Narrowleaf Anacharis (*Elodea naias*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, July 2024
Revised, March 2025
Web Version, 6/16/2025

Organism Type: Flowering Plant
Overall Risk Assessment Category: Uncertain

Photo: Jonas Franke Raupp. Licensed under CC BY-NC 4.0 International. Available: https://www.inaturalist.org/photos/393015952 (July 2024).

1 Native Range and Status in the United States

Native Range

From POWO (2024):

"The native range of this species is E. Bolivia to Brazil and NE. Argentina."

From Pfingsten and Rose (2024):

"South America (Argentina, Brazil, Paraguay, and Uruguay) (Cook and Urmi-König 1984)"

Status in the United States

From Pfingsten and Rose (2024):

"First spotted in the U.S. in a subdivision lake in Hillsborough County, FL in 2017 (G. Lokuta, [Florida Fish and Wildlife Conservation Commission,] pers. comm. 2019)."

"The residential pond population in Hillsborough County, FL was eradicated in 2018 after chemical treaments [sic] (G. Lokuta, pers. comm. 2019)."

Elodea naias is in trade within the United States (e.g., Flipaquatics 2025 under the synonym *Anacharis najas*).

Regulations

Elodea naias is regulated in California (CDFA 2021 under the synonym *Egeria najas*). 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 Pfingsten and Rose (2024):

"*Egeria najas* [synonym of *Elodea naias*] is available in the plant nursery trade, and likely is released via aquarium dumping."

Remarks

The taxonomic authorities used in this Ecological Risk Screening Summary are defined in the Standard Operating Procedure (USFWS 2024). This report follows the chosen taxonomic authority for plants, World Flora Online. According to World Flora Online (2025), the valid scientific name is *Elodea naias* (Planch.) Casp. Many synonyms are used in other scientific databases and the literature with *Elodea najas* being most common (e.g., GBIF Secretariat 2023; Pfingsten and Rose 2024; POWO 2024). The following additional synonyms of *Elodea naias* from WFO (2025) were used to search for information for this report: *Egeria najas* and *Anacharis naias*.

Mention of commercial products in this Ecological Risk Screening Summary does not entail endorsement by the U.S. Federal Government.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From POWO (2024):

Kingdom Plantae
Phylum Streptophyta
Class Equisetopsida
Subclass Magnoliidae
Order Alismatales
Family Hydrocharitaceae
Genus *Elodea*
Species *Elodea najas*

According WFO (2025), *Elodea naias* (Planch.) Casp. is the current valid name for this species.

Size, Weight, and Age Range

From Pfingsten and Rose (2024):

"Habit: dioecious, submerged, freshwater perennial forb"

"Size: up to 3 m in length or longer (Cook and Urmi-König 1984)"

Environment

From Bini et al. (1999):

"*E. najas* typically occurs in high transparent ponds with remote influence of the High Paraná River in Argentina (Neiff, 1986) and in backwaters of the Paraná in Brazil, upstream to Itaipu reservoir (S.M. Thomaz, personal observation)."

"The remaining species [including *E. naias*, as *E. najas*] formed a group tending to occur in sites with relatively low nutrient status, and usually intermediate to high underwater light."

From Pfingsten and Rose (2024):

"Habitat: found at about 1 m depth in slow-moving or still water (lentic) in native Argentina (Cook and Urmi-König 1984)"

"Light penetration strongly influences *E. najas* root and shoot growth (Tavechio and Thomaz 2003). Under light attenuation, increased temperatures caused increased decomposition rates for *E. najas* (Carvalho et al. 2005)."

Climate

From POWO (2024):

"It […] grows primarily in the subtropical biome."

Distribution Outside the United States

Native

From POWO (2024):

"The native range of this species is E. Bolivia to Brazil and NE. Argentina."

From Pfingsten and Rose (2024):

"South America (Argentina, Brazil, Paraguay, and Uruguay) (Cook and Urmi-König 1984)"

Introduced

From Su et al. (2020):

"*Egeria naias*, a recently naturalized aquatic species in China, was recorded for the first time for local flora [in the Jinjiang river basin, Jiangmen Municipality, China]."

From Efremov (2025):

"Egeria najas […] began to spread in tropical, subtropical and temperate regions of western and central Europe and Asia. In Asia, it is currently found in Hong Kong and Singapore (GBIF, 2024). […] This is the first presentation of the information on a new species of aquatic plant, *E. najas*, which is alien to Malaysia."

"Only female plants were found in the coenopopulation […] They formed two types of shallow-water communities in the East Lake: *Thalia geniculata* (PC [percent cover] 30%) – *E. najas* (PC 40-50%) and pure thickets of *E. najas* […]."

No further information was found on the above-reported introductions to Europe, Hong Kong, or Singapore.

