Cuscuta cephalanthi

Buttonbush Dodder

Convolvulaceae

Cuscuta cephalanthi by Peter M. Dziuk, 2013

***Cuscuta cephalanthi* 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

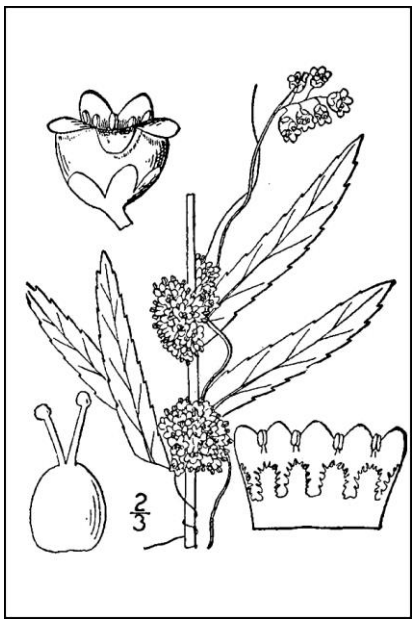
Cuscuta cephalanthi (Buttonbush Dodder) is a leafless, twining, parasitic vine. *Cuscuta* was traditionally placed in its own family (Cuscutaceae) but it was recently designated as a tribe (Cuscuteae) in the morning-glory family on the basis of molecular studies (Stefanović et al. 2003). *Cuscuta* stems are usually orange, yellow or purple. The seedlings may be greenish and capable of photosynthesis before attaching to a host but once a connection is established their photosynthetic ability declines. *C. cephalanthi* has been identified as a species that can retain a weak capacity for photosynthesis (Yuncker 1943).

Cuscuta seeds contain just enough nutrients to sustain the young plants through germination and a brief period of development, usually less than three weeks (Furuhashi et al. 2011). Dodder seedlings begin life with ephemeral root-like structures that contain the stored nutrients and are briefly capable of absorbing water and interacting with mycorrhizal fungi. Each seedling emerges as an arch-shaped stem that straightens and elongates before beginning a slow, counter-clockwise rotation as it forages for a host (Fessehaie 1988). The root-like organ withers within a few days, after which the seedling is unable to absorb water or nutrients on its own so the dodder cannot survive or produce offspring without a host plant. When a foraging seedling contacts an elongated object it twines around it and, if the object is a suitable host, it penetrates the stem with a slender projection called a haustorium that connects the phloem of the *Cuscuta* plant with that of the host (Smith 1934, Behdarvandi 2014). In addition to water and nutrients, the haustoria also serve as a conduit for various macromolecules, mRNA, and hormones (Olszewski 2019). Some exchange of proteins and RNA may be bidirectional (Kim and Westwood 2015). More information regarding host selection is included in the Habitat section.

Dodders typically complete their life cycle within a single year, but some species—including *C. cephalanthi*—have the ability to winter over inside the stems of perennial plants. After stimulating the host to form a gall the haustorial tissue remains alive and continues to grow, producing new shoots either later in the growing season or the following spring. *Cuscuta* species that can perennate inside a host generally make a greater investment in clonal reproduction (Dean 1954, Truscott 1958, Prather 1987, Burt et al. 2021).

The stems of Buttonbush Dodder are yellow-orange; occasionally with a touch of green pigmentation. Since *Cuscuta* plants have such a simple structure, flowers and fruits are essential for the accurate identification of a species. *C. cephalanthi* may be found in bloom between June and October (Burt et al. 2021, Weakley et al. 2024). The species belongs to subgenus *Grammica*, the members of which are distinguished by having two separate and slightly unequal styles topped with spherical stigmas. The inflorescences can be loose or dense. *C. cephalanthi* flowers are stalkless or nearly so, and sometimes their bases are embedded in the stem. The flowers on any given plant can have 3–5 parts but the majority have 4; however, 5-parted flowers may be more numerous early in the season. The lobes of the calyx are blunt and they are about half as long as the corolla tube. The cylindrical corolla tube ends in ovate lobes that may be spreading or reflexed. Both the tube and the lobes are white to cream-colored. *Cuscuta* species have characteristic scales inside the corolla at the base of each stamen: Those of *C. cephalanthi* are bordered by a short, tooth-like fringe that is usually densest near the top. The fruit is a globular, indehiscent capsule with a slightly flattened upper surface. As a *C. cephalanthi* fruit

develops and expands, the upper part of the withered corolla is torn from its base and it remains on top of the capsule like a small crown (See Engelmann 1842, Britton and Brown 1913, Yuncker 1919a & 1932, Fernald 1950, Gleason and Cronquist 1991, Burt et al. 2021, Costea et al. 2023, Costea and Nesom 2024).



