Vallisneria natans (an eelgrass, no common name)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, January 2025
Revised, April 2025
Web Version, 5/29/2025

Organism Type: Flowering Plant
Overall Risk Assessment Category: Uncertain

Photo: Auckland Museum. Licensed under CC BY 4.0. Available: https://commons.wikimedia.org/wiki/File:Vallisneria_._natans_(Lour.)_H.Hara_(AM_AK353348-3).jpg (January 2025).

1 Native Range and Status in the United States

Native Range

From Zhuang (2011):

"This species is native to South East Asia."

"China (Sichuan, Guangdong, Shandong, Jiangxi, Jiangsu, Zhejiang, Hunan, Hubei, Hebei, Yunnan, Guizhou, Jilin, Liaoning, Shanxi, Guangxi, Henan); India; Iraq; Japan; Korea, Democratic People's Republic of; Nepal; Russian Federation (Primoryi); Taiwan, Province of China (Taiwan, Province of China (main island)); Viet Nam"

In addition to the locations listed above, Flora of China (2010) includes Australia, Malaysia, and the Chinese provinces of Anhui, Fujian, and Shaanxi within the native range of *V. natans*.

Status in the United States

No records of *Vallisneria natans* in the wild in the United States were found.

From Tringali et al. (2023):

"*V. natans* and the Japanese varieties '*asiatica*' and '*biawensis*' [sic] have also been domesticated for marketing in the U.S. under the trade names 'Contortion/Contortionist' and 'Corkscrew' tape grass […]"

From Puts (2017):

"Unfortunately, this [*Vallisneria asiatica*, synonym of *Vallisneria natans*] is one of the less common Vals and it might be a little difficult to find in your local aquarium store. Luckily, you can also easily buy it online."

Regulations

No species-specific regulations on possession or trade were found within the United States.

Means of Introductions within the United States

No records of *Vallisneria natans* in the wild in the United States were found.

Remarks

This ERSS was previously published in April 2021. Revisions were completed to incorporate new information and conform to updated standards.

From Les et al. (2008):

"*Vallisneria* presents an unusually difficult challenge for taxonomic study due to various confounding factors. The genus itself has a cosmopolitan distribution and the species are quite similar and often distinguished only by minute floral characters."

From Tringali et al. (2023):

"Although there are 13 widely accepted species [in the genus *Vallisneria*] and perhaps 3–5 distinct varieties, the taxonomy is unsettled."

From Puts (2017):

“When buying Vallisneria asiatica [sic], keep in mind that not all plants are correctly labeled. There is another Val that goes by the common name "corkscrew Vallisneria": Vallisneria tortifolia [sic].”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2025):

Kingdom Plantae
Subkingdom Viridiplantae
Infrakingdom Streptophyta
Superdivision Embryophyta
Division Tracheophyta
Subdivision Spermatophytina
Class Magnoliopsida
Superorder Lilianae
Order Alismatales
Family Hydrocharitaceae
Genus *Vallisneria*
Species *Vallisneria natans* (Lour.) H. Hara

According to WFO (2025), *Vallisneria natans* (Lour.) H.Hara is the accepted name for this species.

The following synonyms of *Vallisneria natans* from WFO (2025) were used to search for information for this report: *Vallisneria asiatica* Miki, *Vallisneria asiatica var. biwaensis* Miki, *Vallisneria biwaensis* (Miki) Ohwi.

Size, Weight, and Age Range

From Ke and Li (2006):

“[…] perennial […]”

“[…] may extend 2 m or more depending on water depth.”

Environment

From Li et al. (2005):

“The *Vallisneria* species can be found in several kinds of freshwater bodies, such as lakes, ponds, rivers, and paddy fields (Sun, 1992).”

From Ke and Li (2006):

"The temperature range (10–35 °C) and substratum types ideal for growth are wide."

"[…] a wide range of temperatures (25–35 °C) was favorable for germination of *V. natans* seeds."