Means of Introduction Outside the United States

From Su et al. (2020):

"It is probably released via aquarium dumping […]"

Short Description

From Pfingsten and Rose (2024):

"Stems/Roots: adventitious (developing at nodes) roots; irregular branching at double nodes (two nodes close together)"

"Leaves: scale-like or elongate, recurved, visibly serrated, usually in whorls of 5 leaves"

"Flowers: unisexual plants (dioecious), flowers originating from an apical spathe, three white petals much larger than the sepals"

"Fruits/Seeds: fusiform, sessile fruits, uncommon due to dioecious plants not typically being found together"

Biology

From Pezzato et al. (2023):

"*Egeria najas* is a submerged rooted angiosperm, perennial and dioecious macrophyte, belonging to the family Hydrocharitaceae. […] Despite being considered a rooted species, it can be found free (Duarte et al., 1994; Bianchini Jr. et al., 2006)."

From Efremov (2025):

"The plant easily reproduces vegetatively (non-specialized morphological disintegration); seed reproduction is often limited by sexual segregation."

From Pfingsten and Rose (2024):

"*Egeria najas* lacks dormant structures (hibernacula), and seed is not found in wild populations (Cook and Urmi-König 1984). Dispersal is via fragmentation of double nodes (shorter than usual internodes), which can produce new stems and roots."

Human Uses

From Pfingsten and Rose (2024):

"The plant was reported to be in cultivation across Europe by Cook and Urmi-König in 1984 but no subsequent reports have been made."

Elodea naias is present in the aquarium trade (e.g., Flipaquatics 2025 under the synonym *Anacharis najas*).

Cohen et al. (2007) report *E. naias* (as *Egeria najas*) as the eighth most sold aquatic plant species (out of 138 species) in Montreal, Canada.

Diseases
No information was found on diseases associated with *Elodea naias*.

Threat to Humans
From Bini and Thomaz (2005):

"In Jupia Reservoir (Parana River, State of Sao Paulo, Brazil), for example, growth rates of these species were found to be so high that even electric power generation is affected."

From Pfingsten and Rose (2024):

"In forming dense mats, *E. najas* populations can clog hydroelectric facilities, interrupting energy production and requiring millions of dollars to manage the species annually (Mori 2012)."

3 Impacts of Introductions
No information on impacts of introductions of *Elodea naias* outside the native range was found.

Elodea naias is regulated in California (CDFA 2021), see section 1.

4 History of Invasiveness
The History of Invasiveness for *Elodea naias* is classified as Data Deficient. *E. naias* has been documented as established in Hillsborough County, Florida. That population was successfully treated and eradicated in 2018. It is also recorded in the wild in China, Malaysia, and Singapore. The Chinese and Malaysian introductions appear to have resulted in established populations. There is little information on documented impacts of *E. naias* within its nonnative range, but it has been considered a pest that dominates plant communities in reservoirs within its native range. Furthermore, *E. naias* is available in the plant nursery trade. It was reported as a commonly traded species in Montreal, Canada, in the 2000s, but limited information was found to further quantify the volume and duration of trade.

5 Global Distribution

Figure 1. Reported global distribution of *Elodea naias*. Map from GBIF Secretariat (2023). Observations are reported from Argentina, Brazil, Bolivia, Paraguay, Switzerland, Netherlands, China, Hong Kong, Malaysia, and Singapore. Reported locations in Europe are not believed to be representative of established populations and were not used in climate matching analysis. Establishment status of introductions in Hong Kong and Singapore could not be confirmed so the points were not used in the climate matching analysis.

Su et al. (2020) provided additional locations of *Elodia naias* in China.

