

# Haspan Flatsedge (*Cyperus haspan*)

## Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, March 2023

Revised, May 2023

Web Version, 3/22/2024

Organism Type: Flowering Plant

Overall Risk Assessment Category: High



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<https://www.invasive.org/browse/detail.cfm?imgnum=5406865> (March 2023).

## 1 Native Range and Status in the United States

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### Native Range

From Gupta and Lansdown (2018):

“This species is native throughout sub-Saharan Africa, the Indian Ocean Islands, from Iran east through the Indian sub-continent to parts of China, Japan, the Korean Peninsula, south through south-east Asia to the Solomon Islands, Bismarck Archipelago and Australia, as well as from

Texas and the south-eastern United States south through Mexico, central America and the Caribbean though northern South America to Brazil and Paraguay (The Board of Trustees of the Royal Botanic Gardens, Kew 2017).”

“Native: Angola; Australia; Belize; Benin; Bolivia, Plurinational States of; Brazil; Burkina Faso; Burundi; Cambodia; Cameroon; Chad; China; Colombia; Congo, The Democratic Republic of the; Costa Rica; Côte d'Ivoire; Cuba; Dominica; Ecuador; Equatorial Guinea; Ethiopia; French Guiana; Gabon; Gambia; Ghana; Guatemala; Guinea; Guinea-Bissau; Guyana; Honduras; India; Indonesia; Iran, Islamic Republic of; Japan; Kenya; Korea, Democratic People's Republic of; Lao People's Democratic Republic; Liberia; Madagascar; Malawi; Malaysia; Mexico; Mozambique; Myanmar; Nepal; Nicaragua; Niger; Nigeria; Pakistan; Panama; Papua New Guinea (Bismarck Archipelago); Paraguay; Peru; Philippines; Puerto Rico; Senegal; Seychelles; Sierra Leone; Solomon Islands; Somalia; South Africa; Sri Lanka; Sudan; Suriname; Taiwan, Province of China; Tanzania, United Republic of; Thailand; Togo; Trinidad and Tobago; Uganda; United States; Venezuela, Bolivarian Republic of; Viet Nam; Zambia; Zimbabwe”

From USDA, NRCS (2023):

“Native Status: [...] USA (AL, AR, FL, GA, [...], LA, MS, NC, PW, SC, TN, TX, VA), USA+ (PR)”

Corriale et al. (2013) and Echeverría et al. (2017) also report this species as native to Argentina.

## **Status in the United States**

From Bryson and Carter (2008):

“*Cyperus haspan* is a recent introduction into Hawaii with the first collection made in 1957 (Wagner et al., 1990).”

From Medeiros et al. (1998):

“The first collection of this species on Maui was made in Waiho‘i Valley in 1972 [...] and the first collection in the [Haleakalā National] Park was made in 1982 [...]”

This species is in trade in the United States.

From Puget Sound Ponds (2023):

“*Cyperus Haspan* 'Dwarf Papyrus' (Bare Root) [...] Sale \$9.79”

## **Regulations**

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

## **Means of Introductions within the United States**

No information available on means of introduction within the United States for *Cyperus haspan*.

## Remarks

No additional remarks.

## 2 Biology and Ecology

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### Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2023):

Kingdom Plantae  
Subkingdom Viridiplantae  
Infrakingdom Streptophyta  
Superdivision Embryophyta  
Division Tracheophyta  
Subdivision Spermatophytina  
Class Magnoliopsida  
Superorder Lilianae  
Order Poales  
Family Cyperaceae  
Genus *Cyperus*  
Species *Cyperus haspan* L.

According to WFO (2023), *Cyperus haspan* is the current valid name for this species.

### Size, Weight, and Age Range

From POWO (2023):

“Perennial 15–60(90) cm tall, [...]”

### Environment

From Bryson and Carter (2008):

“*Cyperus haspan*[...] commonly occurs in shallow standing water and germinates and grows well in wet, sandy, acidic soils (Bertels, 1957; Eyles & Robertson, 1963; Dirven, 1970).”

From Gupta and Lansdown (2018):

“This species occurs in a wide range of wetland habitats such as wet swamp and marshy habitats. It is associated with streams and rivers, in seasonally and permanently wet grassland, as well as on thin wet soil over rock and in ditches (I. Larridon pers. comm., Flora Zambesiaca in draft).”

## Climate

From Holm et al. (1997):

“*C. brevifolius* and *C. haspan* occur in the tropical and subtropical regions around the world [...]. Both are found in somewhat temperate areas of Japan and the United States, [...]”

## Distribution Outside the United States

### Native

The native range of *Cyperus haspan* is partly within the United States, see Native Range in Section 1.

From Gupta and Lansdown (2018):

“This species is native throughout sub-Saharan Africa, the Indian Ocean Islands, from Iran east through the Indian sub-continent to parts of China, Japan, the Korean Peninsula, south through south-east Asia to the Solomon Islands, Bismarck Archipelago and Australia, as well as [...] Mexico, central America and the Caribbean though northern South America to Brazil and Paraguay (The Board of Trustees of the Royal Botanic Gardens, Kew 2017).”

