

Platanthera grandiflora

Large Purple Fringed Orchid
Orchidaceae



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Platanthera grandiflora 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

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Introduction

Despite the fact that it is a distinct species, *Platanthera grandiflora* is often mistaken for *Platanthera psycodes*. To be exact, the flowers of *P. grandiflora* are often confused with those of *P. psycodes*. *P. psycodes* is far more common than *P. grandiflora* with their flowers withering on the lower portions of the inflorescence before the buds open on the top whereas the flowers of *P. grandiflora* remain open longer throughout the entire inflorescence. Other determining characteristics can be seen when comparing the spur openings and rostellum lobes. Determining the species based off of measurements of the inflorescence and plant size is not definitive because of the extensive overlap in measurements. The two species have an overlapping blooming period, but *P. grandiflora* tends to flower earlier in certain geographical areas. Interestingly enough when there are climatic fluctuations, this will affect the timing of blooms for that given year. Like most orchid species, ethological and mechanical barriers are responsible for maintaining species distinctions rather than any internal barriers to interspecific crosses (Stoutamire, 1974). Many of the populations recorded in New Jersey have low numbers as far as population size, and some populations either do not flower or may not be seen for a few years. Due to the short flowering period this species exhibits, it has been noted to be quite difficult to identify (New Jersey Natural Heritage Program, 2019).

Life History

The showy flowers of *Platanthera grandiflora* can be found from June through August. The flowers consist of three lobes and a labellum that is deeply fringed, with colors ranging from pink to purple and rarely white (See Figure 1 below for evidence of the rare white inflorescence). The inflorescence stem is hairless, and each stem can produce between 1 and 55 flowers, all of which are 75 to 250 mm in length. The labellum can be measured to be 10-25 mm in length and the sepal 6-10 mm in length, while the bract length is up to 20 mm long. There are 2-6 leaves per stem, with a blade length of 130-240 mm and width of 25-90 mm. The height of the entire plant ranges from 27 cm to 120 cm (North American Orchid Conservation Center, 2011-2019).



Figure 1: White flower of *Platanthera grandiflora*.

Distinguishable by their seasonality and spatial isolation as well as their morphological characteristics, *P. grandiflora* and *P. psycodes* are not very different in phenology. While the species overlap in distribution and phenology, it is often said that the flowers of *P. grandiflora* are larger than those of *P. psycodes*. While *P. psycodes* shows more variability in the depth, fringe and divergence of the lobes, this does not mean that *P. grandiflora* does not also exhibit variability. The position of the labellum is a much more distinguishing characteristic rather than the shape of the lobes or fringe for *P. grandiflora*. The lobes between the species differ, with those of *P. grandiflora* curving forward, unlike those of *P. psycodes* that tend to be flat or bent away from the plane of the mid-lobe. Both species may present a white labellum claw, but it is more frequently observed in *P. grandiflora*. The later blooming periods of *P. psycodes* have a direct correlation with increase in latitude. While the blooming periods of the two species has not been clearly distinguished, *P. grandiflora* tends to flower prior to that of *P. psycodes*. Stoutamire had visited Vermont where he saw the two species flowering at the same time, while several days earlier in New York he had recorded seeing *P. psycodes* flower 10-14 days after *P. grandiflora*. Climatic and edaphic conditions affecting the flowering sequences have been suggested. Asa Gray commented in 1863 that there was a difference in anther position between the species, but further explanation was not included (Stoutamire 1974). Detailed representations of *P. grandiflora* flowers can be seen in Figures 2 – 6 below.



