# *Streptopus amplexifolius var. amplexifolius*

**White Twisted-stalk**

**Liliaceae**

*Streptopus amplexifolius* by Tim Shortell, 2018

***Streptopus amplexifolius var. amplexifolius* 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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January, 2025

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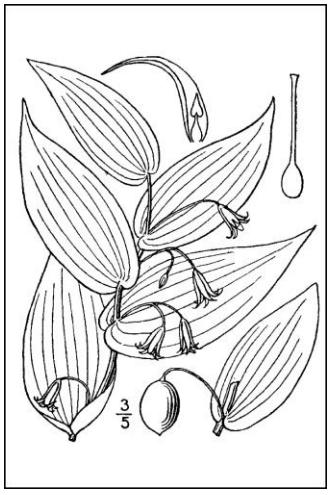
This report should be cited as follows: Dodds, Jill S. 2025. *Streptopus amplexifolius var. amplexifolius* Rare Plant Profile. New Jersey Department of Environmental Protection, State Parks, Forests & Historic Sites, Forests & Natural Lands, Office of Natural Lands Management, New Jersey Natural Heritage Program, Trenton, NJ. 19 pp.

## Life History

*Streptopus amplexifolius* (White Twisted-stalk) is a rhizomatous perennial herb in the lily family. Plants in New Jersey belong to var. *amplexifolius*, although distinctions are seldom made in the literature (see Synonyms section). The rhizomes are short, thick, and covered with fibrous roots. The stems are erect and usually branched, ranging from 5–12 dm in height. The leaves have parallel veins and smooth edges: They are 5–15 cm long, 2.5–6 cm wide, and heart-shaped with distinctly clasping bases. The axillary flowers are solitary or in pairs. The common name "twisted-stalk" refers to the floral pedicels, which are abruptly bent or twisted near the middle so that the flowers hang downward. The bell-shaped flowers are 9–15 mm long and have six white or yellow-green tepals that are strongly recurved at the tips. The fruit of *S. amplexifolius* is a round to ovoid berry that turns bright red-orange at maturity. (See Fernald 1906 & 1950, Britton and Brown 1913, Johnson 1988, Gleason and Cronquist 1991, Utech 2020, Fertig undated).




Left: Britton and Brown 1913, courtesy USDA NRCS 2025a. Center: Tim Shortell, 2018. Right: J. S. Dodds, 2023.

Throughout its range White Twisted-stalk may flower from late April to July and fruits may be present through September (Johnson 1988, Rhoads and Block 2007, Utech 2020, Weakley et al. 2024. In New Jersey the species usually blooms between late May and mid-June and the fruits ripen by late June or July (Hough 1983). The berries of *S. amplexifolius* are edible and have a long history of human consumption, although they reportedly have laxative properties (Johnson 1988, Fertig undated). Shallcross and Johnson (2016) provided some recipes for using juice of the berries in jelly or syrup, although they warned that some allergies have been reported and that careful plant identification is needed because *S. amplexifolius* could be mistaken for a poisonous relative (*Veratrum viride*). Another reason for would-be foragers to be cautious is that when *S. amplexifolius* has been exposed to glyphosate the substance can be sequestered and retained in various parts of the plants for a year or more (Wood 2019).

Only one other species of *Streptopus* occurs in New Jersey: *S. lanceolatus*. The leaves of *S. lanceolatus* have hairy margins and they are not clasping, while its floral tepals are reddish and only slightly spreading. However the two species can hybridize in places where they co-occur. The hybrids have intermediate characteristics—the leaves are slightly hairy along the edges but

less so than in *S. lanceolatus* and the tepals are strongly recurved as in *S. amplexifolius* but deep red to purple in color. The offspring of the diploid *S. lanceolatus* and tetraploid *S. amplexifolius* (*Streptopus* ×*oreopolus*) are sterile and triploid (Fernald 1906 & 1907, Gates 1916, Löve and Harries 1963, Utech 2020, Hough 2021).

## Pollinator Dynamics

The lack of information regarding the pollination of *Streptopus amplexifolius* is surprising, particularly in light of the species' broad global distribution. Warming (1888) observed that *S. amplexifolius* flowers produced nectar and that their structure was indicative of cross-pollination by insects. Grant (1950) identified long-tongued bees as the probable agents of pollination in *Streptopus*, while Harder (2000) categorized *S. amplexifolius* as an animal pollinated species but provided no specifics. No studies addressing self-fertility in the species were found.

