U.S. Fish & Wildlife Service

Waterpoppy (*Hydrocleys nymphoides*)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, January 2024
Revised, December 2024
Web Version, 12/9/2025

Organism Type: Flowering Plant
Overall Risk Assessment Category: High

Photo: Daderot. Public Domain. Available: https://commons.wikimedia.org/wiki/File:Hydrocleys_nymphoides_-_NBGB_-_IMG_4389.JPG (January 2024).

1 Native Range and Status in the United States

Native Range

From Pfingsten (2024):

"**Native Range:** The Greater Antilles (Puerto Rico, Trinidad), Central America (Guatemala), and South America. Presumed extirpated or extinct in Puerto Rico (Axelrod 2011)."

POWO (2024) lists the following additional countries as part of the native range of *Hydrocleys nymphoides*: Argentina, Bolivia, Brazil, Colombia, Ecuador, Guyana, Netherlands Antilles, Panamá, Paraguay, Suriname, and Venezuela.

Status in the United States

From Pfingsten (2024):

"**Native Range:** The Greater Antilles (Puerto Rico, […]"

From USDA APHIS (2021):

"*Hydrocleys nymphoides* is present outside of cultivation in Florida, Texas, Louisiana, and possibly Puerto Rico [EDDMapS 2020; Kartesz 2015; USDA, NRCS 2020]. […] It is naturalized in four counties in Florida and three in Texas (EDDMapS, 2020; Gordon et al., 2012; NRCS, 2020). In Louisiana, it was observed to be growing in a ditch at a park in 2010 (MacRoberts and MacRoberts, 2010), but we did not find information to indicate whether it is naturalized. It has been introduced as an ornamental to Hawaii, where it is a casual exotic (Wester, 1992)."

Additionally, USGS (2025) lists *Hydrocleys nymphoides* as introduced and established in Ventura County, California.

From Pfingsten (2024):

"*Hydrocleys nymphoides* is sold through the pond and aquarium trade and is not prohibited in the United States (Muenscher 1944, Godfrey and Wooten 1979)."

Regulations

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

Means of Introductions within the United States

From USDA APHIS (2021):

"It can be moved on boats and equipment and can also be introduced to new areas through aquarium dumping."

From Pfingsten (2024):

"It is commonly cultivated and may escape captivity or be released from aquaria (Muenscher 1944, Godfrey and Wooten 1979)."

Remarks

From USDA APHIS (2021):

"[…] the status of the species in Puerto Rico is unclear. The National Plant Germplasm System (NPGS, 2020) lists it as native to Puerto Rico, while other references describe it as present but introduced (Acevedo-Rodriguez and Strong, 2005; NRCS, 2020). Pfingsten (2020) indicates that it is native to Puerto Rico but may be extirpated there."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2024):

Kingdom Plantae
  Subkingdom Viridiplantae
    Infrakingdom Streptophyta
      Superdivision Embryophyta
        Division Tracheophyta
          Subdivision Spermatophytina
            Class Magnoliopsida
              Superorder Lilianae
                Order Alismatales
                  Family Alismataceae
                    Genus *Hydrocleys* Rich.
                      Species *Hydrocleys nymphoides* (Willd.)

According to WFO (2024), *Hydrocleys nymphoides* is the current valid name for this species.

Size, Weight, and Age Range

From Pfingsten (2024):

"**Size:** up to 50 cm tall"

Environment

From VRO (2024):

"Water poppy grows rapidly in warm, well lit water bodies to depths of 2 m. [EWRC 2008]. Frost tender (Wild Eel 2008). Exclusive to lentic environments [Pott and Pott 2004]. […] Grows best in 20-45 cm water, can tolerate depths of 2 m. [EWRC 2008; Australian Water Gardens n.d.]."

From Pfingsten (2024):

"**Tolerances:** flowering occurs in water above 21°C (70°F) [MBG 2018]"

"**Habitat:** lake margins and wet ditches [MBG 2018]"

From WFO (2024):

"[…] from sea level to 1500 m elev."

Climate

From POWO (2024):

"[…] grows primarily in the wet tropical biome […]"

From VRO (2024):

"Leaves may burn when temperatures drop into the 20°F [San Marcos Growers 2008]. […] Subtropical, but grows well in both warm and cool temperate climates, […] (RNZIH 2008)."

Distribution Outside the United States

Native

From USDA APHIS (2021):

"*Hydrocleys nymphoides* is native to much of South America and to the Netherlands Antilles and Trinidad and Tobago (NPGS, 2020)."

