Eared Watermoss (*Salvinia auriculata*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, May 2021
Revised, June 2021
Web Version, 7/23/2021

Organism Type: Plant
Overall Risk Assessment Category: Uncertain

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1 Native Range and Status in the United States

Native Range

From CABI (2021):

"*Salvinia auriculata* is native to South and Central America."

From POWO (2021):

"[…] its native range is Mexico to Tropical America."

"Argentina Northeast, Belize, Bermuda, Bolivia, Brazil North, Brazil Northeast, Brazil South, Brazil Southeast, Brazil West-Central, Chile Central, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, French Guiana, Galápagos, Guatemala, Guyana, Honduras, Mexico Gulf, Mexico Northeast, Mexico Southeast, Mexico Southwest, Nicaragua, Panamá, Paraguay, Peru, Puerto Rico, Suriname, Trinidad-Tobago, Uruguay, Venezuela, Venezuelan Antilles"

Status in the United States

From Caudales et al. (2000):

"Two species [in the genus *Salvinia*] in Puerto Rico. Both of them introduced and now escaped."

"**Salvinia auriculata** […] Known from scattered localities; recorded from Fajardo […]."

Like Caudales et al. (2000), USDA, NRCS (2021) and CABI (2021) classify *S. auriculata* as introduced to Puerto Rico; POWO (2021) classifies it as native there.

USGS (2021) reports a collection of *S. auriculata* from Twin Lake, Hennepin County, Minnesota in 1890. The current status of the species in that location is reported as "extirpated."

From CABI (2021):

"[…] the name *Salvinia auriculata* has been reported for the United States but only *Salvinia molesta* has been introduced to the United States (where the entire complex is federally prohibited; USDA-NRCS, 2018)."

U.S.-based retailer Arizona Aquatic Gardens (2021) lists plants for sale under the name *Salvinia auriculata* but describe the product as follows: "includes about 10 different species of small floating, aquatic ferns."

Salvinia auriculata is listed on the Federal Noxious Weeds List (USDA APHIS 2010). Additionally, its trade and possession are regulated via its inclusion on State invasive, prohibited, or noxious weed lists in California (CDFA 2021), Illinois (Illinois General Assembly 2015), Indiana (Indiana Department of Natural Resources 2021), Massachusetts (Commonwealth of Massachusetts 2021), Michigan (Michigan Invasive Species Program 2021), Vermont (State of Vermont 2021), and the following southeastern States, according to Rawlins et al. (2018): Alabama, Arkansas, Florida, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

Means of Introductions in the United States

From USGS (2021):

"Potential Pathway: released aquarium"

Remarks

From CABI (2021):

"Within the genus *Salvinia*, a group of four closely related species is often referred to as the *Salvinia auriculata* complex, *Salvinia* complex or giant salvinia complex. The four species assigned to this complex are: *Salvinia auriculata* Aublet., *Salvinia molesta* D.S. Mitchel, *Salvinia herzogii* de la Sota and *Salvinia biloba* Raddi (Forno et al., 1983; Richerson and Jacono, 2005; Nagalingum et al., 2008). All these species are native to South America, making this region the most diverse for *Salvinia*. Even when these four species are taxonomically well defined with stable names, they are morphologically quite similar and sterile specimens are extremely difficult to distinguish. Consequently, they are often confused with one another and often misidentified (Moran, 1995; Miranda and Schwartsburd, 2016)."

In this report, every effort has been made to include only information pertaining to the species *Salvinia auriculata* rather than the complex, unless clearly stated otherwise.

WFO (2021) lists the following scientific name synonyms for *Salvinia auriculata*: *Salvinia hispida* Kunth, *Salvinia rotundifolia* Willd., so information for this report was sought using all three scientific names. Information about *S. rotundifolia* was excluded if the source treated *S. rotundifolia* as a synonym of *S. minima* rather than of *S. auriculata* (see for example: Lower 2021).

Difficulty in distinguishing among members of the *Salvinia auriculata* complex has contributed to significant confusion about the species range. There are several locations in the Americas where *S. auriculata* is established but its status as native or introduced is unclear (Chile, Guyana, Argentina, Cuba, Dominican Republic) as evidenced by some sources listing the species as native and others listing it as introduced or invasive (see **Distribution Outside the United States**). Additionally, there are several cases where introduced *Salvinia* have been identified as *S. auriculata* and later re-identified as a different species within the complex. Known cases of misidentification are described here in the **Remarks** and not included in the section on **Distribution Outside the United States**, as they do not represent actual populations of *S. auriculata*.

