

American Eelgrass (*Vallisneria americana*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, July 2020

Revised, January 2021

Web Version, 4/8/2021

Organism Type: Plant

Overall Risk Assessment Category: Uncertain



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1 Native Range and Status in the United States

Native Range

From Maiz-Tome (2016):

“The species is widespread across eastern North America, northern Mesoamerica and the Caribbean (eMonocot Team 2015).”

From Randhawa (2018):

“The native range of *Vallisneria americana* includes Asia, Australia, North America, Central America, and South America.”

“*Vallisneria americana* is widely distributed in eastern North America and is present in Canada, Cuba, Dominican Republic, Guatemala, Haiti, Honduras, Jamaica, Mexico and the United States. (IUCN Red List of Threatened Species).”

Status in the United States

Vallisneria americana is native to parts of the contiguous United States.

According to Nature Serve (2021) *Vallisneria americana* is native to the following states: Alabama, Arizona, Arkansas, Connecticut, Delaware, District of Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

From Randhawa (2018):

“*Vallisneria americana* was observed growing in water district pond in Shasta county [sic] in 2007. *Vallisneria* species have been intercepted by county and at CDFA border stations in 2011, 2016 and 2018. This species is introduced to California.”

“*Vallisneria americana* has been observed growing in a man-made pond in a very limited area of California. [...] it has not yet established in California.”

“[...] and spreading towards the west coast, being reported in Washington, Arizona, New Mexico, Texas, Nebraska (Lady Bird Johnson Wildflower Center 2016).”

V. americana is found in the aquarium trade in the United States. According to Pond Plants Online (2020), *V. americana* can be purchased for \$2.50.

PIER (2010) lists *Vallisneria americana* as introduced and invasive on the islands of Kauai, Maui, and Oahu in Hawaii.

From PIER (2010):

“[...] Both phenotypes [of *Vallisneria americana*] are sold as aquatic ornamentals; the latter is also eaten as a potherb and is sold for that purpose in local produce markets” (Staples, Imada & Herbst, 2003; p. 13).”

Means of Introductions in the United States

Information on means of introductions in the United States for *Vallisneria americana* was not found.

Remarks

The accepted name of this species is *Vallisneria americana* (World Flora Online 2020). Some authors have treated other *Vallisneria* species as synonyms of *V. americana* (e.g. USDA NRCS 2020). The treatment of names in this screening followed the structure provided in World Flora Online (2020).

From CABI (2019):

“The name *V. spiralis* has a history of being applied indiscriminately to similar rosette plants [including *V. americana*] from Asia, Australia, Europe and North America [Jacobs, 2010].”

Please consult the ERSS report on *V. spiralis* for more information on that species.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to World Flora Online (2020), *Vallisneria americana* is the accepted name of this species.

From ITIS (2020):

Kingdom Plantae
 Subkingdom Viridiplantae
 Infrakingdom Streptophyta
 Superdivision Embryophyta
 Division Tracheophyta
 Subdivision Spermatophytina
 Class Magnoliopsida
 Superorder Lilianae
 Order Alismatales
 Family Hydrocharitaceae
 Genus *Vallisneria* L.
 Species *Vallisneria americana* Michx.

Size, Weight, and Age Range

According to USDA, NRCS (2020), *Vallisneria americana* can grow up to 1 foot and has a rapid growth rate.

From Minnesota Wildflowers (2021):

“[...] 4 inches to 6+ feet long depending on water depth, 3 to 15 mm (to ~½ inch) wide, [...]”

Environment

According to USDA, NRCS (2020), *Vallisneria americana* can live in an environment consisting of a pH between 5-8.

Climate

According to USDA, NRCS (2020), *Vallisneria americana* needs a minimum temperature of - 33°F.

Distribution Outside the United States

Native

Native range of *Vallisneria americana* is partially within the United States, see Native Range in Section 1.

From Maiz-Tome (2016):

“The species is widespread across eastern North America, northern Mesoamerica and the Caribbean (eMonocot Team 2015).”

From Randhawa (2018):

“The native range of *Vallisneria americana* includes Asia, Australia, North America, Central America, and South America.”

