this posting is that there is little happening at the Reserve this summer to write about. Certainly, there are a few plant species that are blooming this fall but not like falls following winters/springs with more rainfall. Being unable to reach the Reserve before the summer days warm up, this report relies on the observations that Marsha and Bob have made during their few early morning summer Reserve visits. During their visits, Marsha and Bob have only found Turkey Mullein, sunflowers and jimson weed blooming; the same three species Mary Wilson reported finding blooming in her latest field observations posted on the this website. In addition, Marsha and Bob have also seen a small number of rattlesnake weed plant clusters. During autumns following wetter winters/springs, we typically can find vinegar weed, hairy asters, desert straw, the perennial aster and one or two species of buckwheat plants all with blossoms. As reported in my last posting, I thought that the lingering effects of the recent drought years were finally over but, maybe, not. Last winter's limited rains, only 4 ½ inches total rainfall, seems to have had a surprisingly significant impact on the autumn blooming species. We can only hope that the coming winter will bring more rainfall and better wildflower displays next spring and summer.

I find the plant species that are blooming and not blooming this autumn somewhat of a surprising mix. That Jimson weed is blooming this year is not unexpected because it can grow to a fairly large size and, more importantly, it is a perennial species so it has had prior years to develop an extensive, and possibly deep, root system allowing it to survive the drier years. In contrast, not finding desert straw blossoms is a surprise. Although desert straw plants are not as large as jimson weed plants, desert straw is also a perennial species. If the old "rule of thumb" holds that the root system size mirrors the above ground crown, the desert straw's roots would be expected to be much larger than the annual species that are blooming this summer, turkey mullein and sunflowers. The same comments are true for the perennial aster plants which bloom during the autumn and winter months of most every year. That the purple and yellow blossoms have not been seen this fall is surprising. Feedback from Gretchen through Marsha makes seeing the turkey mullein

thriving not so surprising. Gretchen said that this plant species can typically be seen growing at Saddleback Park as well as the Poppy Reserve. Saddleback Park typically has only ¼ to 1/3 of the seasonal rainfall as the Reserve so the plant species adapted to grow on the east side of the Antelope Valley don't require much moisture. Saddleback received a total rainfall of 2.3 inches from 1 Sept'17 to 31 May'18, just over ½ of the Reserve's rainfall, with most of the rainfall in Sept '17 and Mar'18. It would be interesting to know if turkey mullein is growing and blooming at Saddleback Park this summer.

During each of my visits to the Reserve, I make a concerted effort to photograph all the plant species I see blooming. With time limitations and where the visit's primary tasks takes us this certainly remains only an ideal goal; some plant species grow only in limited preferred locations so it is easy to miss them. With that caveat, Table 1lists the plant species I photographed blooming in Sept of the recent drought years.

TABLE 1: OBSERVED FALL BLOOMING PLANT SPECIES

VISIT DATE	PRIOR WINTER'S SEASONAL RAINFALL	PLANT SPECIES OBSERVED BLOOMING
14 Sept '13	1.4 inches	turkey Mullein perennial aster rattlesnake weed jimson weed buckwheat rabbit brush unIDed buds
24 Sept '14	4.55 inches	turkey mullein perennial aster rattlesnake weed jimson weed buckwheat rabbit brush vinegar weed hairy aster tumbleweed saltbush
17 Sept '15	6.89 inches	turkey mullein perennial aster

		rattlesnake weed jimson weed buckwheat rabbit brush vinegar weed hairy aster desert straw

Based on the existing photographic database, turkey mullein is clearly adapted to a wide range of soil conditions including very dry soil. The lack of perennial aster blossoms this fall is a surprise based on it blooming following the very dry 2012 winter. Because this plant species grows widely throughout the Reserve, it seems unlikely that these blossoms were simply missed. With the winter of 2013 having comparable rainfall as this past winter, the lack of vinegar weed blossoms this fall is also surprising. Although it is harder to notice, the summer visits took the volunteers into areas that this species has grown in past years. The lack of buckwheat this fall is also somewhat surprising in that it was observed growing, and blooming, during the fall of 2014. Even though desert straw is a perennial species, it appears that this species requires wetter winters before it grows and blossoms. It also appears that other factors than simply prior seasonal total rainfall has had a significant impact on the plants species that are blooming this fall.