“Native: Angola; Australia; Belize; Benin; Bolivia, Plurinational States of; Brazil; Burkina Faso; Burundi; Cambodia; Cameroon; Chad; China; Colombia; Congo, The Democratic Republic of the; Costa Rica; Côte d'Ivoire; Cuba; Dominica; Ecuador; Equatorial Guinea; Ethiopia; French Guiana; Gabon; Gambia; Ghana; Guatemala; Guinea; Guinea-Bissau; Guyana; Honduras; India; Indonesia; Iran, Islamic Republic of; Japan; Kenya; Korea, Democratic People's Republic of; Lao People's Democratic Republic; Liberia; Madagascar; Malawi; Malaysia; Mexico; Mozambique; Myanmar; Nepal; Nicaragua; Niger; Nigeria; Pakistan; Panama; Papua New Guinea (Bismarck Archipelago); Paraguay; Peru; Philippines; [...] Senegal; Seychelles; Sierra Leone; Solomon Islands; Somalia; South Africa; Sri Lanka; Sudan; Suriname; Taiwan, Province of China; Tanzania, United Republic of; Thailand; Togo; Trinidad and Tobago; Uganda; [...] Venezuela, Bolivarian Republic of; Viet Nam; Zambia; Zimbabwe”

Corriale et al. (2013) and Echeverría et al. (2017) also report this species as native to Argentina.

### Introduced

From POWO (2023):

“Introduced into: Fiji, [...] Mauritius, New Caledonia, Réunion”

From Greenwood (1949):

“Common in drains and other wet places in Naitasiri and Tailevu Provinces, Viti Levu [Fiji].”

## Means of Introduction Outside the United States

According to Bryson and Carter (2008), the means of dispersal for *Cyperus haspan* is ornamental usage and rice agriculture.

## Short Description

From Holm et al. (1997):

“*C. haspan* [...] is also a perennial herb; rhizomes short and somewhat creeping; stems 20 to 40 cm tall, solitary or tufted, sharply triangular, often with a median rib on each side, rather flaccid and the base slightly tuberous; leaves few, basal, 2 to 10 cm long, 3 to 5 mm wide, often as long as stem, sometimes shorter, lower sheaths brownish, purplish or reddish; inflorescence simple or compound, umbellate, flower-bearing rays up to 15 cm long, terminal on stem apex, loose to rather dense, variable size 5 to 15 cm across, slender; involucre bracts few, oblique to widely spreading, short but one or two longer than rest, longest one up to 8 cm, slightly overlapping the inflorescence; spikelets digitally arranged in dusters, few to many, 8- to 25-flowered, 3 to 15 mm long, 0.8 to 1.5 mm wide, green, linear or linear-lanceolate, strongly compressed to axis, acute, persistent; glumes 1.2 mm long, 0.5 to 0.75 mm wide, suberect, keeled, oblong-ovate, closely overlapping with broad, green midrib, membranous sides and sharp tip; stamens 1 to 3; anthers linear-oblong, 0.5 mm long; stigmas 3; style 3-branched; fruit a triangular achene, broadly obovate, shortly apiculate, densely granular to verrucose, whitish becoming yellowish to pale brown, 0.5 mm long.”

## Biology

From Holm et al. (1997):

“Plants of *C. haspan* collected in a rice field in India contained 52,440 seeds each and 1000 seeds weighed only 14 mg (Datta and Banerjee 1976). In the Philippines, Pancho (1964) counted 18,720 seeds/plant growing under similar conditions. Plants of *C. haspan* that start as seedlings may flower during the first year of development, but rhizome formation usually does not occur until the second year (Tadulingam and Venkatanarayana 1955). Plants appear in jute fields in India after the first and second weedings have been done (Saraswat 1980). In Japan, this species flowers from August through October (Numata and Yoshizawa 1975). Florets at the base of the spikelet mature first; flowering then begins on the mid and upper sections; fruits are shed as the spikelet elongates and while flowering continues (Godfrey and Wooten 1979).”

## Human Uses

From Holm et al. (1997):

“Some indigenous groups in East Africa utilize *C. haspan* by preparing salt from the ashes of this species (Uphof 1968). Pigments called "cyperquinones" have also been found in *C. haspan*. Allan et al. (1969) studied 35 Cyperaceae species and only four contained quinones. Two were identified in the roots and rhizomes of *C. haspan* and represented 0.5% of the dry weight of these tissues. The quinones have some biological activity, as they were weakly active on some gram positive organisms.”

From Gupta and Lansdown (2018):

“In India, the rhizomes are diuretic and its pastes are taken for kidney problems. It is also used for healing, lactation and as a stimulant.”

This species is in trade in the United States.

