Triadenum walteri

Walter's St. John's-wort

Clusiaceae

Triadenum walteri by Theo Witsell, 2021

***Triadenum walteri* 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

501 E. State St.
PO Box 420
Trenton, NJ 08625-0420

Prepared by:
Jill S. Dodds
jsdodds@biostarassociates.com

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For:
New Jersey Department of Environmental Protection
Office of Natural Lands Management
New Jersey Natural Heritage Program
natlands@dep.nj.gov

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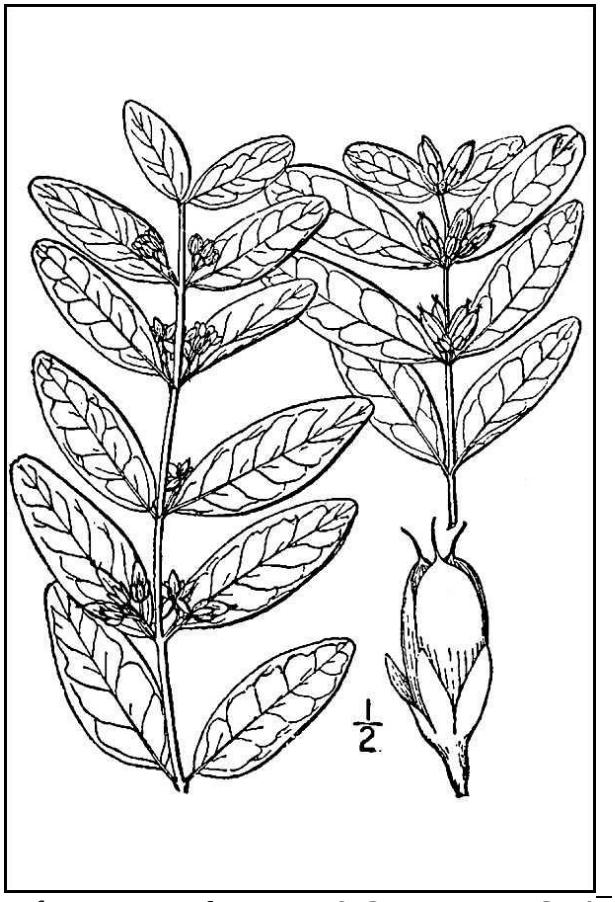
Life History

Triadenum walteri (Walter's St. John's-wort) is a rhizomatous perennial herb. *Triadenum* has traditionally been included in the Clusiaceae but it was recently transferred to the Hypericaceae (APG III 2009, Kartesz 2015). *Triadenum walteri* plants have erect stems up to a meter tall that may be simple or branched near the top. The opposite, entire, narrowly oval leaves are large (3–15 cm long and 1–3.5 cm wide) and have distinct petioles: The latter character separates *T. walteri* from both of the other *Triadenum* species that occur in New Jersey, which have sessile leaves. Small clusters of flowers are produced at the top of the stem and on short branches in the upper leaf axils. The flowers of *T. walteri* have five sepals 3–5 mm long and five pink or pinkish-green petals that are 5–7 mm in length. Each flower has three styles and nine stamens which are arranged in three groups of three and have partially fused filaments. Nürk (2011) noted that both the petals and the stamens are deciduous at maturity. *T. walteri* fruits are three-parted cylindrical capsules 7–12 mm long. (See Britton and Brown 1913, Fernald 1950, Wood and Adams 1976, Gleason and Cronquist 1991, Robson 2020).



