

# *Cypripedium parviflorum* var. *makasin*

Fen Small Yellow Lady's Slipper

Orchidaceae



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## *Cypripedium parviflorum* var. *makasin* Rare Plant Profile

New Jersey Department of Environmental Protection  
Division of Parks and Forestry  
New Jersey Forest Service  
Office of Natural Lands Management  
New Jersey Natural Heritage Program

501 East State Street  
P.O. Box 420  
Trenton, NJ 08625-0420

Prepared by:  
Megan R. King  
Meganryanking@gmail.com

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## **Introduction**

Just as all forms of *Cypripedium parviflorum*, *Cypripedium parviflorum* var. *makasin* consists of relatively small flowers, with 3 petals, 3 dark sepals. It is most commonly confused with *C. parviflorum* var. *parviflorum*, which consists of bracts that are conspicuously pubescent, numerous densely spaced dots on the lateral petals and a floral scent that is rose like or musty rather than sweet. *C. parviflorum* var. *pubescens* is commonly known to have a more southern range in comparison to *C. parviflorum* var. *makasin*. *C. parviflorum* var. *pubescens* is known to have a larger flower, occurring on more upland habitats, as well as having hairy stems, bracts and leaves, in comparison to *C. parviflorum* var. *parviflorum* and *Cypripedium parviflorum* var. *makasin* (North American Orchid Conservation, 2019; Boufford, 1997). According to *Flora of North America* only the *makasin* variety should be called "Lesser Yellow Lady's-slipper" (Bebeau, 2014).

## **Life History**

Flowering periods for *C. parviflorum* var. *makasin* are between May and July leaving this to be the optimal identification period for this species (Boufford, 1997; Doyle, 2019). Rarely consisting of two flowers, the inflated lower petal known as the slipper can be 15 mm to 20 mm long, glossy yellow in color, with purple splotches lining the pouch opening and faint purple venation on the lower parts of the slipper. The flower column is yellow with purple that broadens into a flat oval lip. Its lateral petals are 3 cm to 5 cm long, narrow, typically dark purple to brown and twisted with greenish striping. Sepals are of similar color to the lateral petals, with two fused behind the lip and the other broader and erect above the lip (Figure 1, Figure 4). At the top of the stem, behind the ovary stands a sparsely hairy erect floral bract that is leaf like (Figure 1, Figure 4) (Minnesota Wildflowers, 2006; Native Plant Trust: Go Botany, 2019; Flora of North America beta, 2019).

Leaves are 3-5 (rarely 2), alternately arranged, and orbiculate or broadly ovate to elliptic-lanceolate (Minnesota Wildflowers, 2006; Flora of North America beta, 2019). With prominent parallel veins, these leaves range in length from 52 mm to 209 mm and their base clasps at the stem (North American Orchid Conservation, 2019; Bebeau, 2014). Leaf margins are smooth with a hairy surface. One root can produce 10 or more stems (Minnesota Wildflowers, 2019). The figures below (Figure 1, Figure 2) show the arrangement of the leaves on the stem.