From Puget Sound Ponds (2023):

“*Cyperus Haspan* 'Dwarf Papyrus' (Bare Root) [...] Sale \$9.79”

## Diseases

From Holm et al. (1997):

“*C. haspan* is an important new rice weed in Indonesia (Rahan et al. 1975) and can host the ring nematode (*Criconemoides onoensis*). When nematicides were applied in rice, potential yield increases were off-set by increased weed competition from *Echinochloa* spp. and *C. haspan* since they were no longer affected by the nematodes (Hollis 1972).”

According to Poelen et al. (2014) *Cyperus haspan* can be the host to the following fungal pathogens: *Puccinia abrepta*, *Puccinia canaliculate*, *Puccinia cyperi*, and *Puccinia caricina*.

## Threat to Humans

From Bryson and Carter (2008):

“The adverse economic impact of [genus] *Cyperus* is great. According to Holm et al. (1977), it contains the world’s worst weed and three additional species listed among the 33 worst agricultural weeds in the world.”

“*Cyperus haspan* is among the world’s worst weeds (Holm et al., 1997). It has been reported as a weed in 12 crops and 39 countries throughout tropical and semitropical areas of Africa, Asia, Australia, South America, and North America (Lin, 1968; Holm et al., 1977, 1979; Kissmann, 1997).”

From Holm et al. (1997):

“*C. haspan* is a reported weed of 12 crops in 39 countries [...]. It is a serious or principal rice weed in Bangladesh, Brazil, Dahomey, India, Indonesia, Peru, Sri Lanka, and Vietnam; a common rice weed in Cambodia, Dominican Republic, Ghana, Laos, Pakistan, and Surinam; and also infests rice in Burma, China, Honduras, Ivory Coast, Malaysia, Nepal, Nigeria, the Philippines, the former Soviet Union, Taiwan, Thailand, and the United States.”

“It is a principal weed of rubber in Malaysia and a common weed of cacao in Sarawak; citrus and bananas in Sudan; jute in Bangladesh; sugarcane in Ghana and India; and tea in India. It is an unranked weed of bananas in Surinam; jute in India; maize in Brazil and Honduras; orchards in Brazil; pastures in Surinam; sorghum in Honduras; and sugarcane in Honduras and Indonesia.”

### 3 Impacts of Introductions

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From Medeiros et al. (1998):

“An aggressive herb that in recent years has invaded and come to dominate areas of disturbed bog turf at Big and Mid- Camp Bogs on the northeast rift [Haleakalā National Park, Hawaii].”

From Yoshinaga (1980):

“At the lower edge of the 'ōhi'a forest [Upper Kīpahulu Valley, Hawaii], around 1200 m (3940 ft), there are still relatively few exotics. Below 1110 m (3610 ft), boggy openings previously occupied by the native *Carex alligata* (Fagerlund 1945) are now covered with either \*Hilo grass [*Paspalum conjugatum*] or two sedges unreported in 1967, the exotic \**Cyperus haspan* and the native kuolohia (*Rhynchospora lamarum*).”

“\**Cyperus haspan* is one of the first colonists of pig rootings in poorly-drained openings below 900 m (2950 ft) and now, along with the native kuolohia, forms solid carpets in such locations.”

In the above quotation, Yoshinaga uses “\*” to indicate any exotic species.

