Juniperus communis var. *depressa*

Dwarf Juniper

Cupressaceae

Juniperus communis var. *depressa* by J. S. Dodds, 2024

***Juniperus communis* var. *depressa* 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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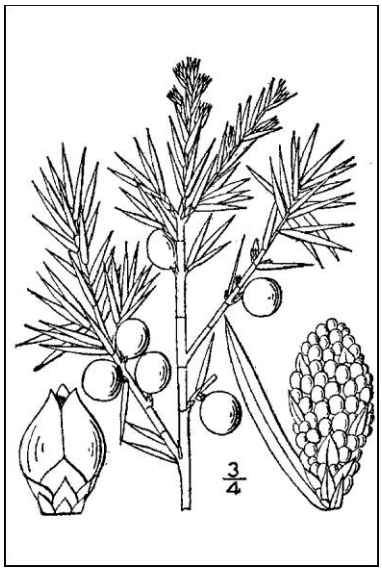
Life History

Juniperus communis var. *depressa* is an evergreen conifer in the cypress family. The typical growth form is low and prostrate, with numerous branches that take root when they contact the ground but turn upward near the ends. Occasionally the variety can grow as a taller shrub or even a small tree. The branches are initially smooth and yellow-green but they darken and become scaly with age. The linear, needle-like leaves occur in whorls of three: They are about 1.5 cm long and pointed at the tips, and a broad white band is present on the upper surface. *Juniperus communis* is dioecious, meaning that individual plants are either male or female. Marion and Houle (1996) found that sex ratios did not vary significantly within populations of *J. communis* var. *depressa*. Both the male and female cones are axillary. The seed cones are round and berrylike, 6–9 mm in diameter, and blue at maturity. (See Britton and Brown 1913, Arnold Arboretum 1916, Fernald 1950, Ryan 1978, Soper and Heimburger 1982, Gleason and Cronquist 1991, Tirmenstein 1999, Adams 2008 & 2024).



Left: *Juniperus communis*, Britton and Brown 1913, courtesy USDA NRCS 2024a. Right: *J. communis* var. *depressa*, J. S. Dodds 2024.

Juniperus communis can be long-lived: When conditions are favorable individual plants may exceed 170 years in age (Diotte and Bergeron 1989). Other native varieties of *J. communis* have been recognized but var. *depressa* is the only one that occurs in New Jersey (Kartesz 2015, Adams 2024, Weakley et al. 2024). However, the European *J. communis* var. *communis* has been planted in the northeastern United States, where it has sometimes been spread by birds (Adams et al. 2016). There are also a number of popular horticultural strains of var. *depressa* (eg. MGB 2024, NCCE 2024, NDSU Research Foundation 2024).

In addition to its favorability as a landscape plant, *J. communis* var. *depressa* has traditionally been used for a variety of medicinal purposes and the female cones have been used to flavor gin, meats, and cabbages (Tirmenstein 1999, NCCE 2024). The smoke from burning branches of *Juniperus communis* has also been said to repel witches and demons, although no corroborating scientific studies could be found.


Left: Male cones, courtesy Alan Cressler, Lady Bird Johnson Wildflower Center. Right: Female cones, courtesy James L. Reveal, Lady Bird Johnson Wildflower Center.

Pollinator Dynamics

The male cones of *Juniperus communis* var. *depressa* shed pollen between March and May and the female cones mature from August through October of their second or third year (Hough 1983, Tirmenstein 1999, Weakley et al. 2024). Like other gymnosperms, *J. communis* is pollinated by wind. Conifer pollen is relatively light for its size and can be transported for long distances (Owens et al. 1998). The female cones produce sticky droplets that capture the wind-borne pollen, facilitate fertilization, and may additionally provide some protection against microbes or fungal infections (Nepi et al. 2009). Each of the three ovules in a *J. communis* cone can produce a pollination drop but due to their close proximity they sometimes merge into a single unit. Individual droplets persist for an average of 12 days or until they are pollinated. Unpollinated droplets may re-form up to four times during that period if removed. *Juniperus* pollen that lands on a pollination drop sinks into the liquid and becomes rehydrated. Once pollinated the droplets retract, carrying the pollen into the ovules, and do not re-form. Partial retraction may occur after contact with unrelated pollen or other airborne materials (Mugnaini et al. 2007). Surso (2018) reported that *J. communis* pollen is released over a very short period and is typically abundant for only 4–6 hours in the middle of a single day.

