U.S. Fish & Wildlife Service

Scrambling Nightshade (*Solanum tampicense*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, January 2023
Revised, January 2023
Web Version, 3/19/2025

Organism Type: Flowering Plant
Overall Risk Assessment Category: Uncertain

Photo: L. Amos. Licensed under CC BY-NC 4.0. Available: https://www.inaturalist.org/observations/102867383 (January 2023).

1 Native Range and Status in the United States

Native Range

From Fox and Bryson (1998):

"WNS [wetland nightshade, *Solanum tampicense*] is thought to have originated in southern Mexico, the West Indies, Guatemala, Belize (Gentry and Standley 1974), Cuba, and El Salvador (Standley 1924)."

From Machuca Machuca et al. (2022):

"*Solanum tampicense* is a woody vine or shrub. It is distributed in Belize, Cayman Islands, Colombia, Costa Rica, Cuba, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, […] and Venezuela. In Mexico, it occurs in the states of Campeche, Chiapas, Guerrero, Jalisco, Nayarit, Oaxaca, Quintana Roo, Tabasco, Tamaulipas, Veracruz, and Yucatán."

Status in the United States

From Bryson et al. (2006):

"It was first reported from mainland Florida in a marsh south of Punta Gorda, Charlotte County in 1983 by Wunderlin et al. (1993). Since that time, wetland nightshade has been detected in Florida in Highlands (1985), DeSoto (1991), Lee (1995), and Glades (1996) counties and on Garden Key in the Dry Tortugas in a moist seep area within Fort Jefferson since 1974 (Reimus and Robertson 1995)."

From FDACS (2023):

"It has invaded three major river basins, including the Peace River drainage, Fisheating Creek (part of the western Okeechobee River drainage), and the Big Cypress Swamp drainage."

No records of *Solanum tampicense* in trade in the United States were found.

Regulations

U.S. Department of Agriculture (2016) lists *Solanum tampicense* on the Federal Noxious Weed List. *Solanum tampicense* is regulated in Louisiana (LDWF 2022), Oklahoma (ODWC 2022), Texas (TPDW 2022), Alabama, California, Florida, Massachusetts, North Carolina, Oregon, South Carolina, and Vermont (USDA, NRCS 2023). Please refer back to state agency regulatory documents for details on the regulations, including restrictions on activities involving this species. While effort was made to find all applicable regulations, this list may not be comprehensive. Notably, it does not include regulations that do not explicitly name this species or its genus or family, for example, when omitted from a list of authorized species with blanket regulation for all unnamed species.

Means of Introductions within the United States

From Langeland and Burks (1998):

"Not known from cultivation; apparently a recent accidental or natural introduction to Florida."

From FDACS (2023):

"*Solanum* seeds are typically dispersed by birds. Seeds and stem fragments may also be transported by water currents."

Remarks
No additional remarks.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing
From ITIS (2023):

Kingdom Plantae
  Subkingdom Viridiplantae
    Infrakingdom Streptophyta
      Superdivision Embryophyta
        Division Tracheophyta
          Subdivision Spermatophytina
            Class Magnoliopsida
              Superorder Asteranae
                Order Solanales
                  Family Solanaceae
                    Genus *Solanum*
                      Species *Solanum tampicense*

According to World Flora Online (2023), *Solanum tampicense* is the current valid name for this species.

From Medal et al. (2009):

"A synonym that has been used in the past is *Solanum houstonii* Dunal but the currently accepted name is *Solanum tampicense*."

Size, Weight, and Age Range
From Bryson et al. (2006):

"The sprawling stems of mature wetland nightshade plants are up to 5 m long and 2 cm diameter near the base."

Environment
From Medal et al. (2009):

"Wetland-nightshade can grow […] mainly in swamps/wetland areas or along river margins. […] It is shade tolerant but will grow in full sun (Fox & Wigginton [1996]; Gentry & Standley 1974; Langeland & Burks 1998).

From Cuda et al. (2002):

"Wetland nightshade can tolerate frost and temporary high water conditions but not permanent flooding. Seeds withstand freezing and drying periods for up to 12 months with little loss in viability (Fox and Wigginton, 1996)."

Climate

From Bryson et al. (2006):

"It is a perennial shrub of warm climates and high-rainfall tropical regions."

Distribution Outside the United States

Native

From Fox and Bryson (1998):

"WNS [wetland nightshade, *Solanum tampicense*] is thought to have originated in southern Mexico, the West Indies, Guatemala, Belize (Gentry and Standley 1974), Cuba, and El Salvador (Standley 1924)."

From Machuca Machuca et al. (2022):

"*Solanum tampicense* is a woody vine or shrub. It is distributed in Belize, Cayman Islands, Colombia, Costa Rica, Cuba, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, […] and Venezuela. In Mexico, it occurs in the states of Campeche, Chiapas, Guerrero, Jalisco, Nayarit, Oaxaca, Quintana Roo, Tabasco, Tamaulipas, Veracruz, and Yucatán."