Figure 2: Single flower of *Platanthera grandiflora*

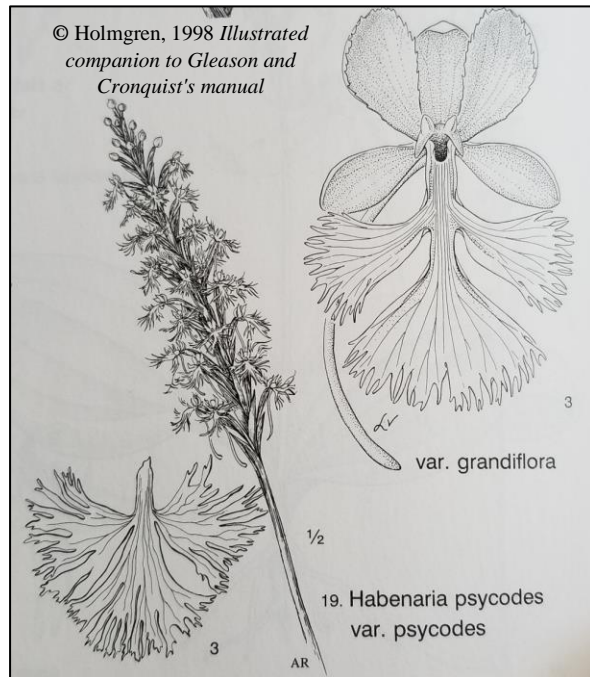


Figure 3: Illustration of *Platanthera grandiflora*

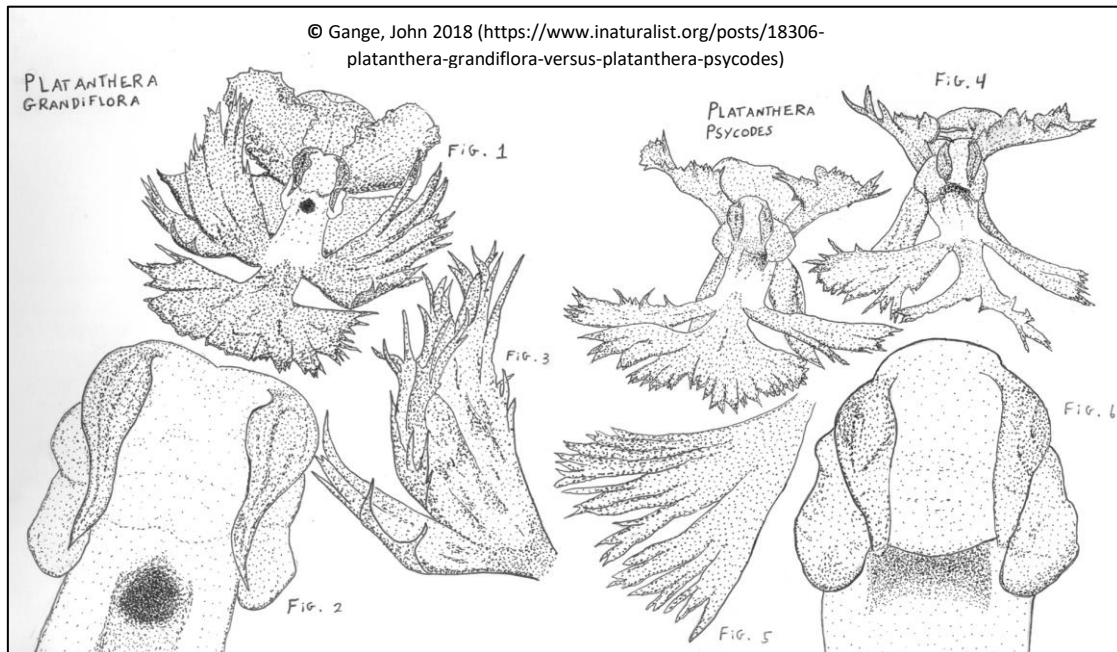


Figure 4: Illustration of *Platanthera grandiflora* (Fig. 1,2 and 3) and *P. psycodes* (Fig. 4,5 and 6).

According to the “North American Orchid Conservation Center” *P. grandiflora* is known to form a natural hybrid with *P. lacera*, in which it is given the name *P. x keenanii* (See Figures 7 for *P. lacera*, Figure 8 for a possible *P. keenanii* as well as Figure 10) (North American Orchid Conservation Center, 2011-2019). Historically other botanists from various parts of its range have noted hybrid species occurring from *P. grandiflora*, but during Stoutamire’s experiment where he conducted artificial crossing between *P. psycodes* and *P. grandiflora*, no hybridization was observed. Stoutamire reported that even if hybridization between the two species did occur, more than likely the characteristics of one column would dominate leaving it nearly impossible to detect the hybrid (Stoutamire, 1974). A recent publication about a population only recorded in Maine and recently in Maryland, might be a confused populations of *P. grandiflora* or *P. x keenanii*. The species has been named *P. shriveri* and is closely related to *P. grandiflora* (See Figure 9). Other sources say that this species might also have a parent hybrid origin from *P. grandiflora* and *P. lacera* (Gange, 2018; Brown, 2008; North American Conservation Center, 2011-2019). Orchidologist and curator at New York Botanical Garden, Matthew Pace comments that he believes that *P. shriveri* is just an extreme of *P. grandiflora* and treats them as the same species. It is unknown if further studies have been done after the morphological analyses performed previously by Pace showed no difference between the entities (iNaturalist.org, 2008).