From Li et al. (2020):

"[…] 0.9–1.2 m was the optimal water depth for planting. *Vallisneria natans* suffered photoinhibition at the shallow water depth of 0.3–0.6 m and lipid peroxidation damage in water 1.2–1.5 m deep."

From Xie et al. (2005):

"*Vallisneria natans* has a high adaptive capability, and can grow in different sediments in either nutrient-poor or nutrient-rich freshwater systems."

Climate

From Li et al. (2005):

"[…] *V. natans* is a cosmopolitan species especially in tropical and subtropical zones (Lowden, 1982; Sun, 1992)."

Distribution Outside the United States

Native

From Zhuang (2011):

"This species is native to South East Asia."

"China (Sichuan, Guangdong, Shandong, Jiangxi, Jiangsu, Zhejiang, Hunan, Hubei, Hebei, Yunnan, Guizhou, Jilin, Liaoning, Shanxi, Guangxi, Henan); India; Iraq; Japan; Korea, Democratic People's Republic of; Nepal; Russian Federation (Primoryi); Taiwan, Province of China (Taiwan, Province of China (main island)); Viet Nam"

In addition to the locations listed above, Flora of China (2010) includes Australia, Malaysia, and the Chinese provinces of Anhui, Fujian, and Shaanxi within the native range of *V. natans*.

Introduced

No records were found of introduction of *Vallisneria natans* in the wild outside the United States.

Means of Introduction Outside the United States

No records were found of introduction of *Vallisneria natans* in the wild outside the United States.

Short Description

From Li et al. (2020):

"[…] submerged macrophyte […]"

From Flora of China (2010):

"Rhizome tuberous; stolons ca. 2 mm in diam., usually smooth. Leaves 0.2-2 m × 0.5-2 cm, veins 5-9, margin entire or inconspicuously serrulate, apex obtuse. Male spathe ovate-conic, 1.5-2 cm × 5-10 mm, with more than 200 male flowers; sepals strongly convex; stamens 1, filaments sometimes 2-lobed at apex, with hairs at base. Female spathe 1.5-2 cm; peduncle 30-50 cm or longer, slender; sepals greenish purple, 2-4 × ca. 3 mm, apex obtuse; petals white, minute; staminodes 3. Fruit cylindric, 5-30 cm × ca. 5 mm. Seeds narrowly obovoid, glandular hairy."

From Puts (2017):

"[…] tall, sea grass-like leaves and bushy growth pattern […]"

From Miki (1934):

"Chief characteristics of this variety [*V. asiatica* var. *biwaensis*] are the strongly twisted and distinctly serrulated leaves and loose spathe."

Biology

From Ke and Li (2006):

"*Vallisneria natans* is relatively fecund and produces a large amount of seeds every year, each fruit containing about 350–600 seeds. As most of the ripe fruits float on the water surface, large numbers of seeds can be easily and quickly collected. *V. natans* also reproduces by rhizome and is therefore capable of both sexual and asexual reproduction. It is a dioecious freshwater perennial plant with fibrous roots (Sun, 1992) […]"

From Li et al. (2005):

"Plants of *Vallisneria* play important roles in freshwater ecosystems, providing food for waterfowl, nursery habitat for fish, substrate for invertebrates, and have a strong influence on water quality (Korschgen et al., 1997). All *Vallisneria* plants can produce both large numbers of seeds and numerous winter buds (Xiong & Li, 2002). In these species sexual reproduction may predominantly serve for long-distance dispersal and long periods of dormancy, whereas vegetative propagation is suitable for dispersal over short distances and overwintering (Bartley & Spence, 1987)."

"A significant positive correlation was observed between seed germination rates and total biomass of freshwater microalgae, suggesting freshwater microalgae may facilitate seed germination of *Vallisneria*."

Human Uses

From Zhuang (2011):

"*Vallisneria* spp. are used in aquariums. It is not clear whether this particular species is being used too. This species however is used as a medicinal plant against sore throat in Viet Nam."