6 Distribution Within the United States

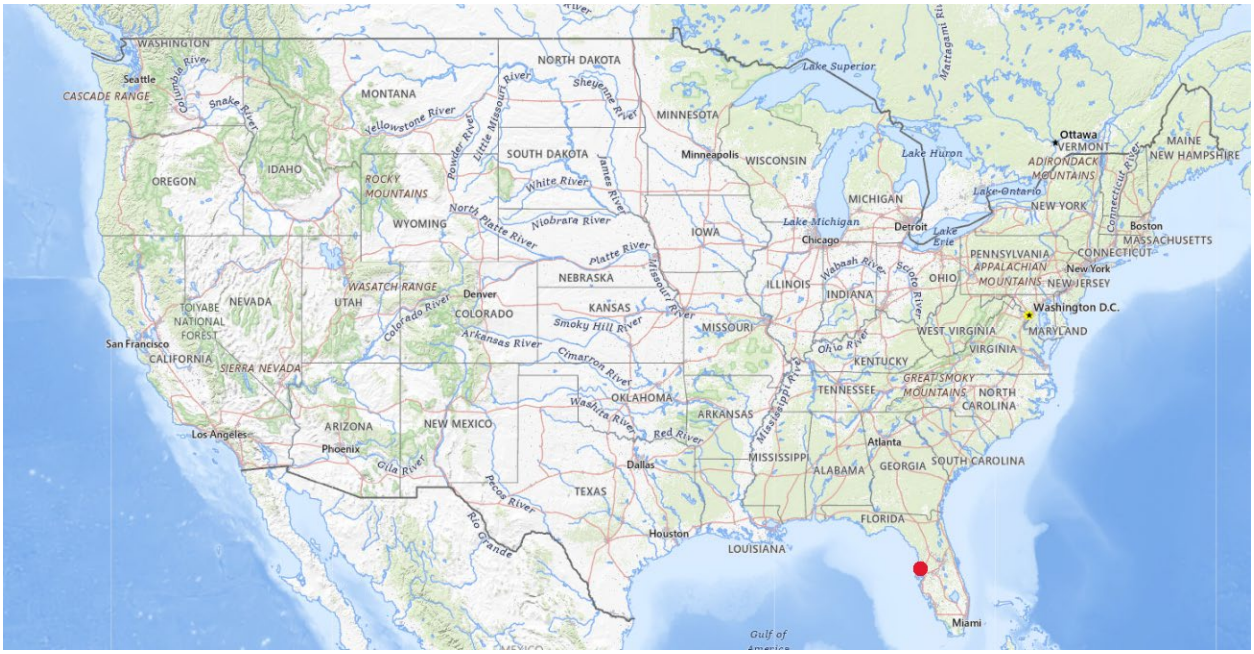

Figure 2. Reported distribution of *Elodea naias* in the United States. Map adapted from Pfingsten and Rose (2024). Observations are reported from Florida. The established population of *Elodea naias* in Hillsborough County, Florida, was eradicated through human intervention in 2018. This location was retained as a source point in the climate matching analysis because of its status as a recently established population that did not fail on its own.

7 Climate Matching

Summary of Climate Matching Analysis

On average, the climate match for *Elodea naias* was high across portions of the Southern Atlantic Coast, Southern Florida, and Gulf Coast regions. Areas of low climate matches were found in portions of the Colorado Plateau, Great Basin, Northeast, Northern Pacific Coast, Northern Plains, and Western Mountains regions. The Southeast had a mostly medium climate match. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.152, 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 *Elodea naias* (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.

