Coeloglossum viride var. *virescens*

Long-bract Green Orchid

Orchidaceae

Coeloglossum viride var. *virescens* by Josh Emm, 2023

***Coeloglossum viride* var. *virescens* Rare Plant Profile**

New Jersey Department of Environmental Protection
State Parks, Forests & Historic Sites
Forests & Natural Lands
Office of Natural Lands Management
New Jersey Natural Heritage Program

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Life History

Coeloglossum viride var. *virescens* (Long-bract Green Orchid) is a short-lived perennial herb in the Orchidaceae. *Coeloglossum viride* can be found throughout much of the northern hemisphere. Described varieties within the species were based primarily on differences in a single morphological feature with variable expression (floral bracts) but the subtaxa are no longer widely accepted (Sheviak and Catling 2020). In any case, all of the *C. viride* plants in the continental United States are referable to var. *virescens*. Both forms occur in Alaska: Bowles and Armstrong (2019) explained how the varieties are typically distinguished in that state but noted that they might represent extremes on a morphological continuum. Molecular studies seem to justify the transfer of the monotypic *Coeloglossum* to *Dactylorhiza*, although some authors continue to maintain it as a distinct genus due to key differences in appearance and reproduction (see Synonyms and Taxonomy section).

Coeloglossum viride has slender roots that bear a few small, fleshy tubers with fingerlike projections. The stems can range from 6–80 cm in height although those of var. *virescens* are usually under 50 cm. Three or more smooth, ovate-lanceolate leaves are alternately arranged along the stem, becoming progressively smaller as they approach the top. The inflorescence is a terminal raceme of 2–26 flowers (Willems and Melser 1998). Means of 17.4 and 16.4 flowers per spike have been reported in the United Kingdom and central Europe (Sonkoly et al. 2016, Tatarenko et al. 2020) but a population in Sweden had an average of 9–10 (Trunschke et al. 2017), and the number is probably close to the lower end of the spectrum for the smaller plants in var. *virescens*. The leaflike bracts of the inflorescence are longer than the flowers. *C. viride* blossoms are green, sometimes with a red-brown tint, and not particularly showy. The sepals form a hood over the column, the lower petal (lip) is oblong with a two-lobed tip, and the basal spur is short and scrotiform (sack-shaped). The fruit is an upright, elliptic capsule. (See Britton and Brown 1913, Fernald 1950, Brackley 1985, Gleason and Cronquist 1991, Homoya 1993, Munro et al. 2014, Sheviak and Catling 2020). *C. viride* seeds are tiny (0.25 mm) and they vary from spindle-shaped to club-shaped in different populations (Gamarra et al. 2015, Shapoo et al. 2020).

Left: Britton and Brown 1913, courtesy USDA NRCS 2025a. Center: Rubin Stensung, 2019. Right: Josh Emm, 2023.

In North America, *Coeloglossum viride* may bloom from April through August but it typically does so during late spring or early summer (Brackley 1985, Homoya 1993, Rhoads and Block 2007, Munro et al. 2014, Weakley et al. 2024). In New Jersey the species usually flowers in May or June but blooming has been recorded from late April to late July, with fruits present during August and September (Hough 1983). Aboveground parts of the plants senesce after the seeds have been dispersed (Willems and Melser 1998).

Coeloglossum viride plants have a short life span (Dijk et al. 1997). Whigham and Willems (2003) found that individuals typically persisted for only a year or two, although they observed one that lasted for seven years. Dormancy is rare in mature *C. viride* plants and does not continue for more than one growing season (Willems and Melser 1998). Hurskainen et al. (2018) noted that dormancy can be costly to plants, eliminating a chance to reproduce and reducing the size of the following year's shoots, although it does provide a means for enduring unfavorable conditions. *C. viride* is primarily dependent on sexual reproduction to sustain established populations but clonal growth occasionally plays a minor role (Willems and Melser 1998, Whigham and Willems 2003, Tatarenko et al. 2020).

Coeloglossum viride var. *virescens* has a long history of use in traditional Chinese medicine and recent investigations have been focused on how extracts from the orchid can affect the brain and nervous system. Preliminary research results indicate that the species has good potential for use in the prevention and treatment of neurological disorders (e.g. Pan et al. 2017, Cai et al. 2021, Lang et al. 2022).