Left: Britton and Brown 1913, courtesy USDA NRCS 2025a. Right: Peter M. Dziuk, 2013.

There are a number of sections within *Cuscuta* subgenus *Grammica* and *C. cephalanthi* has been placed in section *Oxycarpae* (Costea et al. 2015). Its nearest apparent relative is *C. saururi*, which does not occur in New Jersey (Costea et al. 2023). Two other species from that section that do occur in the state are *C. compacta*, which can be distinguished by the presence of numerous bracts at the base of the flower clusters, and *C. gronovii*, which has mostly 5-parted flowers and ovate capsules without "crowns". *C. cephalanthi* might be mistaken for two other New Jersey dodders that have 4-parted flowers, *C. coryli* and *C. polygonorum*, but in both of those species the calyx lobes equal or exceed the length of the corolla tubes and the withered corollas remain at the base of the fruits (Yuncker 1919b, Burt et al. 2021, Costea and Nesom 2024).

Pollinator Dynamics

Cuscuta flowers produce small amounts of nectar and they seemingly attract an assortment of generalist pollinators (Wright et al. 2011, Riviere 2012, Olszewski 2019). One bee, *Colletes ciliatus*, is reported as a specialist pollinator of dodder (Fowler and Droege 2020). *C. ciliatus* appears to be relatively rare, or possibly overlooked, but it was recently documented in Maryland (USGS EESC 2019) and there are scattered records from other states. *Lasioglossum coriaceus* and other small bees have been seen visiting *Cuscuta cephalanthi* (Robertson 1929, Hilty 2020).

Many dodder plants with unequal style development have stigmas that mature sequentially. Wright et al. (2011) suggested that the strategy could facilitate self-fertilization of one stigma

and cross-fertilization of the other. Further investigation of reproduction in *Cuscuta* indicated that the majority of species utilize a mixed-mating system and suggested that *C. cephalanthi* is primarily outcrossing but facultatively self-fertilizing (Wright et al. 2012).

Seed Dispersal and Establishment

Cuscuta cephalanthi capsules typically contain one or two seeds that are 1.4–2 mm long and 1.3–1.4 mm wide (Costea and Nesom 2024). Olszewski (2019) recorded a mean of 3.1 seeds per capsule while Crins and Ford (1988) noted that the capsules of Ontario plants were usually one-seeded. Stevens (1932) estimated that the *C. cephalanthi* stems on the stalk of a single host plant produced about a thousand seeds.

Cuscuta seeds do not have any specialized adaptations for distribution. The capsules can be dispersed by gravity or carried by wind for a short distance. Depending on the setting, some capsules may also be transported by water as they are able to float (Prather 1987). Extended inundation increases the likelihood of decomposition, although a small percentage of dodder seeds can still sprout after a lengthy period of submergence (Bruns 1965). Viable *Cuscuta* seeds can be dispersed by mammals that graze on their host plants (Hilty 2020) and it is likely that waterfowl play a role in the long distance dispersal of many species (Costea et al. 2016, 2019). Dodders have been inadvertently transported over long distances in commercial shipments of agricultural products (Olszewski et al. 2020). Some vegetative dispersal of *Cuscuta* species may also occur, as stem or tendril fragments are capable of establishing on a host (Parker and Riches 1993).

The seeds of Buttonbush Dodder have a hilar fissure that is thought to be the route by which water enters the seed to initiate germination (Olszewski et al. 2020). Drying increases the impermeability of *Cuscuta* seed coats, and seed banking is known in the genus (Leck and Simpson 1993, 1995). *Cuscuta* seeds retrieved from herbarium sheets have been successfully rehydrated and germinated; in some cases the collections were made decades earlier (Fogelberg 1938, Gaertner 1950). Gaertner's experimentation with *C. cephalanthi* resulted in an 81% germination rate from freshly collected capsules, 50% from seeds that had been maintained in dry storage at room temperature for two years, and none from a 30-year-old herbarium specimen. Since dodders primarily exhibit an annual life cycle the seedlings generally grow and mature rapidly (Prather 1987).