From CABI (2021):

"In Guyana and Argentina, the status of this species is uncertain and is listed as both native and introduced (Caudales et al., 2000; Caluff and Fiallo, 2008; Fuentes et al., 2013; GRIIS, 2018; USDA-ARS, 2018)."

"The species within the *Salvinia* complex are closely related and quite difficult to distinguish. Consequently, the names of the different species are frequently misapplied and the history of

spread beyond their native ranges is difficult to track and characterize with certainty. For example, in Sri Lanka specimens collected before 1973 have been misidentified as *Salvinia auriculata* but this species is not present in Sri Lanka (IAS, 2018). Similarly, the name *Salvinia auriculata* has been reported for the United States but only *Salvinia molesta* has been introduced to the United States (where the entire complex is federally prohibited; USDA-NRCS, 2018)."

From Barrett (1989):

"A notable invasion took place at Lake Kariba on the Zambezi River in Africa [on the Zambian-Zimbabwean border], where at its peak in 1962 the weed covered 1,000 square kilometers, nearly one quarter of the total area of what was then the world's largest reservoir. The infestation earned the plant a common name, the 'kariba' weed."

"The kariba weed had been identified as *Salvinia auriculata*, a native of South America, until the 1970's. In 1972 David S. Mitchell of CSIRO in New South Wales located a herbarium specimen of *S. auriculata*. The specimen had been discovered in 1941 along with two other related species. All three specimens originated from the botanical garden in Rio de Janeiro. Botanists began to suspect that the kariba weed was a horticultural hybrid, an offspring of the two related species from the garden. The fact that the kariba weed was sterile seemed to confirm the plant's hybrid origin."

"Later Mitchell described the kariba weed as a new species and named it *Salvinia molesta*, the epithet signifying its aggressive nature. In 1978 the CSIRO team of Forno and K. L. S. Harley at last discovered the native range of *S. molesta* in southeastern Brazil and cast doubt on the original theory that the plant was an artificial hybrid."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to WFO (2021), *Salvinia auriculata* Aubl. is the current valid scientific name for this species.

From ITIS (2021):

Kingdom Plantae
Subkingdom Viridiplantae
Infrakingdom Streptophyta
Superdivision Embryophyta
Division Tracheophyta
Subdivision Polypodiophytina
Class Polypodiopsida
Subclass Polypodiidae
Order Salviniales
Family Salviniaceae
Genus *Salvinia*

Size, Weight, and Age Range

From CABI (2021):

"Floating fronds […] up to 20 mm long, 8-18 mm broad […]"

"Perennial"

"Under conditions of nutrient enrichment, it can form dense mats (>50 cm thick) […]"

Environment

From CABI (2021):

"*Salvinia auriculata* is a free-floating, non-rooted macrophyte that prefers slow-moving and still waters. It can be found in a wide variety of aquatic habitats including lakes, reservoirs, ponds, rivers, marshes, ditches, streams and paddy fields (Moran, 1995; Caudales et al., 2000; Liogier and Martorell, 2000). It can tolerate some salinity, occasional frost and high levels of sedimentation (Cavenaghi et al., 2005; UC-Davis, 2009)."

"*Salvinia auriculata* can grow in a wide variety of aquatic habitats but thrives in slow-moving, nutrient-rich, warm freshwater (Bini et al., 1999). […] Growth is enhanced by enriched nutrient conditions and under suitable conditions it can quickly form dense and thick floating mats. […] It is highly adaptable and can thrive in both shade and open sunny areas. It can also tolerate salinity conditions (Coelho et al., 2000; Medeiros et al., 2017)."

"Water samples taken from a reservoir dominated by *S. auriculata* contained an average of 3.867 mg/L nitrate, 0.706 mg/L ammonia, 1.372 mg/L nitrite and 159.979 mg/L phosphate. Sediments were highly fertile and contained 68.87 mg/dm3 phosphorus (Velini et al., 2005)."

Climate

From CABI (2021):

"It prefers tropical and subtropical areas with temperatures ranging from 20°C to 30°C. […] Low growth rates have been observed when temperatures drop below 10°C."

Distribution Outside the United States

Native

From CABI (2021):

"*Salvinia auriculata* is native to South and Central America."

From POWO (2021):

"[…] its native range is Mexico to Tropical America."