Pollinator Dynamics

Pollination strategy is one of the ways that *Coeloglossum viride* differs from most *Dactylorhiza* species, which produce no nectar and instead attract insects—primarily bees—via deceit. *C. viride* does offer nectar, albeit in very small amounts (Bateman and Rudall 2006, Box et al. 2008, Bell et al. 2009, Akbulut et al. 2020). In comparison with deceptive orchids, rewarding species generally have higher rates of fruit set but produce fewer seeds and that has proven to be the case with *C. viride* (Nieland and Wilcock 1998, Bateman and Rudall 2006, Scopece et al. 2010, Sonkoly et al. 2016). Box et al. (2008) suggested that nectar production in *Coeloglossum viride* might represent an evolutionary shift in pollination strategy. Unlike the brightly colored blooms of typical *Dactylorhiza* species, those of *C. viride* are inconspicuous and they are often concealed by adjacent vegetation (Kindlmann and Jersaková 2006, Tatarenko et al. 2020). Populations of *C. viride* are frequently quite small (Brackley 1985, Homoya 1993, Tatarenko et al. 2020, Mecca et al. 2022) and only a portion of a colony typically flowers in any given year (Willems and Melser 1998). The presence of a nectar reward probably helps attract insects that might otherwise overlook the plants. The blooms of *C. viride* produce a faint, honeylike odor (Fay et al. 2015): Components of the scent were recently analyzed by Mecca et al. (2022).

Darwin (1877) described the pollination mechanism of *Coeloglossum viride* in detail, remarking that it appeared to be "*one of the most wonderful cases of adaptation which has ever been recorded*." Like many other orchids, *C. viride* has pollinia attached by stalks (caudicles) to sticky discs that adhere to foraging insects, which then transport them to other flowers. A thin

membrane protects the nectar source, restricting access to those insects that are able to penetrate it through a narrow slit or break through it. The margins of the orchid's long lip guide visitors to the nectar, placing them in a position where their heads come into contact with the discs. Once a disc is attached to an insect the caudicle rotates, repositioning the pollinium so that it will make contact with the stigmatic surface of another flower. That happens relatively quickly in most orchids but in *C. viride* the caudicle movement takes 20–30 minutes (Darwin 1877, Argue 2012, Claessens and Seifert 2017). The latter authors hypothesized that the unusually slow rotation could be an adaptation to beetle pollination. Small beetles are one of the most frequently noted pollinators of *C. viride*. Other insects known to effect cross-fertilization of the orchid include ichneumonid wasps, sawflies, craneflies, and occasionally small bees (Bateman and Rudall 2006, Kindlmann and Jersaková 2006, Johnson et al. 2007, Argue 2012, Trunschke et al. 2017). Ant pollination of the species was recently documented in Italy: The ants that utilized *C. viride* nectar (*Formica exsecta*) carried an average of three pollinia on their foreheads and one was observed carrying eight (Claessens and Seifert 2017, 2018).

According to Staedler et al. (2021), the average *Coeloglossum viride* flower produces 35,588 grains of pollen that are loosely aggregated into 104–109 clumps (massulae) which in turn cluster together to form the pollinia. Hagerup (1952) observed that *C. viride* massulae fell apart easily when jarred by wind or insect activity and suggested that such movements might sometimes lead to self-fertilization, although he asserted that the orchid was undoubtedly insect-pollinated. Argue (2012) noted that insect-mediated self-fertilization was also a possibility, and the actions of the ants observed by Claessens and Seifert (2018) frequently resulted in the transfer of pollen to different flowers on the same plant. Aside from a notation about a single plant in a botanical garden that did not set fruit when insects were excluded (Hagerup 1952) no studies of self-compatibility were found for *C. viride*.

In *Coeloglossum viride*, fruit set rates of 10% (Willems and Melser 1998) and 7–35% (Kindlmann and Jersaková 2006) were noted to be unusually low for the species. In the first instance the authors speculated that the reduced fertility might be due to the study population being located at the edge of the species' range, and in the second it was suggested that dense vegetation surrounding the orchids may have concealed the flowers from potential pollinators. Other studies of *C. viride* have reported higher fruit set rates of 60% (Sonkoly et al. 2016), 86.8% (Tatarenko et al. 2020), and 88% (Molnár et al. 2015). Trunschke et al. (2017) found that fruit set was 71.6% in open-pollinated flowers and 91.0% in hand pollinated flowers.

Seed Dispersal and Establishment

Each mature fruit of *Coeloglossum viride* contains numerous seeds: Average numbers reported per capsule range from 1330–2300 (Willems and Melser 1998, Arditti and Ghani 2000, Sonkoly et al. 2016, Staedler et al. 2021). The tiny propagules, known as dust seeds, lack endosperm and consist mainly of an embryo surrounded by a loose, papery coating (Dressler 1981). Wind is the primary means of dispersal for the seeds, shaking them free from the capsules and then transporting them to new locations (Stoutamire 1964, Dressler 1981). Orchid seeds have relatively large internal air spaces that could permit them to float in the air for long periods. Arditti and Ghani (2000) found that roughly 93% of the internal volume of *Dactylorhiza* seeds is

free air space. Although their structure suggests a high potential for long-distance dispersal the majority of orchid seeds travel for relatively short distances. The seeds may occasionally be dispersed by other means. For example, many orchid seeds have a water-resistant outer surface that—together with the internal air space—permits flotation, allowing some movement of seeds via surface water after a rain. Under the right circumstances, *Coeloglossum viride* seeds can remain afloat for nearly three weeks (Arditti and Ghani 2000). Arditti and Ghani also noted that the general characteristics of orchid seeds suggest the possibility of transport by adherence to land animals or birds.