At least, I am personally excited that my long held objective of establishing a weather station at Ripley is, hopefully, about to be achieved this fall. The simple weather station will consist of a collection rain gauge and a two channel temperature recorder; the same type recorder used for the original Poppy Reserve weather stations. Each channel of the temperature recorder records the daily maximum and daily minimum temperatures. One channel will be used to record the air temperatures and the second channel will record the near-surface soil temperatures. The major drawback of this recorder is that it has only enough memory to record seven days of data. To not lose data, someone has to go to Ripley and manually retrieve the recorded temperatures and then re-set the recorder; making it ready for the next seven days. Bob has amazingly agreed to do this weekly trek to Ripley. I did this when I first started volunteering at the Poppy Reserve so I know it takes a major, serious commitment. Many, many thanks Bob for doing this.

Combining Ripley's rainfall and air temperature data with the weather data already recorded at the Poppy Reserve and Saddleback Park, will help any

interested researcher to better define the climatic conditions that various local desert plant species are adapted to. Except for a few plant species, the plant communities at the three local California State Parks are quite different. Comparing the plant list for the three parks with their respective differences in climates will help define the climate conditions under which each plant species will grow. Just a couple of examples to show how this can be done. First, there is the already discussed turkey mullein. Being west of the Reserve and at a higher altitude, we expect Ripley to have more rainfall and lower temperatures. It will be interesting to see if turkey mullein also grows at Ripley. One of the prime plant species at Ripley is the linear-leafed goldenbush but only two or three goldenbushes are known growing on the Reserve so the Reserve's weather conditions must be right on the edge of its adaptability range. On the other hand, goldfields grow profusely on both the east and west sides of the valley so it must have a wide adaptability range. Again, it will be interesting to find if its range extends out to Ripley.

This type of study will support continuing research studies predicting how Global Warming will affect the various plant eco-systems. As climatic conditions rapidly change, plant species will have to adapt, if the climate changes are slow enough, or move to alternative locations or the species will become extinct. These types of studies are only as good as the knowledge of the conditions that plant species are currently adapted to. It appears to me that there are significant holes in the current knowledge base. For one example, it appears that it is not generally known that a large number of the Reserve's plant species grow in its climatic conditions. Plant species are collected and stored in various herbariums. To address limitations on knowing the contents of these various herbariums, many of the larger herbariums have joined together to form a Consortium of California Herbaria where the list of collected specimen in individual herbariums have been combined into a master list of all collected plant species and their collection locations; accessible to all in one location. Many of the Reserve's plant species are not documented in the Consortium of Herbaria plant list as having specimens collected anywhere near the Reserve. If the Herbaria listing of specimens is used to define a species current limits of adaptability, the assumed adaptive range is in error and the conclusions of any studies using this data will also likely be in error. In addition to the type of study discussed in the previous paragraph, a focused effort to collect appropriate specimens of all the Reserve's plant species and provide them to an established Consortium

member herbarium would be a big step in improving the current knowledge base, at least for the Reserve's plant species.

Marsha's casual comment that this summer seemed particularly hot in Lancaster set me onto the topic for expanding this posting. The news coverage of the many wildfires burning throughout California this summer repeatedly spoke of the hot temperatures and how this is definitely caused by Global Warming. That made me start wondering what is happening at the Reserve. In my past postings, I have discussed the trends in the Reserve's seasonal rainfall patterns but I haven't previous investigated if the temperatures are also potentially changing. Initially, I'll discuss any observed trends in the Reserve's monthly average air temperatures and then conclude with exploring possible trends in the temperature extremes; both hot and cold.