Figure 5: Flower of *Platanthera grandiflora*.



Figure 6: Flowers of *Platanthera psycodes*.



Figure 7: Flower of *Platanthera lacera*.



Figure 8: Flower of *Platanthera grandiflora* / *P. keenanii*.



Figure 9: Flower of *Platanthera grandiflora* / *P. shriveri*.



Figure 10: Flower of *Platanthera keenanii*.

Pollinator Dynamics

Visits by swallowtail butterflies (*Papilio glaucus*, *Papilio polyxenes* and *Papilio troilus*) and a species of moth (*Autographa ampla*) retrieving nectar while visiting the flowers have been documented by the North American Orchid Conservation Center. The nectar spur length of *Platanthera grandiflora* flower was measured to be between 15 to 35 mm in length (North American Orchid Conservation Center, 2011-2019).

Platanthera grandiflora contains a floral odor that has been noted to be less sweet than that of *P. psycodes* (Gray, 1862).

Herbarium specimens were observed for their column type, labellum and nectary lengths. Most *P. psycodes* specimens contained a labella less than 10 mm in length, whereas *P. grandiflora* exhibited a labella over 10 mm in length. Differences were seen in column shape, size and nectary features in these specimens, leading to the inference that there is a difference in the dynamics of pollen transfer between these two species. To clearly separate the two taxa, the column forms are distinct, each serving different purposes. *P. psycodes* contains two pollinaria, (1.5 to 2 mm in length) slightly enclosed by the column wings. Two lateral openings are produced by a projection on the roof of the nectary, which can be seen past the oblong nectary opening. In *P. grandiflora*, the nectary opening is not obstructed, leaving the nectary opening to be funnel-shaped and beneath the stigma. Visiting hawkmoths remove pollinaria onto their compound eyes with *P. grandiflora*, whereas *P. psycodes* is typically visited by smaller butterflies and is thought to remove pollinaria onto their proboscis (Stoutamire, 1974).

The nectary length is the same throughout the latitude range of *P. psychodes* whereas for *P. grandiflora* it is greater in the northern region than in the central and southern Appalachian regions, which would be an indicator that it might have different pollinator species in various portions of its range (Stoutamire, 1974).

Seed Dispersal

Seeds are likely dispersed by wind, just after the capsules have dried and released the seeds. The capsule, which is pointed upward or outward, contains thousands of very small lightweight seeds (North American Orchid Conservation Center 2011-2019; Bowles, 1999). As for most orchid species, the conditions required for seedling establishment are poorly understood. No further information was found on capsule or seed size (Bowles, 1999).

Habitat

Sharing similar habitat preferences with the more common *Platanthera psychodes*, *P. grandiflora* is primarily a wetland species that can also be found in moist forests and fields, marshes, bogs and swamps (North American Orchid Conservation Center, 2011-2019). Both species can be found growing in similar soils and from full sun to shade. It is recognized that just like most orchids, many species within the genus *Platanthera* rely on a mycorrhizal interaction. There is a mycorrhizal interaction involved with the growth and development of *P. grandiflora*, but the interactions have yet to be completely understood. Further studies are required due to the extreme differences between species of orchids. Interactions cannot be confirmed since there was no other literature found explaining the mycorrhizal interactions with *P. grandiflora* or similar species.

In New Jersey, *P. grandiflora* can be found in rich woods, thickets and meadows (Walz et al., 2018). It has been recorded growing in areas of open or filtered light, on level or sloped ground. The species is typically found in or along the edges of swamps with flowing water. Areas of these populations are growing on Sphagnum hummocks in mixed hardwood and shrub swamps. Near to these populations, a pond or tributary may be found. It should be noted that even in areas of suitable and persistent habitat, above ground vegetation or flowers may not be seen every year (New Jersey Natural Heritage Program, 2019).

Associated species include, but are not limited to, *Betula* spp., *Acer* spp., *Osmundastrum cinnamomeum*, *Osmunda regalis*, *Thelypteris noveboracensis*, *Ranunculus sempervirens*, *Caltha palustris*, *Platanthera clavellata*, *Platanthera lacera*, *Platanthera psychodes*, *Cypripedium* spp., *Symplocarpus foetidus*, *Veratrum viride*, *Lobelia cardinalis*, *Lysimachia ciliata*, *Toxicodendron radicans*, and *Pilea pumila* (New Jersey Natural Heritage Program, 2019).