From Tringali et al. (2023):

"*V. natans* and the Japanese varieties '*asiatica*' and '*biawensis*' [sic] have also been domesticated for marketing in the U.S. under the trade names 'Contortion/Contortionist' and 'Corkscrew' tape grass […]"

From Puts (2017):

"Unfortunately, this [*Vallisneria asiatica*, synonym of *Vallisneria natans*] is one of the less common Vals and it might be a little difficult to find in your local aquarium store. Luckily, you can also easily buy it online."

From Wang et al. (2020):

"It is regularly used as a pioneer species in vegetation restoration efforts in eutrophic waters [Ke and Li 2006]."

Diseases

Poelen et al. (2014) list *Vallisneria natans* as the host of *Phyllosticta vallisneriae*.

Threat to Humans

No information was found on threats to humans from *Vallisneria natans*.

3 Impacts of Introductions

No records of introductions were found for *Vallisneria natans*. Therefore, there is no information on documented impacts of introduction.

4 History of Invasiveness

The History of Invasiveness for *Vallisneria natans* is classified as No Known Nonnative Population. There is information available on the native distribution of this species but no evidence was found of introductions into the wild outside of the native range. Varieties of *Vallisneria natans* are present in the aquarium trade but no quantitative information on volume or duration of trade was available.

5 Global Distribution

Figure 1. Reported global distribution of *Vallisneria natans*. Map from GBIF Secretariat (2023). Observations are reported from Japan, South Korea, North Korea, Russia, China, Vietnam, Sri Lanka, India, Nepal, Iran, Austria, Venezuela, Australia, and New Zealand. Reported occurrences in Sri Lanka, Iran, Austria, Venezuela, and New Zealand are not known to represent established populations of *Vallisneria natans* and were not used to select source locations for climate matching. The reported occurrence in Australia shows potential coordinate error between the mapped location and the data description and was not used to select source locations for climate matching.

No georeferenced occurrences were available for parts of the native range of *Vallisneria natans* in Australia, Iraq, Malaysia, or Taiwan.

6 Distribution Within the United States

No records of *Vallisneria natans* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Vallisneria natans* to the contiguous United States was highest in the Northern Plains, western Great Lakes, and southern Atlantic Coast regions. Areas of low climate match were observed across the Great Basin, California, and the Pacific Northwest. Medium matches were found on the Colorado Plateau, in parts of the Southwest, the interior Southeast and southern Midwest, and in New England. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.683, 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 2023).

Projected climate matches in the contiguous United States under future climate scenarios are available for *Vallisneria natans* (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.