Introduced

From Medal et al. (2009):

"Wetland-nightshade […] probably has also spread into other regions including the northern part of South America."

Means of Introduction Outside the United States

No information was found on means of introduction of *Solanum tampicense* outside the United States.

Short Description

From FDACS (2023):

"This is a sprawling, multi-stemmed shrub that develops a woody base. Stems may grow to 16 feet long, forming dense, tangled thickets. Broad-based, recurved prickles up to 1/5 inch long are borne on the stems and along the primary veins on the lower surface of the leaves. Straight prickles sometimes occur along the veins on the upper leaf surface. The leaves are ovate to lanceolate in shape, 3 to 9 inches long, and pinnately lobed with broad, rounded sinuses between

the lobes. When viewed under magnification, both leaf surfaces bear stellate (star-shaped) hairs, but not simple or glandular hairs. The flowers are borne in short-stalked clusters in the leaf axils. Measuring approximately 5/8 inch wide, each flower has five linear-lanceolate petals that are united only at their base. The corolla is white, and the anthers are bright yellow. The fruit are globose berries, approximately 3/8 inch in diameter, with a lustrous surface that changes from green to orange to red as they mature. Each fruit contains from 10 to 60 flattened, roundish seeds that are yellow to tan in color."

Biology

From Medal et al. (2009):

"This plant has enormous reproductive potential through vegetative parts (sections of stems) as well as seed production. A single plant growing in an open sunny area can produce up to 8,620 seeds during an annual growing season that occurs from early spring to fall in southern Florida (Fox & Wigginton [1996]; Langeland & Burks 1998). Dispersion of the seeds may occur through wildlife feeding on the fruits as is common with other *Solanum* species (Medal et al. 2002; Medal & Cuda 2000)."

From GISD (2023):

"*S. tampicense* seeds are very durable and tolerant of freezing, drying and passage through a bird's gut; they can survive at least 5 years of burial in wetland soil, and fresh seeds have a 90% germination rate (FLEPPC, 2003)."

"According to FLEPPC (2003), *S. tampicense* flowers and fruits emerge in May in Florida if subjected to full sunlight or early fall if subjected to full shade. Sunlight also effects seed production, which can be as high as 247 seeds on one stem in full sunlight but less than 10% of that in shade. Plants can be regenerated from any stem sections that are kept wet and have a leaf or leaf-scar with a healthy bud. Plants can regrow from shoots developing from the root crown, an important recovery mechanism after mechanical damage, freezing, herbivory, etc."

Human Uses

No information was found on human uses of *Solanum tampicense*.

Diseases

No information was found on diseases associated with *Solanum tampicense*.

Threat to Humans

No information was found on threats to humans from *Solanum tampicense*.

3 Impacts of Introductions

No information was found on documented impacts of introductions of *Solanum tampicense*. The following quotes contain information on potential impacts of its introduction:

From Fox and Bryson (1998):

“Once established, WNS [*Solanum tampicense*] can alter riverine and cypress-dominated wetland areas by forming monospecific stands in the often sparsely vegetated niche under a regularly flooded cypress canopy. WNS is capable of invading native wetland habitats, and under suitable hydrological conditions (prolonged periods without standing water), it may out-compete native plants. Although the effects of this nonnative, invasive weed on wildlife utilization and ecosystem functions have not been fully determined, there is a major concern among botanists and natural resource managers about the potential for WNS to invade and disrupt the native flora of Florida's remaining pristine wetland habitats. It has been noted that WNS "... has a strong potential to become a noxious weed in wet forested habitats ..." (Wunderlin et al. 1993), and "... presence of this alien species may imperil natural areas of the state ..." (Coile 1993). The proximity of WNS sites in Ft. Myers (Lee County) to wildlife sanctuaries (50 km to Audubon's Corkscrew Swamp Sanctuary) and the cypress-dominated wetlands of Big Cypress National Preserve and the Everglades National Park (100 km and 130 km, respectively) is of particular concern.”

From Bryson et al. (2006):

“Based on the present research, wetland nightshade could survive and reproduce in areas farther north in the United States than are currently occupied by this species, suggesting similar results to the potential ecological range for tropical soda-apple (Patterson et al. 1997).”

Solanum tampicense is regulated in the following States (see section 1): Louisiana (LDWF 2022), Oklahoma (ODWC 2022), Texas (TPDW 2022), Alabama, North Carolina, Vermont, Massachusetts, Florida, South Carolina, California, and Oregon (USDA, NRCS 2023). It is also listed as a Federal Noxious Weed (U.S. Department of Agriculture 2016).