Wetland Indicator Status (Walz et al., 2018; USDA, NRCS, 2019)

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

USDA Plants Code (USDA, NRCS, 2019)

PLGR2

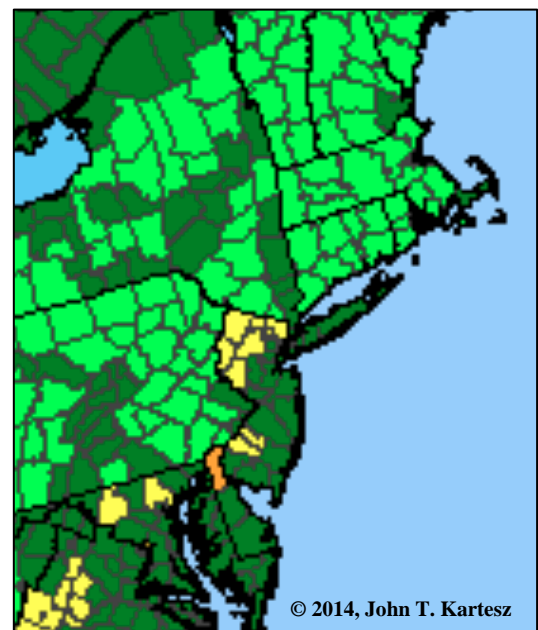
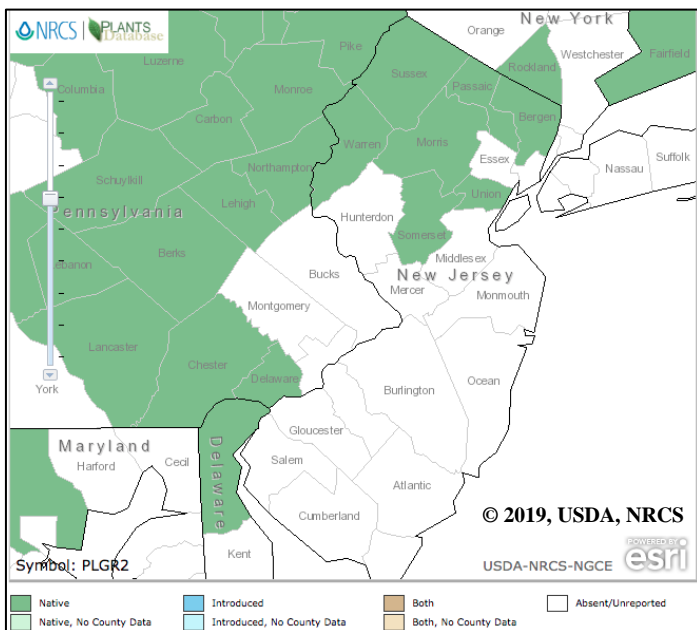
Coefficient of Conservatism (Walz et al., 2018)