Habitat

Cuscuta cephalanthi can be found in a broad range of wetland communities at elevations of 0–1,500 meters above sea level. It is most likely to inhabit wetlands with a relatively open canopy (Costea and Nesom 2024, Weakley et al. 2024). Typical habitats include moist or wet meadows, prairies, fens, marshes, swamps, and the borders of ponds, lakes, streams, or rivers (Engelmann 1842, Ristich et al. 1976, Crins and Ford 1988, Nekola and Lammers 1989, Woodliffe 1989, Nekola 1994, Rhoads and Block 2007, Burt et al. 2021). *C. cephalanthi* was also reported in a

high-altitude spruce-fir climax forest (Davis 1930) and on ridge tops in Illinois (Mohlenbrock 1966).

Because dodders have only a brief period of interaction with the substrate their habitat is primarily defined by the host plants upon which they depend. Most *Cuscuta* species are not host-specific, and some can even secondarily infect their own stems after establishing on a primary host (Furuhashi et al. 2011). *C. cephalanthi* usually establishes on shrubs or perennial herbs. Although Engelmann (1842) named the dodder for one of its typical hosts, *Cephalanthus occidentalis* (Buttonbush), he noted that it had also been found on some herbaceous species. Throughout its range *C. cephalanthi* is most frequently noted on Buttonbush, willows (*Salix* spp.), and plants in the Asteraceae but it also grows on an assortment of other shrubs, herbs and vines that represent a variety of families (Stevens 1916, Yuncker 1919b, Smith 1934, Thorne 1955, Frederick 1967, Crins and Ford 1988, Nekola and Lammers 1989, Burt et al. 2021, Yang et al. 2022). New Jersey hosts have included *Boehmeria*, *Cornus*, *Fraxinus*, *Impatiens*, *Lythrum*, *Rubus*, and *Symphyotrichum* species (NJNHP 2024). Some dodders that are capable of parasitizing a broad array of plants nevertheless occur in a fairly narrow range of habitats, so local soil conditions and nutrient availability may play a role in determining host suitability (Baráth et al. 2025).

Cuscuta seedlings play an active role in the selection of their host plants. Directional growth toward a potential host is initially guided by photoreceptors that detect ratios of red:far red light to differentiate sunlit and shady sites (Furuhashi et al. 2011). Seedlings may twine around the first vertical stem they encounter but a connection is not always established, and some seedlings grow away from stems following the initial contact (Fessehaie 1988, Press and Phoenix 2005). Chemical cues from the potential host plants are thought to guide selection. Some plants have defense systems that prevent penetration, such as certain species of Malvaceae that use a type of wound tissue to block haustorial connections, and the inability of many *Cuscuta* species to parasitize monocots might be attributable to vascular structure or to chemical signaling of incompatibility (Kaiser et al. 2015). In addition to the use of chemical cues for mediating penetration, volatile organic compounds emitted from potential host plants seem to help to direct growing *Cuscuta* seedlings toward compatible species (Mescher et al. 2006, Runyon et al. 2006). Some dodders selectively parasitize the plants that offer the greatest nutritional rewards while others appear to be influenced by the local abundance of potential hosts (Kelly 1992, Koch et al. 2004, Marquardt and Pennings 2011).

The expression of host preferences by *Cuscuta* can impact a habitat by altering community structure. Host plants for dodder experience significant reductions in biomass, vigor, and seed production, an effect that has been well-documented in alfalfa and a variety of other crop plants (e.g. Fessehaie 1988, Lanini and Kogan 2005). Selective parasitism on the most abundant species can create diversity by providing a greater opportunity for other species to thrive (Pennings and Callaway 1996). Zonation within communities may be reinforced because *Cuscuta* can limit a dominant species to certain portions of a habitat by shifting the competitive advantage (Callaway and Pennings 1998). Consequently, dodders can perform a function similar to that of a keystone predator by initiating cycles of alternate dominance and managing the species balance within a community (Pennings and Callaway 2002).