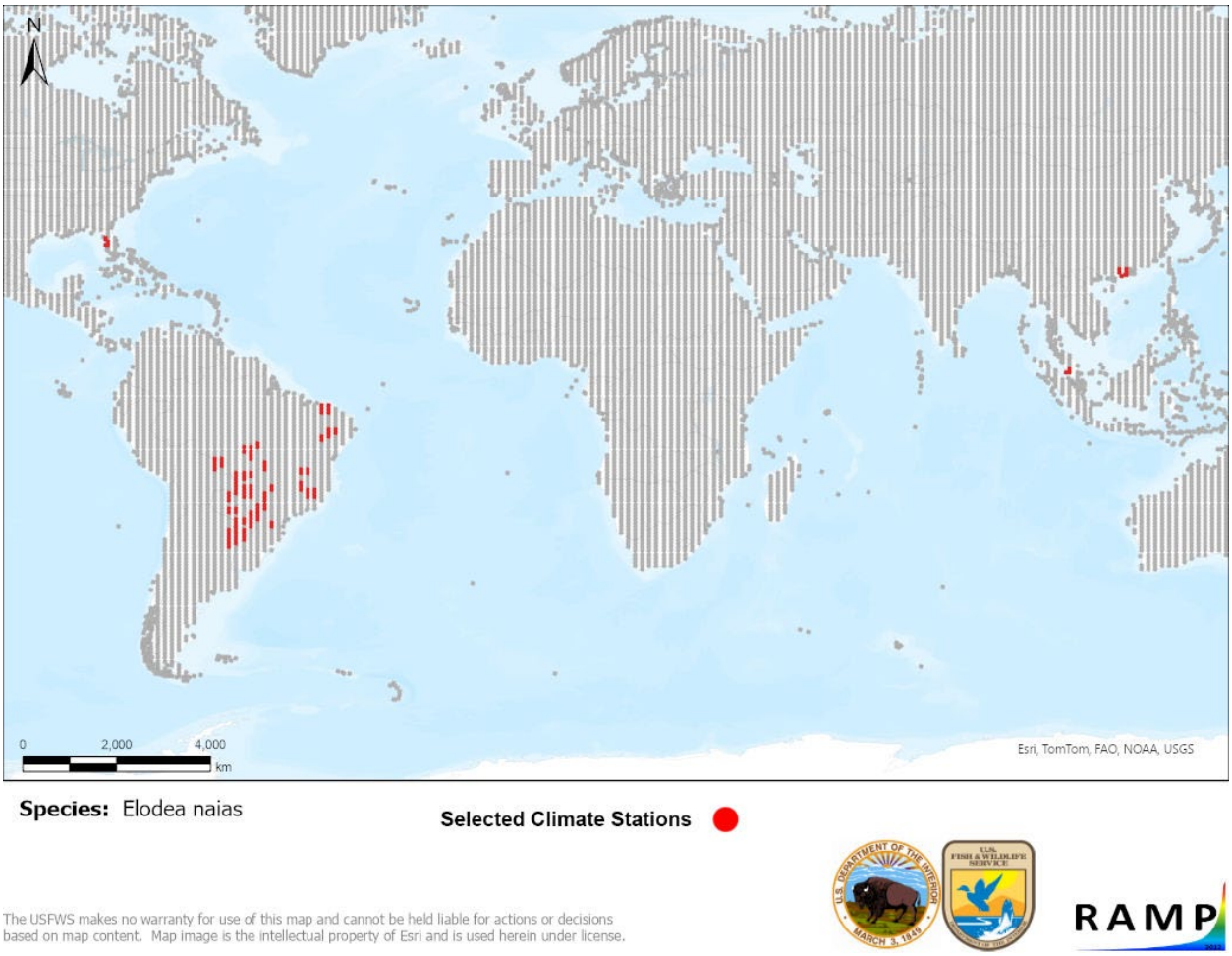

Figure 3. RAMP (Sanders et al. 2023) source map showing weather stations throughout the world selected as source locations (red; Argentina, Bolivia, Brazil, Paraguay, United States, China, and Malaysia) and non-source locations (gray) for *Elodea naias* climate matching. Source locations from GBIF Secretariat (2023), Su et al. (2020), and Pfingsten and Rose (2024). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