Before discussing the results of my analyses, there are two caveats that need to be acknowledged. The first caveat is that all of the following discussions and tentative conclusions are based on the air temperatures recorded by the weather station located in the Poppy Reserve Maintenance Yard. Although the maintenance yard weather station is generally representative of the Reserve's weather conditions, data collected by the mini-weather stations the researchers have established at various locations on the Reserve have shown there can be substantial local variations in rainfall amounts and air temperatures. The limited duration of the collected data used in my analyses is the second caveat. In discussions with a research meteorologist, he shared that they typically assume that 30 years of data is the minimum needed to draw valid weather trend conclusions. With the maintenance yard weather station being established in 1997, there is only 21 years of air temperature data to analyze, ten years less than the desired minimum, which makes any conclusions tentative at best. Unfortunately, it was only in October 2005 that the maintenance yard weather station was modified to start calculating and recording the daily average, daily maximum and daily minimum air temperatures. The researchers have previously gone through all the recorded temperature data to determine the daily maximum and daily minimum temperatures but it was not done for the daily average temperatures. Because doing this work is very labor intensive work and, having limited time to prepare this posting, the monthly average data will be limited to only the last 12 or 13 years; less than half of the desired 30 year minimum.

The maintenance yard weather station records the current air temperature once an hour. Those twenty four temperature readings are averaged by the

weather station to give the daily average. For this analysis, each month's daily average temperatures were then averaged again to provide the monthly average temperature.

Figure 1 shows the average monthly temperatures for the last nine years.