"Argentina Northeast, Belize, Bermuda, Bolivia, Brazil North, Brazil Northeast, Brazil South, Brazil Southeast, Brazil West-Central, Chile Central, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, French Guiana, Galápagos, Guatemala, Guyana, Honduras, Mexico Gulf, Mexico Northeast, Mexico Southeast, Mexico Southwest, Nicaragua, Panamá, Paraguay, Peru, Puerto Rico, Suriname, Trinidad-Tobago, Uruguay, Venezuela, Venezuelan Antilles"

Introduced

Locations where introduced *Salvinia* (typically *Salvinia molesta*) was originally misidentified as *Salvinia auriculata* are excluded from this section. See **Remarks** for additional information.

From POWO (2021):

"Introduced into:
Germany, Spain […]"

According to Hussner et al. (2010), no members of the *S. auriculata* complex are naturalized in Germany.

From CABI (2021):

"In Guyana and Argentina, the status of this species is uncertain and is listed as both native and introduced (Caudales et al., 2000; Caluff and Fiallo, 2008; Fuentes et al., 2013; GRIIS, 2018; USDA-ARS, 2018)."

"It has been introduced and can be found naturalized in the West Indies, Taiwan, Belgium, […] and Chile."

"It is listed as invasive in Chile, Cuba, Dominican Republic, Guyana, Taiwan […] (Caluff and Fiallo, 2008; Chen et al., 2008; Mir, 2012; Fuentes et al., 2013; CIASNET, 2018; Hyde et al., 2018)."

"In Chile, *Salvinia auriculata* was first reported in the wild in 1961 (Fuentes et al., 2013)."

From Parra et al. (2015):

"In this area [semi-arid central Chile] only three aquatic species are found; *Isoetes hieronymi*, *Marsilea mollis*, and the introduced fern *Salvinia auriculata* grow in ephemeral ponds close to the Pacific Ocean (Rodríguez 1995)."

From Verloove (2021):

"*Salvinia auriculata* Aubl. (incl. *S. molesta* Mitchell, S. radula Baker) (S-Am.) – […] usually ephemeral [in Belgium] (Oud-Heverlee, 1981; Zelem, 1991)."

From Heneidy et al. (2019):

"The studies have indicated that *S. auriculata* has been introduced to Taiwan (Chen et al. 2008), India (Bhambie and Bhardwaj 1979) and Bangladesh (Hadiuzzaman and Khondker 1993) where it has been reported as invasive, while it has been introduced in Spain (Cueto and Fuentes-Carretero 2015), but it is not considered as invasive."

"The current study is the first record of introducing [*Salvinia auriculata*] to Egypt."

No information was found to determine whether *S. auriculata* (and in particular, as opposed to *S. molesta*) is established in India, Bangladesh, Spain, or Egypt.

Nakai and Kaneko (2012) report that *S. auriculata* is an "adventive species" in the vicinity of Lake Biwa, Japan.

From Kokou et al. (2021):

"In the aquatic environment, the main aquatic species that invade ponds and lagoons in Togo [include] *Salvinia auriculata* (giant Salvinia; Salviniaceae) […]"

Means of Introduction Outside the United States

From CABI (2021):

"Natural Dispersal
Salvinia auriculata is a free floating fern that spreads sexually by spores and vegetatively by clonal growth and rhizome fragmentation. Spores and vegetative fragments are dispersed by watercourses and during floods. Spores are also dispersed by wind. It also spreads to new areas by the dumping of aquatic garden waste but may also be spread by animals, vehicles and boats."

"Accidental Introduction
The discharge of ship ballast water contaminated with spores is likely a possible means of transmission of *Salvinia auriculata*. Additionally, since it is resistant to desiccation, it is easily transported on boating and other recreational equipment. It can also be spread as a contaminant in aquaculture trade (ISSG, 2009)."

"Intentional Introduction
Salvinia auriculata is commercialized as an aquarium plant and as an ornamental aquatic species (ISSG, 2006; USDA-ARS, 2018)."

From Heneidy et al. (2019):

"They have been used in a number of private botanic gardens for ornamental purposes (Heneidy and Marzouk 2010; Hamdy et al. 2018) [in Egypt]."

From Verloove (2021):

"Increasingly cultivated in private ponds [in Belgium], very rarely escaping […] (Oud-Heverlee, 1981; Zelem, 1991)."