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

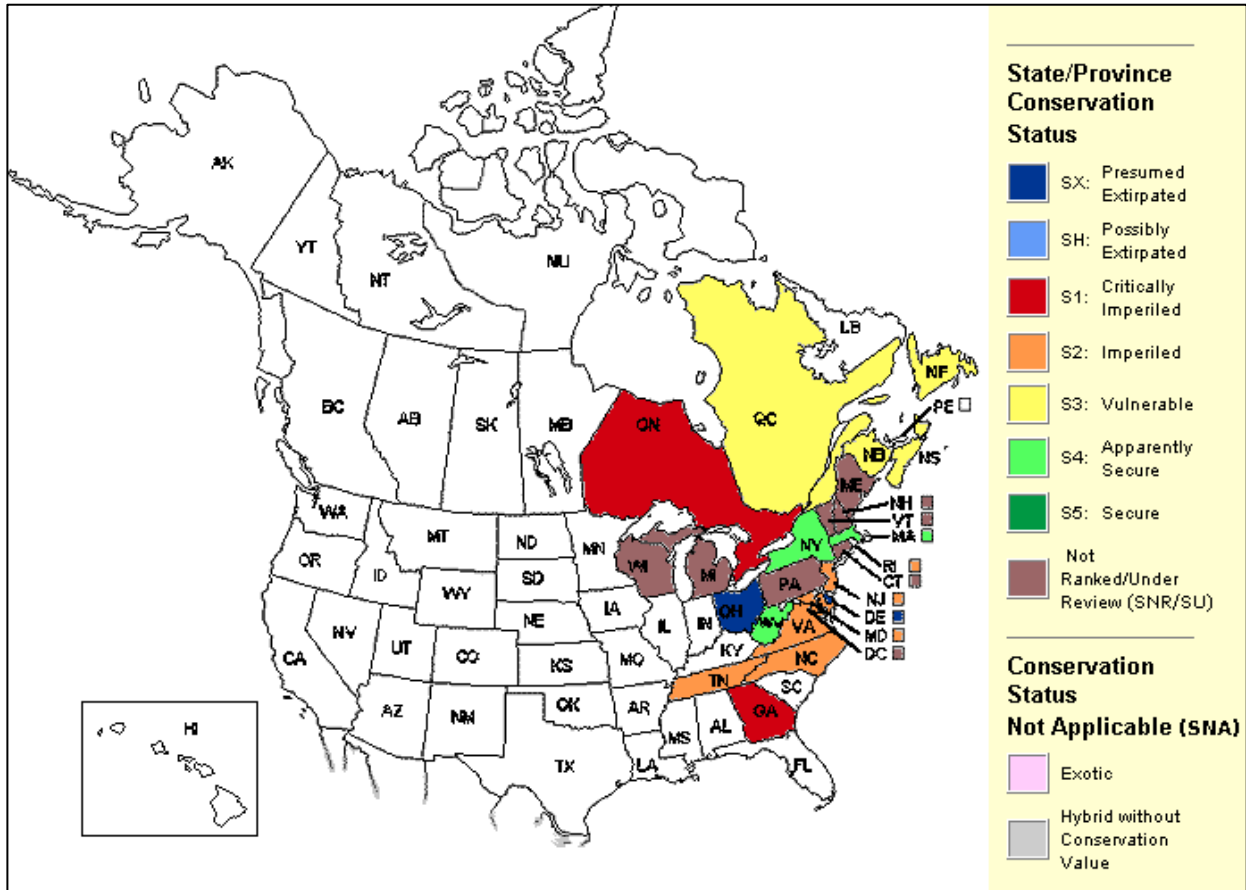
Distribution and Range

The range of the species with their respective rankings in the United States are as follows: Connecticut (SNR), Delaware (SX), District of Columbia (SNR), Georgia (S1), Maine (SNR), Maryland (S2), Massachusetts (S4), Michigan (SNR), New Hampshire (SNR), New Jersey (S2), New York (S4), North Carolina (S2), Ohio (SX), Pennsylvania (SNR), Rhode Island (S2), Tennessee (S2), Vermont (SNR), Virginia (S2), West Virginia (S4), Wisconsin (SNR) (NatureServe, 2018).

Within New Jersey the species has only been recorded in Morris County and Sussex County.



County Color Key: ■ Native, not rare ■ Native, rare ■ Native, adventive ■ Extirpated ■ Extinct ■ Exotic
■ Noxious weed ■ Eradicated ■ Waif ■ Questionable presence



Conservation Status (Walz et al., 2018)

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 occurrences in the near future.

G Rank: G5 (New Jersey Department of Environmental Protection, 2010b)
 Demonstrably secure globally; although it may be quite rare in parts of its range, especially at the periphery (New Jersey Department of Environmental Protection, 2010a).

S Rank: S2 (New Jersey Department of Environmental Protection, 2010b)
 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 (New Jersey Department of Environmental Protection, 2010a).

Regional Status Codes for Plants and Ecological Communities: HL (New Jersey Department of Environmental Protection, 2010b)

Indicates taxa or ecological communities protected by the Highlands Water Protection and Planning Act within the jurisdiction of the Highlands Preservation Area (New Jersey Department of Environmental Protection, 2010a).

Threats

Platanthera grandiflora, already being limited in the areas in which it is found, makes this species more susceptible to threats from forest management practices such as harvesting, site preparations, prescribed burns, land-use conversion and of course, habitat fragmentation (NatureServe, 2018).

Environmental conditions have increasingly changed where *P. grandiflora* is found. Hemlock and Black Spruce trees are facing dieback due to the woolly adelgid, hemlock scale diseases and climate change. This directly affects the forest floor by increasing the amount of light through the canopy and also affecting the soil composition. Increased amounts of light lead to an increase in presence of invasive species. The I1 invasive *Berberis thunbergii*, as well as other invasive species such as *Microstegium vimineum* and *Phragmites australis* have already been documented encroaching in on the swamps and upland habitats that are either inhabited or suitable for *P. grandiflora*. Logging and off-road vehicle activities in these areas and those adjacent, would directly affect the hydrology which is directly linked to the wetlands and stream corridor habitats. This could also change stream temperatures, sediments and nutrient flow. Concerns of herbivory of *P. grandiflora* by deer, whether it be to the species specifically or those around it would allow for further colonization of invasive species (New Jersey Natural Heritage Program, 2019).