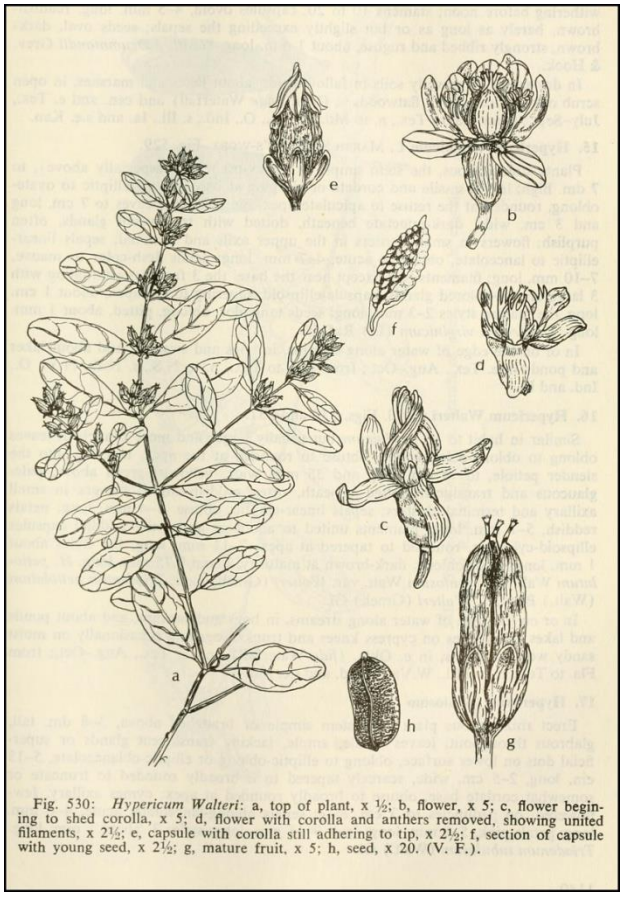


Fig. 530: *Hypericum Walteri*: a, top of plant, x ½; b, flower, x 5; c, flower beginning to shed corolla, x 5; d, flower with corolla and anthers removed, showing united filaments, x 2½; e, capsule with corolla still adhering to tip, x 2½; f, section of capsule with young seed, x 2½; g, mature fruit, x 5; h, seed, x 20. (V. F.).

Left: Britton and Brown 1913, courtesy USDA NRCS 2023a. Right: Correll and Correll 1972.

Throughout its range, *Triadenum walteri* may bloom from July through September (Rhoads and Block 2007, Robson 2020, Weakley et al. 2022) and the fruiting period can extend into November (Les 2017). Recent monitoring of a New Jersey population found that *T. walteri*

plants were bearing both buds and flowers during the last week in August (NJNHP 2022). According to Les (2017), the species is also able to reproduce vegetatively via its rhizomes.

Boverser 2023.

Bob Cunningham 2017.

Dwayne Estes, 2020.

Pollinator Dynamics

The specific pollinators of *Triadenum walteri* have not been identified. Les (2017) remarked that *Triadenum* flowers were usually insect pollinated but self-pollination could also occur. The blooms of other species in the Clusiaceae are typically fertilized by pollen-collecting insects, primarily bees (Zomlefer 1994), and fossilized flowers from early clusioid taxa in New Jersey indicated that bees have served as important pollinators for plants in that family since the Late Cretaceous period (Crepet and Nixon 1998). *Triadenum* species share some of the features of what Robson (1972, 2016) referred to as 'Elodes syndrome', a suite of characteristics that the author interpreted as an indication of pollinator specialization, although no particulars were provided regarding the insects likely to be involved. Chafin (2019) simply noted that *T. walteri* is pollinated by bees. The Yellow-banded Bumblebee (*Bombus terricola*) has been observed on the similar flowers of *T. virginicum* (Stubbs et al. 1992). Some related species are apomictic, meaning that they are capable of forming viable seeds without fertilization. Facultative apomixis has been documented in *Triadenum virginicum* and *Hypericum perforatum* (Myers 1964, Nürk 2011, Barcaccia et al. 2006).

Seed Dispersal

The seeds of *Triadenum walteri* are cylindrical, ranging between 0.8–1.1 mm in length, and they have a finely-roughened surface but are not winged (Wood and Adams 1976, Robson 2020). According to Dennis and Batson (1974), the primary dispersal mechanisms are flotation and adhesion. Some post-consumption dispersal by animals can also occur. For example, *T. walteri* seeds are occasionally eaten by Wood Ducks (*Aix sponsa*) in the fall and their importance as a food source for the waterfowl increases during years when acorn production is low (Landers et al. 1977).