Bees are important pollinators of related North American plants with a similar floral structure including various *Erythronium*, *Polygonatum*, and *Uvularia* species (Bernhardt 1977, Hilty 2020). Graenicher (1907) noted that *Streptopus lanceolatus* was pollinated by small, short-tongued bees, although a study in Maine found that the plants were not commonly visited by insects (Heinrich 1976). The only other *Streptopus* in North America—*S. streptopoides*—is pollinated by fungus gnats, which it attracts by emitting a "faint but slightly foul" floral scent (Mochizuki and Kawakita 2018). However the flowers of that species are not bell-shaped and they are considerably smaller than those of *S. amplexifolius* and *S. lanceolatus* (Utech 2020).

## Seed Dispersal and Establishment

The berries of *Streptopus amplexifolius* contain multiple seeds. A study in Alaska recorded 13–28 seeds per fruit with mean of 22.1 (Traveset and Willson 1997), although the number of seeds per berry may vary significantly depending on where the plants are growing (Traveset et al. 2004). The fruits of *S. amplexifolius* are consumed by a variety of mammals and birds that subsequently disperse the seeds in their scat. Traveset and Willson (1997) found that passage though an animal's digestive tract neither enhanced or diminished the germination rates of White Twisted-stalk, which were high in either case, but the process may be beneficial because it removes the pulp. Uneaten fruits are often destroyed by fungal infections.

Black and brown bears (*Ursus americanus and U. arctos*) are particularly important dispersers of *Streptopus amplexifolius* because they consume a lot of the fruit, typically depositing numerous viable seeds in suitable habitat hundreds of meters away from the parent plants with a generous load of fertilizer (Fuhr and Demarchi 1990, Willson 1993, Bermejo et al. 1998, Willson and Gende 2004, Shakeri et al. 2018). *S. amplexifolius* seeds have also been found in droppings of the American Marten, *Martes americana* (Soutiere 1979), and Willson (1993) observed that seeds in marten scat are usually intact and are probably capable of germination. The apparent consumption of *S. amplexifolius* fruits by rodents was noted by Bermejo et al. (1998). Thompson (1965) listed *S. amplexifolius* as a species that was consumed by voles although he did not specify what parts of the plant were utilized.

Birds probably also play a significant part in dispersing *Streptopus amplexifolius* (Bermejo et al. 1998, Schaefer et al. 2008). The berries have a high protein and carotenoid content (Pendergast and Boag 1971, Schaefer et al. 2008) which makes them a valuable food source for certain species. Ground-dwelling birds like grouse are often noted as consumers of the fruits (Jonkel and Greer 1963, Pendergast and Boag 1971, Johnson 1988). Migrating birds usually favor berries with a high lipid content over those with carotenoids (Alan et al. 2013), which would suggest that bird consumption of *S. amplexifolius* fruit is likely to result in fairly local dispersal. Nevertheless, the species appears to have experienced a number of intercontinental dispersal incidents during the past 2–14 million years (Patterson and Givnish 2002), and the establishment of a new population in southern Poland may be attributable to a recent long-distance dispersal event (Rostański et al. 2013).

*Streptopus amplexifolius* seeds can germinate rather quickly or remain in the seed bank for multiple seasons. Results from experimental plantings have varied widely. In one case fresh seeds from *S. amplexifolius* produced seedlings within 70 days of sowing (Chen et al. 2024), in another seeds planted in the fall sprouted the following spring (Piper 1986), and in still others germination occurred over a period of several years (Traveset and Willson 1997, Willson and Gende 2004). The conditions that trigger seedling emergence in *S. amplexifolius* are not known. Light availability may play a part—Piper (1986) found that seedlings grew larger in open sun but survived longer in shaded sites. Although no reports of beneficial fungal associations were found for *Streptopus amplexifolius*, *S. lanceolatus* is facultatively mycorrhizal (Malloch and Malloch 1982) and that is also the case for the majority of woodland herbs (Whigham 2004).