Short Description

From Winterton et al. (2018):

"Brief description [of the *S. auriculata* complex]: Stem horizontal, floating, irregularly forked, lacking true roots. Leaves in whorls of 3, appearing paired; 2 leaves floating and photosynthetic, orbicular to oblong, covered with complex, unwettable hairs (open or closed at tips) on adaxial surface; third leaf hanging down below water surface, filamentous, resembling roots, not photosynthetic. Sporocarps borne on modified segments of submerged leaves, as chains, hanging clusters or rows. Prothalli develop inside floating spores."

From Riefner and Smith (2009):

"Species of the *S. auriculata* complex share the defining character of 'egg-beater' hairs (four hairs that join at the tip), which grow from the top of papillae on the upper surface of floating leaves (Mitchell & Thomas 1972). The floating leaves of all four species are orbicular to ovate, but vary widely in size according to environmental conditions and growth stage. Therefore, species of the *S. auriculata* complex are difficult to separate when fertile plants bearing sporocarps are absent (Tryon & Tryon 1982; Forno 1983; DiTomaso & Healy 2003; Mickel & Smith 2004)."

"[Characteristics of sterile *S. auriculata* sensu stricto:] Leaf venation of ± isodiametric or slightly elongate areoles (length to ca. 2 times width) in marginal 2/3 of leaf lobe; main axis of submerged leaves (root-like organs) with short, recurved branches distally"

Biology

From CABI (2021):

"*Salvinia auriculata* plants consist of ramets connected by rhizomes forming matted colonies. Each ramet is comprised of a node bearing two floating green leaves and one submerged leaf that functions as a root. The submerged leaf bears the spore-producing organs, which consist of a sori surrounded by a globose indusium (sporocarp). The sporocarps are resistant structures and their production occurs during the dry period, when clonal growth is unfavourable. During flood periods, asexual reproduction is favoured by formation of buds and by rhizome fragmentation. Both reproductive strategies allow this species to survive and colonize places with seasonal patterns, like temporary ponds that are subject to drought and flood periods (Coelho et al., 2005; Medeiros et al., 2017)."

"Under laboratory conditions, this species is capable of doubling its biomass approximately every 2-4 days (ISSG, 2006). This species in particular is capable of prolific generation of sori."

"In Brazil, *Salvinia auriculata* produces sporocarps during the dry period and growth clonally during the rainy season (Coelho et al., 2005). Ramets can lie dormant in vegetation waiting for favourable growing conditions (ISSG, 2006). Abundant production of sori has been observed in temporary ponds that desiccate, indicating flexibility in the life history strategy that may convey tolerance of water level fluctuation and increased probability of survival (Coelho et al., 2005)."

"In Brazil, *Salvinia auriculata* can be found growing associated with water hyacinth (*Eichhornia crassipes*), water lettuce (*Pistia stratiotes*) and Lemnaceae species (Bini et al., 1999). The species has also been reported to coexist with the South American spongeplant (*Limnobium laevigatum*) and *Salvinia minima* (Milne et al., 2007)."

"The weevil species, *Cyrtobagous salviniae* and *Cyrtobagous singularis* have been reported causing infestations in the species within the *Salvinia* complex (Tipping and Center, 2005; UC-Davis, 2009)."

Human Uses

From CABI (2020):

"*S. auriculata* is extensively commercialized in the horticultural trade (e.g. Chen et al., 2008) and it is also available for purchase online."

"*Salvinia auriculata* is commercialized as an aquarium and ornamental aquatic plant. It can also be used in artificial wetlands to remove lead and presumably other heavy metal contaminants from wastewaters (Espinoza-Quiñones et al., 2009). Due to its rapid growth and uptake of nutrients such as phosphorus and nitrogen, *S. auriculata* can be effectively used as a mulch (UC-Davis, 2009). *S. auriculata* has also been suggested as a bioindicator in aquatic ecosystems where it can be used in monitoring water contaminated by cadmium (Wolff et al., 2012)."

"*Salvinia auriculata* is detrimental to the reproduction of the mosquito *Anopheles albimanus*. Mats of *Salvinia* have had a demonstrable inhibitory effect on anopheline breeding. The mechanism in play is apparently an oviposition barrier to gravid *A. albimanus*. Some consideration has been given to using the plant as a control measure in certain areas (Hobbs and Molina, 1983)."

U.S.-based retailer Arizona Aquatic Gardens (2021) lists plants for sale under the name *Salvinia auriculata* but describe the product as follows: "includes about 10 different species of small floating, aquatic ferns."