4 History of Invasiveness

The History of Invasiveness for *Solanum tampicense* is classified as Data Deficient.
S. tampicense is established outside of its native range, although the means of introduction to Florida is not definitively known. Sources state that this species has the potential to outcompete native plants and disrupt sensitive ecosystems in wetland areas of Florida, but no information documenting actual occurrences of those impacts could be found.

5 Global Distribution

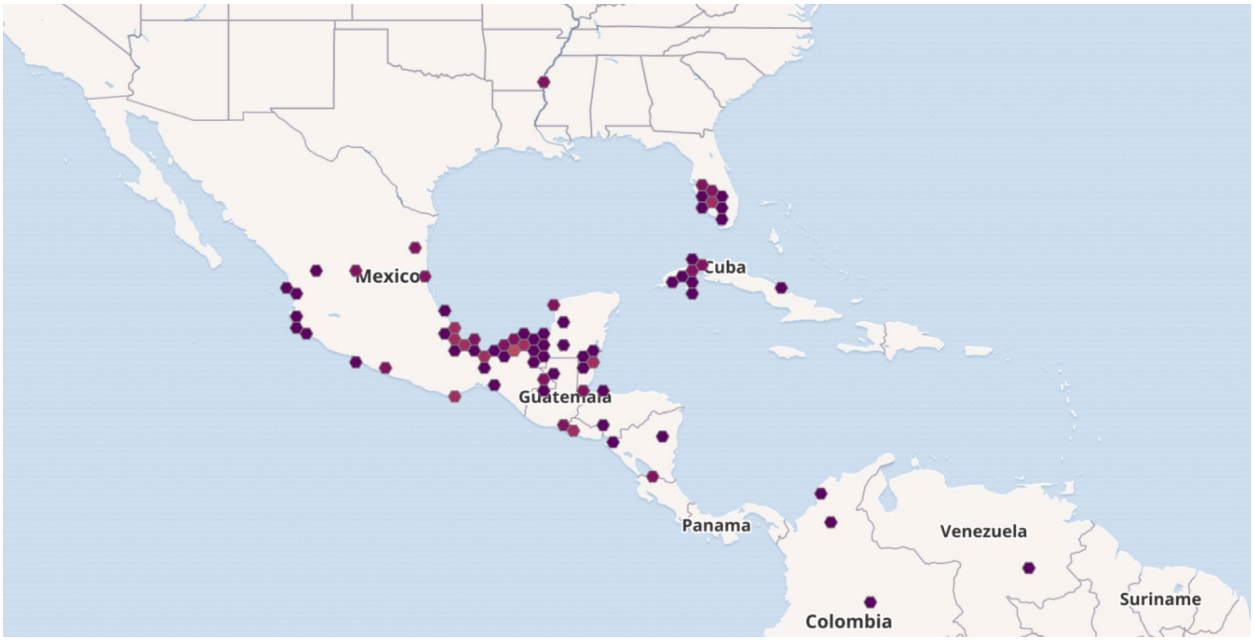

Figure 1. Reported global distribution of *Solanum tampicense*. Map from GBIF Secretariat (2023). Observations are reported from Florida, Mexico, Cuba, Central America, Colombia, and Venezuela. Records in Mississippi were excluded from climate matching analysis because they represent greenhouse-grown specimens.