POWO (2024) lists the following additional countries as part of the native range of *Hydrocleys nymphoides*: Argentina, Bolivia, Brazil, Colombia, Ecuador, Guatemala, Guyana, Panamá, Paraguay, Suriname, and Venezuela.

Introduced

From USDA APHIS (2021):

"It is naturalized in Australia and New Zealand (Howell and Sawyer, 2006; NPGS, 2020; Randall, 2007). It is considered invasive in New Zealand (Brunel, 2009; MPI, n.d.), where it has been spreading since 1912 (Thomson, 1922). In Australia, it is recommended for a watch list (Champion et al., 2008), but it is not a noxious weed (Brunel, 2009). It is also considered invasive in China (Wang et al., 2016), and Ugarte (2011) lists it as introduced in Chile. In 2009, a population was found at a dam in South Africa, and by 2013, this species had covered 30 percent of the surface. It has since been recommended for eradication (Nxumalo et al., 2016). Williams and Champion (2008) report that it has spread to Japan, Fiji, and the United Kingdom in the aquarium trade, but we found no evidence of its presence in Fiji or the United Kingdom. Aston and Jacobs (1980) listed it as naturalized in Japan, but Kadono (2004) indicates that it may be a waif."

"It is naturalized in Australia, New Zealand, Chile, South Africa, and China (Hill and Coetzee, 2017; Howell and Sawyer, 2006; NPGS, 2020; Nxumalo et al., 2016; Randall, 2007; Ugarte et al., 2011; Wang et al., 2016)."

From Peng and Li (2022):

“Waterpoppy has successfully become naturalized in south and southwest China and [sic] lower reach of the Yangtze River where it has become [sic] serious threat to agricultural production and native biodiversity.”

From NIBR (2025):

“Nationwide [South Korea] cultivation, naturalization of [sic] Jeju Island and southern regions”

WFO (2024) reports *Hydrocleys nymphoides* as also introduced in Society Island and New Caledonia. CABI (2019) reports *Hydrocleys nymphoides* as introduced into Taiwan.

Means of Introduction Outside the United States

From USDA APHIS (2021):

“It was probably planted intentionally [in Japan] and is not expected to spread (Kadono, 2004). European and Mediterranean countries occasionally import it as an ornamental […] In Zimbabwe and Kenya, it is planted as an ornamental and used in wetlands for wastewater treatment, but it has not escaped or naturalized (Nxumalo et al., 2016). It is also grown as an ornamental in South Korea (Cho et al., 2018).”

“[…] can also reproduce vegetatively (MBG, 2020) with plantlets detaching from the parent plant at the end of the growing season (Kodela and Jobson, 2018). The plant can also regenerate from fragments (Nxumalo et al., 2016); consequently, attempts at mechanical control are more likely to further disperse the species than to eliminate it (Sullivan and Hutchison, 2010). *Hydrocleys nymphoides* is spreading in New Zealand [MPI n.d.; Thomson 1922] and can be dispersed by boats and machinery (Kodela and Jobson, 2018) and by dumping of aquarium contents into waterways (Weakley 2015).”

Short Description

From Pfingsten (2024):

“**Identification:** As described in Godfrey & Wooten (1973):
Habit: perennial, emergent, aquatic forb
Roots/Stems: rhizomes root at nodes
Leaves: basal, alternate, petioles long, blades ovate to suborbicular, basally cordate and apically rounded, margins entire, upper surface glabrous, lower surface minutely hirsute, midrib spongy
Flowers: solitary, axillary, pedicels long, sepals 3, petals 3, yellow, obovate, 2-3 cm, stamens numerous, filaments purple (fertile), carpels 5-8 and free
Fruits/Seeds: follicles with several seeds”

Biology

From Pfingsten (2024):

"**Life History:** flowers June to August, lasting a day; spreads vegetatively when runners send out new roots [MBG 2018]"

From NZPCN (2024):

"Water poppy produces new plantlets at the end of the growth season. These break away from the main plant and rise to the surface, where they are carried away by water movement to a new location before taking root in the mud (Ermert & Clapp 1998)."

Human Uses

From Pfingsten (2024):

"*Hydrocleys nymphoides* is sold through the pond and aquarium trade […]."

From POWO (2024):

"[…] used as a medicine."

Diseases

According to Poelen et al. (2014), *Hydrocleys nymphoides* is a host of several fungi, including but not limited to: *Pseudodoassansia hydrocleydis*, *Podosphaera* sp., and *Podosphaera fusca*.

From VRO (2024):

"No evidence of *Hydrocleys nymphoides* being a disease host/ vector."

Threat to Humans

From VRO (2024):

"Leaves are thick and shiny and float on the surface, with each shoot connected by a network of elastic creeping stems that form a deep mat (EBOP 2008). May therefore cause drowning."