The seeds of *Coeloglossum viride* usually germinate within a month or two of dispersal, although some can remain viable for up to a year (Tatarenko et al. 2020). Many orchids do not require light for germination and in some cases light can inhibit the process, as has been observed in related *Dactylorhiza* species (Carta et al. 2017), so they germinate below the surface. When a *C. viride* seed in a suitable location becomes hydrated the embryo swells into a mass of cells called a protocorm and the lower portions initiate root hairs. Since the seeds lack endosperm, further development requires the establishment of a fungal partnership (Dressler 1981, Arditti and Ghani 2000, Eriksson and Kainulainen 2011). *C. viride* can form relationships with a variety of fungi during its early stages, including species of *Ceratobasidium*, *Monilopsis*, *Thanatephorus*, and *Tulasnella* (Hadley 1970a, Zelmer et al. 1996). Experiments conducted by Hadley (1970b) suggested that the fungal associates can contribute growth hormones as well as nutrients. Hyphal coils formed by the associations are often broken down quickly and the destroyed fungal tissue is absorbed by the young plants*, but fresh connections are readily established (Zelmer et al. 1996, Rasmussen and Rasmussen 2009). Hadley (1970b) included illustrations of early protocorm development in *C. viride*. It is not clear how long the species remains in the protocorm stage, but by the time the plants make an appearance at the surface they have accumulated sufficient resources to produce an inflorescence during their first year (Willems and Melser 1998).

Mature *Coeloglossum* plants also exhibit flexibility regarding their fungal partners. They are most frequently associated with species in the Ceratobasidiaceae, but the formation of mycorrhizae with species in the Tulasnellaceae and Sebacinales has also been documented (Jacquemyn et al. 2016, Chen et al. 2019, Gao et al. 2020). The selection of partners appears to be influenced by local availability, and colonization rates can vary seasonally (Harvais and Hadley 1967, Jacquemyn et al. 2016). *Coeloglossum viride* is a partial mycoheterotroph, which means that in addition to being photosynthetic the orchids are able to obtain critical nutrients through the fungal network. For example, *C. viride* plants growing in an open meadow habitat were found to export some carbon but they gained significant amounts of nitrogen and hydrogen from their fungal partners (Schiebold et al. 2018).

*to paraphrase Taylor (2004), they're eating the fungi.

Habitat

Coeloglossum viride has been found growing in a wide array of moist habitats at elevations from 0–2800 meters above sea level (Willems and Melser 1998, Sheviak and Catling 2020). The

orchid is moderately shade-tolerant: Weakley et al. (2024) assigned it a heliophily rank of 4 on a scale of 1 (deep shade) to 9 (full sun). Forested areas where *C. viride* has been found include rich deciduous woodlands, tamarack bogs, pine woods, floodplains and swamps; but the species is equally likely to occur in open communities like grasslands and meadows (Hough 1983, Brackley 1985, Homoya 1993, Dijk et al. 1997, Rhoads and Block 2007, Blood et al. 2010, Hicks 2012, Munro et al. 2014, Fay 2015, Carta et al. 2017, Chen et al. 2019, Pätsch et al. 2022, Kricsfalusy and Kindrachuk 2023). The substrate may be acidic, neutral, or alkaline (Wherry 1918, Stuckey 1967, Tsiftsis et al. 2008, Gao et al. 2020).

Botanists who recognize varieties within *Coeloglossum viride* sometimes describe var. *virescens* as larger and more likely to occur in woodlands and var. *viride* as smaller and more frequently associated with open habitats (e.g. Bowles and Armstrong 2019). Many currently take the view that *C. viride* simply has a variable morphology and a tendency to grow larger when shaded (e.g. Mecca et al. 2022). Throughout its range the orchid is often associated with some type of disturbance, and it appears to be rare in mature forests (Ogle 1987). That may be due to its establishment needs—the seedlings require litter-free substrate and sparse vegetation in order to successfully develop (Tatarenko et al. 2020). In Europe, *C. viride* has been recorded in anthropogenic habitats like abandoned quarries, railway embankments, roadsides, or hedges (Adamowski 2006).

