Spectacle in the meadows

Residents and visitors to the Crested Butte area will be treated to a special and spectacular wildflower display this summer. In addition to the general profusion of flowers that results from a heavy snowfall winter, there will be thousands of Frasera spectabilis plants blooming.

This unusual gentian produces stalks that can grow as high as nine feet at lower elevations, covered with several hundred large white/green flowers that give it the common names of green gentian, monument plant and miner’s candle.

We get such displays only every two to seven years, and although a good number were flowering in 2015, this year’s abundance may match what we saw in 2010, 2003, 1996 or 1998.

One of the questions I’ve asked about this wildflower is what causes these mast (big) flowering years. One answer seems to be that mast flowering benefits plants because there are better opportunities for cross-pollination. Although Frasera flowers can pollinate each other within a stalk, there are genetic benefits to exchanging pollen with neighboring plants. Plants that flower in an off-year may lose the opportunity for cross-pollination. So there’s an incentive for plants to synchronize flowering among years.

What might be the mechanism for synchronizing flowering? A way to answer this is to look for environmental variables that match up with good flowering years. Because they don’t occur very often, it took me about 30 years of data collection, doing an annual count of all the plants flowering from the Gothic Road trailhead in Mt. Crested Butte up to Emerald Lake, to find an answer. Those numbers have ranged from as few as two to almost 18,000 (last year there were nine). I think that the amount of summer rainfall is the trigger, with a wet summer producing a good flowering year.

However, these plants prefer their leaves underground for four years before they appear above ground, so it also takes them four years to make the flower stalks underground. The summer rain in 2015 is responsible for this year’s mast flowering. I can also predict because that of the drought last summer, there will be very little Frasera flowering in 2016.

Another interesting aspect of Frasera’s biology is that each plant flowers only once in its life, and dies at the end of the summer when it flowers. This means that they have only one opportunity to attract pollinators and produce seeds. The tall stalks make them visible from a great distance, and many flowers they produce make a lot of pollen and nectar, which makes them attractive to a great diversity of pollinators. Probably bumblebees do the majority of the pollinating, but about 100 different kinds of insects, and even hummingbirds, will visit the flowers. Pollination can happen at all times of day, as moths are also attracted to the flowers.

How long does it take for an individual plant to flower? To answer that question I’ve used two studies. One was to plant some seeds so we would have plants of known age. I did this in 1982 at the Rocky Mountain Biological Lab, and the first plant flowered at the age of 20, in 2003; its stalk was about six feet high. Nineteen others have flowered up until now, and it looks like the remaining several plants will flower this year, after 36 years. Thus, not all plants flowering in a given year are the same age. The differences in height among flowering plants probably reflect in part age differences, with older plants that have had more years to accumulate energy in their roots producing taller plants.

The other study is ongoing at 12,300 feet in Cumberland Pass, where we have a few thousand individual plants tagged, some as far back as 1973, that we measure each year. Some of those plants were already quite old in 1973 (based on their size), but still haven’t flowered as of at least 46 years old. My guess is that some of the plants in that alpine study site are 80 or even 100 years old when they flower and die. (If you’re interested in helping with this count in July, let me know.)

Are these great plants being affected by climate change? I’m not sure. Among the Frasera project has been to track in two sites how many plants flower, and how many plants flowered enough to have flowered, at the Gothic Creek Trail. The population of these plants has been declining. Although there are still many plants left to flower in these sites, if they’re not replacing themselves at some point the population will disappear. Whether it’s a change in land use, or climate change, or some other factor I haven’t figured out yet, I am concerned about the decline in those numbers.

One of the sites where I have counted flowering Frasera is the meadow where Fantasy Ranch has had their horse for many years, at the north end of Mt. Crested Butte. That area has recently sold, and depending on what the new owners do with it, the Frasera population there may be impacted. In the past as many as 2,000 plants have flowered there (in 1988), and I expect there will be at least a thousand there this summer. That will be a big contrast with last year, when there were none flowering in that meadow.

As you travel around the nearby valleys and enjoy the spectacle that blooming Frasera present, you can now appreciate that it is to see so many of them, and how long the plants have been preparing for this event. You can also appreciate how it takes decades of research in order to learn the secrets of such a long-lived species. (Thanks to all our taxpayers, for a small portion of your federal income tax goes to the National Science Foundation, which supports our research.) If you stop by the Gothic Visitor Center, you can learn about some of the other interesting research that scientists from around the country are doing there.