Wetland Indicator Status

Cuscuta cephalanthi is not included on the National Wetlands Plant List (NWPL). Any species not on the NWPL is normally considered to be Upland (UPL) in all regions where it occurs (U. S. Army Corps of Engineers 2022). However, Buttonbush Dodder is a parasite that grows on other plants rather than on a typical substrate so it is likely to be facultative depending on its host.

USDA Plants Code (USDA, NRCS 2025b)

CUCE

Coefficient of Conservancy (Walz et al. 2020)

CoC = 5. Criteria for a value of 3 to 5: Native with an intermediate range of ecological tolerances and may typify a stable native community, but may also persist under some anthropogenic disturbance (Faber-Langendoen 2018).

Distribution and Range

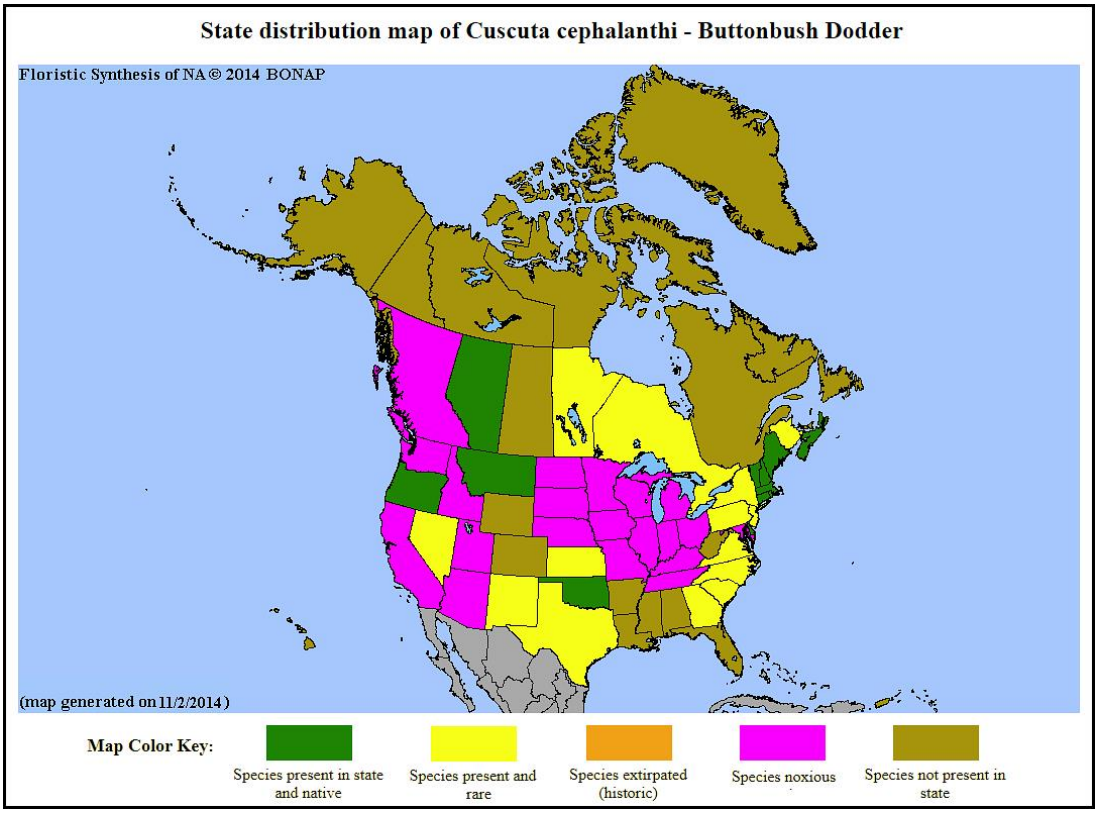


Figure 1. Distribution of C. cephalanthi in the United States and Canada, adapted from BONAP (Kartesz 2015).

The native range of *Cuscuta cephalanthi* extends from southern Canada to northern Mexico (POWO 2025). The map in Figure 1 (above) depicts the extent of the species in the United States and Canada. Plants from Nova Scotia and New Brunswick, Canada that were previously identified as *C. cephalanthi* were recently reassigned to *C. acadiana* (Costea et al. 2023).