Wetland Indicator Status

The U. S. Army Corps of Engineers divided the country into a number of regions for use with the National Wetlands Plant List and portions of New Jersey fall into three different regions (Figure 1). *Coeloglossum viride* has more than one wetland indicator status within the state. In the Eastern Mountains and Piedmont region it is a facultative upland species, meaning that it usually occurs in nonwetlands but may occur in wetlands. In other parts of the state it is facultative, meaning that it occurs in both wetlands and nonwetlands (U. S. Army Corps of Engineers 2022).

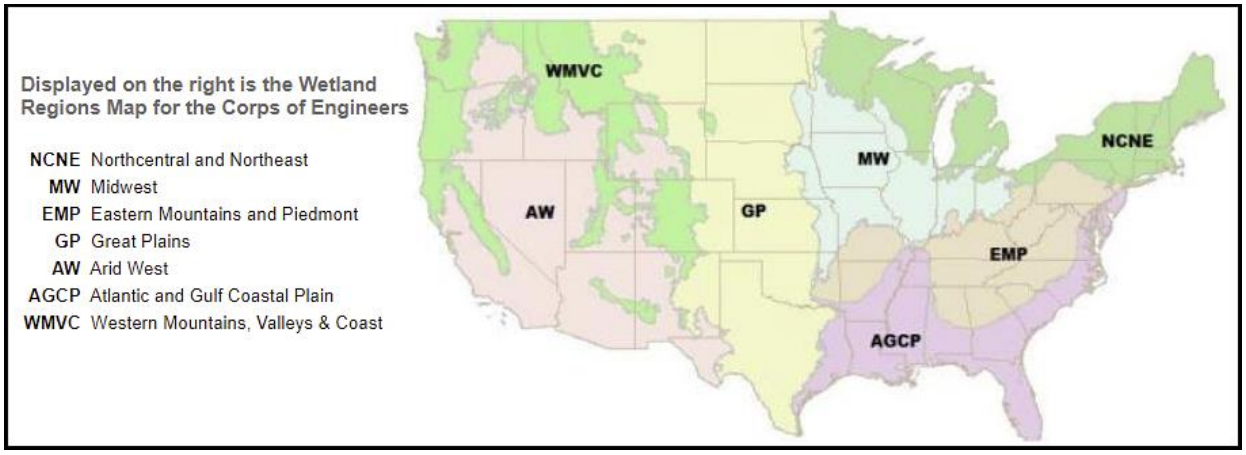

Figure 1. Mainland U. S. wetland regions, adapted from U. S. Army Corps of Engineers (2022).

USDA Plants Code (USDA, NRCS 2025b)

The USDA code for *Coeloglossum viride* var. *virescens* is COVIV. The USDA lists the species as *Dactylorhiza viridis*, for which the code is DAVI6.

Coefficient of Conservancy (Walz et al. 2020)

CoC = 9. Criteria for a value of 9 to 10: Native with a narrow range of ecological tolerances, high fidelity to particular habitat conditions, and sensitive to anthropogenic disturbance (Faber-Langendoen 2018).

Distribution and Range

The map in Figure 2 depicts the extent of *Coeloglossum viride* in the United States and Canada. Outside of North America, *C. viride* var. *virescens* is only found in eastern Asia. *C. viride* var. *viride* is widely distributed throughout Europe, Asia, and much of Canada but absent from the continental United States (POWO 2025). *Coeloglossum viride* appears to be declining in many European countries (Dijk et al. 1997, Willems and Melser 1998, Tatarenko et al. 2020, Trudgill 2022).