“*Vallisneria americana* is widely distributed in eastern North America and is present in Canada, Cuba, Dominican Republic, Guatemala, Haiti, Honduras, Jamaica, Mexico [...]”

Introduced

According to Pradnya Paramitha et al. (2014), *Vallisneria americana* is established and abundant in Lake Sentani, Papua, Indonesia.

From Randhawa (2018):

“*Vallisneria americana* has been reported as a harmful organism in Indonesia and Timor-Leste and is under official control (USDA- APHIS- PCIT [no date]).”

Wu et al. (2010) list *V. americana* as naturalized in Taiwan.

From Verloove (2021):

“*Vallisneria americana* Michaux (eastern U.S.A.) – [...] A small population of ca. 60 m² was discovered in a canal in Geel [Belgium] in 2016. Early 2018 its presence was confirmed and population size reassessed. It was estimated to cover a surface of ca. 180 m².

Means of Introduction Outside the United States

According to Champion et al. (2010), *Vallisneria americana* was imported legally as an aquarium plant into Europe.

From Verloove (2021):

“A very rare escape from cultivation.”

Short Description

From World Flora Online (2020):

“Scapes: staminate scapes 30--50 mm, submersed; pistillate scapes elongate, projecting flowers to surface. Leaves 10--110 ' 0.3--1.5 cm; leaf blade 3-zoned longitudinally, margins entire to serrate. Flowers: staminate flowers 1--1.5 mm wide; stamens 2, filaments basally connate; pistillate flowers solitary, rarely in umbel-like clusters. 2n = 20.”

“Lvs [leaves] very thin, to 2 m, 3-10 mm wide, seldom more; staminate scape stout, 3-15 cm, the fls [flowers] only 1-1.5 mm wide; stamens erect, with short, ± connate filaments, the androecium surrounded by a ring of short hairs; pistillate fls white, the sep 3.5-6.5 mm; staminodia adnate to the short style; fr 5-12 cm. [...]”

From Minnesota Wildflowers (2021):

“Flower: Separate male and female flowers are on different plants (dioecious). Female flowers are single at the tip of a long, naked stalk, lack petals and have 3 sepals each about 4 mm (1/6 inch) long. In the center are 3 broad, white, 2-parted styles. Between the flower and stalk is a green to whitish, tubular sheath (spathe). The flower stalk is initially straight and elongates until it reaches the water's surface, where the flower opens and floats on the surface waiting for pollination, after which the stalk starts coiling, usually dragging the developing fruit under water.

Male flowers are enclosed within an egg-shaped, leaf-like sheath (spathe) at the tip of a short stalk. The spathe detaches from the stalk and floats to the water's surface, where it opens, exposing the stamens, and acts like a boat, drifting across the water's surface where it may get lucky and bump into an open female flower.

Leaves and stems: Leaves are all basal, submersed or sometimes partially floating, stalkless, linear, flat, thin, 4 inches to 6+ feet long depending on water depth, 3 to 15 mm (to ~½ inch) wide, rounded to pointed at the tip, grading into a sheath at the base. Edges are toothless to minutely toothed and may be crinkly/wavy.

Color is green to red, with a central band around the midvein that is lighter colored than along the edges, giving a 3-striped appearance. The central band is known as the lacunar band, made up of several rows of large, hollow cells. Flowering stems are usually multiple from the base. Plants form colonies from horizontal stems, both above ground (stolons) and underground (rhizomes).

Fruit: Fruit is a cylindric capsule 2 to 4¾ inches long, somewhat resembling a string bean. Inside are numerous seeds.”

Biology

From Maiz-Tome (2016):

“The species grows in lakes and slow-moving [*sic*] rivers, primarily in circumneutral to basic water (New England Wild Flower Society 2011-2015).”

From Minnesota Wildflowers (2021):

“It is typically found in the shallow, calm waters of lakes with sandy or mucky bottoms, less often in deeper waters, steadily flowing streams and rivers, brackish water, or in marly or silty soil. It primarily reproduces vegetatively, which is probably a good thing since its pollination process seems more or less a hit or miss operation.”