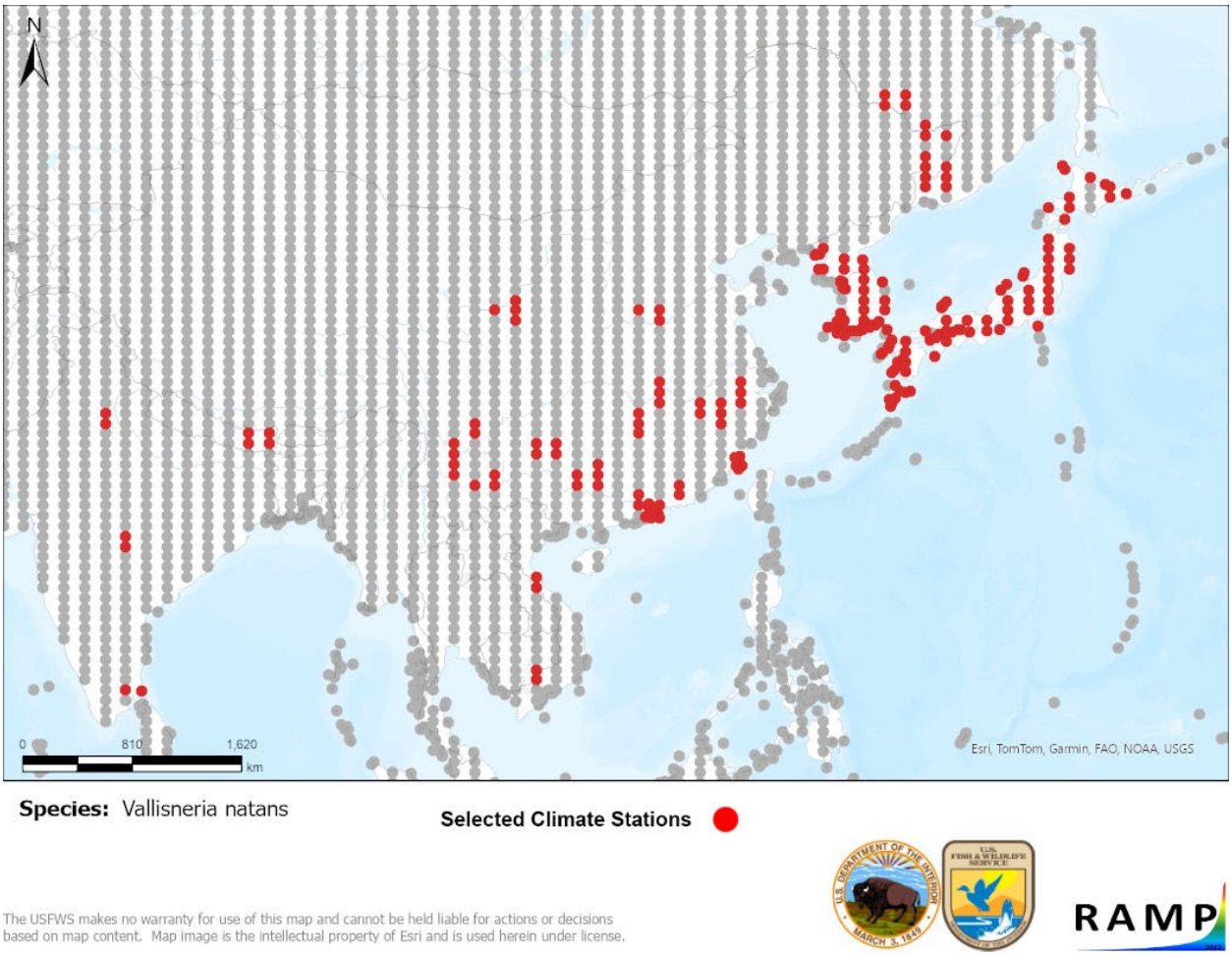

Figure 2. RAMP (Sanders et al. 2023) source map showing weather stations in eastern Asia selected as source locations (red; Cambodia, China, India, Japan, Nepal, North Korea, Russia, South Korea, and Vietnam) and non-source locations (gray) for *Vallisneria natans* climate matching. Source locations 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.