The withdrawal of conifer pollination drops may be influenced by morphological features of the pollen such as size, surface structure, or flotation ability. Later-acting incompatibility mechanisms may also take place within the ovules (Owens et al. 1998). Observations by Mugnaini et al. (2007) suggested that some type of biochemical interaction between the pollen and the droplet governs withdrawal in *Juniperus communis*.

Each female cone of *Juniperus communis* var. *depressa* has the potential to produce up to three seeds (Adams 2008). However, a substantial number of the seeds that develop in any given population lack embryos (Houle and Babeux 1994). Low rates of seed viability have also been documented in other varieties of *J. communis* (Verheyen et al. 2009, Adams et al. 2014).

Successful seed set in *Juniperus* may be limited by the proximity of male plants or by the direction of prevailing winds at pollination time (Adams et al. 2014), and large seed crops can occur at irregular intervals (Bonner 2008). *J. communis* plants are less likely to produce viable propagules as they age (Ward 1982). Houle and Babeux (1994) found that *J. communis* var. *depressa* seeds were generally larger when fewer developed.

Seed Dispersal and Establishment

Mature fruits of *Juniperus communis* may be retained on the plants for up to two years (Stiles 1980). Some are locally dispersed by gravity and occasionally water may transport them for short distances, but animals are the most important means of dispersal (Houle and Duchesne 1999, Tirmenstein 1999). The berry-like female cones are eaten by a variety of birds and mammals, and passage through their digestive tracts enhances seed germination (Soper and Heimburger 1982). Birds that consume *J. communis* tend to avoid aborted, damaged, or unripened cones—instead favoring those most likely to contain viable seeds (García et al. 1999). Livingston (1972) noted that American Robins (*Turdus migratorius*) fed heavily on *J. communis* var. *depressa* during their migrational flights, although Stiles (1980) characterized Juniper cones as low-quality fruits that were primarily utilized by resident bird species during the winter months. Mammals known to eat *Juniperus* seeds include bears, coyotes, foxes, martens, opossums, raccoons, and ringtails (Willson 1993). There is evidence that *J. communis* seeds can persist in the soil for a period of time after they have been dispersed (Major and Pyott 1966).

Juniperus communis is generally viewed as difficult to establish from seed. The seeds have a thick coat and they are dormant at the time of dispersal. In order to germinate, they require several months of warm, moist stratification followed by an equivalent period of cold, moist stratification (Livingston 1972, Diotte and Bergeron 1989, Tirmenstein 1999, Leopold 2005). The optimal temperature for germination is 20^{o} C (Bonner 2008). Light may also improve germination rates: Rosén (1988) found that *J. communis* seedlings established more readily in open spaces than beneath established shrubs. Both ectomycorrhizae and endomycorrhizae have been documented in *J. communis* (Wang and Qiu 2006), although Veldhuis et al. (2022) found that the positive effects of fungal associations were limited by nutrient availability.

Habitat

Juniperus communis is typically associated with dry, open, nutrient-poor habitats, and the species is most likely to be abundant in relatively harsh environments (Tirmenstein 1999). *J. communis* var. *depressa* occurs at elevations of 0–2,800 meters above sea level (Adams 2008). The substrate is commonly rocky, gravelly, or sandy. Natural habitats include barren slopes and summits, cliff edges, plateaus, alvars, and dunes (Arnold Arboretum 1916, Russell 1953, Olsen 1958, Nelson and Fink 1978, Hough 1983, Koch et al. 1983, Hart and Price 1990, Rhoads and Block 2007, Catling 2009, Assal et al. 2015, Catling 2016, Weakley et al. 2024). Potzger (1941) noted that Dwarf Juniper was often an early colonizer of gaps in upland or beach habitats. In New England, *J. communis* var. *depressa* has frequently been found growing in abandoned pastures (Nichols 1914, Knowlton 1915, Livingston 1972).