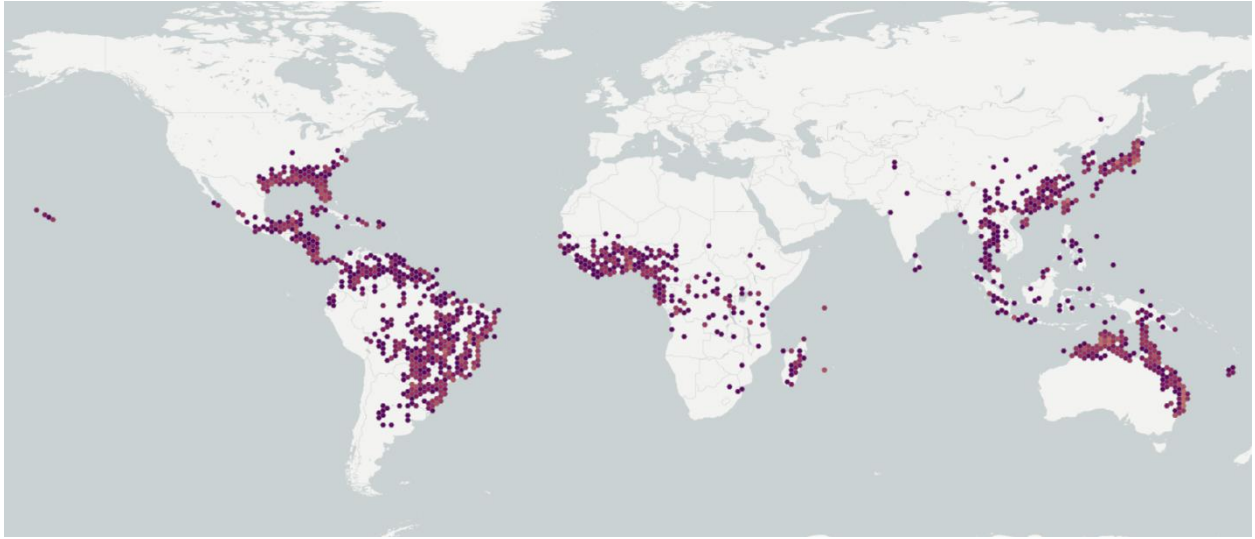
### 4 History of Invasiveness

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The History of Invasiveness for *Cyperus haspan* is classified as High. This species has a wide native range, but it has been reported as introduced to several locations, most notably Hawaii. There it has been documented to outcompete native plants in Haleakalā National Park. Although no information is available about the history of invasiveness of *C. haspan* in other areas of its introduced range, it is considered a major crop weed in many countries within the native range.

## 5 Global Distribution

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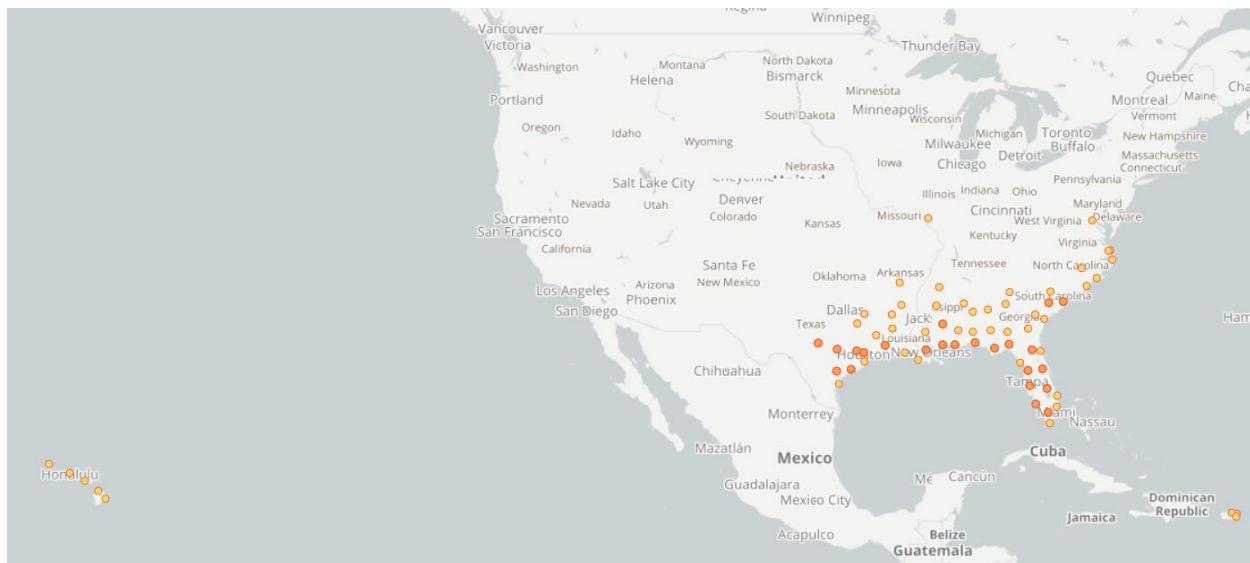
**Figure 1.** Reported global distribution of *Cyperus haspan*. Map from GBIF Secretariat (2022). Observations are reported from tropical and subtropical areas of North and South America, Africa, Asia, and Oceania. A point in Missouri represents a cultivated specimen and was excluded from climate matching analysis.

No georeferenced occurrences were available for parts of the range of *C. haspan* located in Fiji, Iran, Laos, Malawi, Nepal, Somalia, Vietnam, or Zimbabwe.



## 6 Distribution Within the United States

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**Figure 2.** Reported distribution of *Cyperus haspan* in the United States. Map from GBIF-US (2023). Observations are reported from the southeastern United States, Hawaii, and Puerto Rico. A point in Missouri represents a cultivated specimen and was excluded from climate matching analysis.