During a seed bank study undertaken by Peterson and Baldwin (2004) *Triadenum walteri* germinated from soil samples that were collected in marshes and swamps where the species was present in the vegetation. However *T. walteri* failed to emerge during some other seed bank studies at sites where it occurred (Cherry and Gough 2006, Howard and Wells 2007), which could be indicative of limited viability. Les (2017) noted that the species does not appear to form a persistent seed bank. No information was found regarding specific germination and establishment requirements.

Habitat

Triadenum walteri grows at elevations under 400 meters above sea level in an assortment of wetland habitats including swamps, marshes, sinkholes, and the borders of lakes or ponds (Adams 1973, Homoya and Hedge 1982, Cooperrider 1989, Rhoads and Block 2007, Robson 2020, Weakley et al. 2022). Many populations are located in floodplains or tidally influenced settings but some are in sites that are fed by groundwater seepage (Woods and Fuller 1988, Darst et al. 2002, Majure 2007). A microsite study in Arkansas found that *T. walteri* was frequently situated in the lowest-lying parts of the swamp (Grell et al. 2005). Walter's St. John's-wort can grow in partial sun or shade (Chafin 2019). Szakacs et al. (2022) characterized *T. walteri* as a generalist species that did not have a strong affiliation to either open or shaded habitats. It sometime occurs in wet, deeply shaded sites that only support a limited number of herbaceous species (Lelong 1983).

In New Jersey *Triadenum walteri* is most likely to be found in wooded swamps (NJNHP 2022). The sites may be saturated throughout the growing season or seasonally flooded. The species is characteristic of *Acer rubrum—Fraxinus pennsylvanica* / *Saururus cernuus* forests and may also be present in *Liquidambar styraciflua*—(*Acer rubrum*) forests or *Acer rubrum—Nyssa sylvatica—Liquidambar styraciflua—Populus heterophylla* forests. Another potential habitat in the state is tidal shrublands dominated by *Alnus* (*incana* ssp. *rugosa*, *serrulata*) and *Cornus amomum* (Breden et al. 2001).

Hydrologic regimes in the natural communities where *Triadenum walteri* occurs are often characterized by periodic or seasonal fluctuations in water level. The species is most often found in locations that remain flooded for several months at a time but it can also occur at sites that are subject to frequent short floods such as those resulting from tidal activity (Mohlenbrock 1959, Homoya and Hedge 1982, Lelong 1983, Darst et al. 2002, Majure 2007, Witsell 2007). *T. walteri* was found to be tolerant of episodic flooding and drawdown resulting from water level manipulations at a site associated with the construction of locks and dams (Howard and Wells 2007). In places that are permanently inundated, Walter's St. John's-wort can establish on elevated microsites such as floating logs or vegetation mats, stumps or living tree bases, and hummocks formed by other species like *Juncus effusus* (Dennis and Batson 1974, Homoya and Hedge 1982, Huffman and Lonard 1983, MDNHP 1997, Ervin 2005, Les 2017). One floristic study of floating islands found that the vegetation mats were temporary and did not form in the same locations from one year to the next so they did not always persist long enough for species like *T. walteri* to set and disperse seeds (Cherry and Gough 2006).

Wetland Indicator Status

Triadenum walteri is an obligate wetland species, meaning that it almost always occurs in wetlands (U. S. Army Corps of Engineers 2020).

USDA Plants Code (USDA, NRCS 2023b)

TRWA

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 global range of *Triadenum walteri* is restricted to the central and eastern United States (POWO 2023). The map in Figure 1 depicts the extent of Walter's St. John's-wort in North America. Although Kartesz (2015) questioned the species' presence in Pennsylvania, *T. walteri* was included in the state's flora by Rhoads and Block (2007) and it is currently listed as a species of conservation concern in that state (NatureServe 2023).