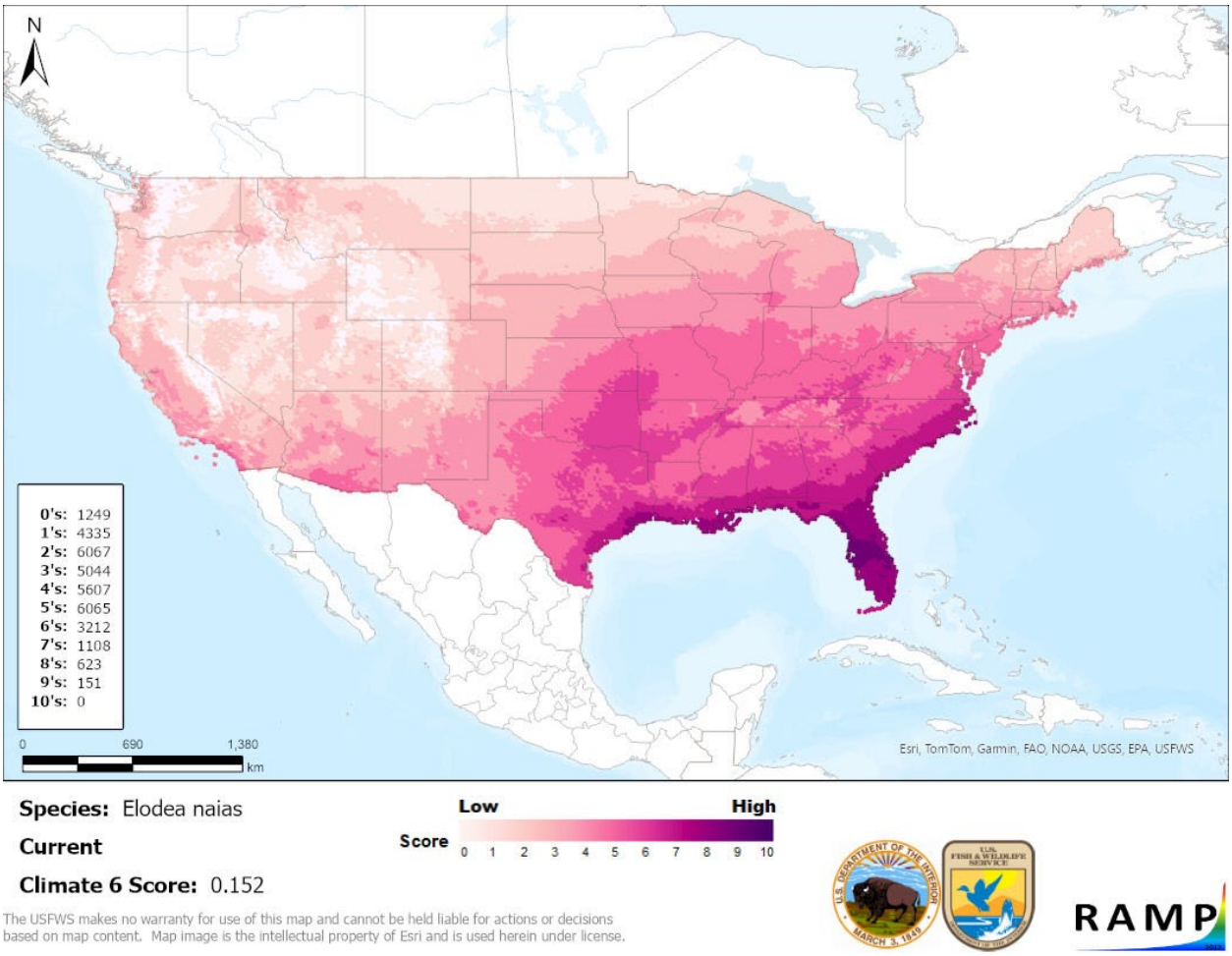

Figure 4. Map of RAMP (Sanders et al. 2023) climate matches for *Elodea naias* in the contiguous United States based on source locations reported by GBIF Secretariat (2023), Su et al. (2020), and Pfingsten and Rose (2024). Counts of climate match scores are tabulated on the left. 0/Pale Pink=Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

The certainty of assessment for *Elodea naias* is classified as Low. There is some information available on the biology and distribution of *E. naias* within its native range. Distribution information outside of the native range may be incomplete and no information was found regarding any impacts from introductions.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Elodea naias, Narrowleaf Anacharis, is an aquatic plant that is native to South America. *E. naias* is a dioecious, submerged, perennial forb found in freshwater. It is present in the aquarium trade. An established population of *E. naias* was found in Florida but has since been eradicated through human intervention. It is also recorded as introduced in Asia and possibly Europe, having established populations in southeastern China and peninsular Malaysia. Information regarding

nuisance characteristics, including impacts to power generation, was available from the species' native range. However, no information was available regarding impacts from introduced non-native populations. The History of Invasiveness for *E. naias* is classified as Data Deficient due to the lack of information on impacts from introduced populations. *E. naias* is regulated in California. The climate matching analysis for the contiguous United States indicates establishment concern for this species. Climate matching was high for the contiguous United States across portions of the Gulf Coast, Southeast, and Peninsular Florida regions. The Certainty of Assessment for this ERSS is classified as Low due to unknown impacts caused by introductions and lack of information about nonnative populations outside the United States. The Overall Risk Assessment Category for *E. naias* in the contiguous United States 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.

Bini L, Thomaz S. 2005. Prediction of *Egeria najas* and *Egeria densa* occurrence in a large subtropical reservoir (Itaipu Reservoir, Brazil-Paraguay). Aquatic Botany 83(3):227–238.

Bini L, Thomaz S, Murphy K, Camargo A. 1999. Aquatic macrophyte distribution in relation to water and sediment conditions in the Itaipu Reservoir, Brazil. Hydrobiologia 415:147–154.

[CDFA] California Department of Food and Agriculture. 2021. CDFA Weed Pest Ratings and CCR 4500 Noxious Weeds. Sacramento: California Department of Food and Agriculture. Available: https://www.cdfa.ca.gov/plant/ipc/encycloweedia/pdf/CaliforniaNoxiousWeeds.pdf (October 2022).

Cohen J, Mirotchnick N, Leung B. 2007. Thousands introduced annually: the aquarium pathway for non-indigenous plants to the St. Lawrence Seaway. Frontiers in Ecology and the Environment 5:528–532.

Efremov A. 2025. The first record of an alien aquatic plant, *Egeria najas* Planch. (Hydrocharitaceae), in Malaysia. Specimen, Number 41, February 13, 2025.

Flipaquatics. 2025. *Anacharis Najas.* Available: https://flipaquatics.com/products/anacharis (March 2025).

GBIF Secretariat. 2023. GBIF backbone taxonomy: *Elodea najas* (Planch.) Casp. Copenhagen: Global Biodiversity Information Facility. Available: https://www.gbif.org/species/5329255 (July 2024).

Pezzato M, Petracco P, Cunha-Santino M, Bianchini I. 2023. Assessment of cardinal temperatures of *Egeria najas* Planchon and its potential growth in a tropical floodplain lagoon. Hydrobiologia 850:2127–2138.

Pfingsten I, Rose D. 2024. *Egeria najas* Planchon. Nonindigenous Aquatic Species Database. Gainesville, Florida: U.S. Geological Survey. Available: https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=3274 (July 2024).

[POWO] Plants of the World Online. 2024. *Elodea najas*. Plants of the World Online. London: Royal Botanic Gardens, Kew. Available: https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:431721-1 (July 2024).

Sanders S, Castiglione C, Hoff M. 2023. Risk Assessment Mapping Program: RAMP. Version 5.0. U.S. Fish and Wildlife Service.

