COASTAL MAINE BOTANICAL GARDENS
PINK LADY'S SLIPPER SURVEY

2013 PROJECT SUMMARY

It is hard to believe that this was the 16th year of the Pink Lady's Slipper survey at Coastal Maine Botanical Gardens. Back in 1998, these lovely and fascinating flowers were putting on an incredible natural show in a one-acre area at the north end of the property, long before the current horticultural show on display for guests to the Gardens, which includes several different kinds of Lady's Slippers. Pink Lady's Slipper (*Cypripedium acaule*) is an early successional species, or plants that may appear where there has been disturbance to the native forest, allowing extra light through the canopy. We think this explains the unusually large number of flowers found when we started the survey, not long after the property's previous owners removed and trimmed trees in the forested study area with the intention of highlighting views of the water for prospective buyers.

In those early days there were no planted gardens to attract visitors and potential members to support our dream of a botanical garden, but those who did come in late spring loved nature's Pink Lady's Slipper show. In fact, many thought that we actually planted these Pink Lady's Slippers for visitor enjoyment, but that is not the case. As our Executive Director, Bill Cullina, points out in his book, *The New England Wild Flower Society Guide to Growing and Propagating Wildflowers of the United States and Canada*, "the plants really do not adapt well to cultivation." While we know that Pink Lady's Slippers are beautiful, they also evoke memories in those walking our trails of populations long gone and raise questions about why their carefully protected natural clumps had disappeared.

Since we could not move or propagate Pink Lady's Slippers, we began this research project to learn more about their natural growth and reproduction, hoping to extend their bloom and promote their multiplication as long as possible. To determine if we were successful, we needed to know how many plants and how many flowers we had each year. Thus, we began the Pink Lady's Slipper Survey in 1998 with no budget, but many enthusiastic volunteers. In our one-acre study area, there were three distinct sites with few individual plants found in between. For the first six years, we did no experimental manipulations, simply tagging plants and observing their natural growth. We noted that flower counts were increasing in the Upper site nearest to the Rhododendron Garden, but flowering plants in the Lower site near the Shoreland Trail's wooden bridge had leveled off, and in 2004, actually declined (see graph). Surveyors noted that where previously tagged plants did not come back, there was a great increase in the number of spruce seedlings. So, in late summer 2004 we decided to manipulate the habitat of the lower two sites by removing competing plants that grew above the Pink Lady's Slippers, blocking out light. We kept the Upper site as a non-manipulated "control" site for two more years to show that the decline would continue without some

landscape maintenance, but eventually started removing competing forest floor plants in this site in 2007 to continue the show there as well.

As changes came to other areas of the Coastal Maine Botanical Gardens over the years, they also came to the Pink Lady's Slipper study habitats. The Pink Lady's Slipper "show" did continue this year for our guests in the Upper site of our study area with 355 flowers! Providing surprises for our guests in late May and early June, Pink Lady Slippers have also popped up along roadsides and in nooks and crannies all over the Gardens where the forest continues to be opened up for more formal gardens and paths. The “show,” however, seems to be over for the natural populations in the Lower and Middle sites of the study area. In the Lower site, they have mostly been replaced by hay-scented ferns and blackberries. Although we removed bracken and tree seedlings and had our largest Pink Lady's Slipper concentration in 2010 (325 flowers in a 20 x 20 meter area), there were only 27 flowers (see graph) this past June in the Middle site, which is now dominated by various kinds of mosses. Therefore, in the future we will only count flowers that bloom despite the competition in the Lower and Middle sites. However in the Upper site of our study area, we will continue to record new plants, monitor the details of growth and flowering of almost 400 existing plants, and track the blooms of an additional 200+ plants.

We have collected 16 years of detailed year-to-year data on growth (leaf sizes, flower stalk height, herbivory, etc.) and flowering for more than 2,300 tagged individual plants. Even though the overall flower counts were lower this year, we did find and add 62 new plants, half of which were in flower, into the survey, (down from 91 in 2012). We currently plan to analyze and publish the results of this research after the 20th survey in 2017. We hope the results will provide new basic long-term natural history information about Pink Lady's Slippers, including how often a single flowering plant will actually flower in a 20-year period, how single plants form clumps of multiple flowering plants, and population dynamics.