Juniperus communis has a low tolerance for shade and usually grows out in the open (Tirmenstein 1999). Weakley et al. (2024) assigned *J. communis* var. *depressa* a heliophily rank of 7, which signifies a strong preference for sunny conditions. When the species occurs in woodlands, the dominant canopy trees are generally other conifers such as *Juniperus virginiana*, *Picea* spp., or *Pinus* spp. (Thieret 1964, Argus 1966, Breden et al. 2001). Hamlin et al. (2012) described *J. communis* var. *depressa* as a characteristic shrub of a Ridgetop Pitch Pine/Scrub Oak community in Massachusetts, noting that the species had been frequent at the site in 1895 and was still frequent in 2011.

Although it is most often found in dry habitats, *J. communis* var. *depressa* has occasionally been encountered in wetter situations. Examples include the shore of a brackish lagoon (Fernald 1951), a marshy habitat on an old dredge spoil (Bernard and Davidson 1969), and a string bog (Reinartz 1986). New Jersey's extant populations are located in more conventional settings on dry outcrops or hilltops: One is situated along the edge of a gap created by a utility right-of-way (NJNHP 2024).

Wetland Indicator Status

Juniperus communis is a facultative upland species, meaning that it usually occurs in nonwetlands but may occur in wetlands (U. S. Army Corps of Engineers 2020).

USDA Plants Code (USDA, NRCS 2024b)

JUCOD

Coefficient of Conservancy (Walz et al. 2020)

CoC = 8. Criteria for a value of 6 to 8: Native with a narrow range of ecological tolerances and typically associated with a stable community (Faber-Langendoen 2018).

Distribution and Range

The global distribution of *Juniperus communis* var. *depressa* is restricted to Canada and the United States (POWO 2024). The map in Figure 1 depicts the extent of Dwarf Juniper in North America.

The USDA PLANTS Database (2024b) shows records of *Juniperus communis* var. *depressa* in ten New Jersey counties: Bergen, Cape May, Essex, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Sussex, and Warren (Figure 2). The data include historic observations and do not reflect the current distribution of the species.

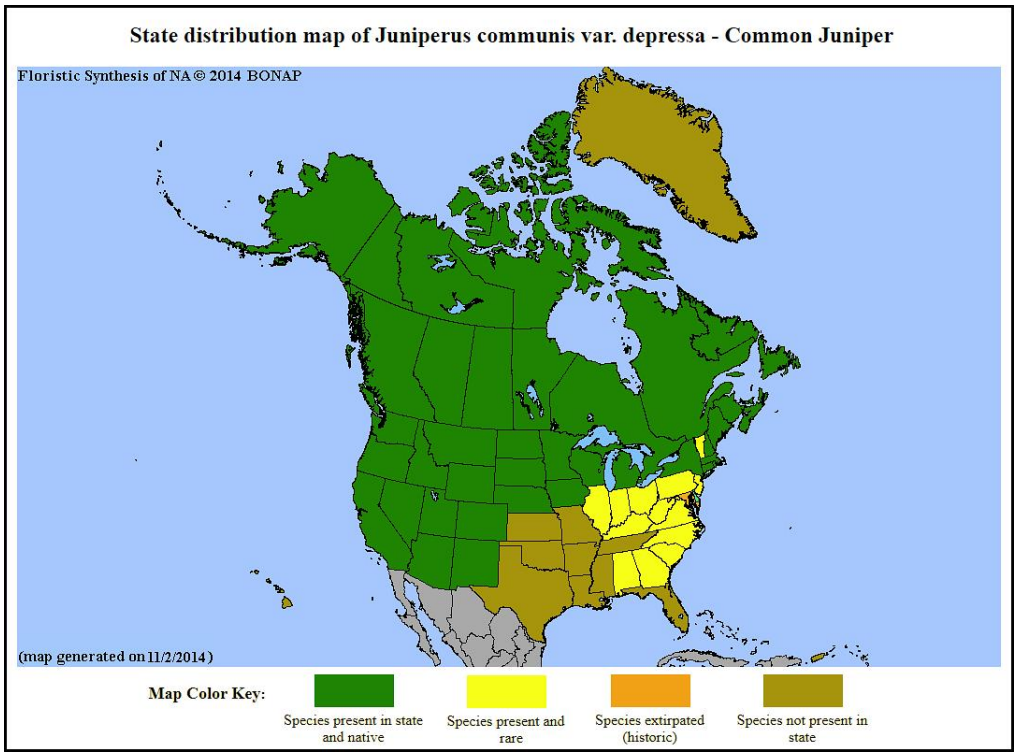


Figure 1. Distribution of J. communis var. depressa in North America, adapted from BONAP (Kartesz 2015).