6 Distribution Within the United States

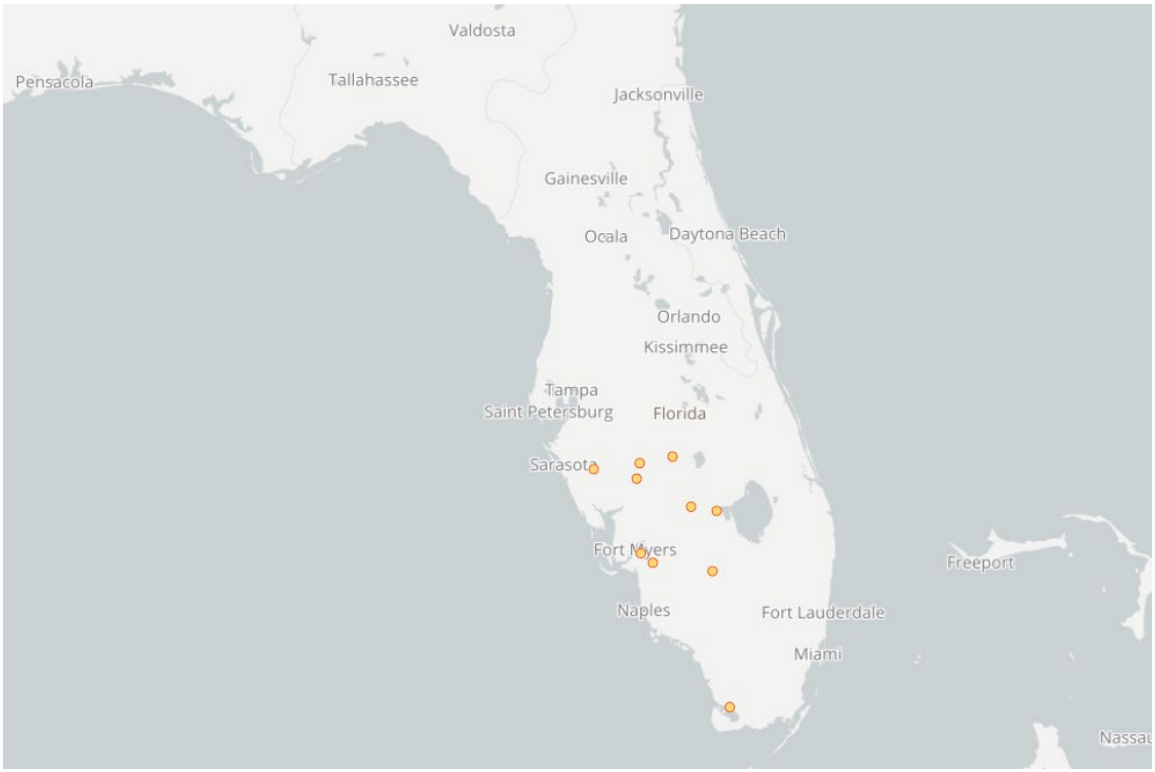

Figure 2. Reported distribution of *Solanum tampicense* in the United States. Map from GBIF-US (2023). Observations are reported from Florida.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for most of the contiguous United States was low except in the coastal Southeast, the Southwest, and southern and central California, where it ranged from medium to high. The climate match was highest in Florida, where the species is already established. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.128, indicating that Yes, there is establishment concern for this species. The Climate 6 score is calculated as: (count of target points with scores ≥ 6)/(count of all target points). Establishment concern is warranted for Climate 6 scores greater than or equal to 0.002 based on an analysis of the establishment success of 356 nonnative aquatic species introduced to the United States (USFWS 2024).

Projected climate matches in the contiguous United States under future climate scenarios are available for *Solanum tampicense* (see Appendix). These projected climate matches are provided as additional context for the reader; future climate scenarios are not factored into the Overall Risk Assessment Category.