The USDA PLANTS Database (2023b) shows records of *Triadenum walteri* in one New Jersey county: Cape May (Figure 2). Some specimens obtained in Camden and Burlington counties were also identified as *T. walteri* (Mid-Atlantic Herbaria 2023). The additional records were based on historic observations and do not reflect the current distribution of the species, which is indeed limited to Cape May County.

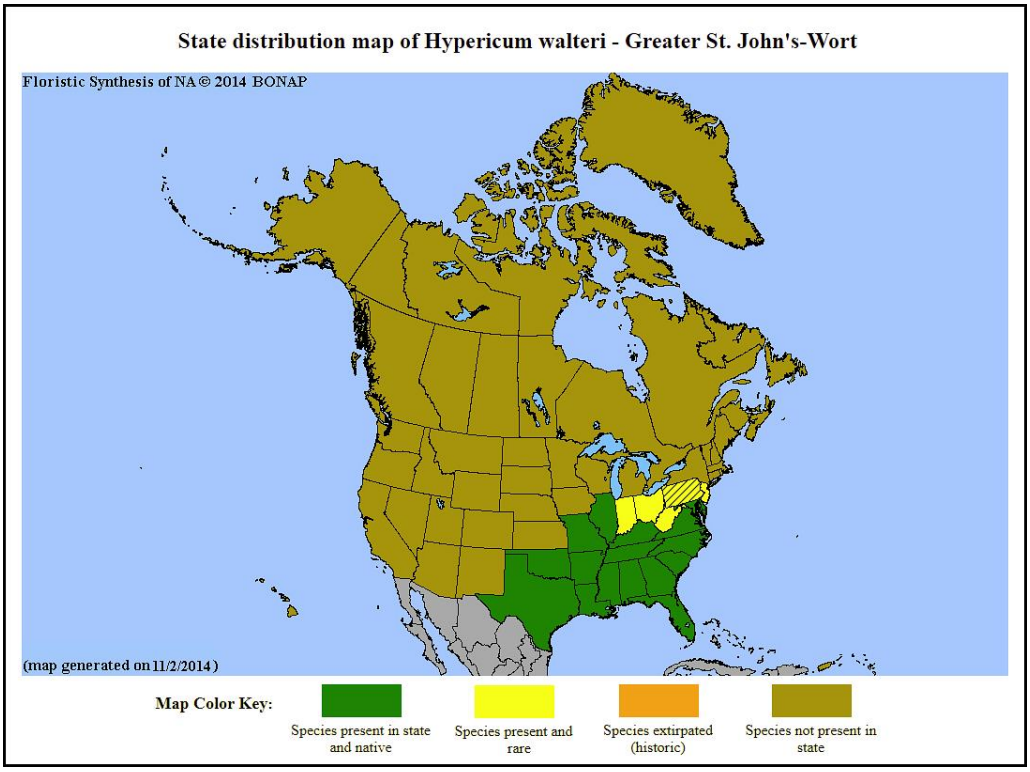


Figure 1. Distribution of T. walteri in North America, adapted from BONAP (Kartesz 2015). Cross hatching /// indicates a questionable presence.