"Large spines or burrs extremely toxic, and cause serious allergies to humans throughout the year."

3 Impacts of Introductions

From Peng and Li (2022):

"These dense stands prevent light penetration and deplete oxygen causing significant biodiversity losses of both native flora and fauna (Gorham 2008). Meanwhile, dense waterpoppy colonies significantly affect human activities, such as fishing, swimming, and boating (Sullivan

and Hutchison 2010). Thus, it has been listed as a problematic invasive aquatic plant in Europe, Australia, and Africa (Williams 2008; Nxumalo et al. 2016)."

"In south and southwest China, especially in Hainan, Guangdong, and Guangxi Provinces, waterpoppy replaces native aquatic plants. For example, we observed that some native species (*Myriophyllum spicatum*, *Potamogeton pectinatus*, *Ottelia acuminata*) were previously more abundant in some streams in the Du'an County, Guangxi in 2005. However, these native species were completely replaced by waterpoppy by 2018."

"In some of our surveys, we observed that native fishes are completely displaced by non-native mosquitofishes (*Gambusia affinis*). This may be because only mosquitofish can endure the low oxygen in dense monotypic stands of waterpoppy."

From USDA APHIS (2021):

"Its long stalks can interfere with the movement of aquatic animals, and it can cover the water surface and block light to submerged vegetation (Nxumalo et al., 2016). Agriculture Victoria (VRO, 2020) reports that when it forms a monoculture, no other vegetation layers are present. It can outcompete and displace native species (MPI, 2012; Nxumalo et al., 2016). In New Zealand, it decreases water quality (ARC, 2004), and Nxumalo et al. (2016) report that it can deplete oxygen if it covers the water surface. *Hydrocleys nymphoides* also clogs drains and canals (Sullivan and Hutchison, 2010) and causes flooding (MPI, 2012). It has been reported to block dams in New South Wales, Australia (Hosking et al., 2011). It interferes with fishing, boating, and swimming in New Zealand (Sullivan and Hutchison, 2010), and Agriculture Victoria (VRO, 2020) in Australia has reported on visitor complaints and a reduction in visitors to infested areas."

According to VRO (2024), *Hydrocleys nymphoides* causes flooding, reduces land value, alters habitat, and competes and displaces native species resulting in the reduction of native populations.

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

4 History of Invasiveness

The History of Invasiveness for *Hydrocleys nymphoides* is classified as High. *H. nymphoides* has been introduced and become established in several countries outside of its native range. It has a presence in trade and may have escaped cultivation; it is also transported on boats and equipment. Established populations have resulted in negative impacts, such as reducing light penetration, reducing oxygen levels, decreasing water quality, altering habitat, and outcompeting and displacing native flora and fauna. *H. nymphoides* also affects humans by decreasing land value, clogging drains, and blocking dams, impacting flooding. Dense colonies of *H. nymphoides* also hinder swimming, boating, fishing, and other recreational activities resulting in decreased tourism.

5 Global Distribution

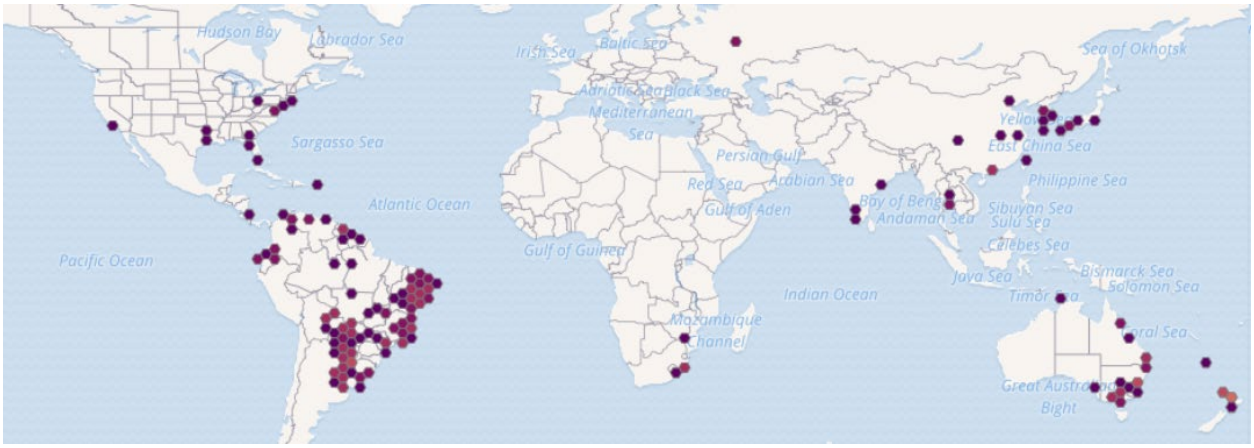

Figure 1. Reported global distribution of *Hydrocleys nymphoides*. Map from GBIF Secretariat (2024). Observations are reported from South America, Costa Rica, Puerto Rico, United States, southern Africa, Russia, southern and eastern Asia, Australia, and New Zealand.