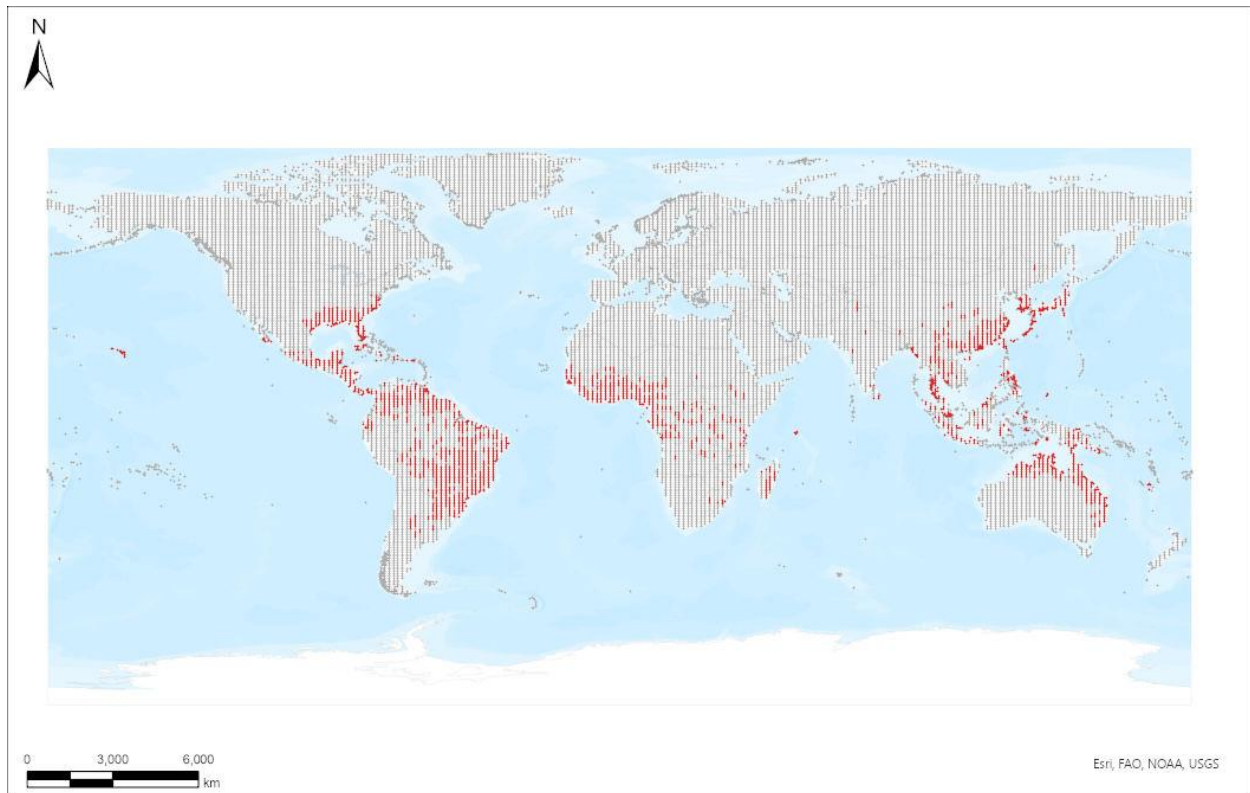
## 7 Climate Matching

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### Summary of Climate Matching Analysis

The climate match for *Cyperus haspan* was high in the southern and eastern areas of the contiguous United States. A large area of high match stretched from Texas, across the South, and up the East Coast to New Jersey, largely overlapping the species native range. The climate match was lowest in the western United States, especially in mountainous areas along the West Coast. The overall Climate 6 score (Sanders et al. 2021; 16 climate variables; Euclidean distance) for the contiguous United States was 0.816, indicating that Yes, there is establishment concern for this species outside its native range. The Climate 6 score is calculated as: (count of target points with scores  $\geq 6$ )/(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).