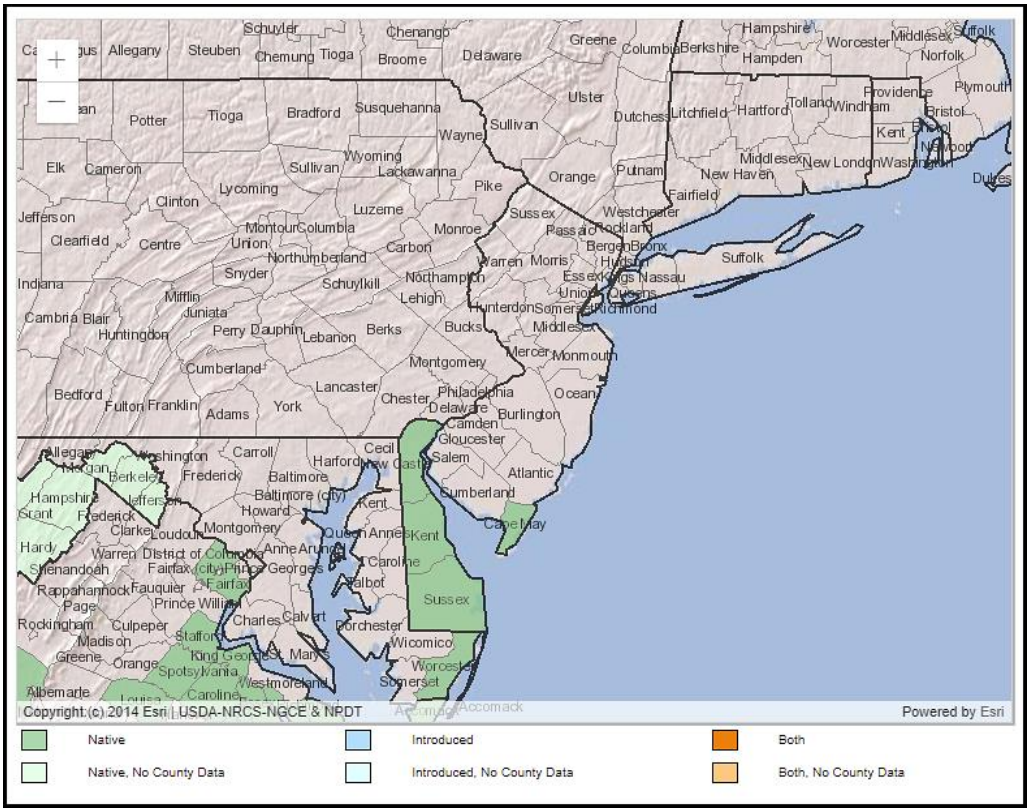


Figure 2. County records of T. walteri in New Jersey and vicinity (USDA NRCS 2023b).

Conservation Status

Triadenum walteri 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 2023). The map below (Figure 3) illustrates the conservation status of *T. walteri* throughout its range. Walter's St. John's-wort is critically imperiled (very high risk of extinction) in three states, imperiled (high risk of extinction) in two states, and vulnerable (moderate risk of extinction) in one state. It is secure, apparently secure, or unranked throughout the remainder of its range.