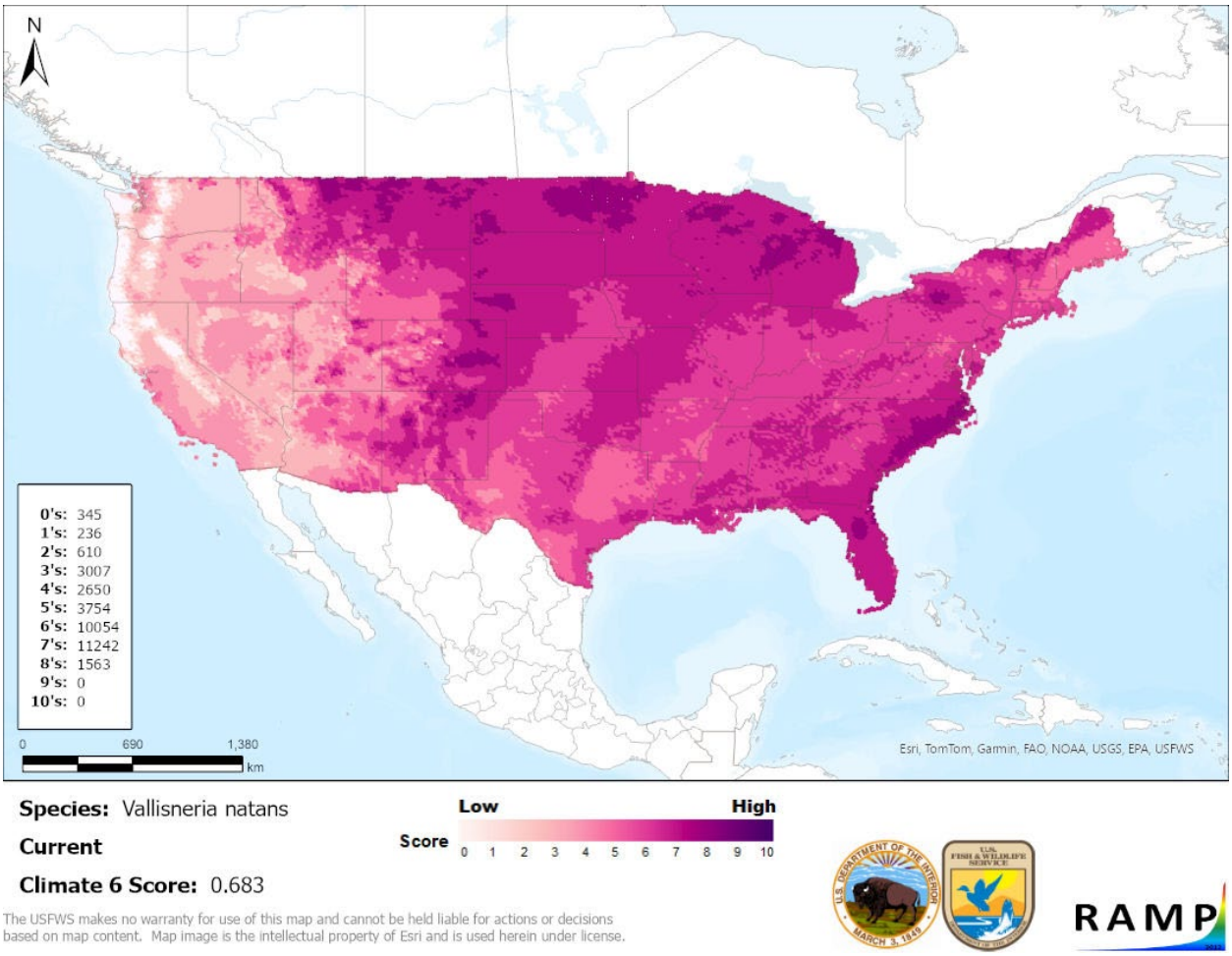

Figure 3. Map of RAMP (Sanders et al. 2023) climate matches for *Vallisneria natans* in the contiguous United States based on source locations reported by GBIF Secretariat (2023). Counts of climate match scores are tabulated on the left. 0/Pale Pink=Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

The Certainty of Assessment for *Vallisneria natans* is classified as Low. Information is available on the biology, ecology, and distribution of *Vallisneria natans*, although a few parts of the native range could not be represented in the climate matching analysis. Without a history of documented introductions outside the native range, there is no information available on impacts of *Vallisneria natans* introduction. Additionally, there are some known taxonomic issues with the genus and incomplete information about its trade history.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Vallisneria natans, a species of eelgrass, is a submergent aquatic plant native to Asia and Oceania. It is present in the aquarium trade, going by the trade names ‘Contortion/Contortionist’ or ‘Corkscrew’ tapegrass or ‘Val,’ although it may be less common in trade than other members

of the genus. *Vallisneria natans* is also used in vegetation restoration efforts within its native range and as a medicinal plant in Vietnam. This species reproduces both sexually and asexually. The History of Invasiveness for *Vallisneria natans* is classified as No Known Nonnative Population due to the absence of reports from the wild outside of its native range. The climate matching analysis for the contiguous United States indicates establishment concern for this species. The climate match was highest in the Northern Plains, western Great Lakes, and Southern Atlantic Coast regions. The Certainty of Assessment for this ERSS is classified as Low because of the lack of information on impacts of introduction, in addition to taxonomic uncertainty and incomplete trade history. The Overall Risk Assessment Category for *Vallisneria natans* in the contiguous United States is Uncertain.