## Habitat

*Streptopus amplexifolius* can grow in sites that are 0–2800 meters above sea level (Utech 2020). In Europe it only occurs in montane areas (Kaplan et al. 2017) and it is frequently found at mid to high elevations in North America (Johnson 1988, Romme et al. 2016, Hough 2021, Berend et al. 2022, Weakley et al. 2024). Edelstein and Martine (2012) noted that it was likely to be replaced by *S. lanceolatus* in comparable habitats at lower elevations. In some of the high elevation sites where *S. amplexifolius* occurs the ground may remain snow-covered well into spring or even early summer. In such sites, the disadvantages of an abbreviated growth period can be offset by the protection of the snow blanket, which helps to retain heat and moisture while shielding the plants from the direct impacts of frost or icy winds (Harshberger 1929, Capers and Slack 2016). The ability to thrive at high-elevation sites with short growing seasons may give *S. amplexifolius* an advantage over plant species that would outcompete it in more hospitable environments (Edelstein and Martine 2012).

*Streptopus amplexifolius* favors locations that are cool, moist, and shaded. It is frequently associated with streams, springs, seepage areas, or the spray zones of waterfalls (Fairbrothers and Hough 1973, Coddington and Field 1978, Hough 1983, Johnson 1988, Rhoads and Block 2007, Adams and Parisio 2013, Kaplan et al. 2017, Hough 2021, NJNHP 2024, Fertig undated). In Alaska it is a common understory herb in temperate rainforests (Bermejo et al. 1998). Although *S. amplexifolius* is generally classified as facultative by the U. S. Army Corps of Engineers (2020), Cooper et al. (2005) said that it was indicative of high moisture availability in Montana

forests. Weakley et al. (2024) assigned the species a heliophily rating of 1, indicating that it requires deeply shaded habitats. The soil pH in *S. amplexifolius* habitats is usually moderate to slightly acidic (Taylor 1932, Edelstein and Martine 2012, Kaplan et al. 2017).

*Streptopus amplexifolius* is most likely to be found in mature, old growth forests (Taylor 1932, Coddington and Field 1978, Moola and Vasseur 2008). An occurrence in Yellowstone National Park was situated in a forest that had apparently remained undisturbed for 250–400 years (Romme et al. 2016). The canopies are often dominated by conifers including *Abies*, *Picea*, *Pinus*, *Thuja*, or *Tsuga* species (Gates 1911, Taylor 1932, Aller 1956, Cooper et al. 2005, Edelstein and Martine 2012, Adams and Parisio 2013, Romme et al. 2016, Rutherford and Fawcett 2023, NJNHP 2024). However, *S. amplexifolius* can also grow in mixed or deciduous woodlands (Baldwin 1951, Quant 2014, Utech 2020). For example, Williams (1936) reported it in *Fagus-Acer* forests, Hudson (1977) noted that it was occasionally found in aspen (*Populus* sp.) woods, and Aller (1956) documented it in wet shrub communities dominated by Mountain Alder (*Alnus sinuata*).

## Wetland Indicator Status

*Streptopus amplexifolius* is a facultative species, meaning that it occurs in both wetlands and nonwetlands (U. S. Army Corps of Engineers 2020).

## USDA Plants Code (USDA, NRCS 2025b)

STAMA2

## Coefficient of Conservancy (Walz et al. 2020)

CoC = 10. 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 native range of *Streptopus amplexifolius* extends throughout the northern hemisphere, including parts of North America, Europe, and Asia. Weakley et al. (2024) noted that the global range is somewhat fragmented. There are disjunct records from Myanmar, where species reaches the southernmost part of its distribution (POWO 2025). The map in Figure 1 shows the extent of *S. amplexifolius* in North America.

The USDA PLANTS Database (2025b) shows records of *Streptopus amplexifolius var. amplexifolius* in two New Jersey counties: Sussex and Warren (Figure 2). The species might still be present in both counties.