Diseases

From Chen et al. (2008):

"Brown spot of *S. auriculata* was found in a home aquarium in December 2006 in Chiayi, Taiwan. Symptoms of the disease included many, irregular, dark brown spots on both upper and lower leaf surfaces. Lesions on the upper surface of the leaves were covered with white patches of mycelia and abundant conidia. […] To our knowledge, this is the first report of *Simplicillium lanosoniveum* causing brown spot of *S. auriculata* and *S. molesta* in Taiwan."

According to Poelen et al. (2014), *Salvinia auriculata* is a host of the fungal pathogen *Cephalosporium salviniae*.

Threat to Humans

From CABI (2021):

"At high levels of growth, mats of *Salvinia auriculata* impedes [sic] navigation, tangles [sic] fishing line, interferes [sic] with recreational activities and reduces [sic] swimming access (Hobbs and Molina, 1983)."

3 Impacts of Introductions

From Kokou et al. (2021):

"In the aquatic environment, the main aquatic species that invade ponds and lagoons in Togo are not only *Pistia stratiotes* (water lettuce; Araceae) […] and *Eichhornia crassipes* (water hyacinth; Pontederiaceae) […] but also the fern species *Azolla africana* (water fern; Azollaceae) and *Salvinia auriculata* (giant Salvinia; Salviniaceae), causing eutrophication and suffocation of all the biological diversity of these ecosystems."

CABI (2021) reports numerous impacts of *S. auriculata* introductions. However, none of the sources cited by CABI (2021) describe observed impacts of *S. auriculata* in the introduced range. Some describe the behavior of *S. auriculata* within its native range and others describe impacts of *S. molesta* rather than *S. auriculata* (see Remarks). The quotations included below describe the behavior of *S. auriculata* within its native range only and must be treated as merely suggestive of potential impacts outside the native range.

From CABI (2021):

"*Salvinia auriculata* is a highly competitive species with a high growth rate. Under conditions of nutrient enrichment, it can form dense mats (>50 cm thick) that shade submersed aquatic plant species and impact fisheries (Bini et al., 1999)."

"At high levels of growth, mats of *Salvinia auriculata* impedes [sic] navigation, tangles [sic] fishing line, interferes [sic] with recreational activities and reduces [sic] swimming access (Hobbs and Molina, 1983)."

Salvinia auriculata is listed on the Federal Noxious Weeds List (USDA APHIS 2010). Additionally, its trade and possession are regulated via its inclusion on State invasive, prohibited, or noxious weed lists in California (CDFA 2021), Illinois (Illinois General Assembly 2015), Indiana (Indiana Department of Natural Resources 2021), Massachusetts (Commonwealth of Massachusetts 2021), Michigan (Michigan Invasive Species Program 2021), Vermont (State of Vermont 2021), and the following southeastern States, according to Rawlins et al. (2018): Alabama, Arkansas, Florida, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

4 History of Invasiveness

The history of invasiveness is Data Deficient. *Salvinia auriculata* has been documented as introduced outside of its native range on multiple continents and has become naturalized in the West Indies, Taiwan, Belgium, Chile, and possibly India, Bangladesh, and Egypt. It is described as being part of a suite of species causing ecological impacts in Togo, but no further information is provided to distinguish between impacts caused by *S. auriculata* and those caused by the other species in the community. CABI (2021) provides information on invasive-like behavior of this species within the native range. No other information was found on impacts of introduction of *S. auriculata*, sensu stricto. As further complication, the historical misidentification of *S. molesta* populations as *S. auriculata* has created an apparent body of literature on impacts of introduction of *S. auriculata* that does not hold up when scrutinized for taxonomic accuracy (for example, in Lake Kariba in southern Africa). Further information on actual impacts of introduction of *S. auriculata* would be necessary to classify the history of invasiveness as high.