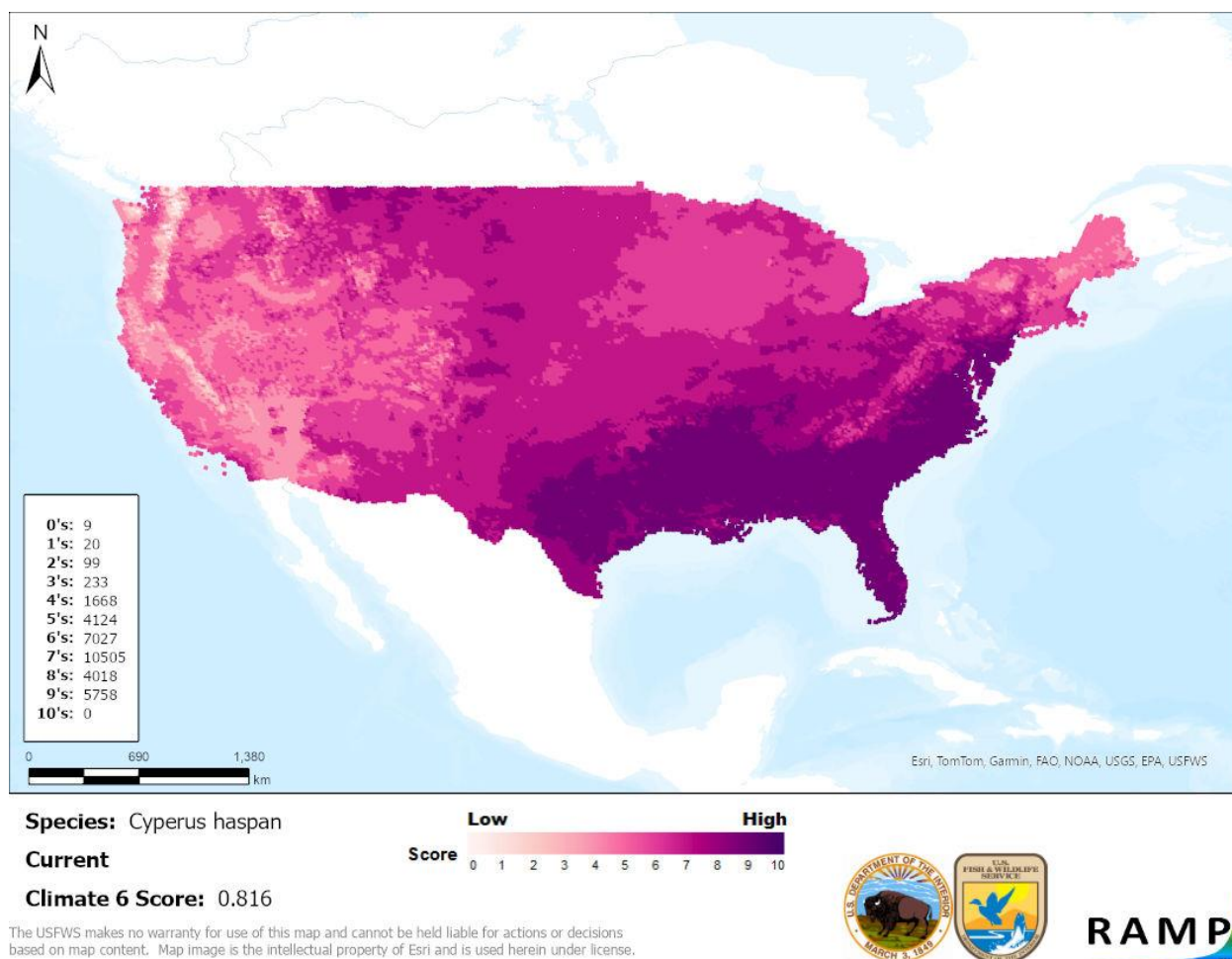
Projected climate matches in the contiguous United States under future climate scenarios are available for *Cyperus haspan* (see Appendix). These projected climate matches are provided as additional context for the reader; future climate scenarios are not factored into the Overall Risk Assessment Category.



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**Figure 3.** RAMP (Sanders et al. 2023) source map showing weather stations worldwide selected as source locations (red; North America, South America, Africa, Asia, Oceania) and non-source locations (gray) for *Cyperus haspan* climate matching. Source locations from GBIF Secretariat (2022). 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 *Cyperus haspan* in the contiguous United States based on source locations reported by GBIF Secretariat (2022). 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 *Cyperus haspan* is classified as High. There is adequate information available about the biology and distribution of this species. It has been documented outside of its native range and has had negative impacts where introduced outside of its native range in Hawaii.

## 9 Risk Assessment

### Summary of Risk to the Contiguous United States

*Cyperus haspan*, Haspan Flatsedge, is a plant that is native to tropical and subtropical regions in North America, South America, Africa, Asia, and Australia. This species is utilized as an ornamental species, but it is also considered a significant weed of rice and other crops worldwide. It was introduced to Hawaii, where it is reported to form dense stands in boggy habitats and outcompete native plants. The History of Invasiveness for *C. haspan* is classified as

High due to documented negative impacts of its introduction outside of its native range. The climate matching analysis for the contiguous United States indicates establishment concern for this species outside its native range. Locally, the highest climate matches were found in the Southeast and Mid-Atlantic regions, within and adjacent to the native range. The Certainty of Assessment for this ERSS is classified as High due to the documented negative impacts of introduction. The Overall Risk Assessment Category for *Cyperus haspan* 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

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**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

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**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