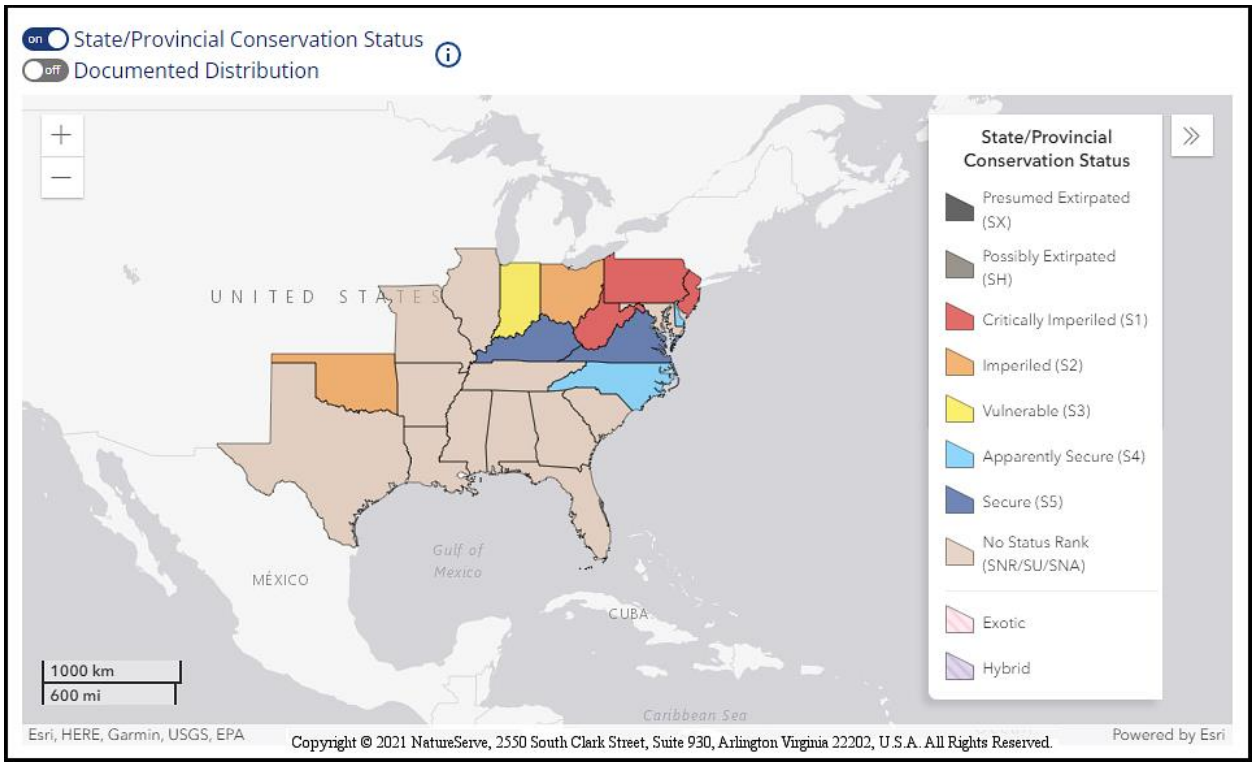


Figure 3. Conservation status of T. walteri in North America (NatureServe 2023).

New Jersey is one of the places where *Triadenum walteri* is critically imperiled (NJNHP 2022). 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. *T. walteri* 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 *T. walteri* 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 record of *Triadenum walteri* in New Jersey was based on an 1800s-era specimen from Camden County (Britton and Brown 1889, Keller and Brown 1905), and Taylor (1915) noted that the species had not been seen in the state since the initial collection was made. Stone

(1911) pointed out that the Camden specimen was incomplete, and although the identity was later confirmed by the presence of both flowers and fruits in the sample the original occurrence is now considered extirpated (NJNHP 2022). Several collections were made from a site in Cape May County during the 1920s, but subsequently Hough (1983) characterized the species' status in the state as uncertain because all of the records were over a half century old and the locations had not been rechecked. In 1985 the ongoing presence of *T. walteri* was confirmed by the discovery of a new population in Cape May County (Snyder 1986) and several additional occurrences were documented during the same decade, one of which may or may not have been a relocation of the site where the 1920s collections were made (Snyder 2000, NJNHP 2022). The four extant populations reported by Breden et al. (2006) are still thought to be present, although three of them have not been revisited since they were first discovered (NJNHP 2022).

Threats

No specific threats to New Jersey populations of *Triadenum walteri* have been identified to date (NJNHP 2022). Wetland habitats like those occupied by *T. walteri* are often susceptible to destruction or degradation resulting from changes in water quantity or quality. Although Walter's St. John's-wort can thrive at sites where water levels fluctuate the extent of the species' tolerance for long-term inundation or desiccation has not been examined. Studies of thermal pollution impacts on communities subjected to the discharge of nuclear reactor effluents found that canopy trees were destroyed by the higher temperatures but the local abundance of *T. walteri* was not affected (Sharitz et al. 1974, Martin et al. 1977).

In some of the forested wetland habitats where *Triadenum walteri* often occurs, direct damage to understory flora can result from feral pig activities such as rooting, wallowing, and trampling (Zengel 2008). Although the competitive abilities of *T. walteri* are unknown, it often occurs in environments which few other herbaceous plants can tolerate so any changes in habitat conditions that favor other plant species could potentially have a detrimental effect on the St. John's-wort.