5 Global Distribution

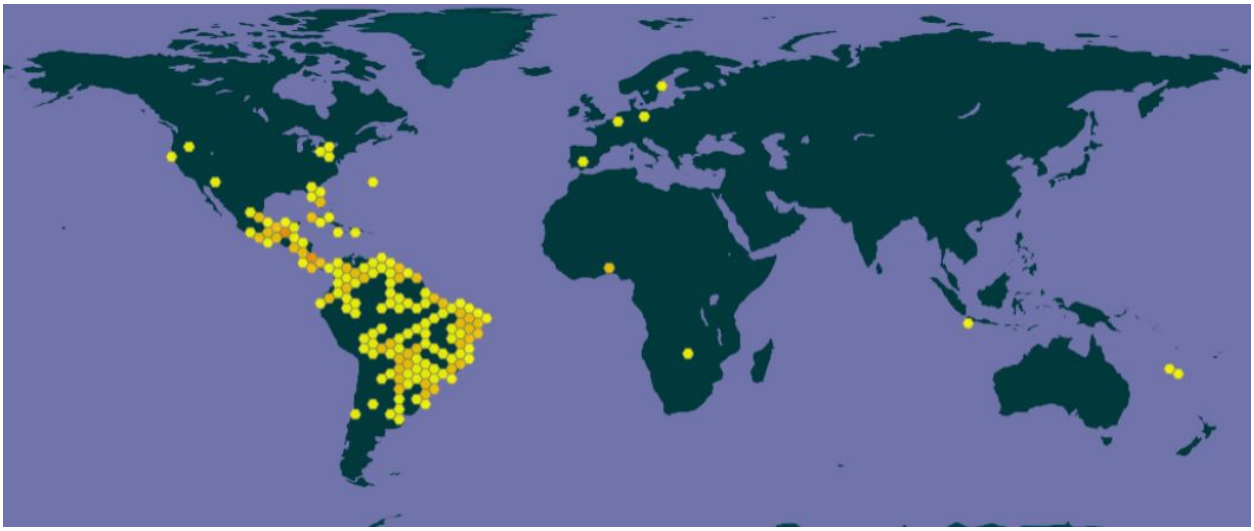

Figure 1. Known global distribution of *Salvinia auriculata*. Observations are reported throughout Central and South America, the West Indies, with scattered locations in North America, Africa, Europe, and Southeast Asia. Map from GBIF Secretariat (2021). Locations in Canada, the United States, Spain, Belgium, Germany, Sweden, Zambia, Indonesia, and New Caledonia will not be included in the climate match as there is no evidence to suggest that *S. auriculata* has established populations in these locations (in Zambia and perhaps other locations, *S. molesta* has been misidentified as *S. auriculata*; see Remarks).

No georeferenced occurrences of *S. auriculata* were available from India, Bangladesh, Taiwan, Egypt, or Japan, however it is unclear if the species is established in many of these locations (see Distribution Outside the United States for more information).

6 Distribution Within the United States

Figure 2. Known distribution of *Salvinia auriculata* in the United States. Map from USGS (2021). Neither of the occurrences shown (in Minnesota and Puerto Rico) will be used as source locations for the climate match because they are not recorded as representing established populations.

There are no georeferenced occurrences for confirmed established populations in Puerto Rico, although *S. auriculata* is established there according to Caudales et al. (2000), USDA, NRCS (2021) and CABI (2021).

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for the contiguous United States generally increased from north to south and from high to low elevations with very low match along the Canadian border and high matches in peninsular Florida, along the Gulf Coast, in southern half of Texas, and along the southern Pacific coast. Medium match stretched across inland California, the Desert Southwest, the southern Great Plains, the southern Midwest, the inland Southeast, and the Mid-Atlantic region. The Pacific Northwest, Rocky Mountains, Upper Midwest, and Northeast regions all had low to very low climate match. The overall Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.129, high (scores of 0.103 and greater are classified as high). The following States received high individual Climate 6 scores: Arizona, California, Florida, Georgia, Louisiana, Maryland, North Carolina, New Mexico, Oklahoma,

South Carolina, Texas, and Virginia. Alabama, Arkansas, Delaware, Mississippi, New Jersey, and Tennessee received medium individual Climate 6 scores. All remaining States received low individual Climate 6 scores.