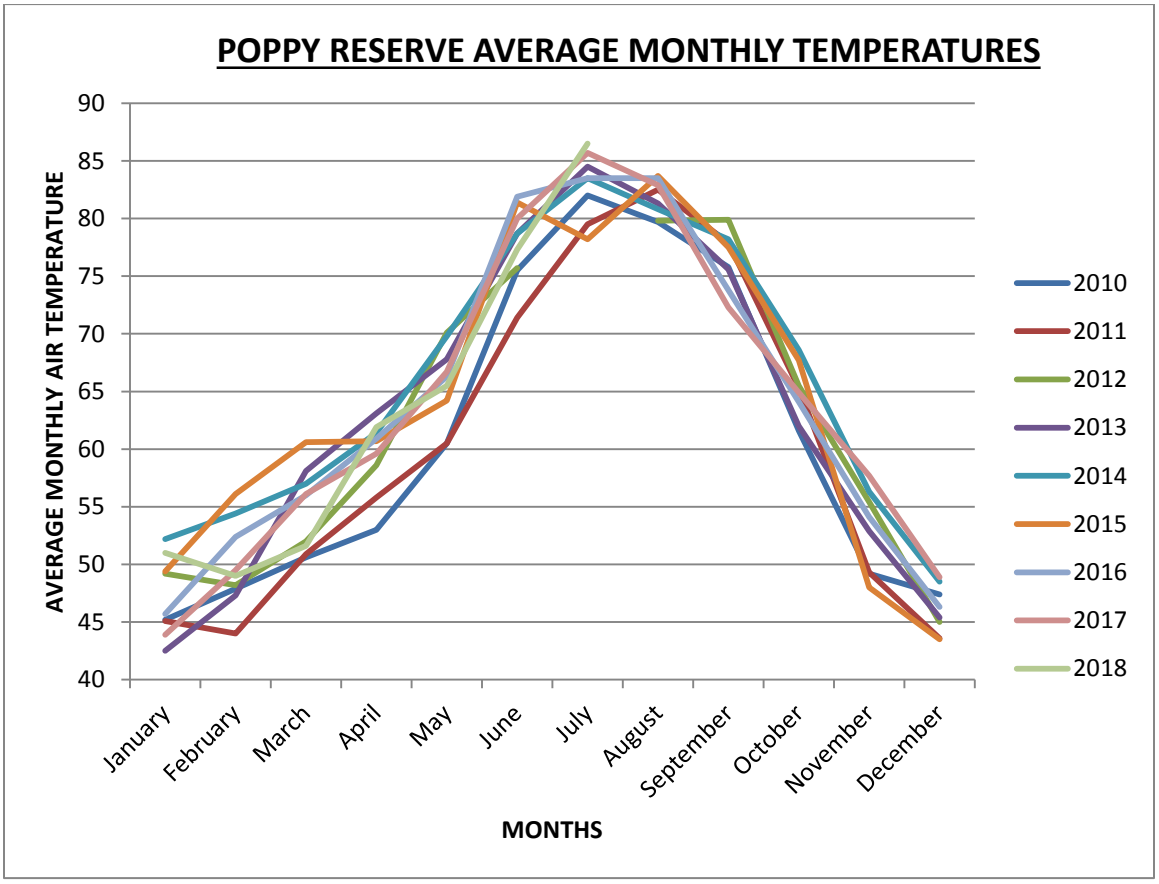

FIGURE 1: POPPY RESERVE AVERAGE MONTHLY TEMPERATURES

Two things are apparent. First, July is typically the warmest month, followed by August and then June. Second, there is more variability in the monthly average temperature in the spring than in the fall. Although it is not obvious from this figure, there is some questionable data for July so the August data was used for further analysis. We also further analyzed the average temperatures for October and December. It is easier to see possible trends in closely grouped data so only the data for the last half of the year was analyzed.

The entire data set is plotted in a different format in Figure 2. The average monthly temperature data for July 2012 was deleted from the figure because it is questionable. Having a daily average temperature of 18 ^{O}F, 14 degrees below freezing, in July is very doubtful. Reminds me of the old saying "As much chance as a snowball in heck".