Most of the known occurrences of *P. grandiflora* are found in some of NJ's northern Wildlife Management Areas (WMA) or close to them (See Figure 11).

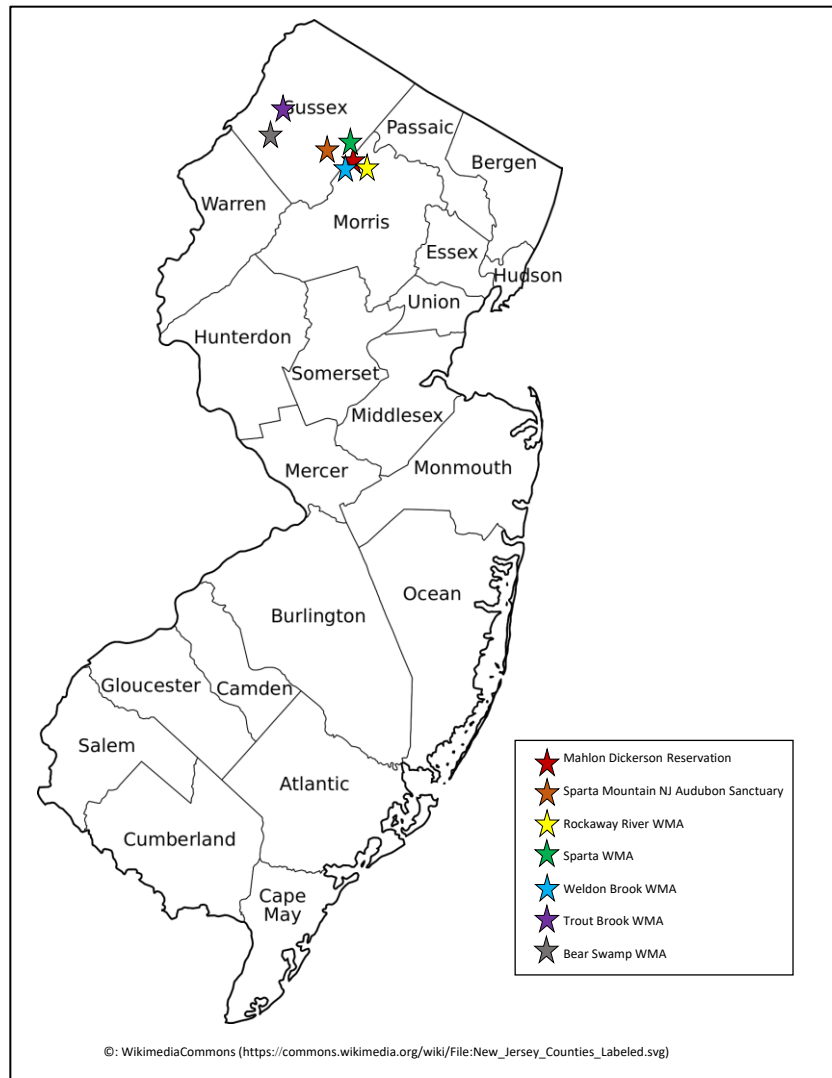


Figure 11: New Jersey map with approximate WMA locations represented.

Management Summary and Recommendations

Removal and treatment of invasive species is typically recommended, but for these particular areas, treatment and removal by the use of herbicides would not be advised. The reason being that, herbicides could make their way into the wetland systems, directly affecting the stream corridor.

The mycorrhizal relationship that exists with *Platanthera grandiflora* and other orchid species has been understudied, and this species, as well as others in this orchid group, would greatly benefit from additional research and studies. Surveying should be conducted in areas that have been noted as having high probability and good habitat such as the Mahlon Dickerson Reservation, and the Weldon Brook and Rockaway River Wildlife Management Areas (New Jersey Natural Heritage Program, 2019).

Synonyms

Greater Purple Fringed Orchid
Greater Purple Fringed Bog Orchid
Large Purple-fringe Orchis

Blephariglottis grandiflora Patterson
Habenaria psycodes var. *grandiflora* (Bigelow) A. Gray
Habenaria grandiflora (Bigelow) Torr.
Habenaria fimbriata E. Wherry

At one point in time, both *Platanthera grandiflora* and *Platanthera psycodes* had the epithet *fimbriata* applied to them.

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