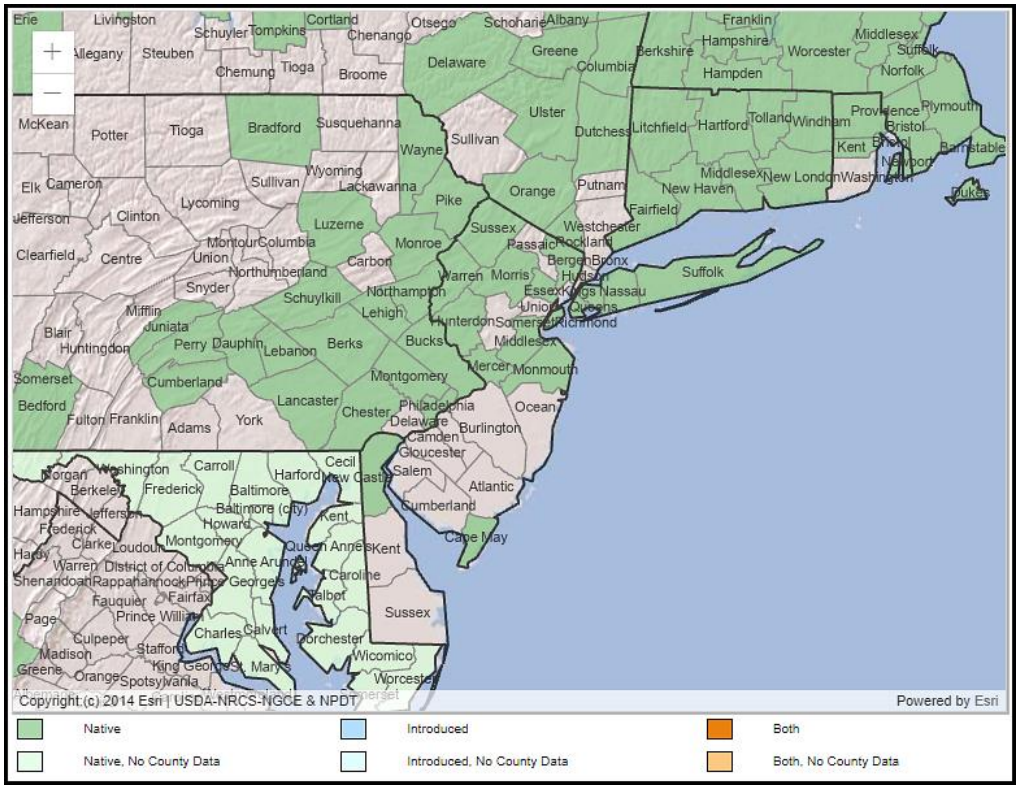


Figure 2. County records of J. communis var. depressa in New Jersey and vicinity (USDA NRCS 2024b).

Conservation Status

Juniperus communis var. *depressa* is considered globally secure. The G5T5 rank means the variety 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 2024). The map below (Figure 3) illustrates the conservation status of *J. communis* var. *depressa* throughout its range. The variety is secure or apparently secure everywhere in Canada except Nunavut and Prince Edward Island, where it is vulnerable (moderate risk of extinction). In the United States it is vulnerable in two states, imperiled (high risk of extinction) in one state, and critically imperiled (very high risk of extinction) in seven states. *J. communis* var. *depressa* has not been ranked in many of the states where it occurs.

