

Rubus novocaesarius

New Jersey Dewberry

Rosaceae



Rubus novocaesarius by J. S. Dodds, 2023

***Rubus novocaesarius* Rare Plant Profile**

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

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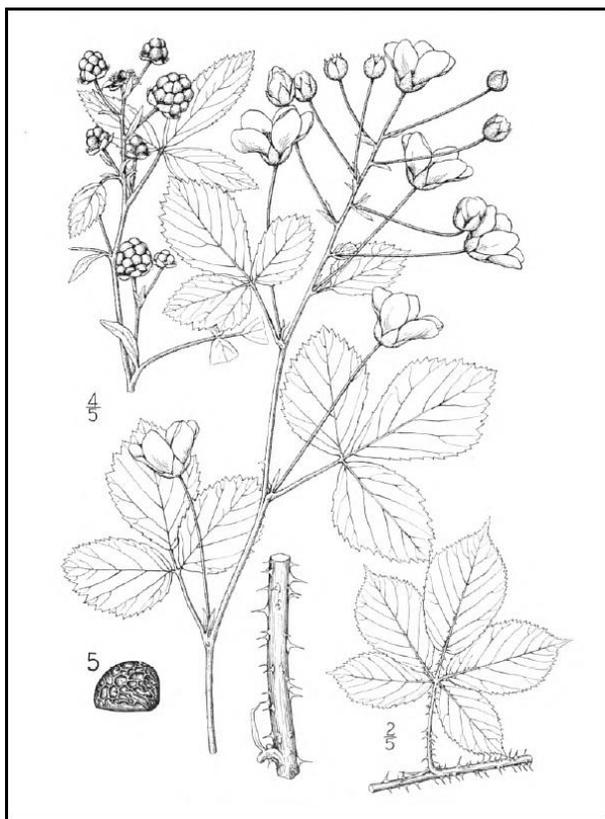
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Life History

Rubus novocaesarius (New Jersey Dewberry) is a low perennial shrub in the Rosaceae that is endemic to New Jersey. The plants produce stems (canes) that are unbranched and vegetative during their first year and develop flowering branches (floricanes) during the second. The primary canes (primocanes) are initially upright but later arch and root at the tips so plants with numerous interwoven stems have a characteristic mound-like shape. The stems are prominently armed with well separated prickles. In some species of *Rubus* the color of the prickles differs from the stem color, which may serve as a warning to potential herbivores (Rubino and McCarthy 2004), but those of *R. novocaesarius* are about the same color as the stems. The leaves of New Jersey Dewberry are compound and mostly divided into five parts on the primocanes and three parts on the floricanes. The leaflets are obovate in shape, smooth and somewhat shiny above, and softly hairy on the underside. The flowers are approximately 3 cm in diameter and have five sepals, five narrow white petals, and numerous stamens and pistils. (See Bailey 1945). *Rubus* fruits are made up of many small, one-seeded drupelets that form a roundish cluster (Fernald 1950), and those of *R. novocaesarius* turn red when they begin to mature (NJNHP 2022). New Jersey Dewberry blooms mainly in June. The fruits start to develop promptly and commence ripening late in July (Bailey 1945, NJNHP 2022). On June 15, 2023 most *R. novocaesarius* flowers had shed their petals and fruits were starting to develop but a few floral branches were still in bud.



Left: Bailey's illustration of *R. novanglicus*, which according to his key is nearly identical to *R. novocaesarius* except for the underside of the leaves: They are mostly smooth in *R. novanglicus* but softly hairy in *R. novocaesarius* (Bailey 1945). Right: *R. novocaesarius*, J. S. Dodds 2023.



R. novocaesarius, downy underside of leaf (left) and developing fruit (right), J. S. Dodds 2023.

Rubus is one of the most complicated genera because the species are highly variable, they hybridize readily, and apomixis and polyploidy are frequent throughout the genus (Bicknell 1910, Hodgdon and Steele 1966, Thompson 1997, Alice et al. 2021). Symonds (1963) suggested that rapid evolutionary changes in *Rubus* might have been precipitated by extensive land clearing following the colonization of North America. The development of cultivars for agricultural production and their subsequent hybridization with native plants may also contribute to genetic confusion. As a result, there has been a great deal of disagreement among experts as to which taxons should be recognized as species or subspecies: Estimates of the number of *Rubus* species have ranged from 250–3000+ (Zomlefer 1994). In a comprehensive monograph Bailey (1945) broke the large genus down into subcategories, placing *Rubus novocaesarius* in subgenus *Eubatus* section *Hispidi*, although he noted that his system was a tool for identification and did not imply direct relationships between species. Recent genetic studies have determined that most of the previously recognized subgenera are polyphyletic or paraphyletic (Carter et al. 2019) so the categories are generally not utilized in current floras (eg. Alice et al. 2021).