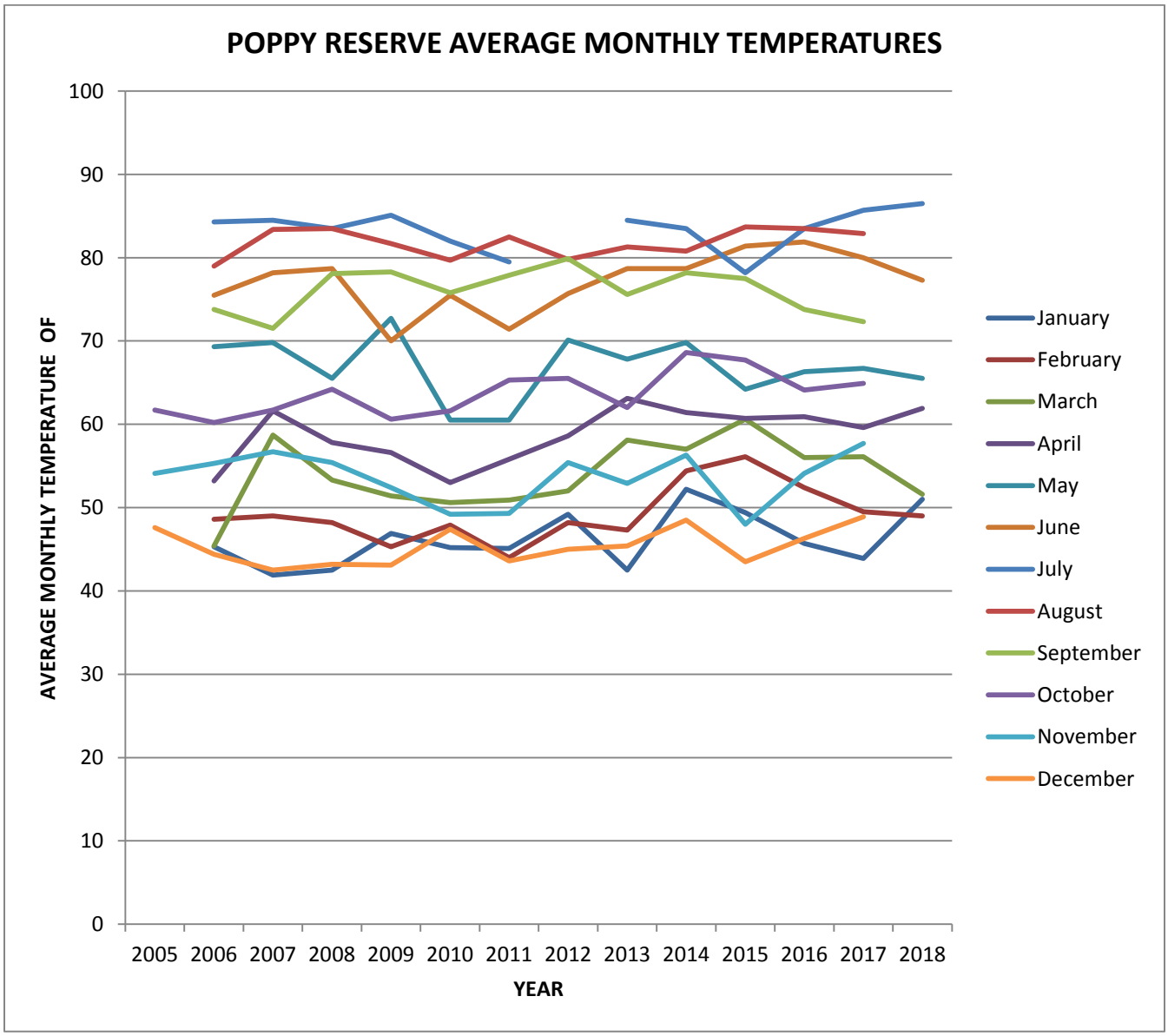

FIGURE 2: POPPY RESERVE AVERAGE MONTHLY TEMPERATURES

With the data shown in this format, linear trend lines can be fitted to the data using a standard statistical technique. The data for August, October and

December are individually re-plotted, with their "best fit" linear trend lines, in Figures 3, 4, and 5, respectively.

