A Population Study of the Lesser Purple Fringed Orchid

By Scott Weber

When I discovered the lesser purple fringed orchid (Platanthera psycodes) on our farm near Baraboo in 1989, I was elated, to say the least. My wife Muffy Barrett and I unknowingly bought our own orchid preserve when we took title to the land.

We have found 10 species on our farm so far, and the purple fringed orchids are the largest and most conspicuous of the lot. The orchid flora of Wisconsin has its share of tiny miniatures ("little green jobs" as we call them), so I was glad to find one of our showiest species a short walk from our house. This species was recorded at TPE's Mounds View Grassland 12 years ago but hasn't been seen again, and Empire-Sauk Chapter director Rich Henderson nudged me to publish some of the data I have on our own population.

I surveyed prairie white fringed orchid (*Platanthera leucophaea*) populations at a variety of sites in southern Wisconsin from 2000 to 2011. I used portable GPS devices to mark the plants so as not to attract attention to their whereabouts. In 2006, I began a similar study with our purple fringed orchids and recorded all the sightings on our farm through 2016. Although the habitat of these two orchid species is somewhat different, their population biology, life history and growth habits are quite similar. Both species move around a lot and are dependent on recruitment of new seedlings to maintain their populations. If there is a nearby seed source, both species may colonize adjacent habitat as long as the land is managed for their survival.

The purple fringed orchid has a greater tolerance of different soil types and shade, so it can be found throughout Wisconsin. The less-tolerant prairie white fringed orchid is mostly confined to the southeastern counties. I would classify the purple fringed as uncommon but not rare.

GPS data has its limitations. Most commercial, hand-held navigation devices may err by more than 30 feet, so they're not perfect, especially over several years with more than one instrument. Even when accounting for GPS error, however, I have very few records that match up (this is also true with prairie white fringed orchid). I also photograph many of the orchids and flag or cage some individuals to protect the seed pods from deer.

The other methods of marking plants support the conclusion of the GPS data: the orchids are short-lived. Of the 154 flowering individuals I have marked from 2006 to 2016, there are only 13 potential GPS matches and only two pair of exact matches, for a possible total of 15. Seven possible matches were one year apart, seven had a two-year difference, and one had a four-year difference. Caged individuals never lasted more than four years. I have 139 records for individuals that were counted once and failed to bloom again and are presumed dead. A study of western prairie white fringed orchid (*Platanthera praeclara*) in North Dakota showed similar results — plants have a half-life of one to three years (Willson and Akyuz, 2008).

Population size is greatly influenced by the weather and rainfall. The lowest count was zero for the drought year of 2012; the highest count was 38 in 2011. They are mostly confined to the wetter sites along our stream corridor, but expand their populations into adjacent upland habitat in years of ample rainfall, then disappear from those sites in dry years. They are found in full sun as well as shaded wet woods. Sometimes, I can barely get to them without getting sucked into a muck hole; other times, they are growing right in the middle of mowed trails, firebreaks or along the gas pipeline right-of-way.

In 2015, we discovered a new population of several individuals blooming in a prairie planting about a quarter mile from the nearest recorded population, but in 2016, we found no flowering plants at that site. The greatest separation between populations is about .53 miles. The plants seem to respond well to fire and/or mowing, but neither is essential for their life cycle. Some of our best hot spots have never been burned or mowed due to a high water table and deep muck soils that will swallow up the tractor and mower. Our wetlands are fed by numerous springs and by a stream that runs all year.

I have sowed many seed lots in vitro in my laboratory. Like the prairie white fringed orchid, purple fringed seeds have extended dormancy and long shelf life. One winter of cold treatment resulted in a very low germination rate; a few seeds continued to germinate each year for at least five years and probably many more. Variable seed dormancy is a good adaptation for mitigating the risk short-lived species face dealing with an unpredictable environment and extreme weather events. How long the seeds remain viable in the seed bank is unknown. Development of seedlings from seed to bloom may take longer than the plant lives as a mature adult, so patience is required when sowing seed in new areas.

Based on my studies of *Platanthera* and related orchids with similar root and shoot characteristics, both the prairie white fringed and purple fringed orchids may take three or four years to reach maturity with no competition. The flowering shoot and its attached root die after flowering and seed set. Normally in a good year, the plant will produce a new shoot and root, sometimes several new ones in a very good year. Any problem such as drought, flood, predation or disease may result in no new offshoots and the death of the plant. Even a heavy set of seed can sap the plant of energy and reduce its longevity.