From Randhawa (2018):

“*Vallisneria americana* grows from underground runners, and forms tall underwater meadows. [...] The upper leaf parts often float on the water surface. This species produces separate male and female flowers. Female flowers are more conspicuous. Mature flowers detach and float on the surface of water. ”

The following information is specific to the genus *Vallisneria*, which includes *Vallisneria americana*:

From CABI (2019):

“*Vallisneria* is one of several genera in the Hydrocharitaceae in which staminate flowers detach completely from a spathe at the base of submerged male plants [Les et al. 2008]. The flowers rise to the surface and open to form free-floating, raft-like structures which are dispersed by wind and currents. In this genus, as in two other genera in the family (*Maidenia*, *Nechamandra*), the pollen remains dry within elevated anthers and the anthers also remain dry within the perianth of the pistillate flower [Les et al. 2008]. The pistillate flowers, attached to submerged plants by long, flexuous peduncles, orient their opening at the water surface and pollination occurs when anthers of the floating staminate flowers contact the stigmas of the pistillate flowers. After fertilization the peduncle coils into a spiral, thus drawing the developing fruit underwater where it matures [Les et al. 2008].”

Human Uses

Vallisneria americana is used in the aquarium trade. According to Pond Plants Online (2020), *V. americana* can be purchased for \$2.50.

From Champion et al. (2010):

“Other aquatic plant species of concern that are commonly traded internationally, based on New Zealand and Australian weed risk assessment exercises, include [...] *V. americana*, [...]”

From PIER (2010):

“[...] Both phenotypes [of *Vallisneria americana*] are sold as aquatic ornamentals; the latter is also eaten as a potherb and is sold for that purpose in local produce markets" (Staples, Imada & Herbst, 2003; p. 13).”

Diseases

According to Poelen et al. (2014) *Vallisneria americana* can be the host to the following pathogen: *Phyllosticta vallisneriae*.

Threat to Humans

No threats to humans were found.

3 Impacts of Introductions

No specific impacts from introductions for *Vallisneria americana* have been reported.

From Randhawa (2018):

“*Vallisneria americana* has been reported as a harmful organism in Indonesia and Timor-Leste and is under official control (USDA- APHIS- PCIT).”

4 History of Invasiveness

Vallisneria americana has been reported as a harmful organism in Indonesia and Timor-Leste and is established in Papua, Indonesia. It has also been introduced and established in Hawaii, Belgium, and Taiwan. While it is reported as a “harmful organism” and may have an official control program in Indonesia and Timor-Leste, no information about the reason for that designation could be found. There was no information found regarding any impacts from the introduction in Indonesia. Therefore, the history of invasiveness for *V. americana* is classified as Data Deficient.

Vallisneria americana has been reported as native to South America, see section 1, but no verifiable observations within that range were available to use in selecting source points for the climate match.