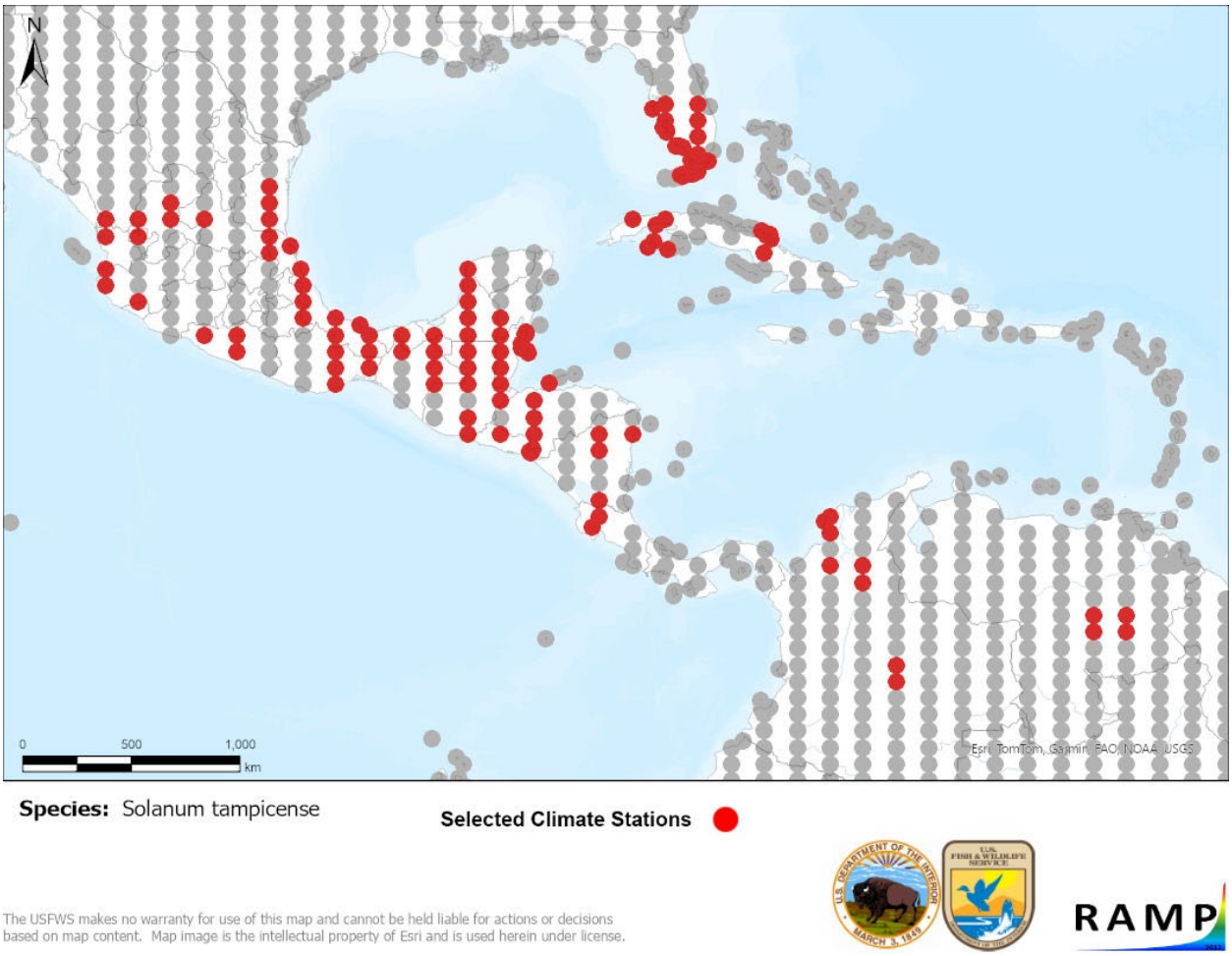

Figure 3. RAMP (Sanders et al. 2023) source map showing weather stations in Florida, Cuba, Mexico, and Central America selected as source locations (red; Florida, Cuba, Mexico, Central America, Colombia, and Venezuela) and non-source locations (gray) for *Solanum tampicense* climate matching. Source locations from GBIF Secretariat (2023). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