T. walteri is sometimes subject to herbivory by crayfish (Les 2017). Crayfish are omnivorous and their diet includes aquatic vegetation, which is obtained by clipping the stems of plants near the substrate. The process is somewhat wasteful, as large fragments are often inadvertently released. Consumption by crayfish has been known to reduce the density of aquatic plants (Lodge et al. 1994). Although the invertebrates are more likely to graze on submergent plants they can also feed on emergent macrophytes, particularly during the early stages of growth, and extensive herbivory might take a toll on some populations (Nyström and Strand 1996).

The amount of information currently available regarding the life history and ecological requirements of *Triadenum walteri* is not sufficient for a meaningful assessment of the species' vulnerability to climate change. Shifting climactic conditions in New Jersey are resulting in higher temperatures, more frequent and intense precipitation events, and increasing periods of drought. Plant communities in low-lying areas near the coast are also susceptible to rising sea levels and such sites are likely to become increasingly saline and experience more frequent flooding (Hill et al. 2020). Although *T. walteri* is adapted to withstand alternate periods of

inundation and drying, climate-driven changes may exacerbate other threats: For example, Zengel (2008) observed that feral pig activity in southern swamps was intensified during periods of drought. A relatively low salinity tolerance was inferred for *T. walteri* by Darst et al. (2002). Some of New Jersey's extant populations are situated in aquifers that are already experiencing contamination from saltwater intrusion (Lacombe and Carleton 2002), and the habitats may also be subject to tidal surges associated with extreme storms like 2012's Superstorm Sandy (NJ Adapt 2023).

Management Summary and Recommendations

Les (2017) observed that little is known regarding the reproductive biology and seed ecology of the *Triadenum* species group. Research on *Triadenum walteri* is urgently needed in order to establish a foundation for management planning in states where the species is imperiled. Although *T. walteri* appears to be most vulnerable in the northern part of its range the reasons for that are unclear. Recommended topics for investigation include the frequency and extent of vegetative reproduction, identification of pollinators, evaluation of self-compatibility and the potential for apomixis, determination of the length of time that seeds can remain viable in the soil bank, description of germination and establishment requirements, limitations resulting from hydrologic extremes, and appraisal of salinity tolerance.

Three of New Jersey's four *Triadenum walteri* populations are in need of updated status assessments. Monitoring would provide an opportunity to document the present extent of two occurrences that have never been fully surveyed and of one that was extremely small when last observed in 1987. Site visits would also provide an opportunity to reevaluate habitat conditions and identify current and emerging threats so that appropriate management decisions can be made.

Synonyms

The accepted botanical name of the species is *Triadenum walteri* (J. F. Gmel.) Gleason. Orthographic variants, synonyms, and common names are listed below (ITIS 2023, POWO 2023, USDA NRCS 2023b). The synonym *Hypericum walteri* is still in use by some sources (eg. Kartesz 2015, POWO 2023). The status of the genus remains unsettled because there is a strong case for the separation of *Triadenum* based on morphological features but recent genetic studies have indicated that the genus belongs to a clade that is nested within *Hypericum* (see Gleason 1947, Ruhfel et al. 2011, Nürk et al. 2013, Robson 2016 and 2020, Weakley et al. 2022).

Botanical Synonyms	**Common Names**
Hypericum walteri J. F. Gmel.	Walter's St. John's-wort
Elodes axillaris Spach	Greater Marsh St. Johnswort
Elodes floribunda Spach	Greater St. John's-wort
Elodes tubulosa Purs	
Elodes tubulosa Raf.	

Gardenia petiolata Farw.
Hypericum paludosum Choisy
Hypericum petiolatum Walter, non L.
Hypericum tubulosum var. *walteri* (J. F. Gmel.) Lott
Hypericum virginicum var. *walteri* (J. F. Gmel.) A. E. Murray
Hypericum virginicum subsp. *walteri* (J. F. Gmel.) A. E. Murray
Martia petiolata Spreng.
Triadenum petiolatum (Walter) Britton
Triadenum tubulosum var. *walteri* (J. F. Gmel.) Cooperr.

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