6 Distribution Within the United States

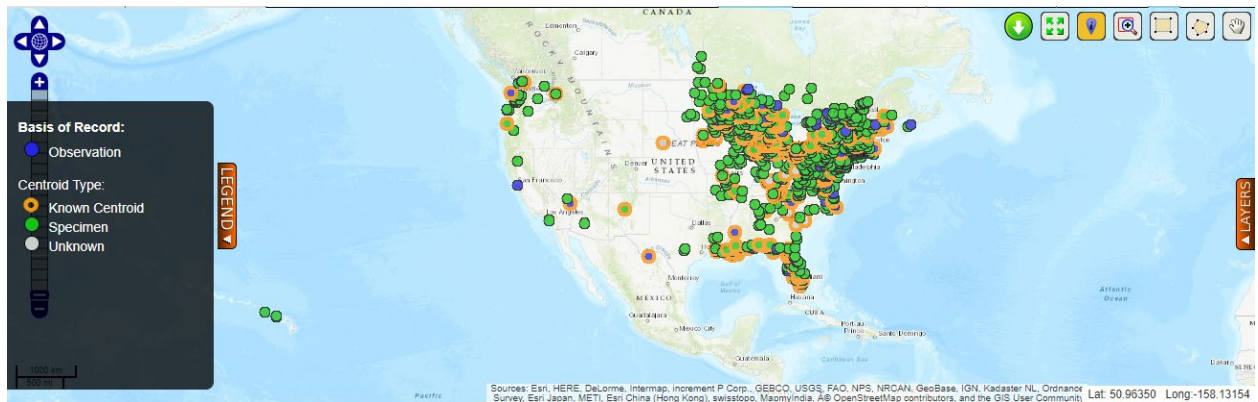


Figure 2. Known distribution of *Vallisneria americana* in the United States. Map from Bison (2020). *V. americana* is considered to not be established in California, therefore those observations were not used to select source points for the climate match.

7 Climate Matching

Summary of Climate Matching Analysis

The overall climate match for the contiguous United States was high. There was some areas of medium match in the Rocky Mountains and into parts of the Pacific Southwest, and no areas of low match. Areas of high match included the eastern United States, where *Vallisneria americana* is native, and areas in the West where it has become established. The overall Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.886, high, (scores of 0.103 or greater are classified as high). All States had high individual Climate 6 scores.