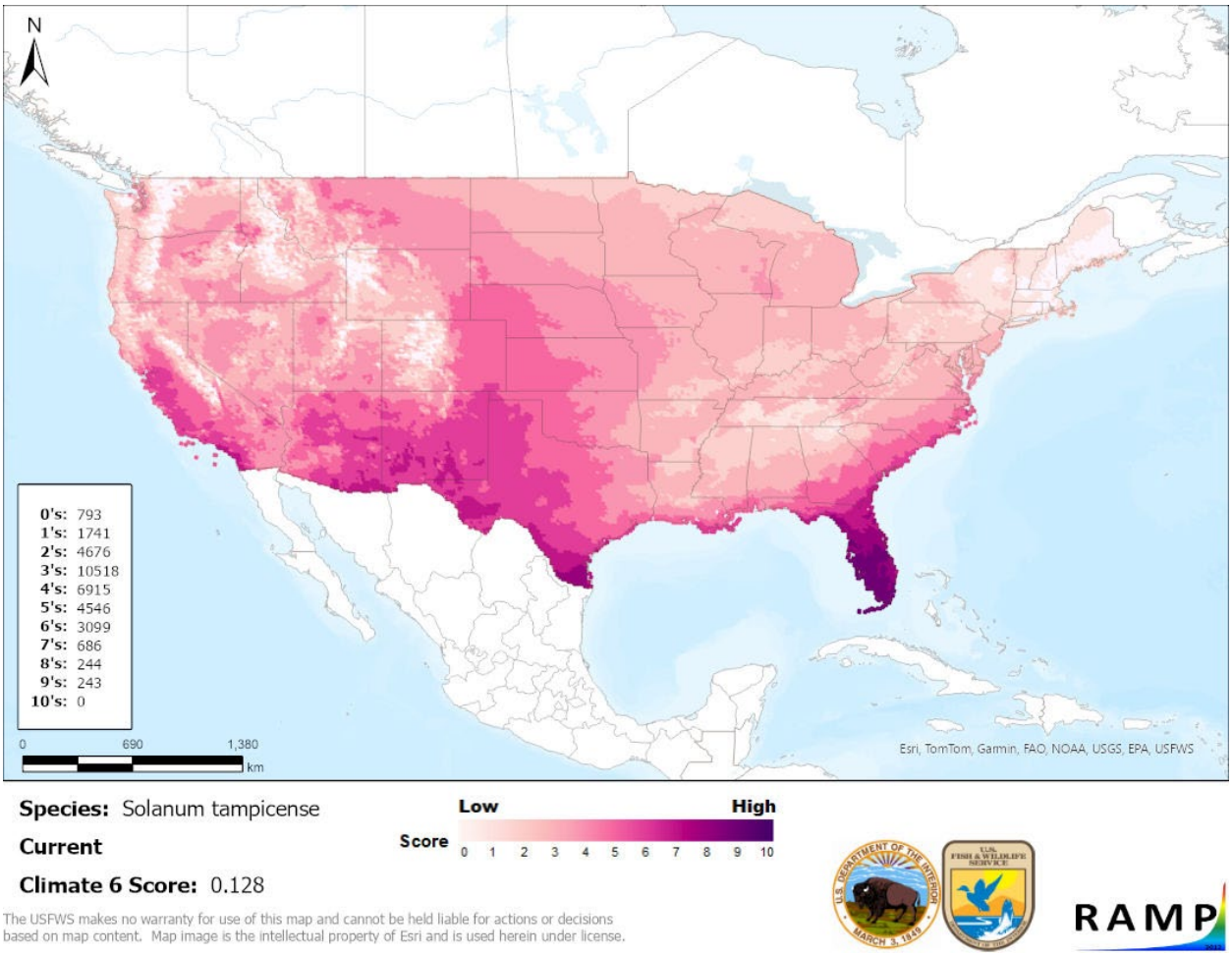

Figure 4. Map of RAMP (Sanders et al. 2023) climate matches for *Solanum tampicense* in the contiguous United States based on source locations reported by GBIF Secretariat (2023). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

The Certainty of Assessment for *Solanum tampicense* is classified as Low. Information was available regarding the species biology, ecology, and distribution. There was limited information available to assess the invasion history.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Solanum tampicense, Scrambling Nightshade, is a plant that is native to Mexico, the Caribbean, and Central America. This species grows in wetlands, riparian areas, and wet forested areas, and forms dense thickets of sprawling, prickly shrubs. It can reproduce by fragmentation as well as seed. Its means of introduction outside of its native range is not known. It is established in several drainages in Florida, where there is concern it may outcompete native plant species. However, the History of Invasiveness for *Solanum tampicense* is classified as Data Deficient due

to a lack of information documenting observed impacts or lack of impacts from the established nonnative populations. The climate matching analysis for the contiguous United States indicates establishment concern for this species. The climate match was highest for Florida, where it is already established. Other areas of high climate match included the Southwest, southern and central California, and the coastal Southeast. The Certainty of Assessment is classified as Low due to limited information about the impacts of *S. tampicense*. The Overall Risk Assessment Category for *Solanum tampicense* is Uncertain.

Assessment Elements

- **History of Invasiveness (see section 4): Data Deficient**
- **Establishment Concern (see section 7): Yes**
- **Certainty of Assessment (see section 8): Low**
- **Remarks, Important additional information: None**
- **Overall Risk Assessment Category: Uncertain**

10 Literature Cited

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in section 11.

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11 Literature Cited in Quoted Material

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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Appendix

Summary of Future Climate Matching Analysis

Future climate projections represent two Shared Socioeconomic Pathways (SSP) developed by the Intergovernmental Panel on Climate Change (IPCC 2021): SSP5, in which emissions triple by the end of the century; and SSP3, in which emissions double by the end of the century. Future climate matches were based on source locations reported by GBIF Secretariat (2023).

Under the future climate scenarios (figure A1), on average, high climate match for *Solanum tampicense* was projected to occur in the Southern Florida region of the contiguous United States. Small areas of high match were also found in the Southwest and southern California. Areas of low climate match were projected to occur in the Appalachian Range, Northeast, and Western Mountain regions. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.096 (model: MPI-ESM1-2-HR, SSP5, 2085) to a high of 0.152 (model: UKESM1-0-LL, SSP5, 2085). All future scenario Climate 6 scores were above the Establishment Concern threshold, indicating that Yes, there is establishment concern for this species under future scenarios. The Climate 6 score for the current climate match (0.128, figure 4) falls within the range of scores for future projections. The time step and climate scenario with the most change relative to current conditions was SSP5, 2085, the most extreme climate change scenario. Under one or more time step and climate scenarios, areas within the Appalachian Range, Colorado Plateau, Great Lakes, Northeast, Northern Pacific Coast, Northern Plains, Southeast, and Western Mountains saw a moderate increase in the climate match relative to current conditions. No large increases were observed regardless of time step and climate scenarios. Under one or more time step and climate scenarios, areas of the Gulf Coast, Southern Atlantic Coast, Southern Florida, and Southwest saw a moderate decrease in the climate match relative to current conditions. No large decreases were observed regardless of time step and climate scenarios. However, additional, very small areas of large or moderate change may be visible on the maps (figure A3).