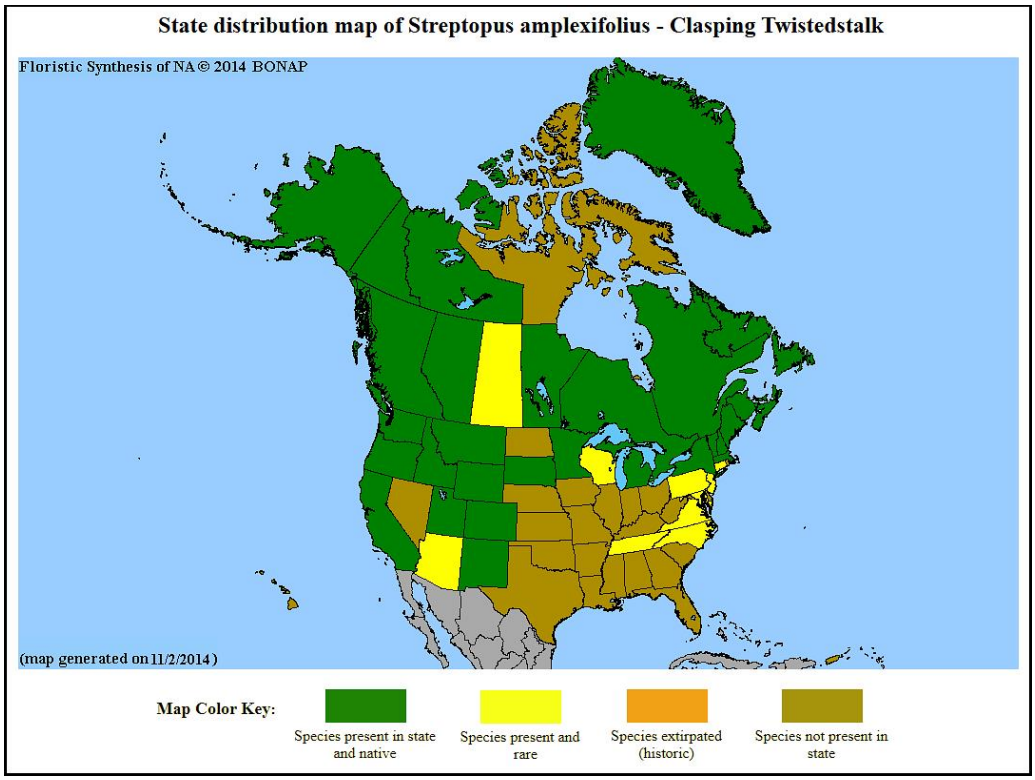



*Figure 1. Distribution of S. amplexifolius in North America, adapted from BONAP (Kartesz 2015).*