Assessment Elements

- **History of Invasiveness (see section 4): No Known Nonnative Population**
- **Establishment Concern (see section 7): Yes**
- **Certainty of Assessment (see section 8): Low**
- **Remarks, Important additional information: The taxonomy of this genus is unsettled.**
- **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), no region of the contiguous United States was projected to have an overall high climate match for *Vallisneria natans*. However, primarily in time step 2055, smaller areas of high match were present particularly in the Northern Plains, Great Lakes, and Mid-Atlantic regions. Areas of low climate match were projected to occur in the Great Basin and Northern Pacific Coast regions under all future scenarios. Much of California was also projected to have a low climate match under all scenarios. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.199 (model: UKESM1-0-LL, SSP5, 2085) to a high of 0.660 (model: IPSL-CM6A-LR, SSP3, 2055). 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 (0.683, figure 3) falls above 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 all time step and climate scenarios only minor or no increases in the climate match relative to the current match were observed. At the 2085 time step, and particularly under SSP5, areas within the Colorado Plateau, Great Basin, Great Lakes, Gulf Coast, Northeast, Northern Plains, Southeast, Southern Atlantic Coast, Southern Florida, Southern Plains, Southwest, and Western Mountains saw a moderate decrease in the climate match relative to current conditions. No large decreases were observed regardless of time step and climate scenarios. Additional, very small areas of large or moderate change may be visible on the maps (figure A3).