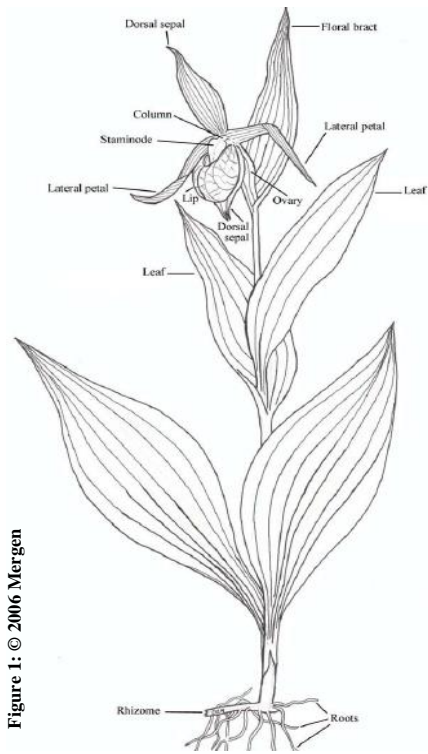


Figure 1: © 2006 Mergen



Figure 2. © William Cullina, Native Plant Trust

### Pollinator Dynamics

Reproduction normally occurs vegetatively through the root system, but fertile flowers produce an ellipsoid capsule containing many small seeds (Figure 4). Bees have been found to be the most frequent pollinators (Bebeau, 2014). Insect species from the following genera have been documented as pollinators: *Agapostemon*, *Andrena*, *Apis*, *Ceratina*, *Eristalis*, *Osmia* and *Lasioglossum* (more specifically, *Lasioglossum rohweri*). Different pollinators are seen visiting each variety due to variation in flower size and fragrance of *Cypripedium parviflorum*. For example, *Cypripedium parviflorum* var. *pubescens* is pollinated by *Ceratina calcarata*, but *C. parviflorum* var. *makasin* could also accommodate the species (North American Orchid Conservation, 2019). In Figure 3, you can see that Mergen (2006) represents the unknown material with question marks for *C. parviflorum*'s life cycle.

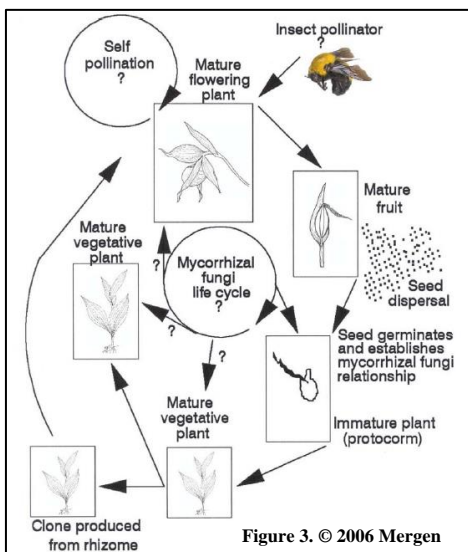


Figure 3. © 2006 Mergen

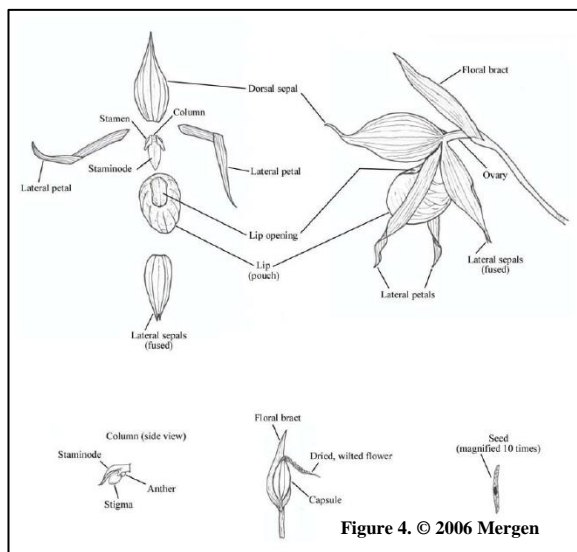


Figure 4. © 2006 Mergen

## Seed Dispersal

The fruit of *Cypripedium parviflorum* var. *makasin* is an oblong to elliptic capsule containing numerous small seeds (Figure 4) (Minnesota Wildflowers, 2019). Typically, the fruit capsule of *C. parviflorum* is 2 cm to 3 cm in length and about 1 cm in width, the capsule pointing upwards or angled outwards (Native Plant Trust: Go Botany, 2019; Mergen, 2006). Fruiting occurs from late June to late July (Doyle, 2019). The seeds of *C. parviflorum* varieties are dust like in size, and unlike most flowering plants, they lack a food source for germination such as an endosperm. Seeds of *C. parviflorum* will not germinate unless under the right light, soil and fungal conditions. It can take 3-4 months before a seed becomes mature after fertilization, and many seeds can lay dormant for up to 8 years. It is very much known that seeds require a mycorrhizal relationship for both seed development and seedling establishment because it is using this as a source of nutrients. While the literature mentions that little is known about seed dispersal, they are assumed to be wind pollinated due to the characteristics of their seeds. Covered by a seed coat (testa) that is air-filled, inflated, and having a rough outer texture are the characteristics for wind dispersal, but also the seed coat is water repellent leaving room for water dispersal as well (Mergen, 2006).

## Habitat

This species is known to occur in an ecological community association, Pasture Fen (Turfy Juniper Fen) that is itself overall critically imperiled. The association consists of saturated wetland of turf mineral soils occurring over calcareous bedrock (Walz, 2006). Other habitats include mesic to wet fens, prairies, meadows, thickets and open coniferous and mixed forests (Boufford, 1997). *Cypripedium parviflorum* var. *makasin* occurs at elevations between 0 and 1500 m (Boufford, 1997).