Su F, Guo Y, Wang R. 2020. *Egeria naias* Planch., a newly naturalized aquatic species in China. Guangdong Agricultural Sciences 47(9):63–65.

[USFWS] U.S. Fish and Wildlife Service. 2023. Standard operating procedure: how to prepare an "Ecological Risk Screening Summary." Version 3. Available: https://www.fws.gov/media/standard-operating-procedures-how-prepare-ecological-risk-screening-summary-2024 (June 2025).

[WFO] World Flora Online. 2025. World Flora Online – a project of the World Flora Online Consortium. Available: http://www.worldfloraonline.org (June 2025).

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.

Bianchini I Jr, Bitar AL, Cunha-Santino MB. 2006. Crescimento de *Egeria najas* Planchon da lagoa do Óleo em condições laboratoriais. Pages 99–111 in Santos JE, Pires JSR, Moschini LE, editors. Estudos Integrados em Escossistemas: Estação Ecológica de Jataí. Volume 4. São Carlos, Brazil: EdUFSCar.

Cook C, Urmi-Konig K. 1984. A revision of the genus *Egeria* (Hydrocharitaceae). Aquatic Botany 19:73–96.

Duarte CM, Planas D, Peñuelas J. 1994. Macrophytes, taking control of ancestral home. Pages 59–79 in Margalef R, editor. Limnology now: a paradigm of planetary problems. Amsterdam: Elsevier.

GBIF. 2024. GBIF occurrence download for *Egeria* Planch. Available: https://doi.org/10.2307/3393209 (November 2024).

Mori E, Martins D, Velini E, Marino C, Gouvea C, Leite S, Camacho Palomino E, Curies R. 2012. Genetic diversity in *Egeria densa* and *E. najas* in Jupia Reservoir, Brazil. Ciencia e Investigación Agraria 39(2):321–330.

Neiff J. 1986. Aquatic plants of the Paraná system. Pages 557–571 in Davies BR, Walker KF, editors. The ecology of river systems. Dordrecht, the Netherlands: Dr W.Junk Publishers.

Sousa W, Thomaz S, Murphy K. 2010. Response of native *Egeria najas* Planch. and invasive *Hydrilla verticillata* (L.f.) Royle to altered hydroecological regime in a subtropical river. Aquatic Botany 92:40–48.

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 Su et al. (2020), Pfingsten and Rose (2024), and GBIF Secretariat (2023).

Under the future climate scenarios (figure A1), on average, high climate match for *Elodea naias* was projected to occur in the Southern Atlantic Coast and Southern Florida regions of the contiguous United States. Areas of low climate match were projected to occur in the Colorado Plateau, Great Basin, Northern Pacific Coast, Northern Plains, and Western Mountains regions. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.066 (model: UKESM1-0-LL, SSP5, 2085) to a high of 0.274 (model: MRI-ESM2-0, SSP3, 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 (0.152, 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. At the 2085 time step, and especially under SSP5, areas within the Great Lakes, Northeast, and Northern Plains saw a large increase in the climate match relative to current conditions. Additionally, under one or more time step and climate scenarios, areas within the Appalachian Range, California, Colorado Plateau, Northern Pacific Coast, and Western Mountains saw a moderate increase in the climate match relative to current conditions. At the 2085 time step, areas within the Gulf Coast, Southern Atlantic Coast, and Southern Florida 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).