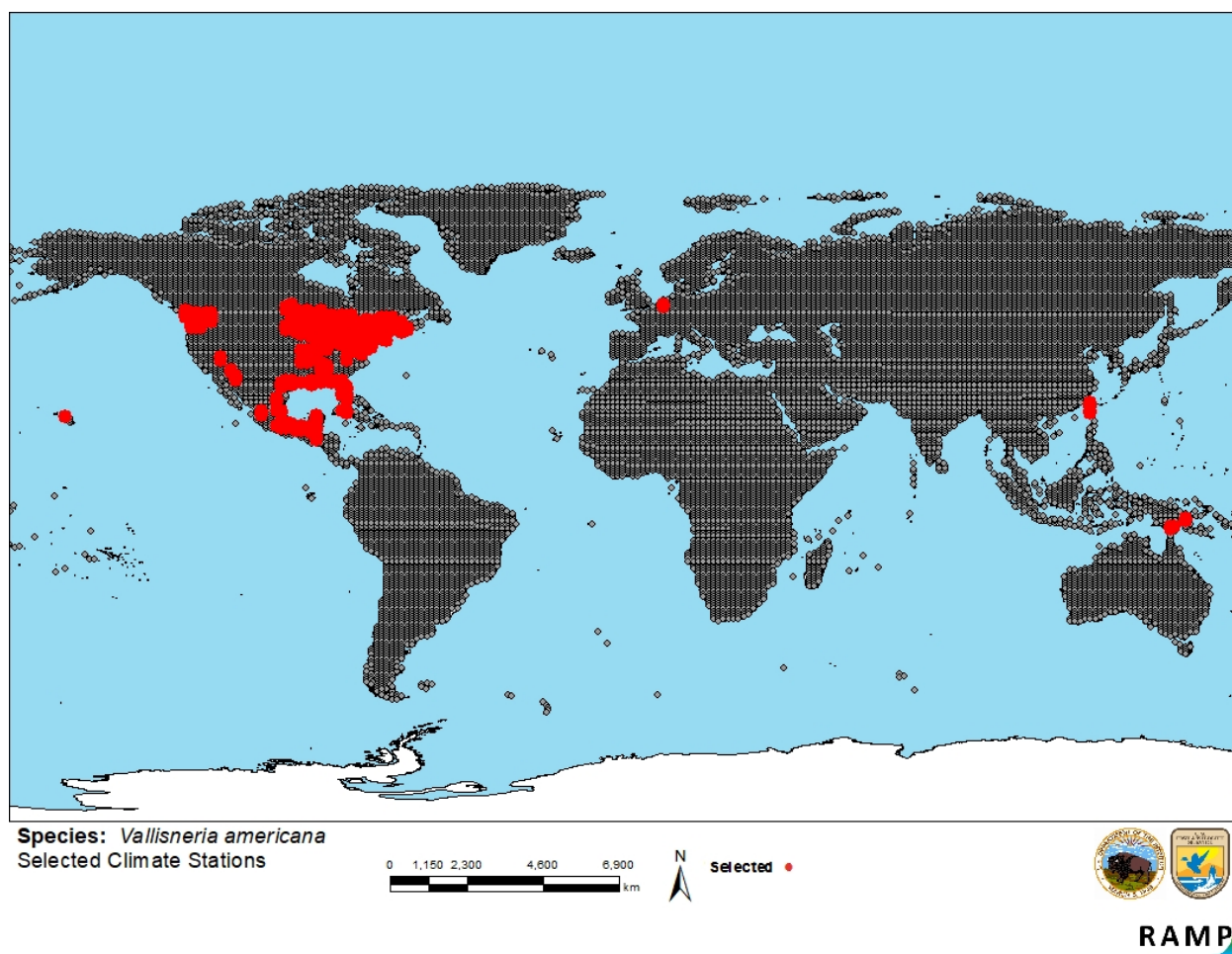


Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations in the contiguous United States and Europe selected as source locations (red; North America, Asia, and Europe) and non-source locations (gray) for *Vallisneria americana* climate matching. Source locations from GBIF Secretariat (2020). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