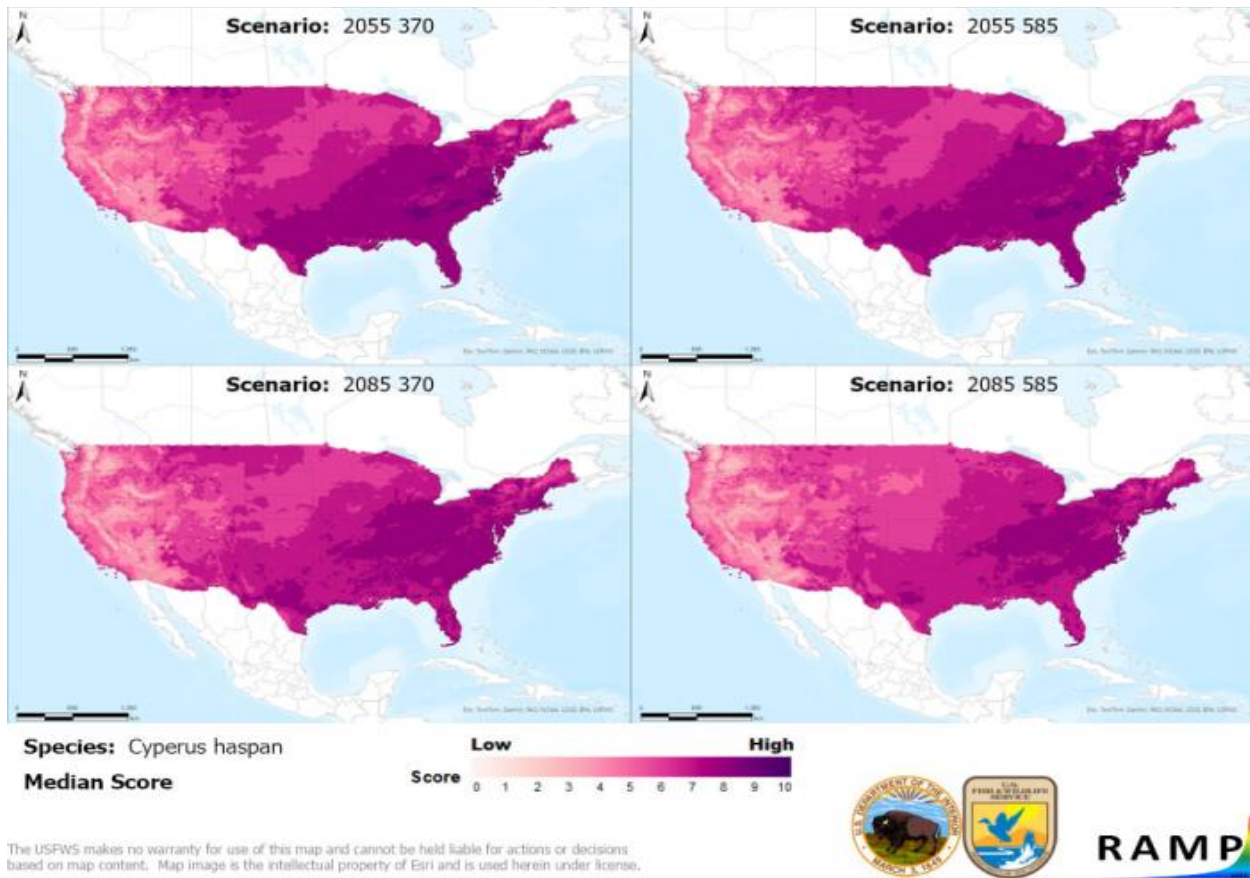
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## Summary of Future Climate Matching Analysis

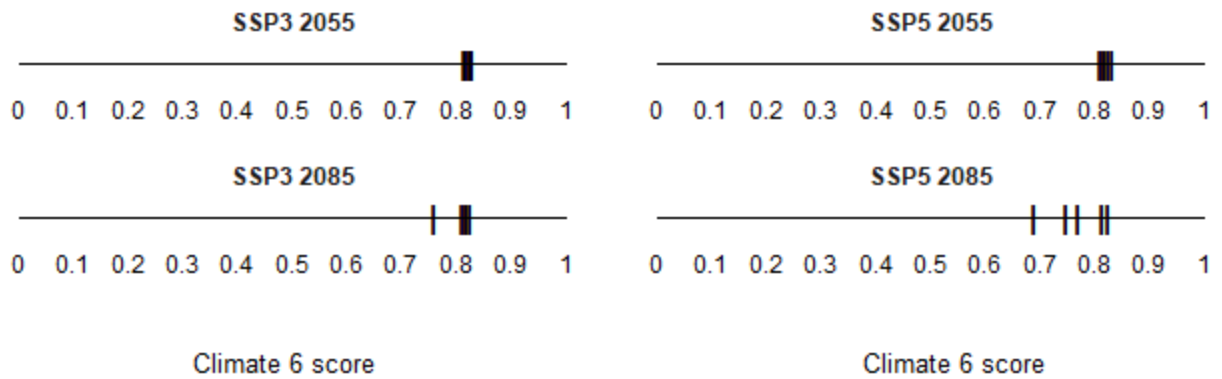
Future climate projections represent two Shared Socioeconomic Pathways (SSP) developed by the Intergovernmental Panel on Climate Change (IPCC 2021): SSP5, in which emissions triple by the end of the century; and SSP3, in which emissions double by the end of the century. Future climate matches were based on source locations reported by GBIF Secretariat (2022).