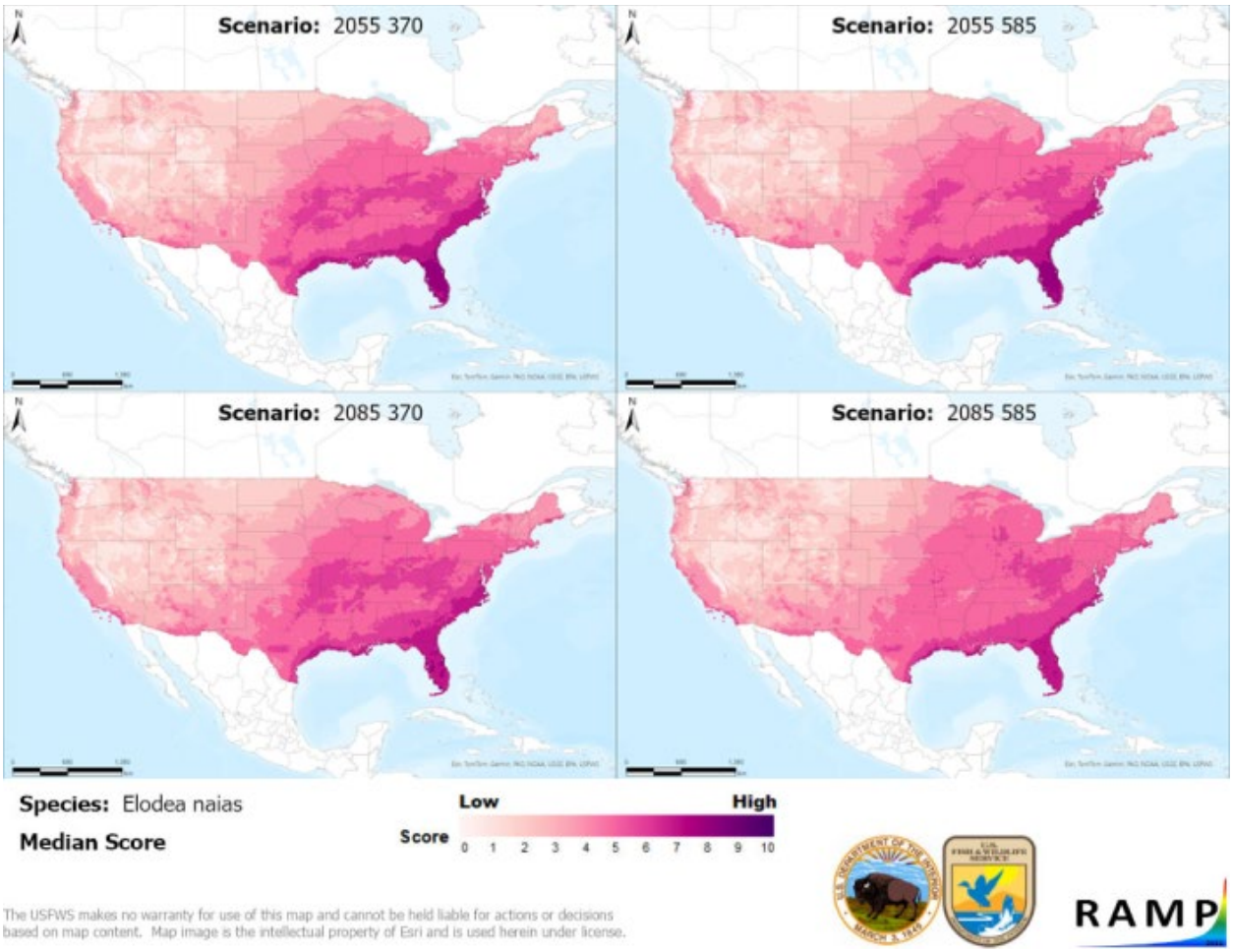

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Elodea naias* in the contiguous United States. Climate matching is based on source locations reported by Su et al. (2020), Pfingsten and Rose (2024) and 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.

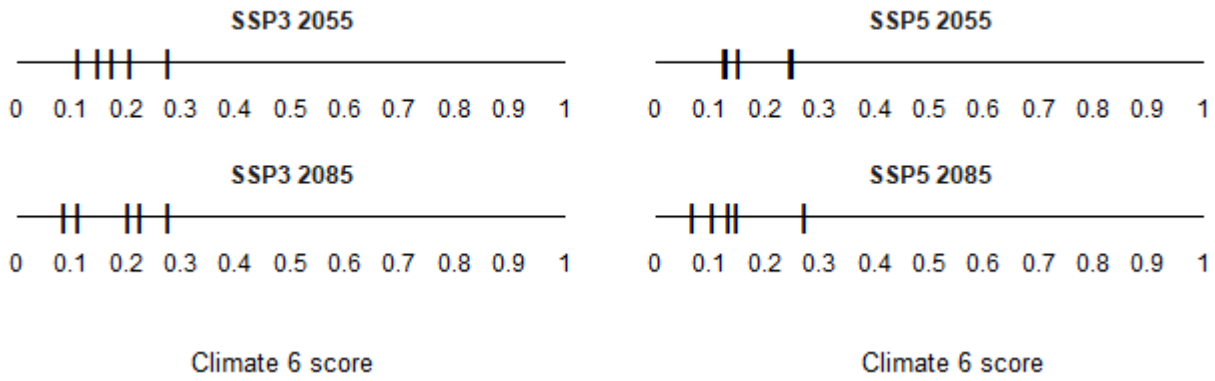

Figure A2. Comparison of projected future Climate 6 scores for *Elodea naias* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018; IPCC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