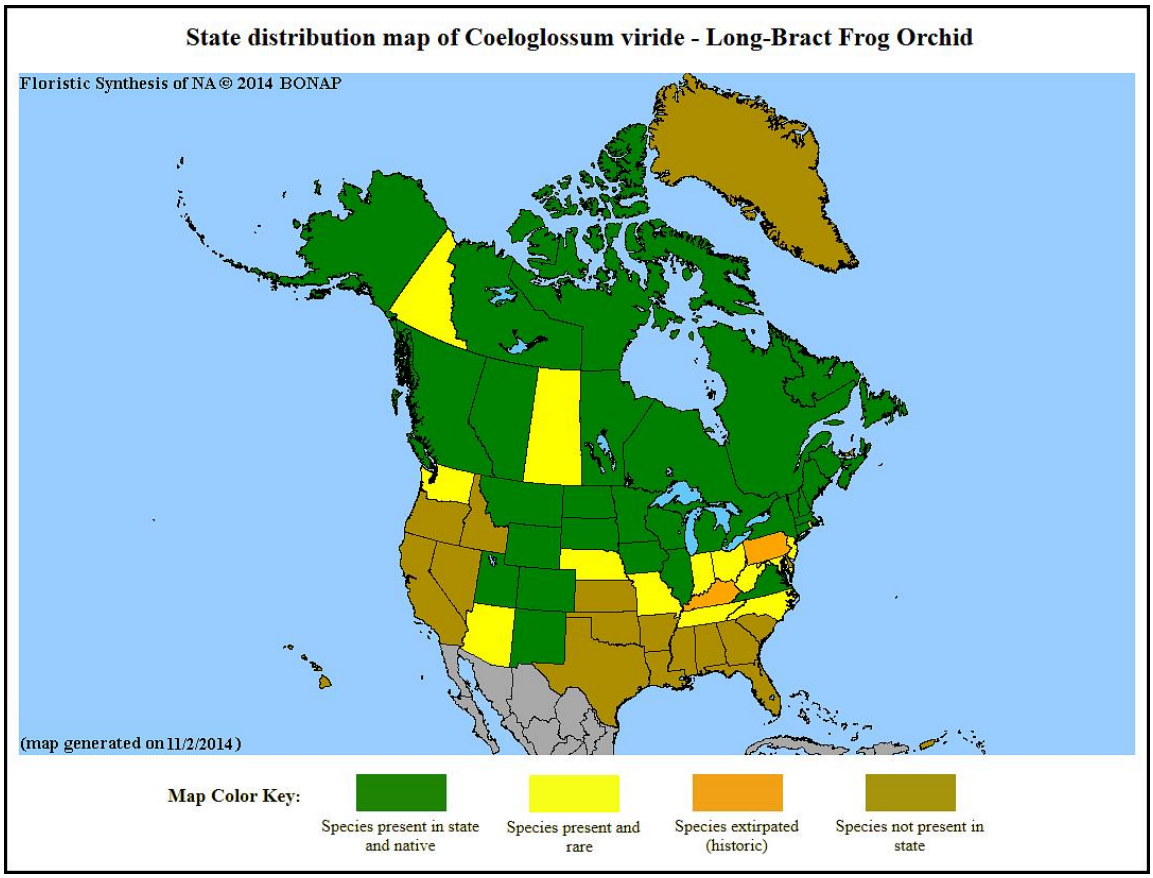

Figure 2. Distribution of C. viride in North America, adapted from BONAP (Kartesz 2015).

The USDA PLANTS Database (2025b) shows records of *Coeloglossum viride* in six New Jersey counties: Bergen, Camden, Morris, Passaic, Sussex, and Warren (Figure 3). The data include historic observations and do not reflect the current distribution of the species.