It is not surprising that the status of *Rubus novocaesarius* is in question. Bailey's description of the species was based on a single occurrence, and a broad review of the genus by Davis et al. (1967) initially concluded that the specimens on Bailey's herbarium sheets were "too poor and immature for critical evaluation." During the course of their studies the Davises visited the type localities for more than 500 *Rubus* names (Utech 1990), and although they did make a trip to New Jersey in 1954 their collection does not include any specimens from the *R. novocaesarius* site (Mid-Atlantic Herbaria 2023). Despite his earlier comments, Davis ultimately recognized New Jersey Dewberry as a species in his final treatise (Davis 1990). However *R. novocaesarius* was not included in the works of Fernald (1950), Gleason and Cronquist (1991), or Alice et al. (2021), even as a synonym or a hybrid. POWO (2023) lists *Rubus novocaesarius* as an 'unplaced' name, meaning that it cannot be accepted or put into synonymy, probably due to the aforementioned insufficiency of the type material. Although *R. novocaesarius* is recognized by a number of current sources (Walter and Gillett 1998, Kartesz 2015, Frances 2017, NatureServe 2023, USDA 2023) it has generally been overlooked by the scientific community so there is little specific information available regarding its life history or ecology and its nearest relatives have not been identified.

Pollinator Dynamics

Insects visit *Rubus* flowers to collect both nectar and pollen (Hilty 2020), and some species reportedly have a sweet scent that may further aid in the attraction of pollinators (Genders 1977). *Rubus* plants tend to be pollinated by a wide variety of insects: For example, Robertson (1929) recorded 48 species on *R. canadensis*, 22 species on *R. occidentalis*, and 89 species on *R. villosus*. Stubbs et al. (1992) identified numerous bee species known to forage on *Rubus* flowers. Whittington et al. (2004) examined the pollen collected by bumblebees (*Bombus impatiens* and *B. occidentalis*) which had been placed in a greenhouse to fertilize tomatoes and found that most of the "foreign" pollen carried by the bees came from *Rubus* species. Honeybees (*Apis mellifera*) have been reported as effective pollinators of dewberries (Sandler 2001). Little carpenter bees (*Ceratina* spp.), long-horned bees (*Synhalonia* spp.), cuckoo bees (*Nomada* spp., *Coelioxys* spp.), leaf-cutting bees (*Megachile* spp.), mason bees (*Osmia* spp., *Hoplitis* spp.), Halictine bees and Andrenine bees have also been identified as pollinators of *Rubus* flowers (Hilty 2020). *Andrena melanochroa* is a pollen specialist bee on *Rubus* and several other genera in the rose family (Fowler and Droege 2020). While bees appear to be the primary pollinators of *Rubus* species the flowers are also visited by an assortment of other insects including syrphid flies, wasps, butterflies, and skippers (Hilty 2020).

Although apparently not lacking for potential pollinators, *Rubus novocaesarius* may also have some capacity for the development of seeds from unfertilized ovules. Asexual seed production is relatively frequent in the genus (Alice et al. 2021). However at low population densities—which is the case for *R. novocaesarius*—dewberry plants are likely to invest more of their resources in clonal reproduction (Abrahamson 1975). In favorable circumstances *Rubus* species can spread rapidly by vegetative means (Hodgdon and Steele 1966).

Seed Dispersal

The fruits of *Rubus novocaesarius* have been observed to be "more or less ripe" or "not fully ripe" during the last week in July (NJNHP 2022). Dispersal periods vary within the genus: Some species typically shed all of their fruit by the end of August while others may still have berries remaining on the branches in October (Stiles 1980). Haskell (1961) reported avian dispersal of *Rubus* seeds, noting that germination was enhanced by passage through a bird's digestive system. Stiles (1980) indicated that both birds and mammals were likely to play a role in dispersal of *Rubus* propagules, and that the sweetness and odor of the fruits made them especially likely to be consumed by mammals. However Bailey (1945) noted that the fruits of species which he placed in section *Hispidi* were generally sour or unpalatable at maturity. Small mammals like mice can access *Rubus* fruits on stems that are relatively low to the ground and they excrete the seeds in viable condition. A variety of resident and breeding birds are known to disperse *Rubus* seeds (Stiles 1980), and mammals identified as potential dispersers for the genus include black bear, raccoon, coyote, fox, marten, skunk, and opossum (Willson 1993). The fruits may also attract box turtles (*Terrapene carolina*). Braun and Brooks (1987) evaluated *T. carolina* as a possible agent for the dispersal of a number of native plants and found that *Rubus* fruits were particularly favored by box turtles. While passage through a turtle's digestive tract improved the germination percentages for some plant species, that was not the case with *Rubus*: Germination rates of