New Jersey occurrences have recorded *C. parviflorum* var. *makasin* to exist in sensitive, rich swamps, edges of seeps, upland edges of a limestone shrub fen, and the edge of a lakeshore marl fen which historically was disturbed (NJ Natural Heritage Program, 2019; Walz et al., 2018).

Mycorrhizal associations are known to occur with all varieties of *C. parviflorum*, but little is known about these associations in its adult stages. *The Friends of the Wild Flower Garden* stated “It tolerates sun but resists transplanting due to a symbiotic relationship with certain soil fungus called ‘mycorrhiza’. The root system is rhizomatous and will form a nice clump via enlargement of the root system” (Bebeau, 2014). Refer to the seed dispersal section (above) for more information about the role of mycorrhiza in earlier stages in the life cycle of *C. parviflorum*.

Associated species include but are not limited to, *Acer saccharum*: *Thuja occidentalis*, *Pinus strobus*, *Cypripedium reginae*, *Abies balsamea*, *Carex disperma*, *C. trisperma*, *Cornus stolonifera*, *Alnus rugosa*, *Gentiana andrewsii* (Doyle, 2019) *Juniperus virginiana* *Carex flava*, *Carex tetanica*, *Juncus brachycephalus*, *Juncus dudleyi*, *Juncus nodosus*, *Equisetum fluviatile*, *Bromus kalmii*, *Castilleja coccinea*, *Sisyrinchium angustifolium*, *Solidago uliginosa*, *Eupatorium maculatum*, *Cypripedium parviflorum*, *Thelypteris palustris*, *Lobelia kalmii*, *Liatris spicata*, *Spiranthes lucida*, *Trollius laxus*, *Rudbeckia fulgida*, *Pedicularis canadensis*, *Pedicularis*

*lanceolata*, *Betula pumila* and *Dasiphora fruticosa* ssp. *floribunda* (= *Pentaphylloides floribunda*) (Walz, 2006).

Associated species recorded from New Jersey occurrence reports include *Juniperus virginiana*, *Toxicodendron vernix*, *Pentaphylloides (Dasiphara) fruticosa* var. *floribunda*, *Sarracenia purpurea*, *Equisetum arvensis*, *Parnassia glauca*, *Rhynchospora capillacea*, *Carex viridula* ssp. *viridula*, and *Symplocarpus fretides*, *Rhamnus alnifolia*, *Equisetum* sp., *Cornus* sp., *Rosa* sp., and *Viburnum* sp. (NJ Natural Heritage Program, 2019).

### **Wetland Indicator Status (Walz et al., 2018)**

FACW – Usually occur in wetlands, but may occur in non-wetlands

### **USDA Plants Code**

CYPAM3

### **Coefficient of Conservatism (Walz et al., 2018)**

CoC = 10; Native with a narrow range of ecological tolerances, high fidelity to particular habitat conditions, and sensitive to anthropogenic disturbance.

### **Distribution and Range**

In New Jersey there are currently eight occurrences documented in the Biotics database, all of which are believed to be extant (NJ Natural Heritage Biotics database, 2019). Of these, two are good-sized populations with potential for more individuals in the surrounding area. The majority of the documented populations are at risk of being outcompeted by invasive species and habitat disturbance. Five of the occurrences are recorded from Sussex County, two from Warren County and lastly one from Morris County.

The range of the species with their respective rankings in the United States is as follows California (S1), Colorado (SNR), Connecticut (SU), Illinois (S1), Indiana (SNR), Iowa (SNR), Maine (SNR), Massachusetts (S1), Michigan (SNR), Minnesota (SNR), Montana (SNR), New Hampshire (S1), New Jersey (S2), New York (S4), North Dakota (SNR), Oregon (SNR), Pennsylvania (S1), Vermont (S2S3), Washington (SNR), Wisconsin (S3S4).

## **Conservation Status**

### **G Rank: G5T4Q**

(Apparently secure globally; although it may be quite rare in parts of its range, especially at the periphery. Element ranks containing a "T" indicate that the T intraspecific taxon is being ranked differently than the full species. Elements containing a "Q" in the global portion of its rank indicates that the taxon is of questionable, or uncertain taxonomical standing, e.g., some authors regard it as a full species, while others treat it at the sub-specific level.)