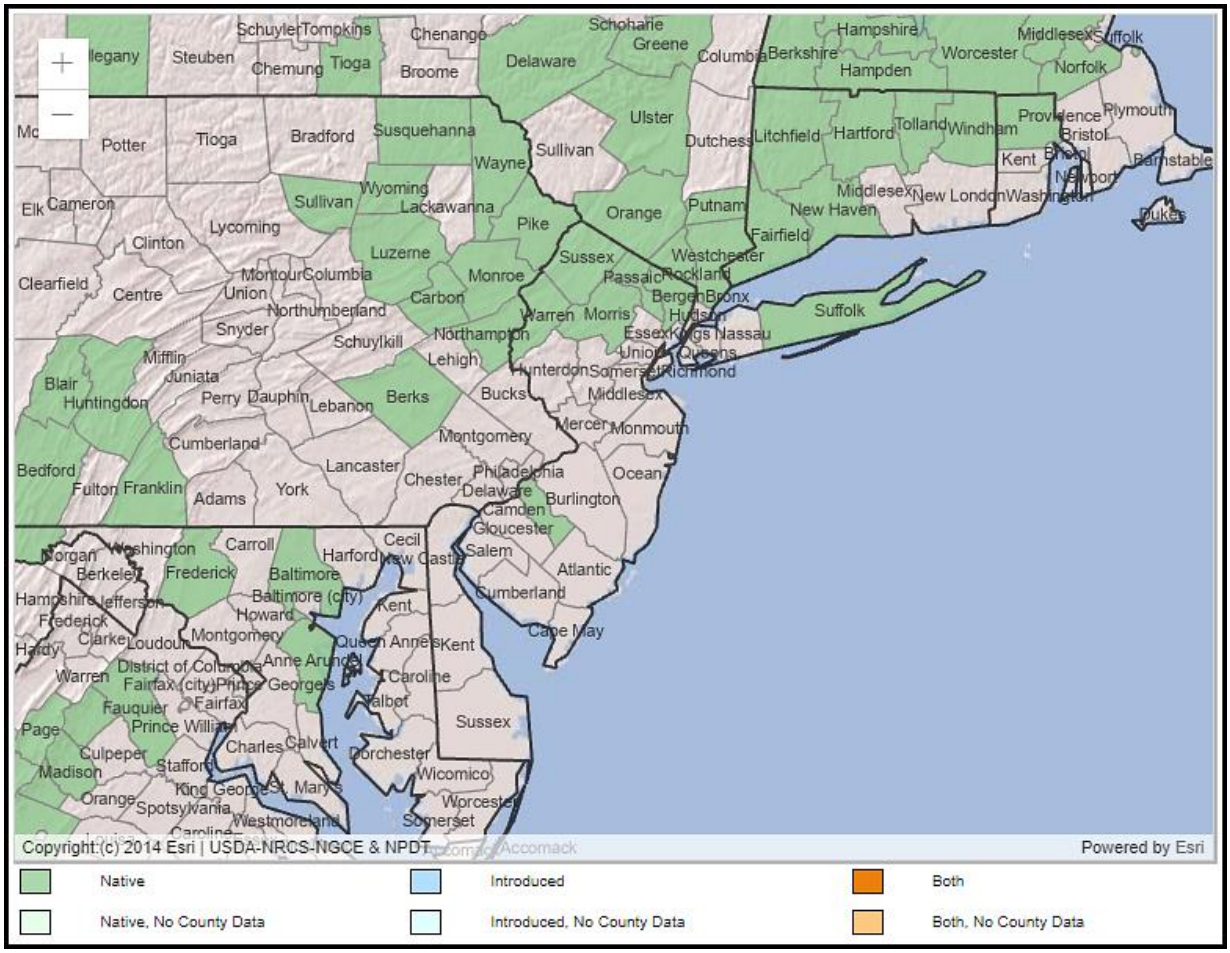

Figure 3. County records of C. viride in New Jersey and vicinity (USDA NRCS 2025b).

Conservation Status

Coeloglossum viride is globally secure. The G5 rank means the species has a very low risk of extinction or collapse due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats. The varieties are not individually ranked (NatureServe 2025). The map below (Figure 4) illustrates the conservation status of *C. viride* in North America. *C. viride* is vulnerable (moderate risk of extinction) in two states and three provinces, imperiled (high risk of extinction) in three states and two provinces, critically imperiled (very high risk of extinction) in fifteen states, possibly extirpated in the Northwest Territories, and likely extirpated in Kentucky. The orchid is secure or apparently secure in six provinces and two states and remains unranked in a number of other states where it occurs.