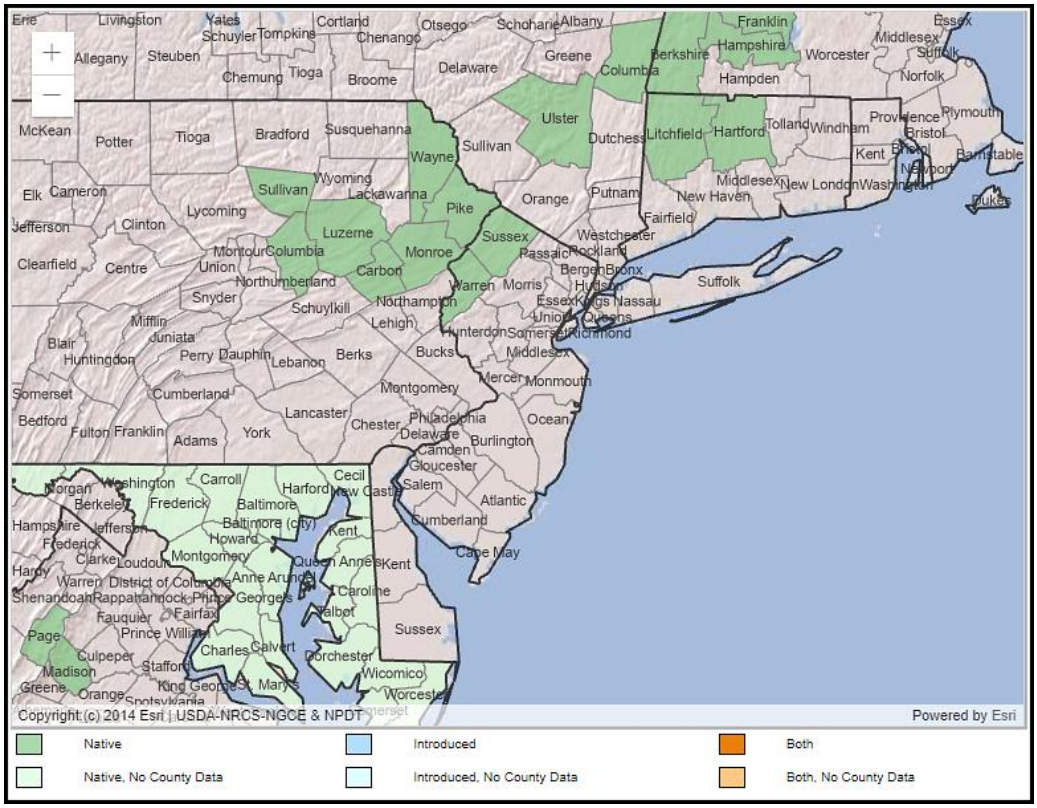



*Figure 2. County records of S. amplexifolius in New Jersey and vicinity (USDA NRCS 2025b).*

## Conservation Status

*Streptopus amplexifolius* 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 *S. amplexifolius* in Canada and the United States. The species appears to be critically imperiled (very high risk of extinction) in five eastern states, imperiled (high risk of extinction) in one state and two provinces, and vulnerable (moderate risk of extinction) in two states and one province. The New Jersey status is not shown on the map because *S. amplexifolius* is listed at the varietal level in the state.

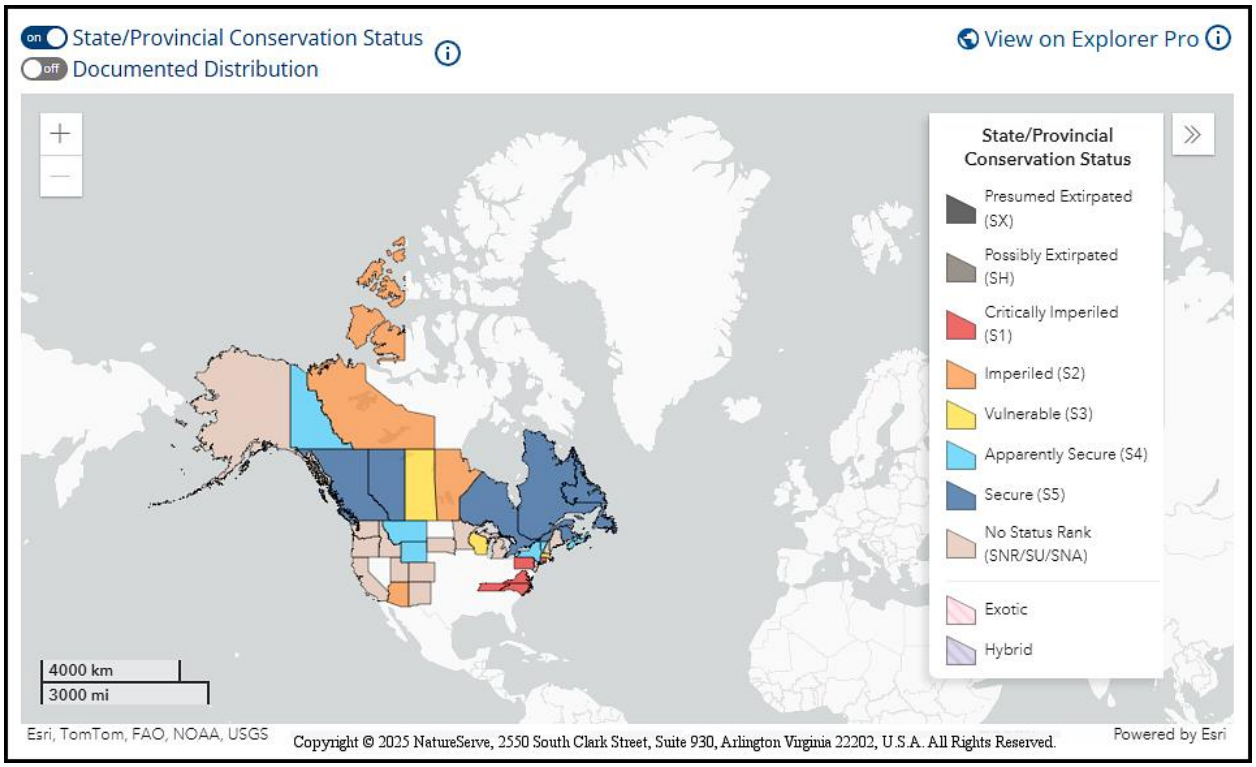



*Figure 3. Conservation status of S. amplexifolius in the United States and Canada (NatureServe 2025).*

*Streptopus amplexifolius* 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. *S. amplexifolius* 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 such as wetlands or coastal habitats, being listed does not currently provide broad statewide protection for the plants. Additional regional status codes assigned to White Twisted-stalk 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).