excreted seeds were comparable to those of seeds that had not passed through turtles. Nevertheless, box turtles that consume dewberries are likely to deposit some viable seeds in new locations. It is worth noting that a box turtle was observed within a few meters of New Jersey's *R. novocaesarius* occurrence during a site visit in June 2023, although the fruits were not yet ripe.

The germination requirements of *Rubus novocaesarius* are unknown. A number of *Rubus* species have been known to form mycorrhizae but that is not universal in the genus (Harley and Harley 1987, Wang and Qiu 2006) so it is not clear whether fungal associations are required for establishment.

Habitat

The habitat description for *Rubus novocaesarius* provided by Bailey (1945) was concise ("lowish ground"), and the only additional source of information was observational notes made for the Natural Heritage Program (NJNHP 2022). The population is located in a small, wet, bog-like depression that was probably anthropogenic in origin. The ditch is situated between a forested strip and a transportation corridor where it is alternately colonized by woody species and subjected to disturbances for right-of-way maintenance. The wetland where *R. novocaesarius* occurs is dominated by sphagnum mosses and mixed graminoid species with a few other plants such as *Parthenocissus quinquefolia*, *Lysimachia terrestris*, *Viola lanceolata*, and *Pogonia ophioglossoides* scattered throughout. Latham (2003) characterized *R. novocaesarius* as a shrubland species and noted that, as such, it would be most likely to persist in a stable habitat.

Wetland Indicator Status

Rubus novocaesarius is not included on the National Wetlands Plant List (NWPL). Generally speaking, any species not on the NWPL is considered to be Upland (UPL) in all regions where it occurs (U. S. Army Corps of Engineers 2020). In this case the species' absence from the list is probably due to its questionable status, as the only documented occurrence is associated with a wet habitat.

USDA Plants Code (USDA, NRCS 2023)

RUNO5

Coefficient of Conservancy (Walz et al. 2020)

CoC = 4. 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

Rubus novocaesarius is one of two species with a global range that is restricted to New Jersey (NJDSR 2021). The map in Figure 1 depicts the worldwide extent of the species. *R. novocaesarius* is only known from a single location in Cape May County (NJNHP 2022).

