Characterization of *Cypripedium* species and Habitats in New Hampshire

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Cypripedium species, commonly known as lady's slippers, are terrestrial orchids that grow in loose humus soils and thrive in temperate climates. Lady's slippers are listed as endangered species primarily due to habitat loss and degradation. This research program is part of an effort aimed at halting the decline of *Cypripedium* species in northern New England. Over the past two years, our restoration program has raised over 5,000 seedlings of *Cyp. reginae* in sterile culture. These plants are in the process of being vernalized for transplantation into soil. Identification, characterization, and protection of suitable specimens and habitats are critical to this effort. *Cypripedium* species and their seeds were observed in their natural habitats in western New Hampshire and eastern Vermont in 2012. Associated plant species and soils were catalogued as part of this effort. *Cypripedium* species exhibit low pollination-to-fruit development success. Under histological examination, *Cypripedium* seeds showed a lack of endosperm. The seeds are adapted to wind dispersal and, since they lack endosperm, depend upon symbiotic mycorrhiza for germination in the wild. Tracking insect pollination of a small population of fifteen showy lady's slippers over four years yielded less than 20% of plants with fruit. In comparison, artificial pollination yielded 50% fruit production. Dry, un-dehisced fruit from *Cyp. reginae*, *Cyp. parviflorum,* and *Cyp. areitinum,* weighed an average of 1.1 grams, 1.2 grams, and 0.16 grams respectively. *Cyp. parviflorum* and *Cyp. areitinum* grow in mixed hardwood forests primarily populated by the trees *Acer saccharum, Fraxinus americana,* and *Fagus grandifolia.* The clubmoss, *Lycopodium dendroideum,* the ferns, *Adiantum pedatum* and *Polystichum acrostichoides*, as well as mosses such as *Polytrichum* were common to these areas. *Cyp. parviflorum* and *Cyp. areitinum* grow in calcareous soil with a pH of 6.8 under heavily filtered sunlight while *Cyp. reginae* is found in fens of sphagnum moss, small trees, and bushes with a less dense canopy. The pH of the fen with the largest *Cyp. reginae* population ranged from 6.8 to 7.0. *Cyp. reginae* grows between heavy shade to over 8 hours of sunlight per day.