The main goal of the applied horticultural aspect of our research project has been to extend a naturally amazing display of Pink Lady's Slippers for guests at the Gardens for as long as possible through an experiment that focused on manipulating only one environmental factor: competition. When used by gardeners, this approach is called "editing" and has long been used at the Gardens to highlight other attractive natural groups of plants such as mosses and ferns. Our graph shows that that this approach has been effective, up to a point, with Pink Lady's Slippers. Testing the effects of other environmental factors, such as removing branches and trees, attracting pollinators, changing soil moisture and chemistry, etc., would have certainly increased our understanding of the ecology and, perhaps, propagation constraints on these native plants, but would have required a treatment protocol beyond the budget and staffing available for this project. Furthermore, unlike minimal impact off-season removal of competing plants, these more manipulative treatments may have detracted from the joyous, natural-looking exuberance of the flowering display.

One of the key features of this project is that the bulk of the monitoring and measuring has been done by almost 100 enthusiastic and dedicated volunteers (citizen scientists!) and staff over the years. While plants have come and gone, the number of tags has multiplied four-fold since 1998, giving surveyors in later years a much greater challenge in finding each tag and connecting it to a specific plant. This year it was especially difficult for the surveyors in the Middle site who were no longer surrounded by a sea of Pink Lady's Slipper flowers signaling the location of tagged individual plants or clumps of plants to measure. We greatly appreciate their efforts to search in the leaf litter, rampant moss cover, and a newly arrived ant population, for flowerless plants and the tags of those that have gone missing over the years.

So, many thanks for the outstanding effort by the 2013 group of 18 volunteers and by all volunteers who have donated their time in the past! We look forward to seeing some of you back in 2014 for the 17th annual Pink Lady's Slipper Survey.

Survey manager: Sharmon Provan
Advisor: Joanne Sharpe
Staff support: Kristin Neill, Carrington Flatness

2013 Survey volunteers:

Julie Benavides, Faith Blethen, Betsy Bradford, Ginger Deucher, BJ Dobson, Elaine Eadler, Connie Gatz, Mary Gevaudan, Polly Gibson, Jean Hamilton, Kath Holland, Ellen Knox, Jane Lunt, Jancie Olson, Pam Rawden, Dan “Tree” Robbins, Rose Rodrigue, and Roxanne Smith.

Additional volunteers and staff support in past years:

Pam Ames, Kathryn Armstrong, Elaine Bartley, Barbara Blackburn, Allan Bonomi, Angel Boord, Barbara Bush, Cyndy Bush, Ginger Carr, Ann Carroll, Krista Clark, Ellie Clark†, Jackie Cressey, Jackie Cressy, Gareth Crosby, Gena Donnell, Stephen Ellis†, Charlotte Evanofski, Judith Falk†, Joseph & Caroline Fazekas, Meredith Fossel, Janet Foster, Barbara Fowler, Gayle Gavreau, Steve Gray, Shelly Hanson, Brendan, Don and Mary Hart, Wanda Hendrickson, Mike Hicks, Sarah Hillman, Tom Hilton†, Jean Howe, Anne Hughes, Lauren James, Julia Jellison, Carolyn Jenks, Barby Johnson, Sue Kennedy, Marty Landorf, Pam Lingel, Susan Lloyd, Caitlin Lupton, Kiersten Lynch, Suzy Mace, Penny Matthews, Bruce McElroy, Jane McKinney Kaler, Sue McNulty, Nancy McReel, Cathy Miller, John Miller, Jeanne Olsen, Justin Nichols, Izabella Provan, Nancy Ray, Julie Rea, Nancy Richeson, Patricia Robbins, Elisabeth Roos, Ethan Roos, Connie Rose, Muriel Soule†, Gail Sprague, Lauren Stockwell, Irene Taylor, Mary Morrison Vanniere, Hoyt Walbridge, Tina White, Annie Wilcox, Janet Woessner, Dick Zeig.

GRAPH showing the annual changes in the number of flowers seen in the three sites of and total of one-acre study area. From a high in 2010 of 692 flowers (12 years after the study began) only 384 bloomed in 2013 in the Total study area. The Middle site was down from 325 in 2010 to 27 in 2013, a decrease of nearly 92% in only 3 years. Despite the overall decrease, flowering at the Upper site continues at high levels (355).