*Streptopus amplexifolius* was not recorded in New Jersey prior to the 1960s, when two populations were discovered by Vincent Abraitys (Snyder 1984). Fairbrothers and Hough (1973) indicated that the species was known from a few locations in Sussex County, but it seems that only one of those was documented (NJNHP 2024, Mid-Atlantic Herbaria 2025). Hough (1983) noted that a historical Warren County occurrence had been destroyed. One population in each of the two counties is currently tracked as extant, although the Sussex County occurrence has not been seen since 2014 despite a recent attempt to locate surviving plants (NJNHP 2024).

## Threats

Throughout North America, threats to *Streptopus amplexifolius* populations may result from development, silviculture, recreational activities, or invasive species (Soteropoulos 2024). Factors that have likely contributed to the decline of New Jersey occurrences include flooding, heavy foot traffic, and the spread of invasive species. Reduction of hemlock (*Tsuga canadensis*) cover following the spread of the Hemlock Wooly Adelgid (*Adelges tsugae*) may also have hastened the loss of some eastern populations (PANHP 2019, NJNHP 2024). Decreases in canopy cover due to logging or clearcutting have reduced or eliminated *S. amplexifolius* populations at certain sites (Wallmo et al. 1972, Mamashita 2009) although Cole et al. (2008) found no significant effect on *S. amplexifolius* from moderate thinning. Small canopy gaps might promote seedling establishment (Piper 1986). At a Montana location where vigorous growth in the understory occurred after a fire, *S. amplexifolius* was one of the dominant herbs (Cooper et al. 2005) and in Yellowstone the species persisted following a fire in an old-growth forest (Romme et al. 2016).

Herbivores can have a significant detrimental effect on *Streptopus amplexifolius*. Some of the animals that help the species by spreading its seeds can also be harmful: For example, grouse may consume *S. amplexifolius* flowers before they can set fruit (Pendergast and Boag 1970) and bears sometimes eat the plants early in the season (Larsen 2012). Grazing was identified as the primary threat to a newly established population in Poland (Rostański et al. 2013). LeResche and Davis (1973) noted that the plants are occasionally eaten by moose (*Alces alces*) in Alaska but White-tailed Deer (*Odocoileus virginianus*) are expanding their range westward (Woodford 2019) so herbivory may eventually take a greater toll on *S. amplexifolius* in that state. Deer often preferentially browse on plants in the lily family (Miller et al. 1992) and various types of deer have been identified as a particular threat to White Twisted-stalk at multiple locations throughout its range (Wallmo et al. 1972, Rhoads and Block 2004, Pojar 2008).

Herbivory by a non-native insect might also pose a serious threat to *S. amplexifolius*. The lily leaf beetle, *Lilioceris lilii*, was introduced into Canada during the 1940s and over the past several decades it has rapidly expanded its range in North America. The beetle is already well-established in New Jersey. It was initially identified as a pest of cultivated lilies but was subsequently documented on native members of the Liliaceae, including *Streptopus lanceolatus*. *L. lilii* eggs were first found on wild *S. amplexifolius* plants in 2013 and additional studies have since confirmed that the insect can complete its life cycle on White Twisted-stalk. The adult beetles are bright red-orange and the larvae clothe themselves in excrement, probably to deter predators. *L. lilii* larvae can defoliate entire plants, and to date options for controlling the beetles

appear to be limited (Kealey et al. 2013, MITPPC 2016, Freeman 2019, BugGuide 2025, iNaturalist 2025).

There have been few reports of disease in *Streptopus amplexifolius* but a novel infection was recently described by Robertson (2005) in Alaska. It is actually a complex of two unrelated viruses that can attack the plants either individually or together, resulting in leaf discoloration, deformities, or early senescence. The mechanism for transmission has not been determined.

## Climate Change Vulnerability

Information from the references cited in this profile was used to evaluate the vulnerability of New Jersey's *Streptopus amplexifolius* 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 *S. amplexifolius* was assessed as Moderately Vulnerable, meaning that it is likely to show some decrease in abundance or range extent in New Jersey by 2050. The conclusion was reached with relatively low confidence because the score was approaching the High Vulnerability rank. However, an assessment in Pennsylvania similarly concluded that the species was Moderately Vulnerable in that state (Schuette 2022).