Points in Russia, Thailand, Taiwan, northern South Korea, India, Zimbabwe, Norfolk Island, Costa Rica, and Puerto Rico, West Virginia, Washington D.C., Connecticut, and Louisiana in the United States are not representative of confirmed established populations of *H. nymphoides*. Therefore, these points were excluded from the climate matching analysis. The two westernmost points in Australia were also excluded from the climate matching analysis as they represent cultivated populations.

Points may be missing from United Kingdom, Guatemala, Panama, and Chile. Status of populations introductions in the United Kingdom and Chile could not be confirmed by peer reviewed literature.

Additional observations of established populations in China were provided in Peng and Li (2022).

6 Distribution Within the United States

Figure 2. Reported distribution of *Hydrocleys nymphoides* in the United States. Map from USGS (2025). Observations are reported from Florida, Louisiana, and Texas. Yellow diamonds indicate observations representing established populations; orange diamonds indicate observations with unknown population status. Only observations representing established populations were used in the climate matching analysis.

Figure 3. Reported native range of *Hydrocleys nymphoides* in Puerto Rico. Map from Pfingsten (2024). Orange shading indicates the reported native range of *H. nymphoides*; it is presumed extirpated or extinct in Puerto Rico.

CABI (2019) reported that *Hydrocleys nymphoides* was introduced to Hawaii but no georeferenced observations were found for this introduction.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Hydrocleys nymphoides* in the contiguous United States was high along the Gulf Coast, Southern Atlantic Coast, Mid-Atlantic Coast, in the Southeast region, and in central and southern California. Areas of low match were found along the northern Pacific Coast and in some areas of the Cascade and Sierra Nevada ranges. Everywhere else had a medium match. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.614, 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 *Hydrocleys nymphoides* (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.