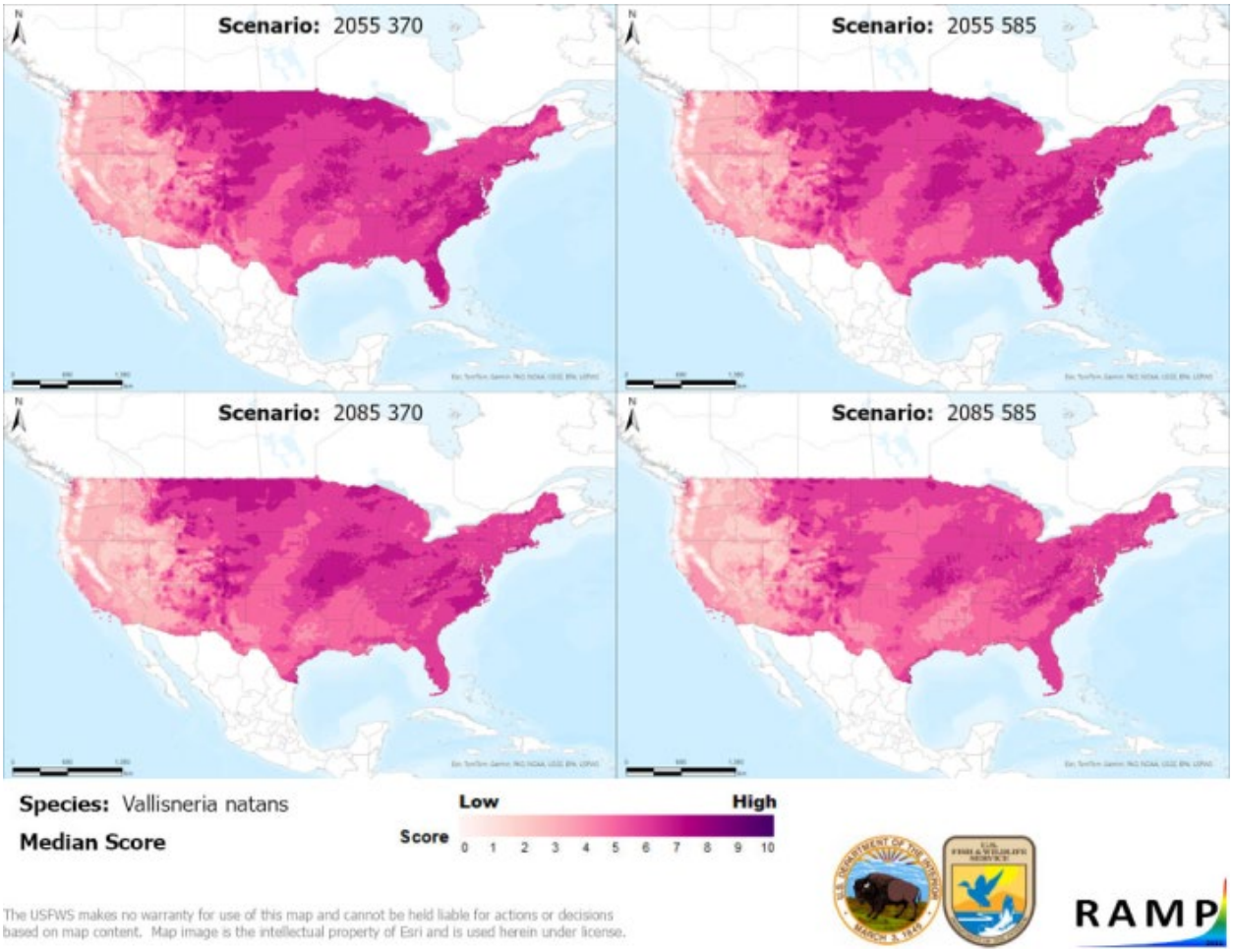

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Vallisneria natans* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2023). Shared 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.

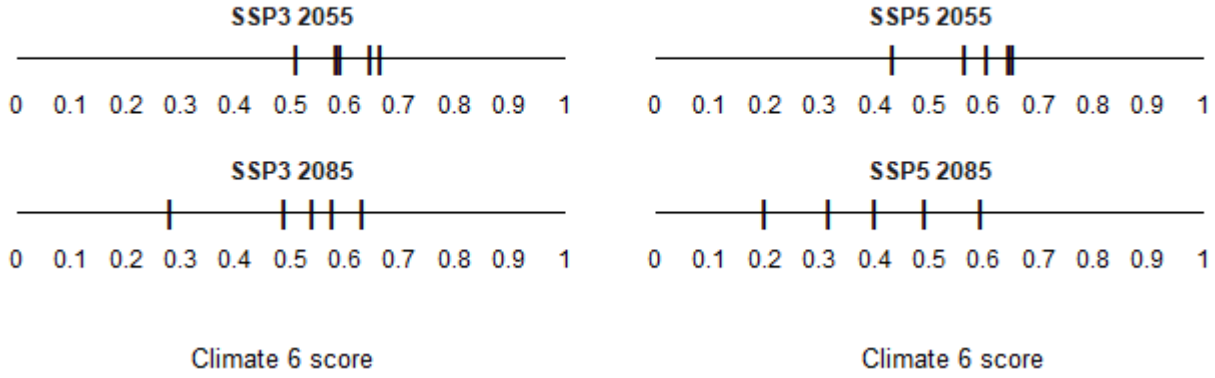

Figure A2. Comparison of projected future Climate 6 scores for *Vallisneria natans* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018; 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.