### **S Rank: S2**

(Imperiled in New Jersey because of rarity [6 to 20 occurrences]. Historically many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.)

Please note, additional occurrence information present in herbaria or other sources that are not yet documented in the NJNHP Biotics may occur. Ongoing digitization efforts by herbaria around the world will lead to an increase in recorded occurrences in the near future.

### **Regional Status Codes for Plants and Ecological Communities: HL**

(Indicates taxa or ecological communities protected by the Highlands Water Protection and Planning Act within the jurisdiction of the Highlands Preservation Area.)

## **Threats**

Information from records of known occurrences report that, *Cypripedium parviflorum* var. *makasin* in its New Jersey occurrences is at risk of being encroached on by invasive species, such as *Microstegium*. Habitat disturbance is another major risk, and can be caused by logging, off road vehicles, trampling by hikers, botanists, etc. Significant clear cutting projects could lead to the alteration of stream corridor habitats and drier water conditions, as well as changes to nutrient flow and stream temperatures. Herbivory by deer is another potential risk. For example, one out of six plants recorded in an occurrence record had been browsed (NJ Natural Heritage Program, 2019; Walz et al., 2018).

The greatest risks that *Cypripedium parviflorum* is subjected to are those involving plant collecting (whether it is for medicinal use, profit, or by enthusiastic orchid hunters), timber harvest, construction, grazing as well as other activities which directly impact populations. Indirect impacts affect the habitat such as recreation, weed control, fire suppression, mining, fuel-wood harvest, and prescribed fires. Fuel-wood harvest or commercial timber harvest not only negatively impacts the habitat for *C. parviflorum*, it impacts the entire occurrence. Independent from the species of trees removed, frequency at which they are removed impacts *C. parviflorum* occurrences. The level of impact felt is dependent on the level of harvest. Disturbance and removal of tree species will affect the microbes within the soil which *C. parviflorum* depends on. While it is mentioned that an opening in the canopy can increase the population at a given occurrence and lower the probability of wildfires, this leaves *C. parviflorum* to compete for space against other species. *C. parviflorum* is a poor competitor, that

occupies a relatively small area, and receives no benefit from monocultures or invasive species that will try to occupy its niche. Monocultures and invasive species can alter the light, nutrients and water resources, which would affect the microsites of nearby orchids (Mergen, 2006). Drought, flooding and wildfires are environmental risks that *C. parviflorum* faces. In the past, the Pasture Fen habitats in which *C. parviflorum* exists have been affected negatively by grazing (Walz, 2006). Trampling of areas due to recreational activities, leads to soil compaction as well as possibly impacting the area's hydrology. Negative impacts to mycorrhiza can result from soil impaction. However, it is thought that winter recreational activities would pose less of an impact to the species since they will be dormant and cushioned by snow but should still be prevented if possible, near known populations. While specific light requirements remain unknown, the amount of light competition from other plant species negatively impacts the *C. parviflorum* population size within that specific area (Mergen, 2006). Additional information on the threats to *C. parviflorum*, can be found on pages 37-45 of "Cypripedium parviflorum Salisb. (lesser yellow lady's slipper): A technical Conservation Assessment prepared for the USDA Forest Service" (accessible by [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5206980.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5206980.pdf)).

### **Management Summary and Recommendations**

Population monitoring and plant surveys are crucial to help understand the occurrences that are persisting in New Jersey (and other states) to help us better understand the habitat requirements of *C. parviflorum*. Protecting areas of known populations from recreational use, collecting, logging, invasive species, etc. would help to decrease the impacts that these man-made activities will have on *Cypripedium parviflorum* var. *makasin*. Further studies on the mycorrhizal interactions as well as the overall soil chemistry would help to better understand *C. parviflorum* and its varieties as well as further studies on its pollinator species (Mergen, 2006). There were no previously established management plans found during this literature review.

### **Additional Information**

*Cypripedium parviflorum* var. *makasin* was formerly thought to be *Cypripedium calceolus*. *C. calceolus* is now known to occur natively in Europe and Asia, and the closely related species *C. parviflorum* is the one native to North America. European nations have taken precautions to protect *C. calceolus* by including the genus *Cypripedium* in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). *C. calceolus* has declined in these areas due to over collection and habitat loss.



## **Other Common Names**

Greater Yellow Lady's Slipper  
Lesser Yellow Lady's Slipper  
Northern Yellow Lady's Slipper  
Northern Small Yellow Lady's Slipper

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