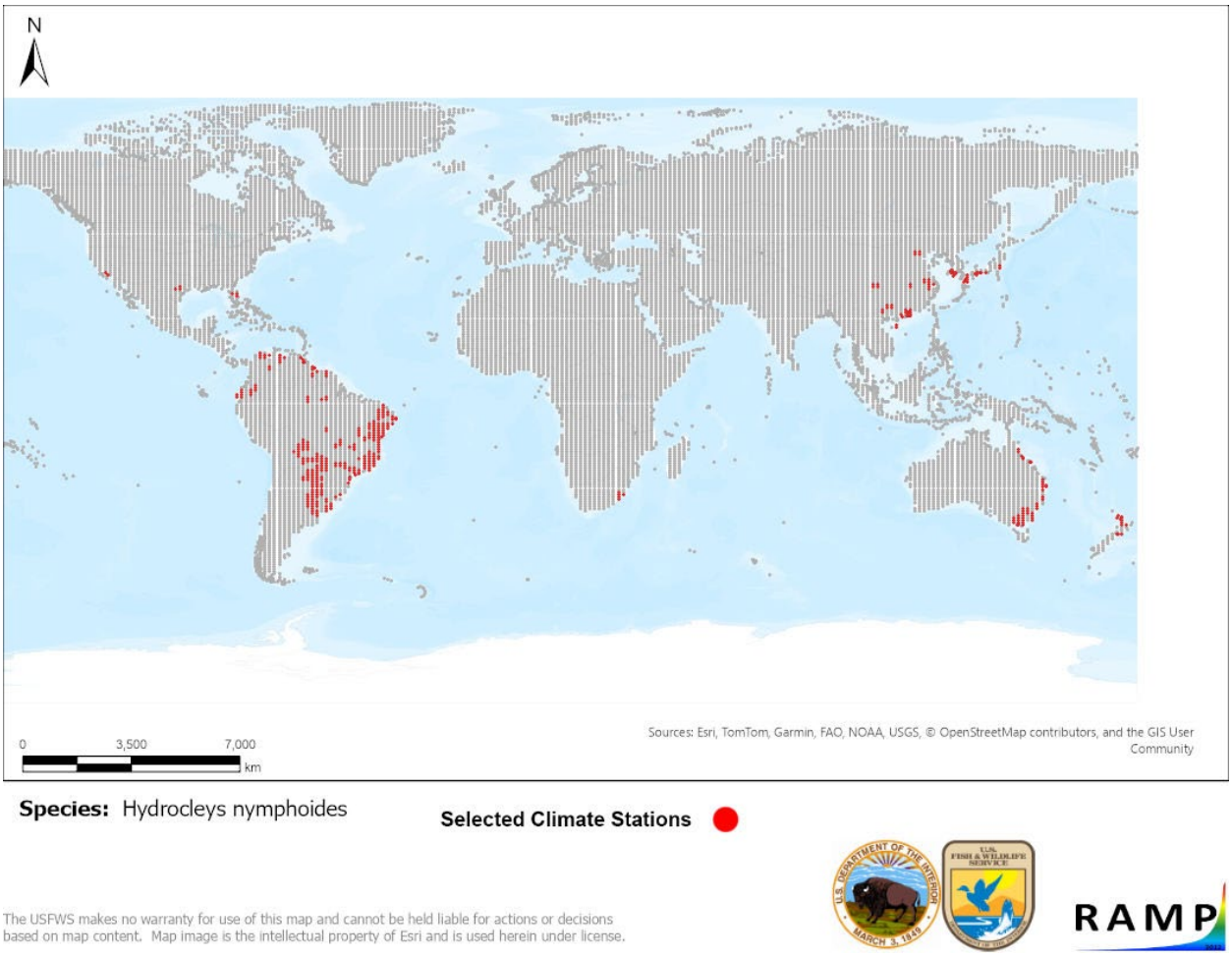

Figure 4. RAMP (Sanders et al. 2023) source map showing global weather stations selected as source locations (red; United States, Argentina, Australia, Bolivia, Brazil, Chile, Colombia, Ecuador, Guatemala, Guyana, Netherlands Antilles, New Zealand, Panamá, Paraguay, South Africa, Suriname, Trinidad-Tobago, Venezuela, Japan, South Korea, China) and non-source locations (gray) for *Hydrocleys nymphoides* climate matching. Source locations from Peng and Li (2022) and GBIF Secretariat (2024). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