Some major causes of seedling mortality in order of importance are:

Lesser Purple Fringed Orchid (*Pltanthera leucophaea*) with hummingbird clearwing moth (*Hemaris thysbe*). *(Photo by Scott Weber)*

Continued on next page

pathogenic fungi, extreme weather events, slug damage, inbreeding depression, and assorted other pests and diseases. Deer will eat mature plants, so we cage individuals that will set the most seed.

The production of viable seed with the purple fringed orchid requires the presence of its pollinator, the day flying hummingbird clearwing moth (*Hemaris thysbe*). There usually aren't enough orchids in one place to draw the pollinators by themselves, so the presence of other flowering species such as blazing stars (*Liatris spp.*) and bergamot (*Monarda fistulas*) are needed for good pollination. I had zero germination success until the year I recorded the moth on the orchid. The moth is not a dedicated pollinator, but, like the orchid itself, an opportunist. I think the moth was primarily interested in the nearby patch of blazing star but visited the orchids as a side trip.

Lack of suitable fungi does not appear to be a limiting factor; fungal spores are abundant in our climate, and based on our own orchid flora studies, many species like to colonize very poor soil low in organic matter following major soil disturbance. Nodding ladies' tresses (*Spiranthes cernua*) and Loesel's twayblade (*Liparis loeselii*) have both appeared in pots of other plants in our greenhouse, and tubercled orchid (*Platanthera flava*) colonized a bulldozer scrape on subsoil beside our driveway. Even prairie white fringed orchid has colonized bulldozer scrapes in former cropland from nearby seed sources, and, likewise the lesser purple fringed orchid will colonize old fields taken out of row crops.

Most native orchids are sensitive to high inorganic nitrogen levels, so cropland might need to lie fallow for a year or two (nitrates leach quickly from most soils), and they may be affected by runoff from adjacent farmland. They are much better adapted to low nitrogen than most weed species. Many orchids dislike competition and take advantage of disturbance, whether major or minor, to get a foothold, produce seed and move on.

With good rainfall this spring, we should have a good chance of finding more orchids this summer. The best time to look is from mid-July to the first week in August. The orchids are very dependent on good seed set and recruitment of new seedlings, so protecting the plants from deer is a very good idea. Mounds View Grassland should be large enough to harbor enough individuals to prevent inbreeding depression, but the more individuals, the better the odds for a sustainable, vigorous population.

Reference Cited

Willson, Gary D. and Akyuz, F. A. 2008. *Survival of the Western Prairie Fringed Orchid at Pipestone National Monument*. 21st North American Prairie Conference Abstracts, 56.

Win Some, Lose Some ***continued from page 1***

Rob and John created a colorful poster for the Albany Library to depict some of the native plants that were reappearing after at least 75 years of mowing. John led seed-collecting trips to the prairie with students from nearby Albany Schools. He also offered a tour of the prairie for St. Patrick's 50th anniversary, and he showed the parishioners a "state record" red oak tree behind the church.

John and Father Mick walked the prairie each week to see what was new, what was flowering, what was just coming up, what was going to seed. Last fall, a few uncommon white lettuce plants appeared and flowered.

But the experiment wasn't universally accepted. A neighbor complained to the village board about the "weeds" in the cemetery. And when a parishioner died, the heavy equipment used to open the grave crossed the nascent prairie, leaving deep, wide, muddy ruts.

So it ended.

The experiment lasted for two years, but there was a storm brewing.

Father Mick came to the March 2017 meeting of the Prairie Bluff Chapter and explained why he wasn't renewing the agreement to manage for prairie. He cited village opposition, parish indifference and the practical need to drive across this parcel to open new gravesites. The chapter thanked Father Mick for the opportunity to demonstrate the resilience of native ecosystems.

We hope the plants will be there next time the mowing stops.

This was not Prairie Bluff Chapter's only experience with cemetery prairies. For years, we have helped to manage Green's Prairie Cemetery, an acre of deep-soil prairie in northwest Green County where we have twice had to defend our "no-mow" land management. The Town of York, owner of the cemetery, has resolutely backed our efforts to manage the graveyard with carefully executed, annual prescribed fire.

"The protection and management of pioneer cemetery prairies is a daunting challenge," began a 2004 paper presented by scientists from the Illinois Nature Preserve Commission at the 19th North American Prairie Conference in Madison, Wis. "As the public has become accustomed to highly manicured grass in their lawns and neighborhood parks … prairie cemeteries with grasses three- to-six-feet tall, are often thought to be abandoned or unkept, even though the cemeteries retain their original vegetation."

It's not widely known or appreciated that these early- to mid-19th century cemeteries with native grasses and flowers were the prevalent landscape when early Americans were laid to rest. They wouldn't have known any other scenery than the colorful spring violets, tall summer composites, warm season

Continued on next page