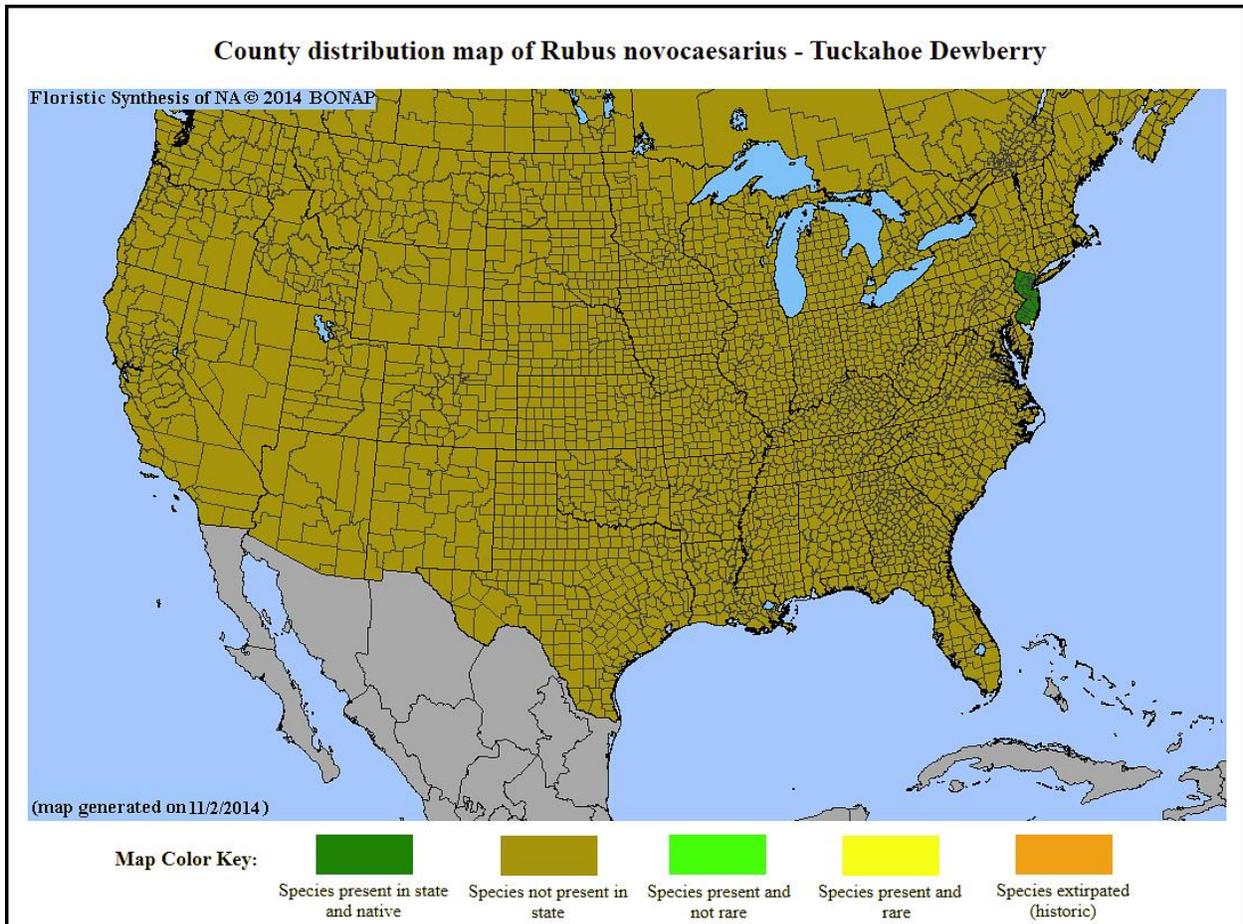


Figure 1. Distribution of *R. novocaesarius* in North America, adapted from BONAP (Kartesz 2015).

Conservation Status

Rubus novocaesarius is critically imperiled globally. The G1 rank means the species is at very high risk of extinction or collapse due to a very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors (NatureServe 2023). The World Conservation Union has also recognized New Jersey Dewberry as a globally endangered species (Walter and Gillett 1998). *Rubus novocaesarius* 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 R1 (critically imperiled), signifying a very high risk of extinction in the region (Frances 2017). The map below (Figure 2) illustrates the conservation status of *R. novocaesarius* throughout its range.