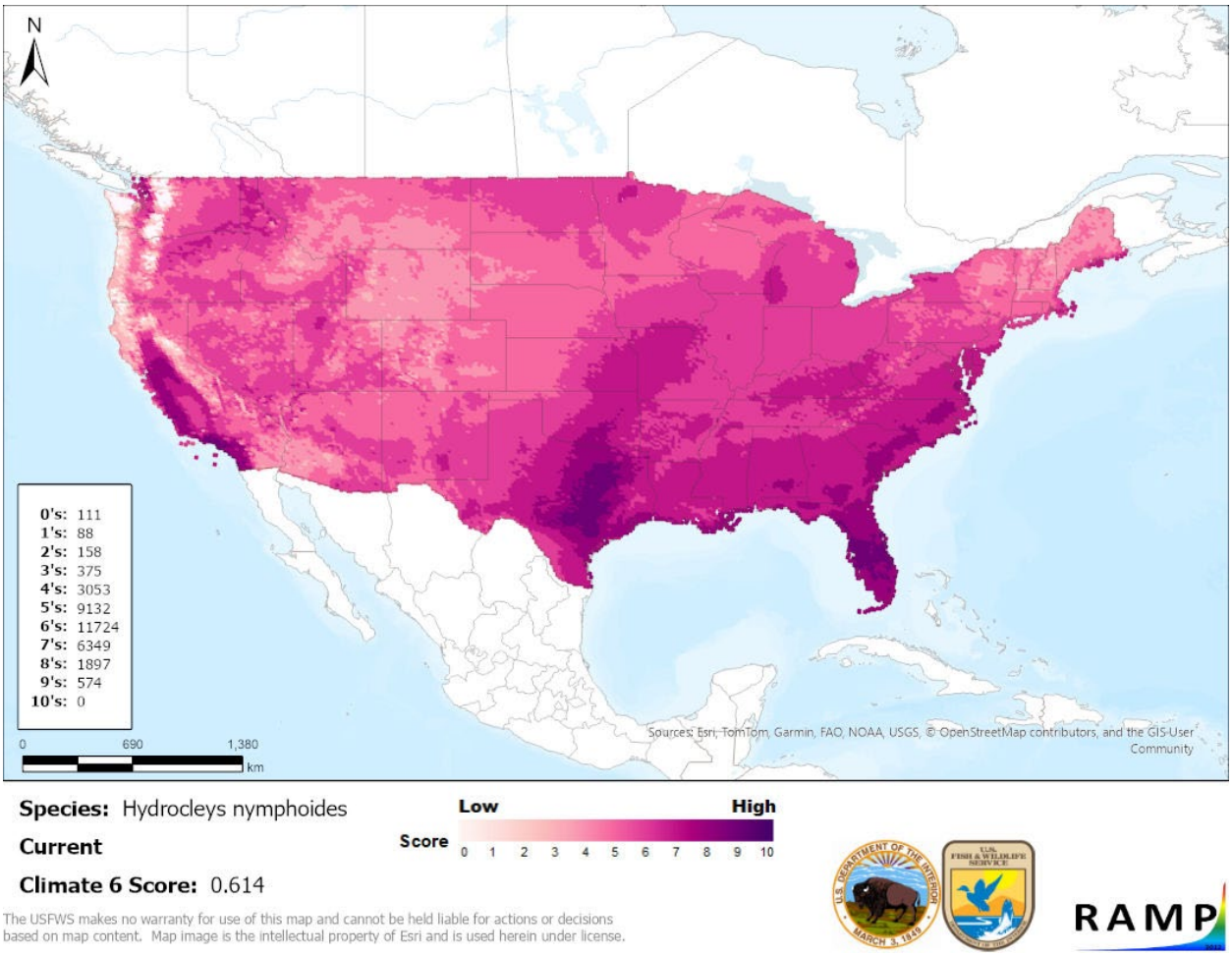

Figure 5. Map of RAMP (Sanders et al. 2023) climate matches for *Hydrocleys nymphoides* in the contiguous United States based on source locations reported by Peng and Li (2022) and GBIF Secretariat (2024). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

The Certainty of Assessment for *Hydrocleys nymphoides* is classified as High. Information regarding the biology, ecology, and distribution of *H. nymphoides* is available. Records of introductions and impacts were also available. There is some ambiguity on the species' status in the wild in a few cases but it is not thought to be enough to impact the interpretation of the climate matching analysis.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Hydrocleys nymphoides, Waterpoppy, is a freshwater aquatic plant native to Central America, South America, Puerto Rico, and Trinidad. *H. nymphoides* grows in shallow, warm, well-lit bodies of water. *H. nymphoides* has been introduced and established in several countries. It has been introduced in California, Hawaii, Texas, Louisiana, and Florida and is established in California, Texas, and Florida. It has also been introduced and become established in eastern Asia, South Africa, Australia, and New Zealand. *H. nymphoides* has a high presence in the ornamental trade both within the United States and internationally. The History of Invasiveness for *H. nymphoides* is classified as High due to this species being established outside its native range and having documented negative impacts from those introductions. Introduced and established populations have resulted in negative impacts such as reduced light penetration, reduced oxygen levels, decreased water quality, altered habitat, decreased land value, clogged drains, blocked dams, and displacement of native flora and fauna. The climate matching analysis for the contiguous United States indicates establishment concern for this species. The climate matching analysis for the contiguous United States found areas of high match in central and southern California, along the Gulf Coast, Southern Atlantic Coast, Mid-Atlantic Coast, and Southeast regions of the United States. The Certainty of Assessment for this ERSS is classified as High. The Overall Risk Assessment Category for *H. nymphoides* in the contiguous United States is High.

Assessment Elements

- **History of Invasiveness (see Section 4): High**
- **Establishment Concern (see Section 7): Yes**
- **Certainty of Assessment (see Section 8): High**
- **Remarks, Important additional information: None**
- **Overall Risk Assessment Category: High**

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 Peng and Li (2022) and GBIF Secretariat (2024).

Under the future climate scenarios (figure A1), on average, high climate match for *Hydrocleys nymphoides* was projected to occur in the Southern Atlantic Coast and Southern Florida regions of the contiguous United States. Climate matching remains similar across scenarios and time steps. However, 2085 scenarios show a slight reduction in the areas of high match compared to 2055 scenarios. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.415 (model: MPI-ESM1-2-HR, SSP5, 2085) to a high of 0.644 (model: IPSL-CM6A-LR, SSP5, 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 (0.614, figure 5) 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 Colorado Plateau, Northeast, and Northern Pacific Coast 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 within California, the Colorado Plateau, Gulf Coast, Northern Pacific Coast, 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).