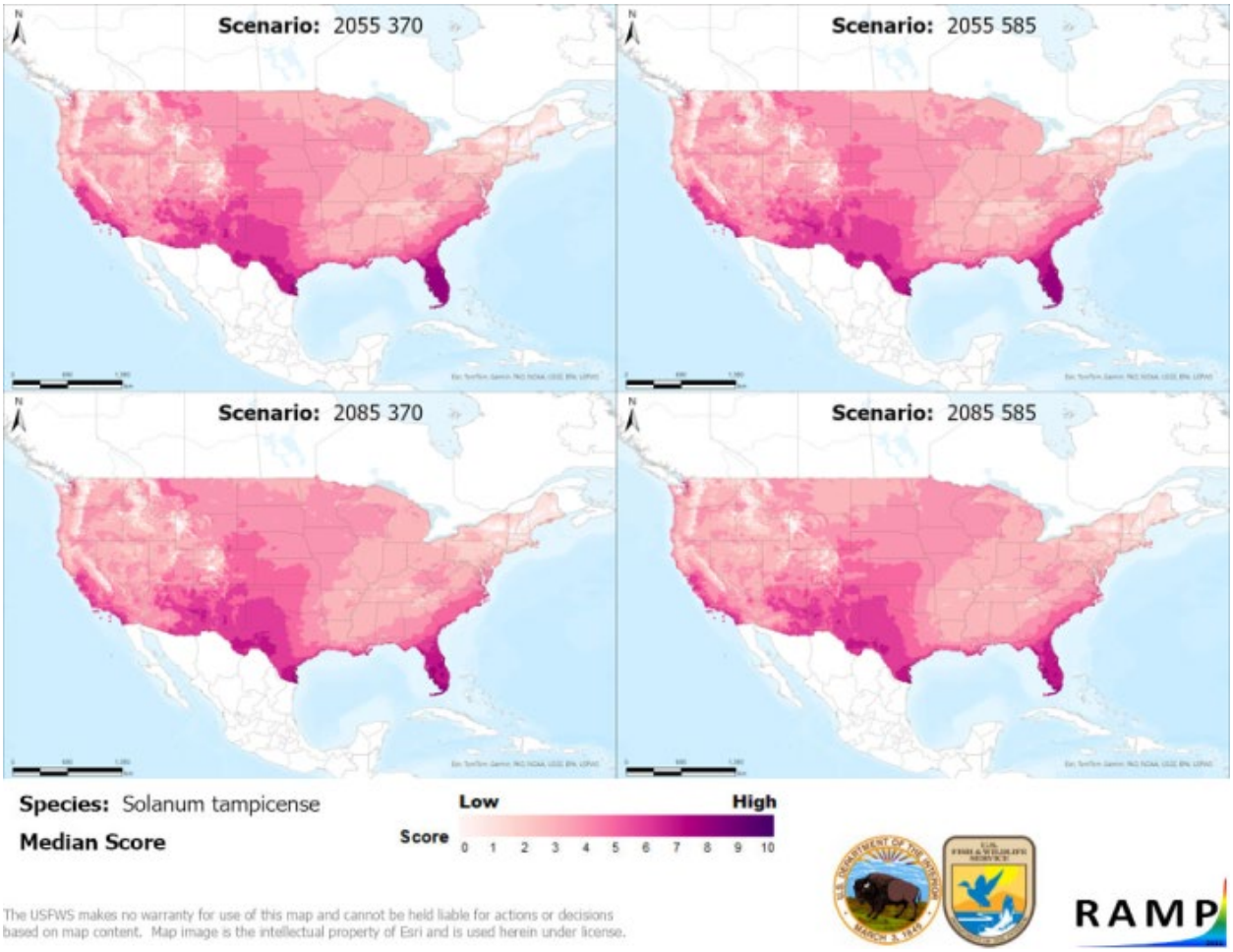

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Solanum tampicense* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2023). Shared Socioeconomic Pathways (SSPs) used (from left to right): SSP3, SSP5 (IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global climate models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

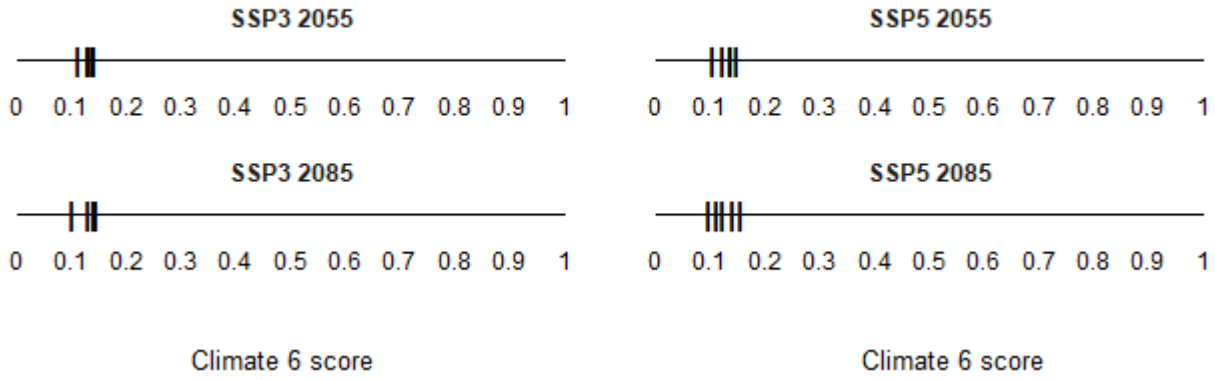

Figure A2. Comparison of projected future Climate 6 scores for *Solanum tampicense* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018; IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global climate models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0.