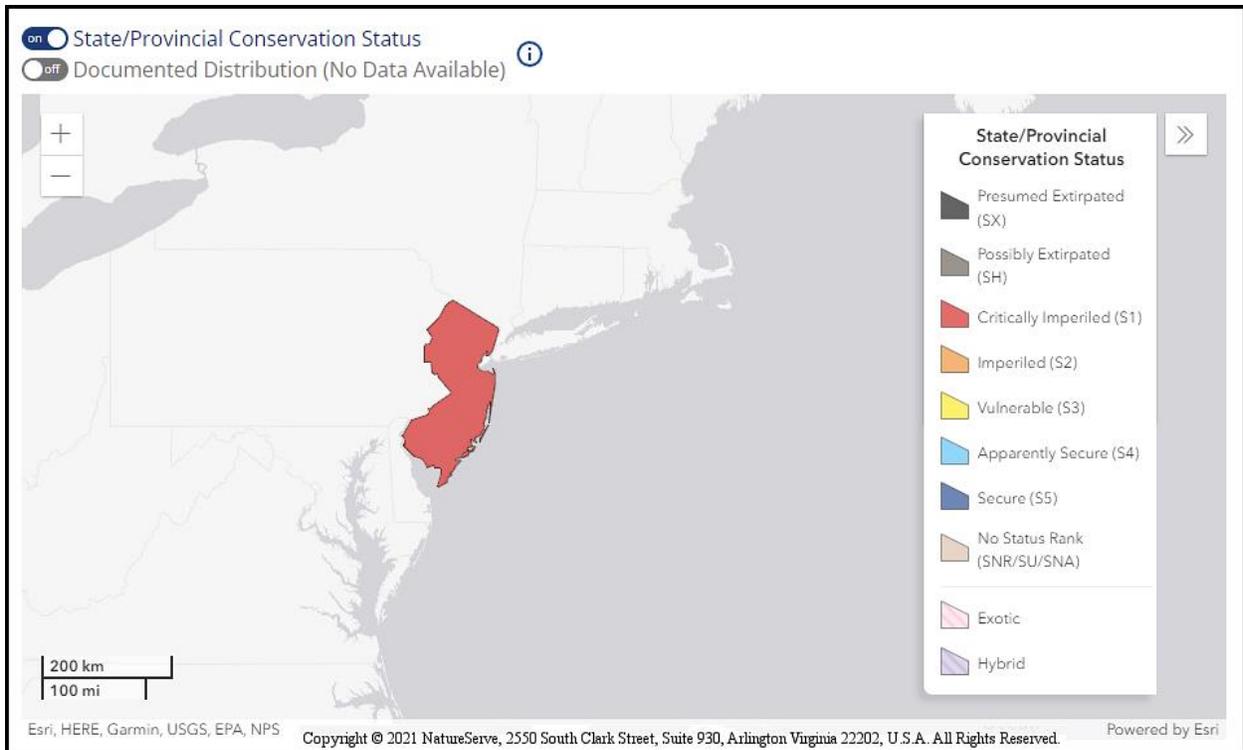


Figure 2. Conservation status of *R. novocaesarius* in North America (NatureServe 2023).

Rubus novocaesarius is ranked S1.1 in New Jersey (NJNHP 2022), meaning that it is critically imperiled due to extreme rarity. A species with an S1.1 rank has only ever been documented at a single location in the state. *R. novocaesarius* 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 the dewberry 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).

Liberty Hyde Bailey (1945) first described *Rubus novocaesarius* based on a plant that he encountered in Cape May County, New Jersey in 1935. His specimens provided few details regarding the exact location and no subsequent collections were made so the dewberry was initially listed as a historical species in the state (NJNHP 2001). After years of diligent searching, David Snyder located a small population of *R. novocaesarius* during 2003 which may or may not be the remains of the original occurrence documented by Bailey. The entire population occupied an area under 2 square meters in size (NJNHP 2022). Although only a few stems have persisted at the site, the species was still present in 2023.

Threats

As presently understood, the worldwide extent of *Rubus novocaesarius* is limited to one tiny occurrence in an unstable habitat. The corridor where the plants are located has periodically

been cleared of woody vegetation either by cutting or via the application of herbicides. Although the more open habitat might help the shrub to persist, right-of-way maintenance activities have often directly damaged the rare plant. At one point nearly all of the canes were cut down and only a single stem was found, and on other occasions deformed leaves or dead canes have been observed following herbicidal treatments (NJNHP 2022). So far the species has made some recovery following each affront, apparently relying on existing rootstock for the production of new canes. No establishment from seed has been documented for *R. novocaesarius*.

Because so little is known about *Rubus novocaesarius* it is difficult to predict how the species might respond to shifting climactic conditions. In New Jersey, the impacts of climate change include both elevated temperatures and an increase in the frequency and severity of droughts and floods (Hill et al. 2020). Some *Rubus* species have been known to experience crown mortality following extended periods of inundation (Sandler 2001), and since *R. novocaesarius* is only known from a wet habitat it is equally possible that a lengthy drought could be harmful to the shrub. It seems probable that extreme conditions of any kind would exacerbate the impacts of the challenges which the small population already faces.

Management Summary and Recommendations

Resolution is needed regarding the taxonomic status of *Rubus novocaesarius*. *Rubus* has long inspired debate over what defines a species (e.g. Bicknell 1910, Rydberg 2015) and even in those discussions *R. novocaesarius* has largely been ignored. It is unfortunate that the Davises were unable to obtain a complete specimen of New Jersey Dewberry and resolve its status as they did for so many other *Rubus* taxons. However, *R. novocaesarius* is a distinctive shrub that has persisted for more than 80 years so until that question has been satisfactorily answered it makes sense to regard it as worthy of the highest possible degree of protection. The extant population should be monitored annually and every effort should be made to preserve the remaining plants.

The potential for research on *Rubus novocaesarius* is limited by the rarity of the species. Inclusion of *R. novocaesarius* in future genetic studies could help to shed light on whether the dewberry initially developed as a hybrid and to clarify its relationship to other *Rubus* species. In turn, that information might provide a basis for drawing inferences about the ecological and life history requirements of *R. novocaesarius* from research on related species which are more abundant. A small-scale germination study of New Jersey Dewberry may also be feasible and that could yield valuable data regarding seed viability, seedling establishment, and early development.

Synonyms

The accepted botanical name of the species is *Rubus novocaesarius* L. H. Bailey. Orthographic variants, synonyms, and common names are listed below (USDA NRCS 2023).

Botanical Synonyms

Common Names

New Jersey Dewberry
Tuckahoe Dewberry

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