Under the future climate scenarios (figure A1), on average, high climate match for *Cyperus haspan* was projected to occur in the Appalachian Range, Great Lakes, Gulf Coast, Mid-Atlantic, and Southeast regions of the contiguous United States. Three of the four future scenarios also included an area of high match in the north-central region of the contiguous United States, stretching from the eastern slope of the Rocky Mountains to the Minnesota-North Dakota border. Local climate match decreased overall moving westward across the contiguous United States, with low matches found in all scenarios for parts of the Southwest, Great Basin, and West Coast. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.688 (model: MPI-ESM1-2-HR, SSP5, 2085) to a high of 0.828 (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 climate scenarios. The Climate 6 score for the current climate match (0.816, 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 SSP3, 2085 (figure A3). Under all scenarios, areas within the Northeast saw a moderate to large increase in the climate match relative to current conditions. Additionally, areas within the Appalachian Range, Great Lakes, and Northern Pacific Coast saw a moderate increase in the climate match relative to current conditions. Under one or more time step and climate scenarios, areas within the Great Basin, Northern Plains, Western Mountains, Mid-Atlantic, Southeast, Southern Plains, and Southwest all saw low to moderate decreases in the climate match relative to current conditions. No large decreases were observed regardless of time step and climate scenarios, but the moderate decreases in climate match in the Southeast were particularly widespread for the 2085 time step.

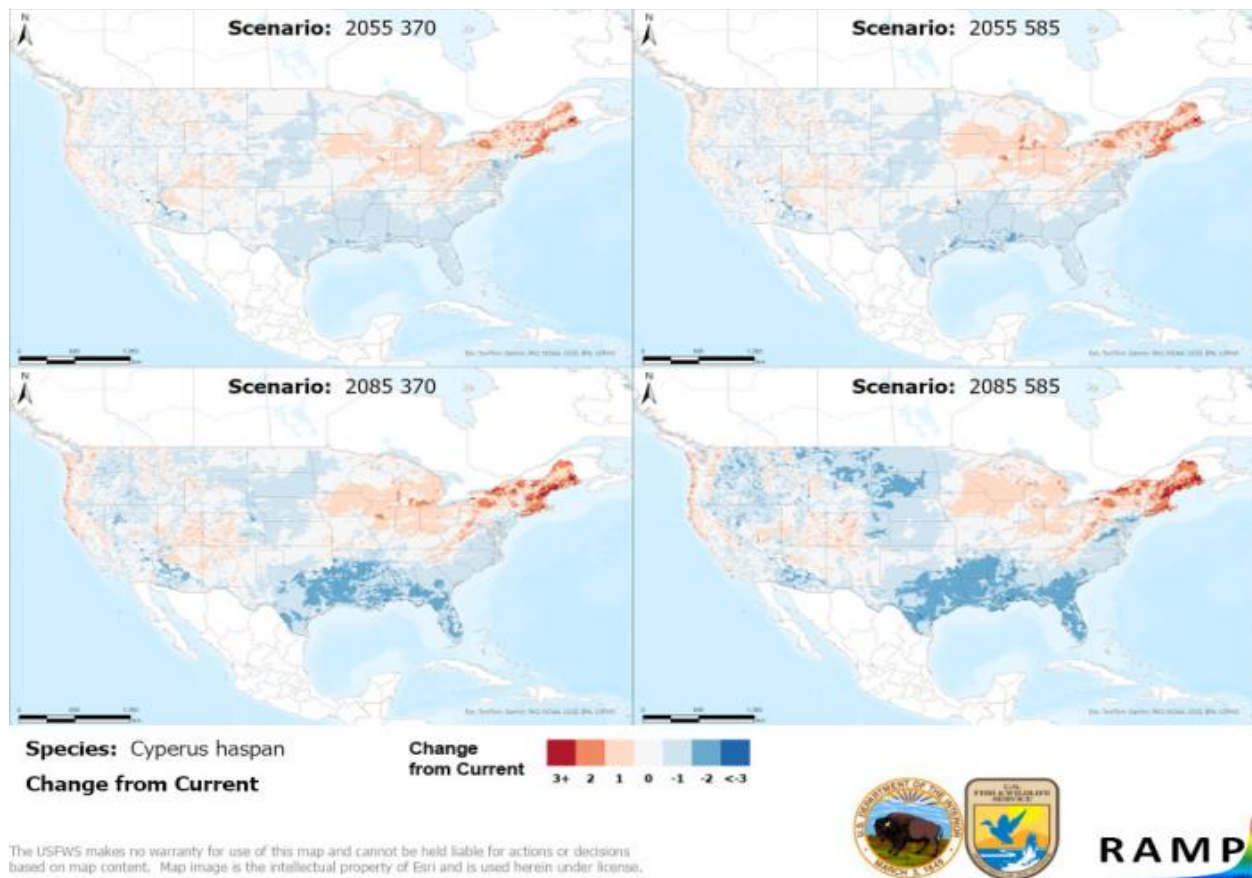




**Figure A1.** Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Cyperus haspan* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2022). Shared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



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**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 *Cyperus haspan* based on source locations reported by GBIF Secretariat (2022). 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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