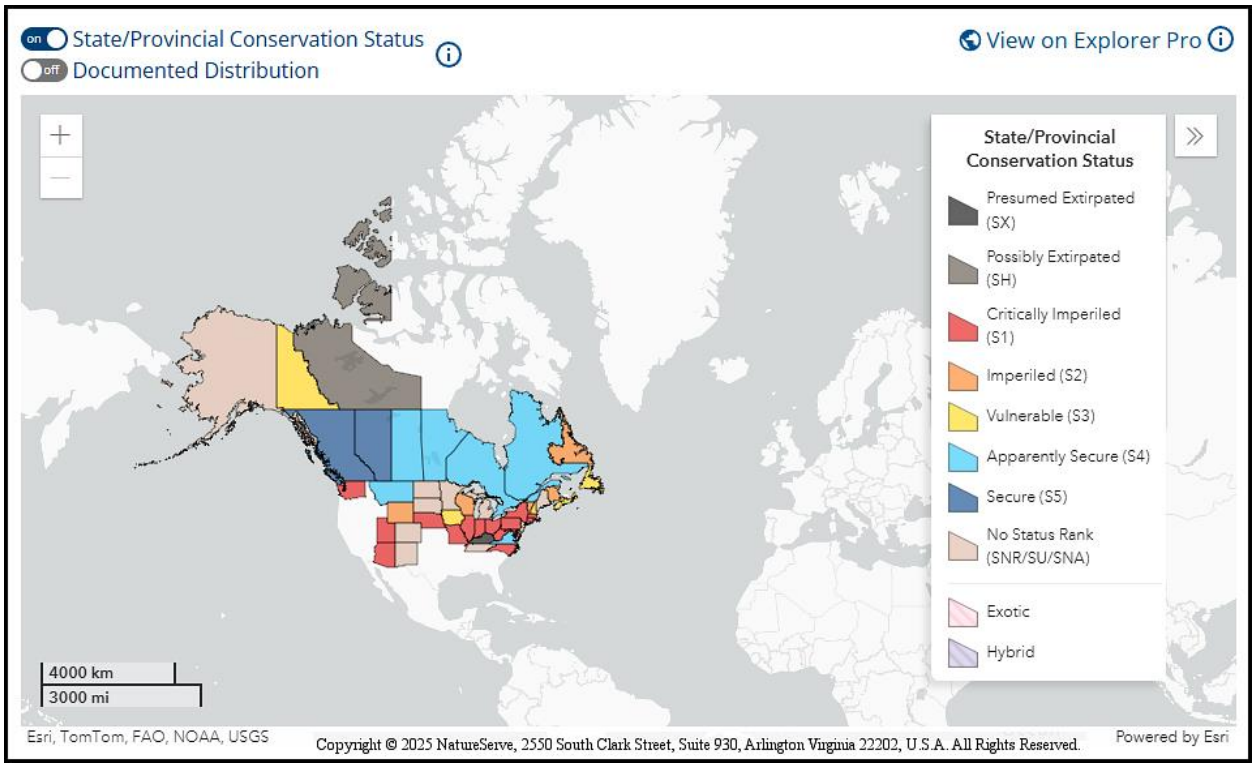

Figure 4. Conservation status of C. viride in North America (NatureServe 2025).

Coeloglossum viride is critically imperiled (S1) in New Jersey (NJNHP 2024), although that status is not shown on the above map because it is state-listed at the varietal level. The rank signifies five or fewer extant occurrences. A species with an S1 rank is typically either restricted to specialized habitats, geographically limited to a small area of the state, or significantly reduced in number from its previous status. *C. viride* has also been assigned a regional status code of HL, signifying that the species is eligible for protection under the jurisdiction of the Highlands Preservation Area (NJNHP 2010).

Coeloglossum viride was collected in Camden County during 1867 (NJNHP 2024) but that record was not included in any of the state's early floras. Willis (1877) reported the species in Bergen County and it was subsequently found in four other counties in northern New Jersey (Britton 1889, Taylor 1915). Hough (1983) indicated that records of the orchid from Bergen and Passaic counties were old but that some from Morris, Warren, and Sussex were more recent. Snyder and Vivian (1989) observed that the species appeared to be declining in the state, although they noted that some occurrences may be overlooked. *C. viride* was ranked S2 in New Jersey until 2022 when the status was downgraded to S1 (NJNHP 2022). Fifteen occurrences are presently tracked in the state and all but one are ranked as historical (NJNHP 2024).

Threats

The majority of New Jersey's historical records of *Coeloglossum viride* occurrences are based on collections that were made over a century ago so the reasons for the species' disappearance from those places not known. No threats were identified at the site of the extant occurrence (NJNHP

2024). Declines in other parts of the orchid's range have been attributed to habitat loss, competition, and herbivory—all of which are significant problems for many other rare plants in New Jersey.

The repurposing of habitat for development and agriculture has been noted as an ongoing concern in both North America and Europe (Whigham and Willems 2003, Fay and Taylor 2015, Stípkova et al. 2021). *Coeloglossum viride* is sensitive to competition so both natural succession and the spread of invasive flora can cause populations to decline (Ogle 1987, Whigham and Willems 2003, Tatarenko et al. 2020). The species is also subject to herbivory by White-tailed Deer (Miller et al. 1992). The vulnerability of *C. viride* to grazing is increased by the small size of its populations and by its reliance on frequent re-establishment from seed to maintain existing colonies. Tatarenko et al. (2020) observed that the fruiting capsules of *C. viride* were especially attractive to herbivores, and noted that half of the reproductive plants in one of their study populations were consumed before they had dispersed their seeds.

Climate Change Vulnerability

Information from the references cited in this profile was used to evaluate the vulnerability of New Jersey's *Coeloglossum viride* var. *virescens* population to climate change. The species was assigned a rank from NatureServe's Climate Change Vulnerability Index using the associated tool (Version 3.02) to estimate its exposure, sensitivity, and adaptive capacity to changing climactic conditions in accordance with the guidelines described by Young et al. (2016) and the state climactic computations by Ring et al. (2013). Based on available data *C. viride* was assessed as Moderately Vulnerable, meaning that it is likely to show some decrease in abundance or range extent in New Jersey by 2050.

Changing climactic conditions are causing temperatures to rise rapidly in New Jersey, resulting in lower levels of soil moisture during the growing season, and shifting regional precipitation patterns are also bringing about more frequent and prolonged droughts (Hill et al. 2020). *Coeloglossum viride* is generally most imperiled in the southern part of its range (see Figure 4), which might be indicative of some sensitivity to high temperatures. Although light and moisture appear to play a role in governing its flowering time (Brackley 1985), a study in central Europe indicated that the orchid is not blooming earlier in response to warming trends (Molnár et al. 2012). *C. viride* is intolerant of desiccation (Ogle 1987) so droughts are likely to be detrimental to both seedlings and mature plants. Fay (2015) identified *C. viride* as a species that was likely to decline as a result of increasing competition as the climate continues to change. Although his assessment was based on conditions in Great Britain it can also be applied in New Jersey, where invasive plants are predicted to become an even greater threat as the planet continues to warm (Bellard et al. 2013, Salva and Bradley 2023).