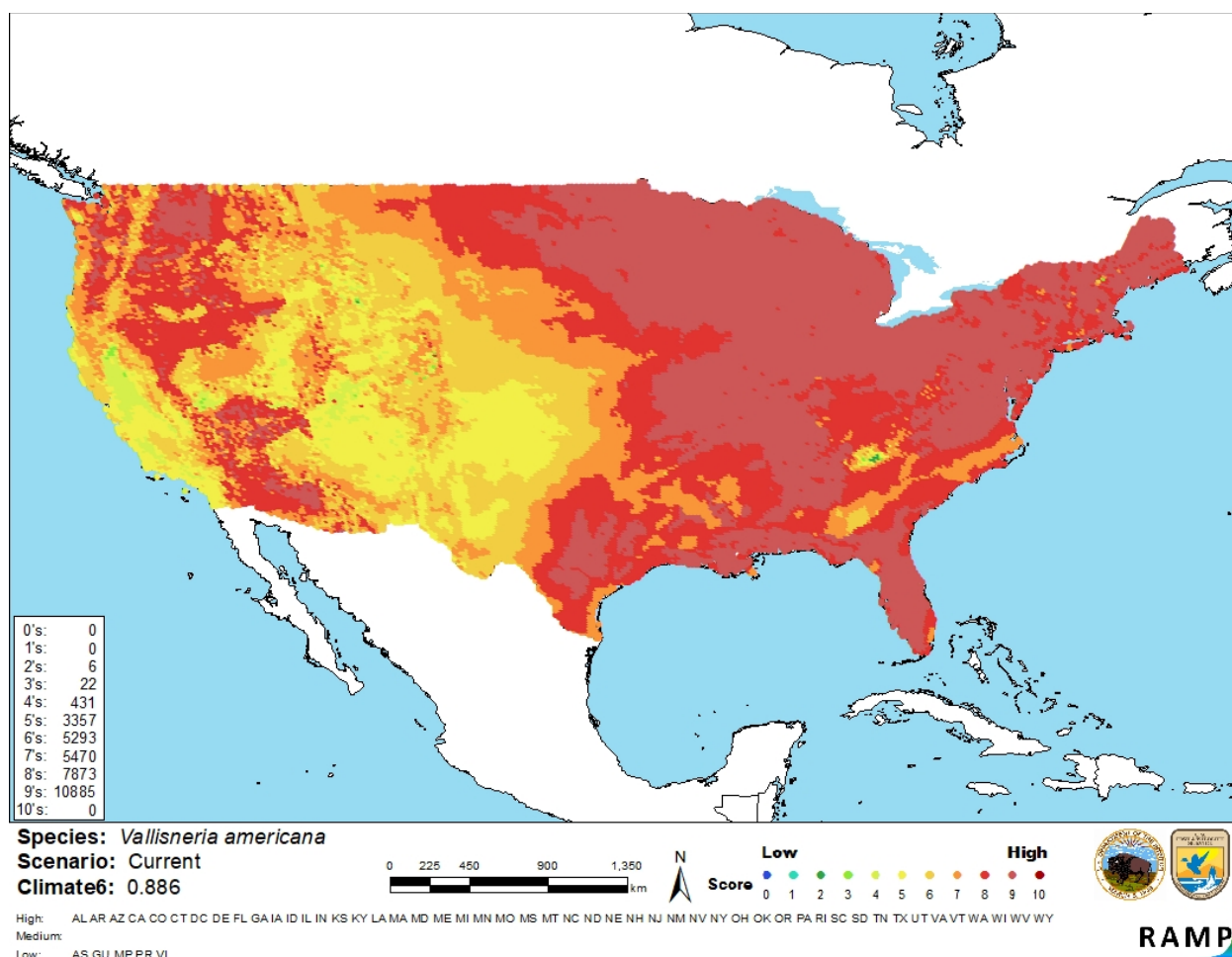


Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Vallisneria americana* in the United States and its territories based on source locations reported by GBIF Secretariat (2020). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

8 Certainty of Assessment

General information about the biology and uses of *Vallisneria americana* was available from peer reviewed journals and online databases. *V. americana* is available for purchase through the aquarium trade, but no information was found on the volume traded. Native range and distribution information was available, but limited information on the impacts of introductions

was found. With limited information on impacts of introduction, the certainty of this assessment is low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

American eelgrass (*Vallisneria americana*) is a freshwater plant native to parts of the contiguous United States, Central America, South America, and Canada. It has also been listed as native to Asia and Australia but those populations may be separate species. This species is in the aquarium trade and legally imported around the world, but records of the volume traded was not found. *V. americana* is introduced and established in Belgium, Indonesia, Timor-Leste, Taiwan, and nonnative areas of the United States, such as Hawaii. It is reported as harmful in Indonesia and Timor-Leste but no supporting information for that statement could be found. The history of invasiveness is classified as Data Deficient because no information on impacts of introduction was found. The overall Climate match for the contiguous United States was High. Nearly the entire United States had a high or medium match, only a few tiny areas had a low match. Areas of high match were centered on the native range in the eastern United States and areas with established nonnative populations in the western United States. The certainty of assessment is Low due to lack of information on impacts. The overall risk assessment category for *Vallisneria americana* 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: No additional remarks**
- **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.

BISON. 2020. Biodiversity Information Serving Our Nation. U.S. Geological Survey. Available: <https://bison.usgs.gov> (July 2020).

[CABI] CAB International. 2019. *Vallisneria spiralis* (eelweed) [original text by Lewis J]. CABI Invasive Species Compendium. Wallingford, United Kingdom: CAB International. Available: <https://www.cabi.org/isc/datasheet/56573#tosummaryOfInvasiveness> (July 2020).

Champion PD, Clayton JS, Hofstra DE. 2010. Nipping aquatic plant invasions in the bud: weed risk assessment and the trade. *Hydrobiologia* 656:167–172.