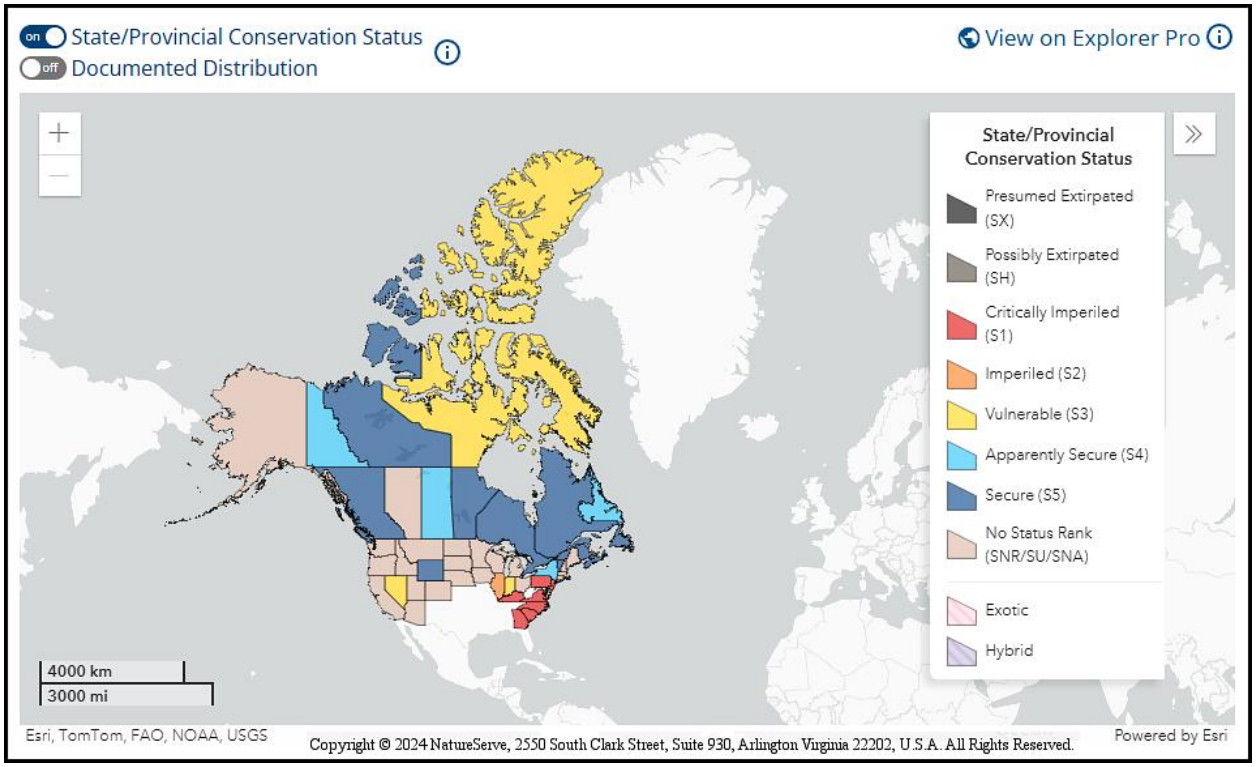


Figure 3. Conservation status of J. communis var. depressa in North America (NatureServe 2024).

New Jersey is one of the states where *Juniperus communis* var. *depressa* is ranked as critically imperiled (NJNHP 2024). The S1 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. *J. communis* var. *depressa* 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).

Juniperus communis was once collected fairly frequently throughout northern New Jersey (Britton 1889, Taylor 1915, Mid-Atlantic Herbaria 2024), and Hough (1983) reported a current sight record in Cape May County. Only two populations are currently tracked in the state. They

were discovered in 1983 and 2013, respectively, and both are located in Sussex County (NJNHP 2024).

Threats

One of New Jersey's two extant populations of *Juniperus communis* var. *depressa* is small but it seems to be stable. The second occurrence appears to consist of a single plant, and threats from both deer browse and right-of-way maintenance were noted (NJNHP 2024). Tirmenstein (1999) indicated that *Juniperus communis* is subject to browsing by both deer and rabbits, particularly during the winter months. Although the species was not favored by rabbits during a series of winter studies conducted in Massachusetts during the 1940s (Sweetman 1949), the animals have been known to graze young *J. communis* plants intensively at other locations (Ward 1982). In New Jersey the greater threat is likely to come from deer (NJDSR 2019, 2021).

Utility corridor maintenance could be harmful or beneficial to *Juniperus communis* var. *depressa* depending on the methods utilized. The application of herbicides or direct damage to plants by machinery would obviously be detrimental. On the other hand, maintenance activities can help to maintain the kind of habitat that the juniper needs. *J. communis* var. *depressa* is mainly found in open sites, favoring stressful environments that limit competition (Diotte and Bergeron 1989, Tirmenstein 1999). The shrub typically begins to decline after trees establish in the sites where it occurs, and it is eventually shaded out as succession proceeds (Potzger 1941, Olson 1958).