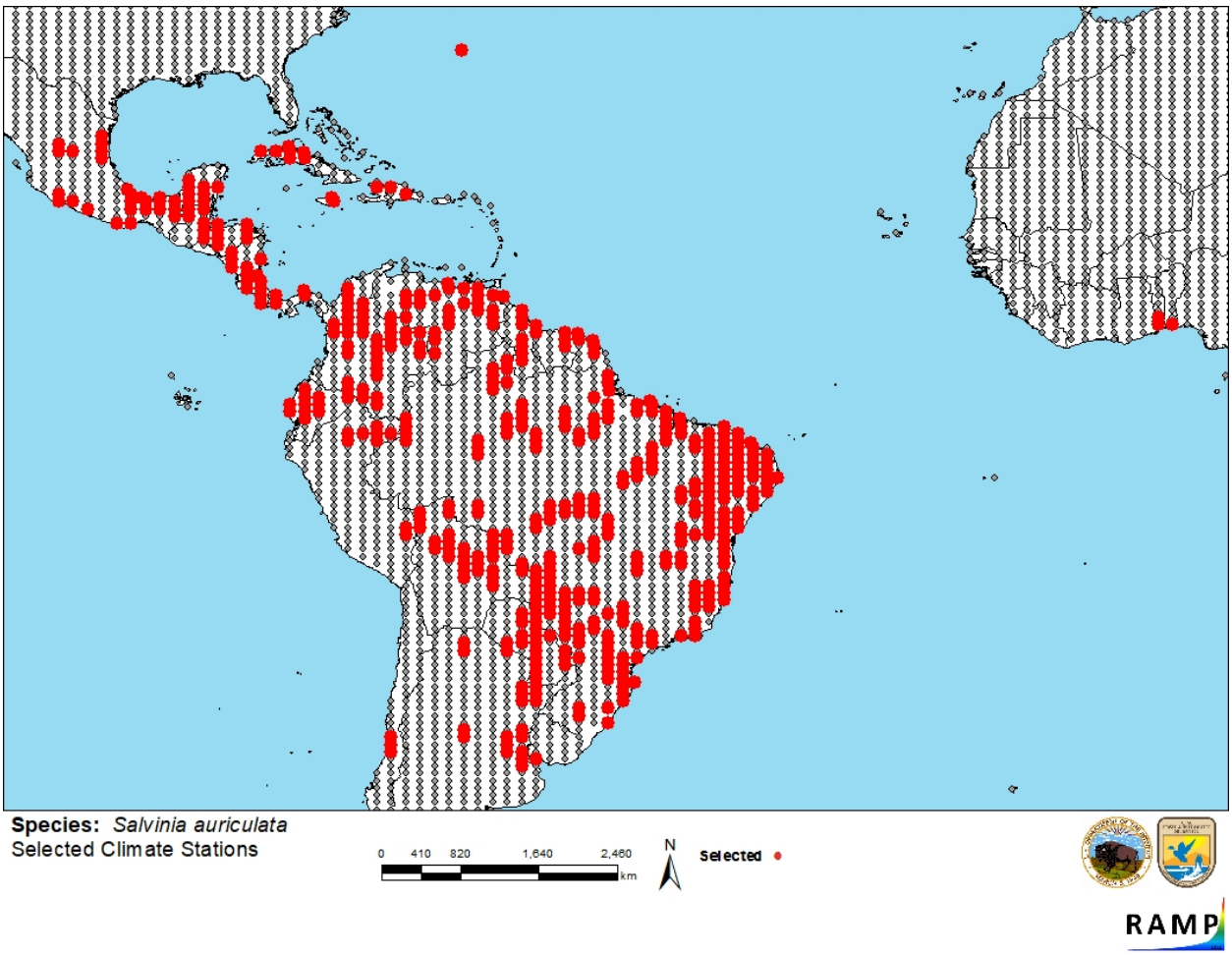

Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations selected as source locations (red; Mexico, Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Panama, Cuba, Jamaica, Haiti, Dominican Republic, Bermuda, Colombia, Ecuador, Peru, Venezuela, Guyana, Suriname, French Guiana, Brazil, Bolivia, Paraguay, Uruguay, Argentina, Chile, Togo) and non-source locations (gray) for *Salvinia auriculata* climate matching. Source locations from GBIF Secretariat (2021). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