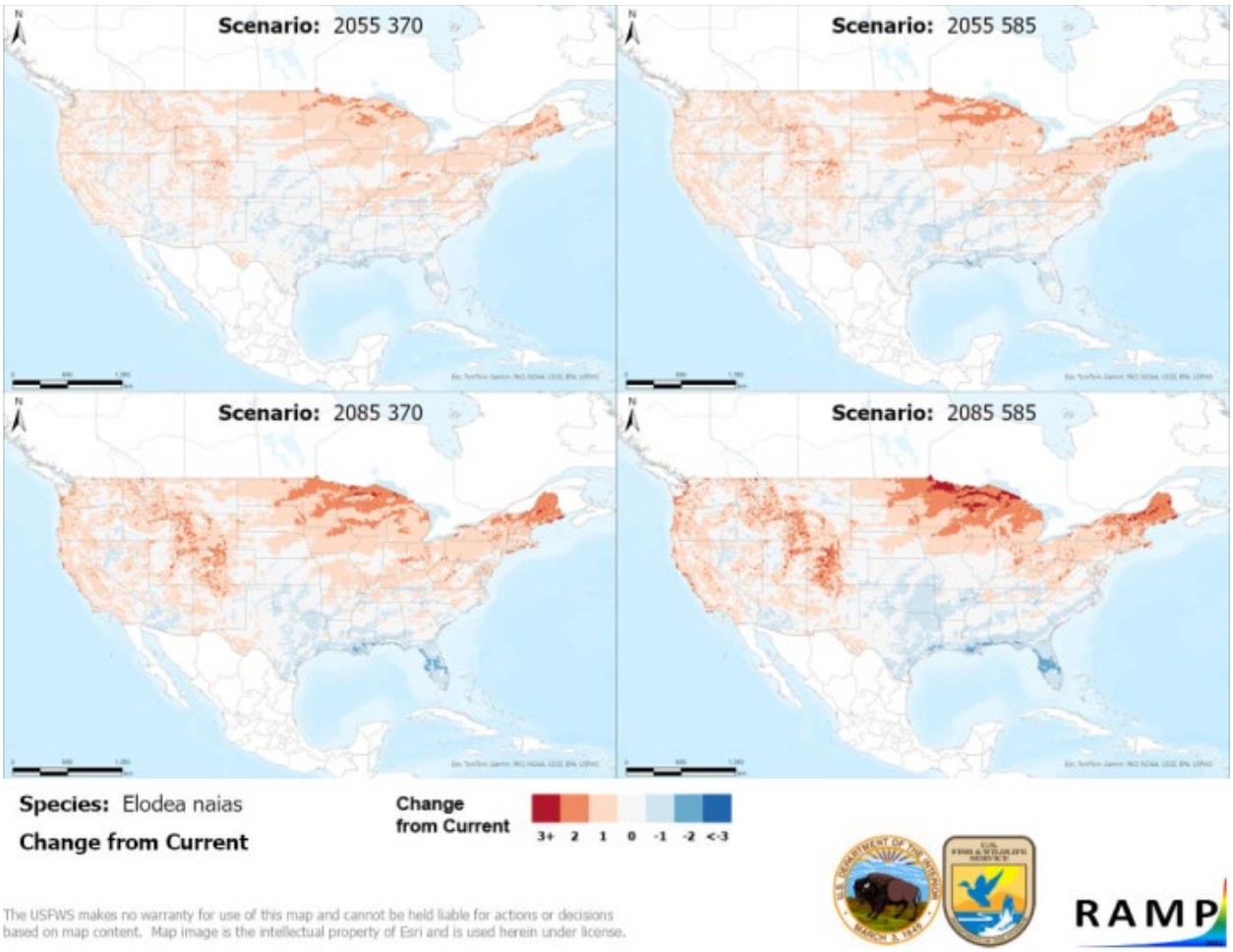

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 4) and the median target point score for future climate scenarios (figure A1) for *Elodea naias* based on source locations reported by Su et al. (2020), Pfingsten and Rose (2024) and 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: *Elodea najas* (Planch.) Casp. Copenhagen: Global Biodiversity Information Facility. Available: https://www.gbif.org/species/5329255 (July 2024).

[IPCC] Intergovernmental Panel on Climate Change. 2021. Climate change 2021: the physical science basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.

Karger DN, Conrad O, Böhner J, Kawohl T, Kreft H, Soria-Auza RW, Zimmermann NE, Linder HP, Kessler M. 2018. Data from: Climatologies at high resolution for the earth's land surface areas. EnviDat. Available: https://doi.org/10.16904/envidat.228.v2.1.

Karger DN, Conrad O, Böhner J, Kawohl T, Kreft H, Soria-Auza RW, Zimmermann NE, Linder P, Kessler M. 2017. Climatologies at high resolution for the Earth land surface areas. Scientific Data 4:170122.

Pfingsten I, Rose D. 2024. *Egeria najas* Planchon. Nonindigenous Aquatic Species Database. Gainesville, Florida: U.S. Geological Survey. Available: https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=3274 (July 2024).

Sanders S, Castiglione C, Hoff M. 2023. Risk Assessment Mapping Program: RAMP. Version 5.0. U.S. Fish and Wildlife Service.

Su F, Guo Y, Wang R. 2020. *Egeria naias* Planch., a newly naturalized aquatic species in China. Guangdong Agricultural Sciences 47(9):63–65.