The USDA PLANTS Database (2025b) shows records of *Cuscuta cephalanthi* in six New Jersey counties: Bergen, Burlington, Hunterdon, Mercer, Morris, and Warren (Figure 2). It has also been reported in Camden, Cape May, Gloucester, Middlesex, Ocean, Salem, and Sussex counties (Weiss and West 1921, Stone 1911, Hough 1983, NJNHP 2024, Mid-Atlantic Herbaria 2025). The data include historic observations and do not reflect the current distribution of the species.

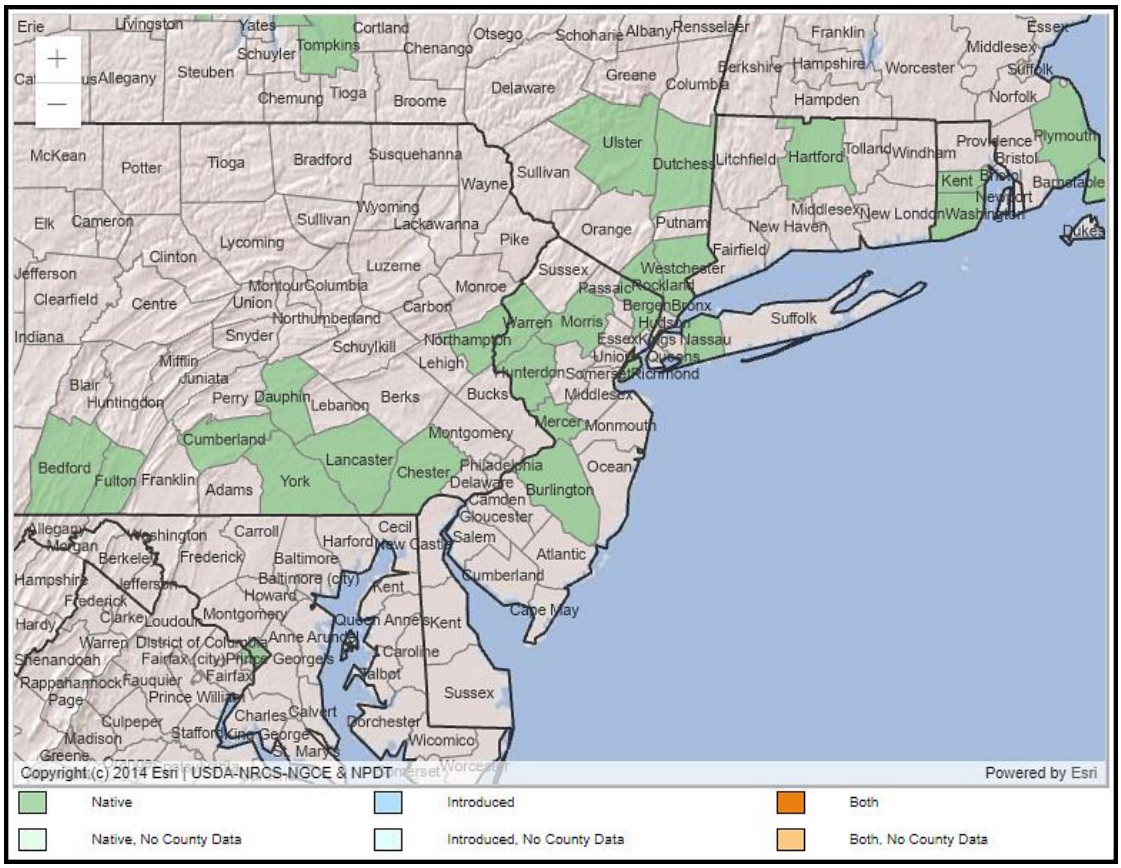


Figure 2. County records of C. cephalanthi in New Jersey and vicinity (USDA NRCS 2025b).

Conservation Status

Cuscuta cephalanthi is considered 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 (NatureServe 2025). The map below (Figure 3) illustrates the conservation status of Buttonbush Dodder in the United States and Canada. The species is imperiled (high risk of extinction) in two states and three provinces, critically imperiled (very high risk of extinction) in nine states and two provinces, and presumed extirpated in the District of Columbia. The range map from Kartesz (Figure 1) indicates that

many states view *C. cephalanthi* as a noxious weed, although Johnson (2024) noted that it is not known to parasitize any important agricultural crops.

Cuscuta cephalanthi has been identified as a plant species of highest conservation priority for the North Atlantic region, which includes four Canadian provinces and twelve U. S. states. The species has a rank of R2 (imperiled), signifying a high risk of regional extinction (Frances 2017).