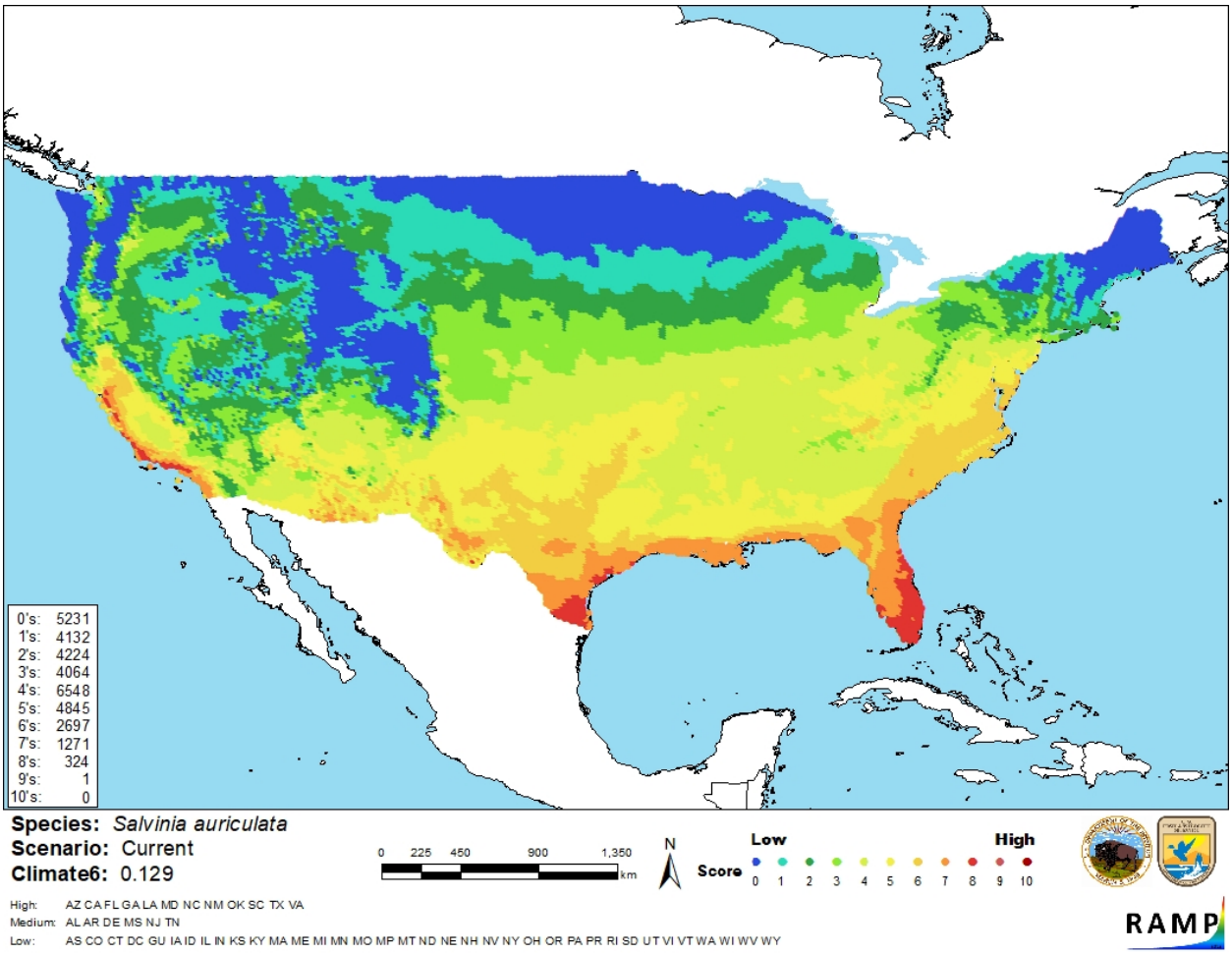

Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Salvinia natans* in the contiguous United States based on source locations reported by GBIF Secretariat (2021). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: (Count of target points with climate scores 6-10)/ (Count of all target points)	Overall Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

8 Certainty of Assessment

Information is available on the biology and ecology of *S. auriculata.* However, the history of misapplication of the scientific name *Salvinia auriculata* creates a lot of uncertainty around the established range of this species and its impacts of introduction. There is very limited

information on observed impacts of introduction outside the native range that can be confidently traced to *S. auriculata* sensu stricto. The certainty of this assessment is Low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Salvinia auriculata, Eared Watermoss, is a free-floating perennial aquatic fern native to Central and South America. This species is found in the aquarium and horticultural trade worldwide; in the United States, it is listed as a Federal noxious weed and several States prohibit or restrict its trade or possession. This species has been reported as introduced in many locations outside of its native range, but some of these reports were misapplications of the name *S. auriculata* to a different species. The species is now established outside its native range in Chile, Taiwan, Togo, and the West Indies, including Puerto Rico; additionally, it is possibly established in parts of Europe and South Asia. Information on impacts of introduction is very limited, describing either broad observed impacts for a suite of invasive species or potential impacts based on behavior of the species within its native range. The history of invasiveness is classified as Data Deficient. The overall climate match for the contiguous United States is High, with high match being found primarily along the southern border of the country. The certainty of assessment is Low due to limited information on impacts of introduction and historical misapplication of the species scientific name. The overall risk assessment category for *Salvinia auriculata* is Uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): Data Deficient**
- **Overall Climate Match Category (Sec. 7): High**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks, Important additional information: The name *Salvinia auriculata* has been applied to some introduced *Salvinia* populations that were later identified as *Salvinia molesta*.**
- **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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