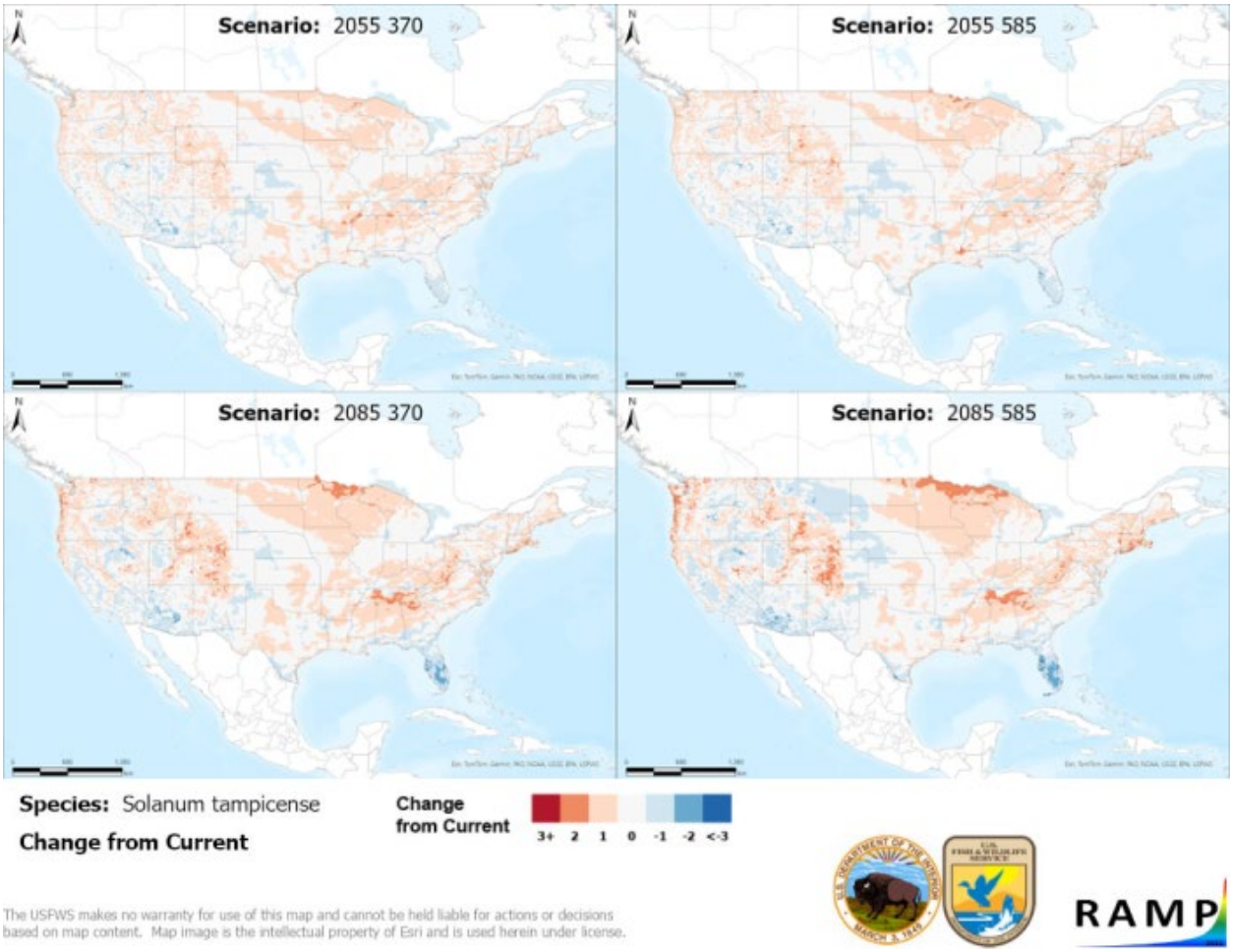

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 4) and the median target point score for future climate scenarios (figure A1) for *Solanum tampicense* based on source locations reported by GBIF Secretariat (2023). Shared Socioeconomic Pathways (SSPs) used (from left to right): SSP3, SSP5 (IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0. Shades of blue indicate a lower target point score under future scenarios than under current conditions. Shades of red indicate a higher target point score under future scenarios than under current conditions. Darker shades indicate greater change.

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