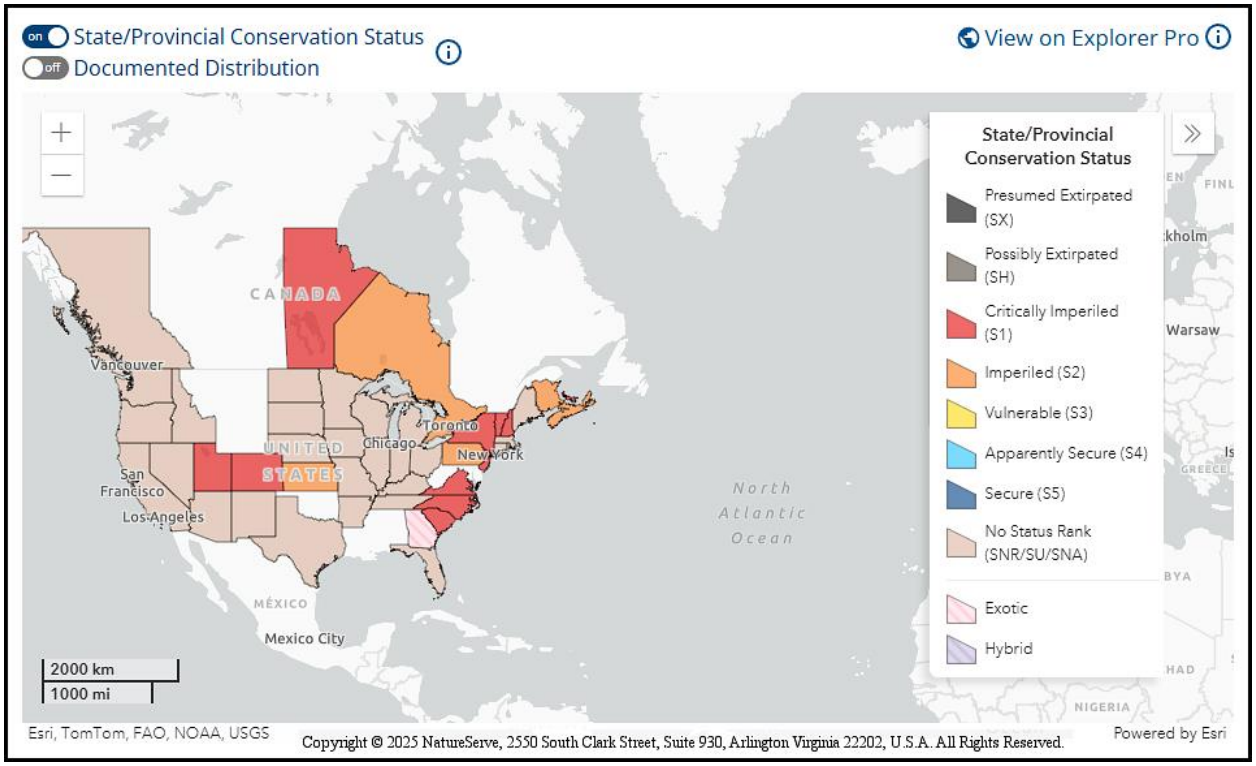


Figure 3. Conservation status of C. cephalanthi in the United States and Canada (NatureServe 2025).

Cuscuta cephalanthi is critically imperiled (S1) in New Jersey (NJNHP 2024). The rank signifies five or fewer occurrences in the state. 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. cephalanthi* is also listed as an endangered species (E) in New Jersey, meaning that without intervention it has a high likelihood of extinction in the state. Although the presence of endangered flora may restrict development in certain communities being listed does not currently provide broad statewide protection for plants. Additional regional status codes assigned to the dodder signify that the species is eligible for protection under the jurisdictions of the Highlands Preservation Area (HL) and the New Jersey Pinelands (LP) (NJNHP 2010).