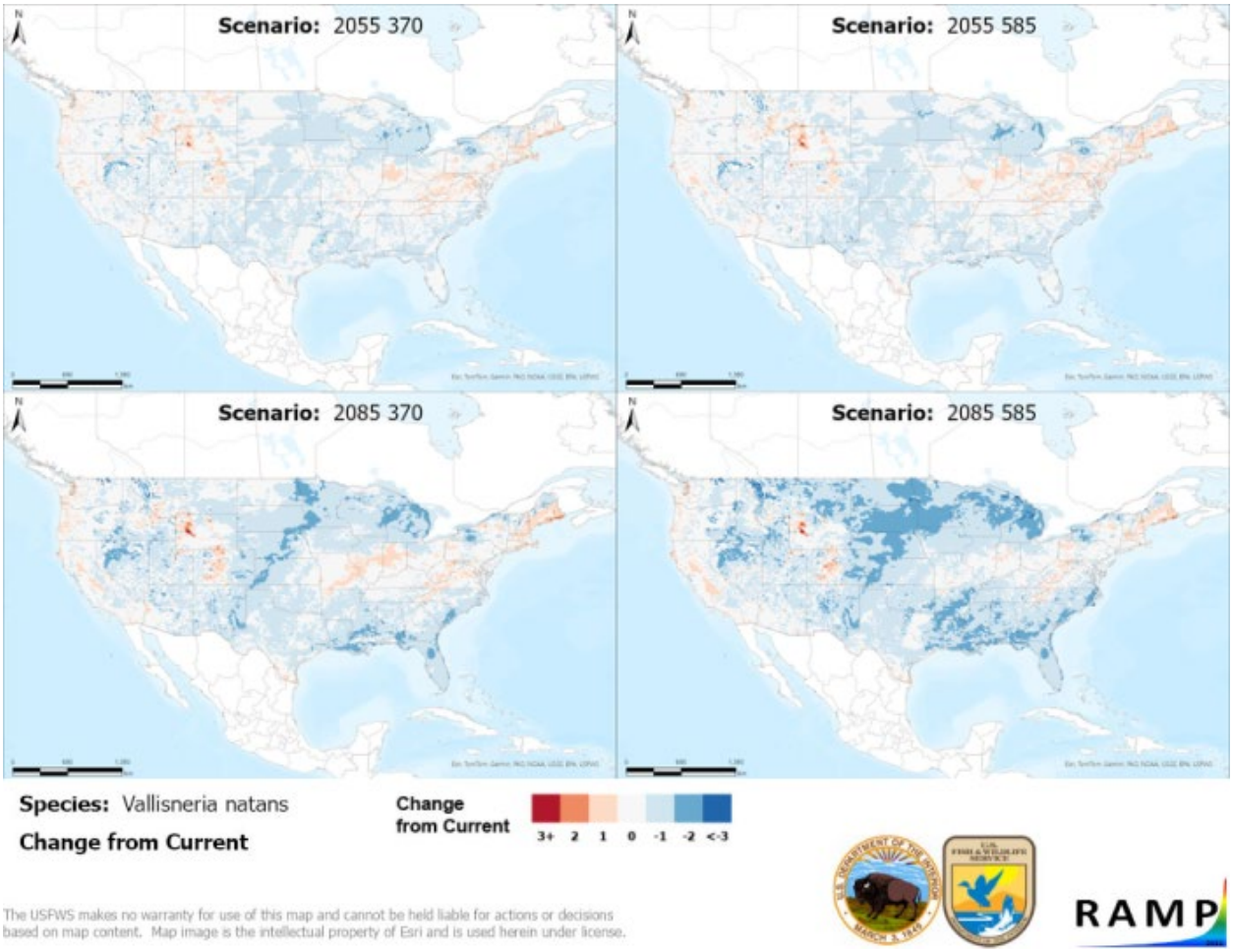

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 3) and the median target point score for future climate scenarios (figure A1) for *Vallisneria natans* based on source locations reported by GBIF 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.

Literature Cited

GBIF Secretariat. 2023. GBIF backbone taxonomy: Vallisneria natans. Copenhagen: Global Biodiversity Information Facility. Available: https://www.gbif.org/species/2865504 (April 2025).

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