Management Summary and Recommendations

New Jersey's only putatively extant population of *Coeloglossum viride* consisted of two plants when it was last seen in 1997 so it is not clear whether it has persisted. Suitable habitat may still

be found in some historic locations. An updated assessment of the orchid's status in the state is needed. It is possible that the species is present in places where it has not been detected. The plants are inconspicuous even in flower so they can easily be overlooked (Brackley 1985, Homoya 1993, Fay and Taylor 2015) and—as previously noted—*C. viride* populations are often very small.

Any populations of Long-bract Green Orchid that remain in the state are likely to require management, with a particular focus on maintaining an open habitat that includes suitable microsites for seedling establishment (Tatarenko et a. 2020). The orchid has sometimes benefitted from periodic mowing, but the use of fertilizers should be avoided in the vicinity of *Coeloglossum viride* populations because it encourages the establishment of more competitive species (Willems and Melser 1998, Whigham and Willems 2003). The installation of small enclosures to exclude herbivores should also be considered for occurrences in New Jersey.

Synonyms and Taxonomy

The accepted botanical name of the species is *Coeloglossum viride* var. *virescens* (Muhl. ex Willd.) Luer. Orthographic variants, synonyms, and common names are listed below (POWO 2025). Many botanists treated *Coeloglossum* as a species of *Habenaria*/*Platanthera* well into the twentieth century despite a convincing argument to the contrary by Darwin (1877), who identified the orchid as *Peristylus viridus*. More recently, phylogenetic analyses indicated that *Coeloglossum* was embedded in the otherwise monophyletic genus *Dactylorhiza*, supporting a merge (Bateman et al. 1997). A strong case was put forth by Devos et al. (2006) for maintaining *Coeloglossum* on the basis of numerous differences between *C. viride* and typical *Dactylorhiza* species, but a counterargument was made based on the fact that *D. iberica* displays many of the same characteristics as *C. viride* (Bateman and Rudall 2018, Bateman et al. 2018) and a number of recent studies concluded that the evidence in support of combining the two genera is more compelling (e.g. Inda et al. 2010, Gamarra et al. 2015, Akbulut et al. 2020). Regardless of whether they called the species *Coeloglossum viride* or *Dactylorhiza viridis*, varieties were not recognized by many of the sources used to prepare this profile (e.g. Kartesz 2015, Sheviak and Catling 2020, Weakley et al. 2024, ITIS 2025, NatureServe 2025, USDA NRCS 2025).

Botanical Synonyms	**Common Names**
Coeloglossum viride f. *virescens* (Muhl. ex Willd.) O. Gruss & M. Wolff	Long-bract Green Orchid
Dactylorhiza viridis var. *virescens* (Muhl. ex Willd.) Baumbach	Longbract Frog Orchid
Dactylorhiza viridis var. *coreana* (Nakai) N. S. Lee	
Coeloglossum bracteatum (Muhl. ex Willd.) Parl.	
Coeloglossum coreanum (Nakai) Schltr.	
Coeloglossum viride ssp. *bracteatum* (Muhl. ex Willd.) Hultén	
Coeloglossum viride ssp. *coreanum* (Nakai) Satomi	
Coeloglossum viride var. *akaishimontanum* Satomi	
Coeloglossum viride var. *bracteatum* (Muhl. ex Willd.) A. Gray	
Coeloglossum viride var. *interjecta* (Fernald) Miyabe & Kudô	

Coeloglossum viride f. *bracteatum* (Muhl. ex Willd.) Bolzon
Habenaria bracteata (Muhl. ex Willd.) R. Br.
Habenaria flava var. *virescens* (Muhl. ex Willd.) Fernald
Habenaria viridis ssp. *bracteata* (Muhl. ex Willd.) R. T. Clausen
Habenaria viridis var. *bracteata* (Muhl. ex Willd.) Rchb. ex A. Gray
Habenaria viridis var. *interjecta* Fernald
Orchis flava var. *virescens* (Muhl. ex Willd.) Green
Orchis bracteata Muhl. ex Willd.
Orchis coreana Nakai
Orchis obsoleta Muhl. ex Willd.
Orchis virescens Muhl. ex Willd.
Peristylus bracteatus (Muhl. ex Willd.) Lindl.
Peristylus virescens (Muhl. ex Willd.) Lindl.
Peristylus viridis var. *bracteata* (Muhl. ex Willd.) Blytt
Platanthera bracteata (Muhl. ex Willd.) Torr.
Platanthera viridis var. *bracteata* (Muhl. ex Willd.) Rchb. f.
Satyrium bracteale Salisb.
Satyrium virescens (Muhl. ex Willd.) Pers.

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