- GBIF Secretariat. 2020. GBIF backbone taxonomy: *Vallisneria americana* Michx. Copenhagen: Global Biodiversity Information Facility. Available: <https://www.gbif.org/species/2865501> (July 2020).
- [ITIS] Integrated Taxonomic Information System. 2020. *Vallisneria americana* Michx. Reston, Virginia: Integrated Taxonomic Information System. Available: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=38951#null (July 2020).
- Maiz-Tome L. 2016. *Vallisneria americana*. The IUCN Red List of Threatened Species 2016: e.T64326246A67731212. Available: <https://www.iucnredlist.org/species/64326246/67731212> (January 2021).
- Minnesota Wildflowers. 2021. *Vallisneria americana* (American Eelgrass). Available: <https://www.minnesotawildflowers.info/aquatic/american-eelgrass> (January 2021).
- NatureServe. 2021. NatureServe Explorer: an online encyclopedia of life, version 7.1. Arlington, Virginia: NatureServe. Available: <http://explorer.natureserve.org> (January 2021).
- PIER. 2010. *Vallisneria americana* Michx., Hydrocharitaceae. Pacific Island Ecosystems at Risk. Available: http://www.hear.org/pier/species/vallisneria_americana.htm (April 2021).
- Poelen JH, Simons JD, Mungall CJ. 2014. Global Biotic Interactions: an open infrastructure to share and analyze species-interaction datasets. *Ecological Informatics* 24:148–159.
- Pond Plants Online. 2020. *Vallisneria* (*Vallisneria americana*). Available: <https://www.pondplantsonline.com/products/hardy-vallisneria?variant=7621583109> (July 2020).
- Pradnya Paramitha IGAA, Nasution SH, Kurniawan R. 2014. The diversity of aquatic macrophyte, a habitat of ornamental fish in Lake Sentani, Papua. Pages 414–425 in *Ecohydrology approaches facing the global water environment challenges*. Proceedings of the International conference on Ecohydrology, Yogyakarta, Indonesia.
- Randhawa R. 2018. American Eelgrass *Vallisneria americana* Michx. California Department of Food and Agriculture. Available: <https://blogs.cdfa.ca.gov/Section3162/?p=5827> (January 2021).
- Sanders S, Castiglione C, Hoff M. 2018. Risk Assessment Mapping Program: RAMP. Version 3.1. U.S. Fish and Wildlife Service.
- USDA, NRCS. 2020. *Vallisneria americana*. The PLANTS database. Greensboro, North Carolina: National Plant Data Team. Available: <https://plants.usda.gov/core/profile?symbol=VAAM3> (July 2020).

Verloove F. 2021. *Vallisneria americana*. Manual of Alien Plants of Belgium. Belgium: Botanic Garden Meise. Available: <http://alienplantsbelgium.be/content/vallisneria-americana> (April 2021).

VicFlora. 2017. *Vallisneria australis* S.W.L.Jacobs & Les eel grass. Flora of Victoria. Royal Botanic Gardens Victoria. Available: <https://vicflora.rbg.vic.gov.au/flora/taxon/7525463a-f755-4e8f-884e-81d349616344> (April 2021).

World Flora Online. 2020. World Flora Online – a project of the World Flora Online Consortium. Available: <http://www.worldfloraonline.org/taxon/wfo-0000770230> (July 2020).

Wu S-H, Yang TYA, Teng Y-C, Chang C-Y, Yang K-C, Hsieh C-F. 2010. Insights of the latest naturalized flora of Taiwan: change in the past eight years. *Taiwania* 55(2):139–159.

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.

eMonocot Team. 2015. eMonocot. Available: <http://e-monocot.org> (December 2015).

IUCN. 2016. The IUCN Red List of Threatened Species. Version 2016-1. Available: www.iucnredlist.org (July 2018).

Jacobs S. 2010. Evolution of *Vallisneria*. Evolution of *Vallisneria*. Available: <http://www.rbg.vic.gov.au/science/Research/vallisneria>.

Lady Bird Johnson Wildflower Center. 2016. Inspiring the conservation of native plants. *Vallisneria americana* Michx. Austin: University of Texas. Available: https://www.wildflower.org/plants/result.php?id_plant=VAAM3 (July 2018).

Les DH, Jacobs SWL, Tippery NP, Chen L, Moody ML, Wilstermann-Hildebrand M. 2008. Systematics of *Vallisneria* (Hydrocharitaceae). *Systematic Botany* 33:49–65.

New England Wild Flower Society. 2011-2015. Go botany. Discover thousands of New England plants. Available: <https://gobotany.newenglandwild.org>.

Staples, Imada, Herbst. 2003. [Source material did not give full citation for this reference.]

[USDA-APHIS-PICIT] USDA Phytosanitary Certificate Issuance and Tracking System. No date. Phytosanitary Export Database (PEXD). Harmful organism report: *Vallisneria americana*. Available: <https://pcit.aphis.usda.gov/PEXD/faces/ReportFormat.jsp> (July 2018).