Fire is a popular tool for the management of succession but it is generally viewed as harmful to *Juniperus communis*. The branches are resinous and highly flammable. Although some plants in a population may survive a crown fire or a patchy burn, severe fires can eliminate an entire occurrence. Due to the poor regeneration capabilities of *J. communis*, it is unlikely to re-appear at a site once it has been eradicated (Diotte and Bergeron 1989, Tirmenstein 1999, Penney et al. 2008).

Juniperus communis plants can be utilized for landscaping in urban areas because they are tolerant of air pollution (NCCE 2024). In natural settings, however, pollution may interfere with reproduction. When particulate matter is deposited on pollination droplets it can initiate their partial withdrawal, and contamination also reduces the surface area available to receive viable pollen (Mugnaini et al. 2007).

J. communis var. *depressa* is relatively resistant to damage from insects and disease (NCCE 2024), although it was identified as an alternate host for Quince Rust (*Gymnosporangium clavipes*), a fungal pest on apple crops (Miller et al. 1933) and it is also commonly infected by *G. clavariiforme* and *G. cornutum* (Parmelee 1960). *Gymnosporangium* rusts can cause leaves and twigs to swell and they often produce gelatinous orange galls on the branches. Although they may be considered unsightly, they rarely cause long-term harm to the hosts (Wisconsin Horticulture 2024).

Climate Change Vulnerability

Information from the references cited in this profile was used to evaluate the vulnerability of New Jersey's *Juniperus communis* var. *depressa* 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 *J. communis* var. *depressa* was assessed as Highly Vulnerable, meaning that it is likely to experience a significant decrease in abundance or range extent throughout New Jersey by 2050. However, the conclusion was reached with relatively low confidence because the scoring system placed it close to the border between moderate and high vulnerability.

As the global climate warms, temperatures are rising faster in New Jersey than elsewhere in the northeast and the weather patterns are also changing. A net increase in annual precipitation is likely due to greater storm intensity but more frequent droughts are also expected in the state (Hill et al. 2020). *J. communis* can withstand periods of drought but the species has a low tolerance for heat and humidity (NCCE 2024). Warm, wet conditions have been found to decrease the growth of established *J. communis* plants and to increase mortality (Riddle 2011). Seed viability is likewise reduced by warming, and also by nitrogen deposition (Verheyen et al. 2009). Recent shifts in the distribution of Plant Hardiness Zones reflect warming trends that have already been documented across much of the country (USDA, AGS 2023) and the pattern is expected to continue. While *J. communis* appears to have effective means of dispersal, limited production of viable seeds and poor establishment capabilities reduce the probability that the species will be able to colonize new locations at higher altitudes when older sites become unsuitable. Rising temperatures and a longer growing season are also expected to facilitate the introduction of more competitive plant species in New Jersey (Bellard et al. 2013, Salva and Bradley 2023), which would further jeopardize the future of Dwarf Juniper in the state.

Management Summary and Recommendations

An updated assessment of the statewide status of *Juniperus communis* var. *depressa* is recommended. The older of the two New Jersey populations that are currently tracked was noted to be small in size, so if site conditions remain undisturbed it is likely to persist but regular monitoring of the habitat conditions is advisable. The more recently discovered occurrence appears to consist of a single plant and, while some actions could be taken to preserve it, an investment of time and resources may not be warranted if there is no possibility of reproduction. However, viability of that population has not been formally assessed and there might be additional plants in the vicinity. Because *J. communis* was once characterized as relatively common in the northern part of the state it could be worthwhile to follow up on some of the sites where the species was previously reported.

Synonyms

The accepted botanical name of the species is *Juniperus communis* var. *depressa* Pursh. Some orthographic variants, synonyms, and common names are listed below (ITIS 2024, POWO 2024, USDA NRCS 2024b). There is a great deal of morphological variation within *J. communis* var. *depressa* so future studies might result in further divisions (Adams 2024, Weakley et al. 2024).

Botanical Synonyms	**Common Names**
Juniperus communis ssp. *depressa* (Pursh) Franco	Dwarf Juniper
Juniperus canadensis Lodd. ex Burgsd.	Common Juniper
Juniperus communis var. *canadensis* (Lodd. ex Burgsd.) Loudon	Ground Juniper
Juniperus depressa Raf.	Mountain Juniper
Sabina multiova Goodwyn	Pasture Juniper

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