The earliest New Jersey reports of *Cuscuta cephalanthi* were from the pine barrens region in Burlington, Gloucester, and Ocean counties (Britton 1889, Stone 1911) although it was apparently also collected in Warren County during the late 1800s (NJNHP 2024). Despite a few scattered records from around the state during the early 1900s, no extant populations were known at the beginning of the 1980s (Snyder and Vivian 1981, Hough 1983). The species was

rediscovered by David Snyder in 1987 and several additional collections were subsequently made (Snyder 2000). *C. cephalanthi* was included on New Jersey's first official list of endangered plant species (NJONLM 1990) and reports of the dodder continue to be infrequent. It is interesting to note that all of the recent observations have been from counties in the central and northern parts of the state (Breden et al. 2006, NJNHP 2024).

Threats

Burt et al. (2021) identified several pairs of closely related *Cuscuta* species in which one spreads aggressively while the other remains relatively scarce—such as *C. gronovii* and *C. cephalanthi*—and noted that the factors driving the disparity in their abundance have not been determined. Even though *C. cephalanthi* is not known to be a problem in agricultural settings (Lanini and Kogan 2005), the species may be deliberately removed when it is mistaken for a more prolific species (Johnson 2024). Some districts indiscriminately label all dodders as weeds (Costea and Stefanović 2009), and many states have identified Buttonbush Dodder as a noxious pest (see Figure 1).

Yuncker (1933) observed that *Cuscuta* species as a whole were relatively free of disease. They are, however, susceptible to gall weevils in the genus *Smicronyx*, many of which specialize on dodders. The insects form galls in the stems or floral parts of the vines and their developing larvae feed on the tissues or developing seeds (Dean 1936, Anderson 1962, Burt 2022). One species that is known from scattered locations across the United States and Canada, *Smicronyx sculpticollis*, was found on *Cuscuta cephalanthi* in New Jersey by Weiss and West (1921) and the insect has continued to maintain a presence in the state (BugGuide 2025). *S. sculpticollis* has been documented on multiple species of *Cuscuta* and its presence is likely to limit seed production in affected dodder plants, although the potential extent of damage from weevil activity does not appear to have been evaluated.

Insect gall on dodder in northern New Jersey, J. S. Dodds 2014

Climate Change Vulnerability

Information from the references cited in this profile was used to evaluate the vulnerability of New Jersey's *Cuscuta cephalanthi* populations 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. cephalanthi* was assessed as Less Vulnerable, meaning that climate change is not expected to have a notable detrimental impact on its extent in New Jersey by 2050. Frances (2017) indicated that the species was assessed as Moderately Vulnerable in Pennsylvania.

Projections for other dodders suggest that they will experience range shifts driven by rising temperatures although results for individual species vary, with some expanding and others contracting (Ren et al. 2020, Cai et al. 2022). The assessments underscore the difficulty of predicting how parasites that are able to establish on a wide range of hosts may be affected, particularly since the relevance and mechanics of host-habitat interactions are poorly understood for *Cuscuta*. *C. cephalanthi* has an broad distribution that extends across multiple hardiness zones (USDA, AGS 2023), and since New Jersey is near the middle of its range populations in the state are not likely to experience adverse impacts from rising temperatures during the next few decades.

Management Summary and Recommendations

Aside from protecting wetland habitats in places where populations of *Cuscuta cephalanthi* are already established there is little that can be done to manage the species. The use of herbicides should be avoided. Although many *Cuscuta* species appear to be resistant to the chemicals (Lanini and Kogan 2005) the untimely destruction of host plants could prevent the dodders from completing their life cycles.

Many aspects of *Cuscuta* have been studied but there are still some consequential questions remaining about the genus. It would be especially useful to identify the factors that determine why closely related dodders with apparently similar host requirements sometimes differ radically in their abundance, and to understand why species like *C. cephalanthi* that can parasitize a wide array of hosts seem to favor particular habitats. More information is needed regarding the frequency and relative importance of vegetative proliferation in *C. cephalanthi*, and an understanding of what limits the distribution of the dodder at the edges of its range could help to predict its likely response as the climate continues to change.

Synonyms

The accepted botanical name of the species is *Cuscuta cephalanthi* Engelm. Orthographic variants, synonyms, and common names are listed below (ITIS 2025, POWO 2025, USDA NRCS 2025b).

Botanical Synonyms	Common Names
Grammica cephalanthi (Engelm.) Hadac & Chrtek *Cuscuta tenuiflora* Engelm. *Epithymum cephalanthi* (Engelm.) Nieuwl. & Lunell	Buttonbush Dodder

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