Temperatures are rising at an unprecedented rate in New Jersey, with the increases being especially pronounced during the winter months, and changes in global circulation patterns are also contributing to unpredictable weather patterns that result in both more frequent flooding events and prolonged periods of drought (Hill et al. 2020). Erosion and scouring from a flood apparently contributed to the loss of one New Jersey occurrence (NJNHP 2024). Since *S. amplexifolius* is particularly well-adapted to cool, moist habitats it may be expected to fare poorly in a warmer climate and to be intolerant of extended droughts. *S. amplexifolius* populations that have become accustomed to high elevations are likely to have the greatest vulnerability (Edelstein and Martine 2012, Adams and Parisio 2013, Capers and Slack 2016).

## Management Summary and Recommendations

Although two populations of *Streptopus amplexifolius* are ranked as extant in New Jersey the current status of the species in the state is unclear. Site visits are needed to determine whether any of the rare plants are still present. A number of management needs were previously identified for one of the occurrences, which formerly consisted of two subpopulations, but the results of recent searches suggest that it may be too late. Although no threats were noted at the site of the second occurrence the records indicate that only two nonflowering plants were present in 1990 and no subsequent surveys have been conducted (NJNHP 2024). If the ongoing presence of the *S. amplexifolius* is confirmed at either location, the feasibility of measures to control invasive species or protect the plants from trampling and herbivory should be considered.

In other districts where *Streptopus amplexifolius* is imperiled the protection of mature forest communities and maintenance of their natural hydrological conditions is recommended, both at the sites supporting extant populations and in nearby patches of comparable habitat (Moola and Vasseur 2008, PANHP 2019). Some actions may also be needed to protect the species from excessive herbivory, including fencing and management of deer population sizes. Tilghman (1989) suggested that deer populations should be maintained at densities of fewer than 18 deer for every 259 hectares in order to maintain healthy forests.

*Streptopus amplexifolius* has been included in the Arctic Plant Germplasm Collection in Palmer, Alaska as part of an effort to document and preserve genetic diversity in native plants (Robertson 2005). In addition to genetic studies, there are a number of other areas where research is needed to fill gaps in the available information about the species. The lack of specifics regarding the pollinators of *S. amplexifolius* was noted by Loose et al. (2005). Outstanding questions also remain regarding the factors that govern germination and influence seedling establishment, self-compatibility, mycorrhizal associations, and the pros and cons of using prescribed burns for the management of *S. amplexifolius* habitat.

## Synonyms

The accepted botanical name of the species is *Streptopus amplexifolius* (L.) DC. var. *amplexifolius*. Some orthographic variants, synonyms, and common names are listed below. An assortment of varieties have been described for *S. amplexifolius* but most are not recognized by current sources (for example; Kartesz 2015, Utech 2020, ITIS 2025, NatureServe 2025, and POWO 2025 accept no varieties). Fassett (1935) listed seven varieties—with the plants in our area represented by var. *americanus* (Weakley et al. 2024, Mid-Atlantic Herbaria 2025)—but Utech (2020) dismissed them as "poorly defined races." The form occurring in the eastern United States is also identified as var. *amplexifolius* by Weakley et al (2024) and USDA NRCS (2025b).

| **Botanical Synonyms** | **Common Names** |
|---|---|
| *Convallaria amplexifolia* (L.) E. H. L. Krause | White Twisted-stalk |
| *Convallaria dichotoma* Thibaud ex Pers. | Claspleaf Twistedstalk |
| *Streptopus amplexifolius* var. *americanus* Schulte | White Mandarin |
| *Streptopus amplexifolius* var. *denticulatus* Fassett | Pagoda-bells |
| *Streptopus amplexifolius* var. *genuinus* Fassett | Watermelon Berry |
| *Streptopus amplexifolius* var. *grandiflorus* Fassett | |
| *Streptopus distortus* Michx. | |
| *Streptopus fassetii* Á. Löve & D. Löve | |
| *Tortipes amplexifolius* (L.) Small | |
| *Uvularia amplexicaulis* Mill. | |
| *Uvularia amplexifolia* L. | |
| *Uvularia distortus* Michx. | |

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