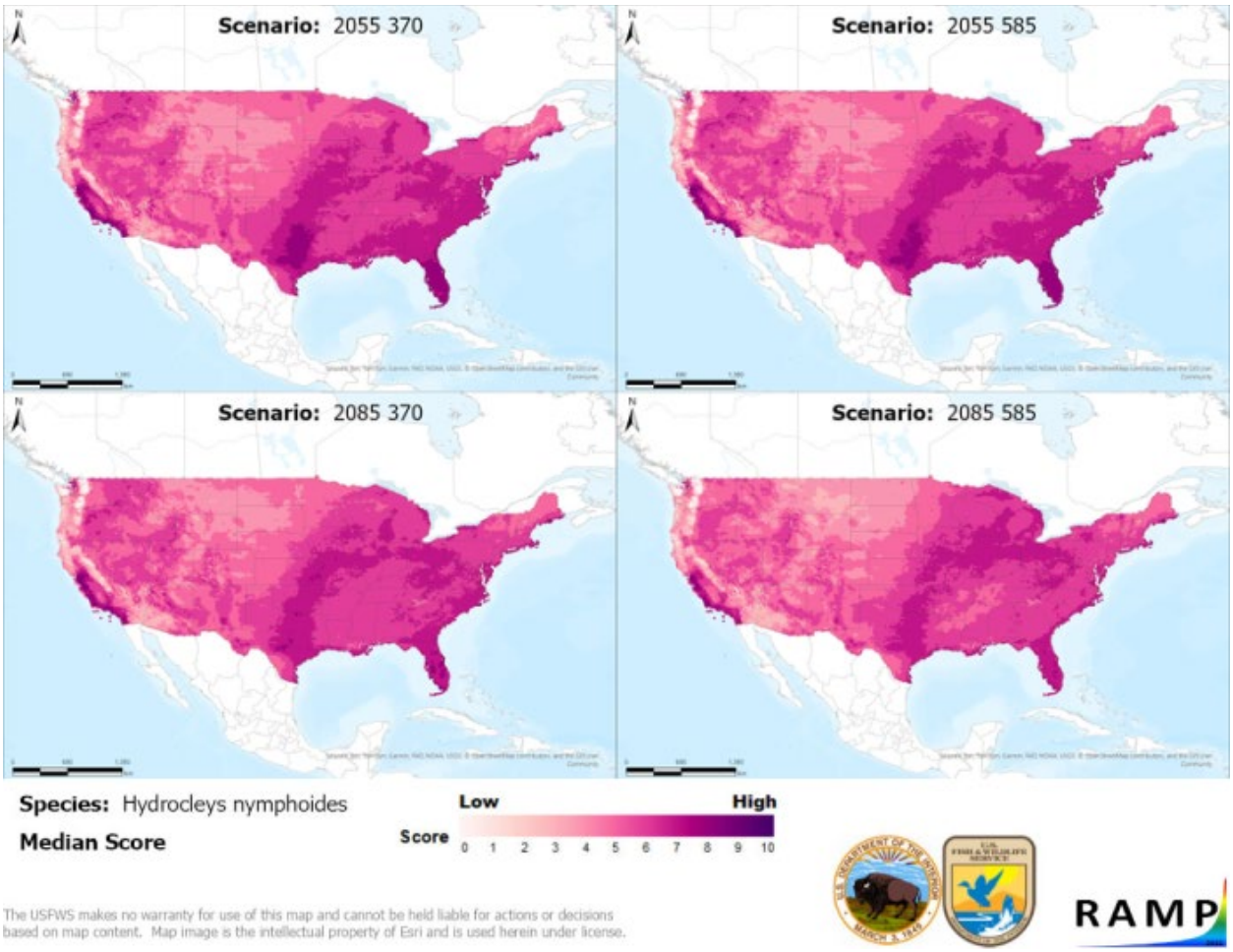

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Hydrocleys nymphoides* in the contiguous United States. Climate matching is based on source locations reported by Peng and Li (2022) and GBIF Secretariat (2024). 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.

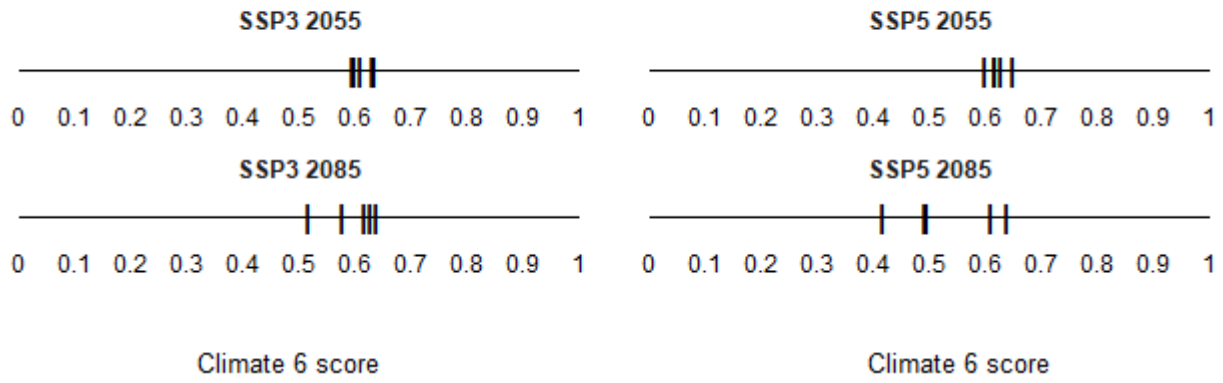

Figure A2. Comparison of projected future Climate 6 scores for *Hydrocleys nymphoides* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018;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