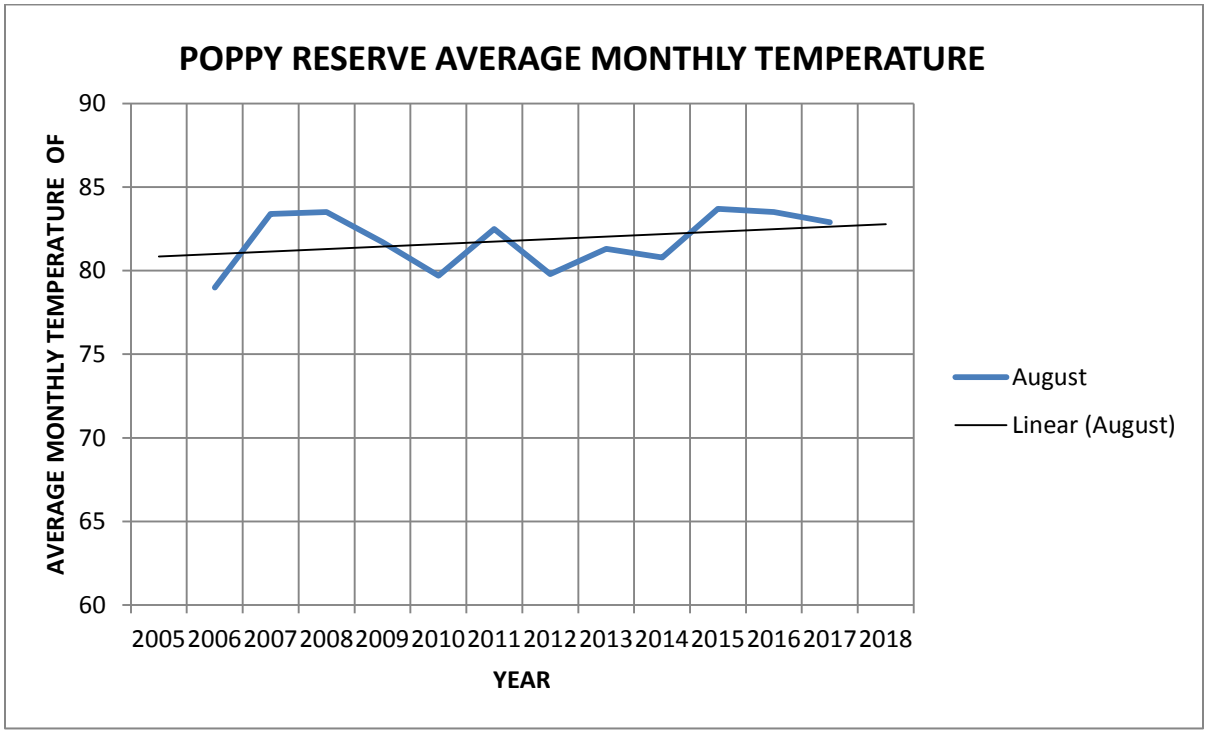

FIGURE 3: POPPY RESERVE AVERAGE MONTHLY TEMPERATURE

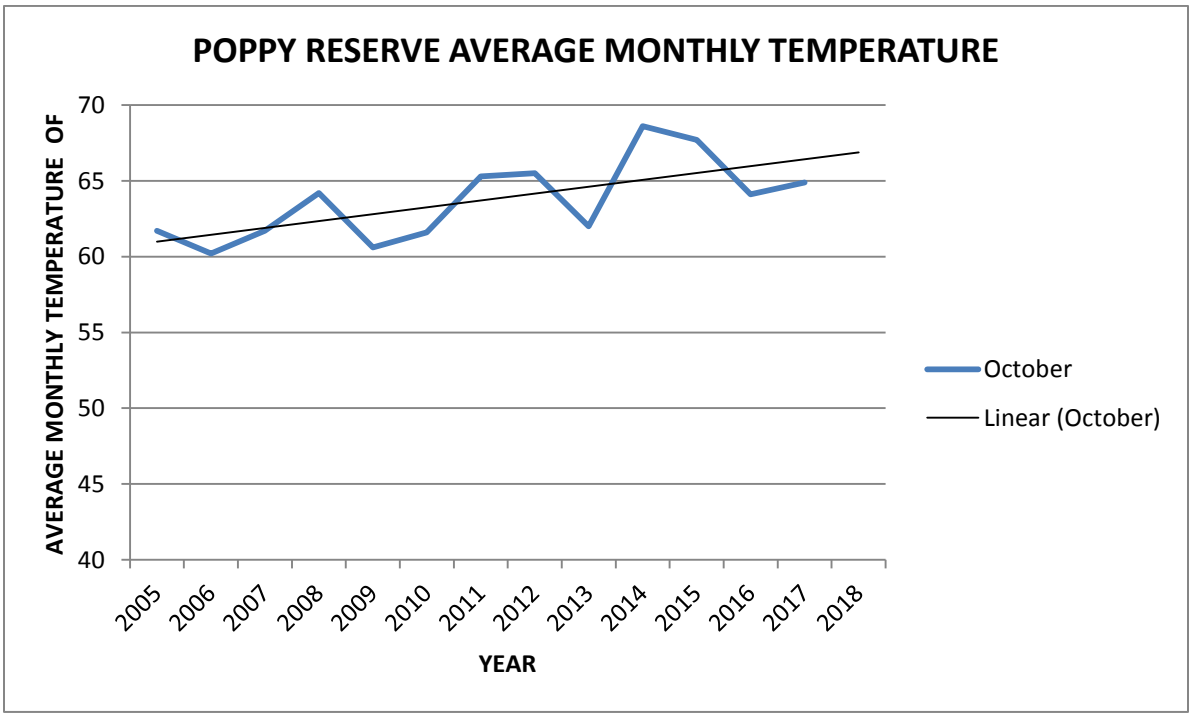

FIGURE 4: POPPY RESERVE AVERAGE MONTHLY TEMPERATURE

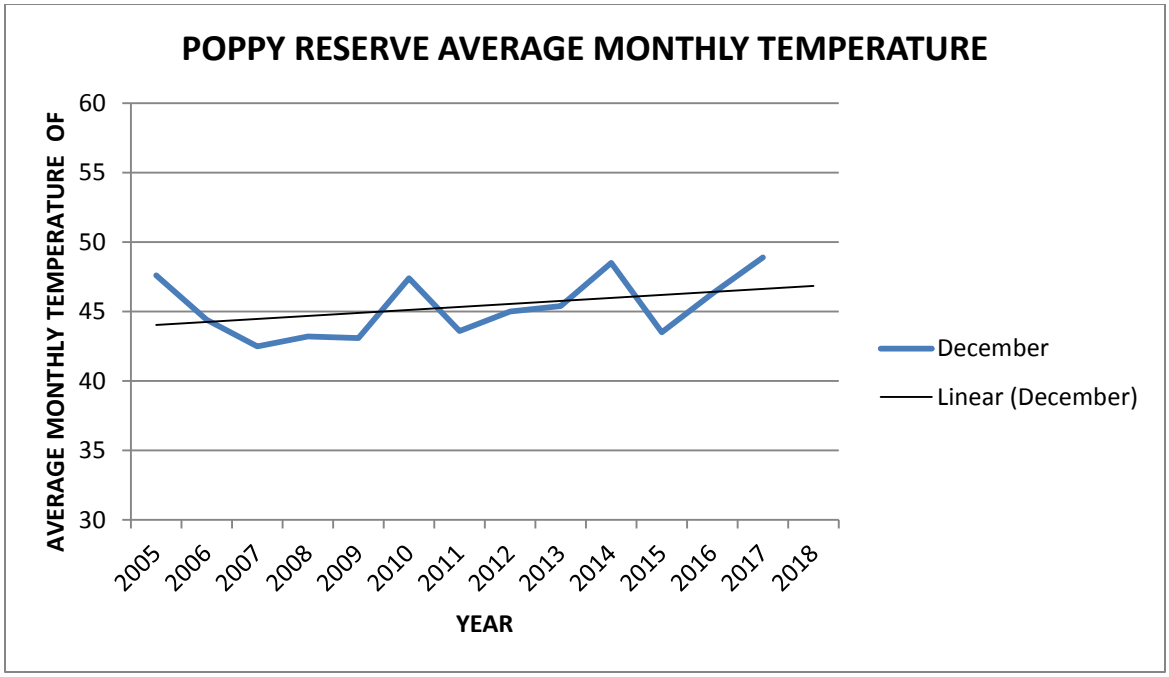

FIGURE 5: POPPY RESERVE AVERAGE MONTHLY TEMPERATURE

Figures 3, 4 and 5 consistently all show a modest increase in the average monthly temperatures over the last thirteen years. The amount of increase varies from approximately two to five degrees Fahrenheit. This variation in the amount of increased monthly average temperature for the three selected months could be real or due to the limited number of data points being curved fit. We can't say the temperature increase is due to Global Warming because the increase could also be simply the upswing portion of a multi-year temperature cycle. There are a number of natural phenomena that contribute to the earth's observed complex temperature variations. These phenomena include the El Nino/La Nina's two to seven year cycling, the sunspot eleven year cycle, the little understood, highly variable Pacific Decadal Oscillation that describes the North Pacific Ocean surface temperature cycling that can last for as long as 20 to 30 years or much shorter time period, and the recently predicted 100 year Pacific Centennial Oscillation. There are even much longer cycles that have significant impact on the earth's climate that are collectively called the three Milankovitch cycles. These include a variation in the earth's orbital eccentricity, 100,000 years, a variation in the earth's spin axis tilt, 41,000 years, and a variation in the earth's spin axis precession (similar to the wobble of a spinning top), 26,000 years.

Although I earlier promised in this posting to investigate the possible trends in the monthly average temperature extremes as well as the monthly average temperatures, I have discovered it going to take an extended time to conduct the necessary number crunching. Time I don't have if I am going to get this posting to the web master when promised so this further discussion is going to have to wait until the next posting. Check back in three months to read the rest of the story.

If any reader has questions, you are free to email them to me at mfpowell@verizon.net and I am always open to receiving feedback on these postings.