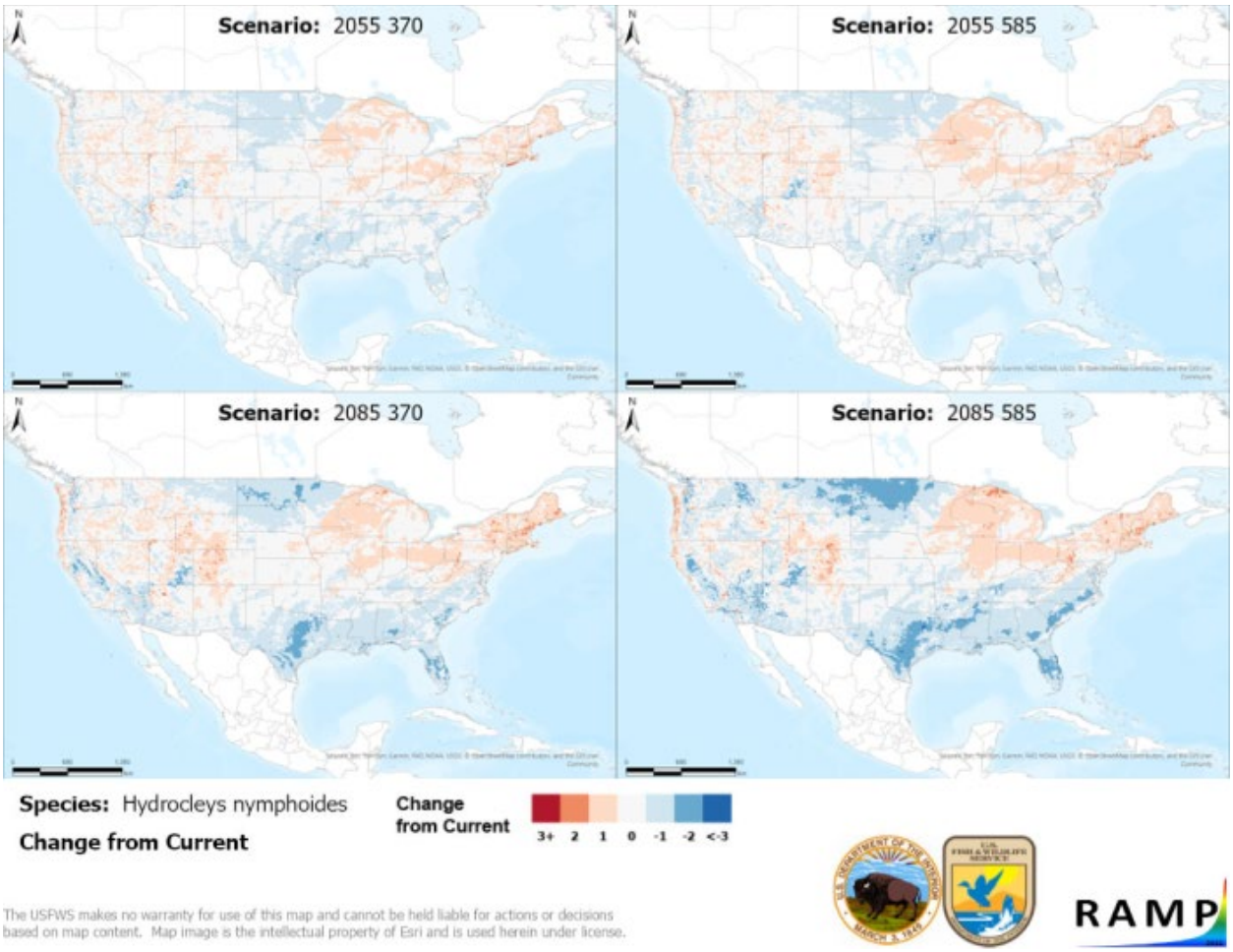

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 5) and the median target point score for future climate scenarios (figure A1) for *Hydrocleys nymphoides* based on source locations reported by Peng and Li (2022) and GBIF Secretariat (2024). 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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