California Pest Rating Proposal for

Eichhornia crassipes (Mart.) Solms, water hyacinth, common water hyacinth, floating water hyacinth

Family: Pontederiaceae

Current Pest Rating: Q, NR

Proposed Pest Rating: C

Synonyms: *Pontederia crassipes* Mart., *Eichhornia speciosa* Kunth

Photo credit: Wilfredo Robles, Mississippi State University, Bugwood.org

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Comment Period: 02/13/2023 through 03/30/2023

Initiating Event:

This plant has recently been assigned a temporary rating of "Q" by the CDFA and a pest rating proposal is required to evaluate the current rating and status of the species in California. It was evaluated by a posted Pest Risk Proposal in 2015 and given no rating at that time due to its widespread distribution and use in the nursery trade.

Background:

Eichhornia crassipes is a perennial, usually free-floating herb with short vegetative stems and leaves clustered in rosettes (DiTomaso and Healy, 2003; Horn, 2002; Rosatti, 1987). In situations where the vegetation is dense enough the leaves may become completely emergent. The outer leaves have an

elongate spongy petiole, which helps keep the plant afloat, and an ovate to round incurved glossy green blade. Rosette plants also produce lateral stolons, which can rapidly produce daughter rosettes from lateral buds. The emergent spike inflorescence bears 4-15 showy flowers. The perianth consists of six partially united purplish to bluish (more rarely whitish) petaloid tepals, with a central yellow spot on the upper tepal. Elongate capsule fruits produce 100 or more small (1-2 mm) longitudinally ribbed cylindrical seeds in each of the 3 chambers.

The common water hyacinth is widely considered to be one of the most aggressive aquatic weeds in tropical to warm temperate areas of the world because of its high rate of vegetative reproduction and spread (CABI, 2022; Horn, 2002; NIWA, 2020). Under favorable conditions, populations of the plant can double in size by vegetative propagation in as little as two weeks (Penfound and Earle, 1948). The species can form thick mats across the water, causing problems for water delivery, boating, fisheries, and hydropower infrastructure, and can encourage the buildup of mosquito populations. The species is grown as an ornamental water garden species in the United States (Missouri Botanical Garden, 2022), but its sale is prohibited in many of the southern states in which it is naturalized and in the Great Lakes region (EDDMapS, 2022). Because of its attractive flowers, water hyacinth has become popular as a water garden plant in California and has been sold in nurseries and farmers markets in the summer months. The species is not listed as a noxious weed in California, but its sale is not recommended by the PlantRight database (2022) affiliated with the California nursery and garden industry.

Worldwide Distribution: *Eichhornia crassipes* is native to tropical South America (Venezuela to Brazil and possibly more broadly) and is widely naturalized in tropical to warm temperate areas of the world (Plants of the World Online, 2022; Rosatti, 1987; USDA GRIN, 2022). In the United States the species is found most commonly in coastal and southern states including California and Arizona and from Texas to Florida and north to Virginia (Horn, 2002; USDA/GRIN, 2022). The species has also been more recently reported from scattered localities in a larger number of northern and western states and in the Canadian province of Ontario (EDDMapS, 2022), where the populations are likely to be more transient due to freezing winter weather.

Official Control: *Eichhornia crassipes* has not been officially listed as a noxious weed in California, but has been under long-term control by the Division of Boating and Waterways to reduce its effects on waterways in the state. The species is listed as a prohibited aquatic plant species in Florida (UF/IFAS, 2022), a prohibited invasive plant in Wisconsin, an illegal aquatic weed in South Carolina, and a noxious weed by the states of Alabama, Arizona, Arkansas, Idaho, and Texas (EDDMapS, 2022; NPB, 2022). *Eichhornia crassipes* is listed as a harmful organism for phytosanitary exclusion by the countries or territories of Antigua and Barbuda, Australia, Fiji, French Polynesia, Morocco, Nauru, New Caledonia, New Zealand, Turkey, and Zambia, and the genus *Eichhornia* is listed as a harmful organism by Namibia and South Africa (USDA PCIT, 2022).

Eichhornia crassipes is listed by the state of Arizona as a restricted noxious weed seed (USDA/AMS, 2022).

California Distribution: The species has been reported from the river and delta system in each of the counties in Sacramento/San Joaquin Valley and in bodies of water in every coastal or near coastal county of California from San Diego County north to Sonoma and Lake counties. It has also been

reported from San Bernardino and Riverside counties in inland southern California (CalFlora, 2022; Consortium of California Herbaria (CCH), 2022). It was collected in naturalized settings as early as 1917 in San Bernardino County and in Fresno and Tulare counties in the 1920s (CCH, 2022). It can be found in warmer weather north of the Sacramento River Delta, but the plants are killed or greatly reduced in living biomass by freezing winter temperatures (Bock, 1969; DiTomaso and Healy, 2003).

California Interceptions: The species has been intercepted several times in aquatic plant shipments into the state and in nursery inspections (CDFA PDR database, 2022), but has likely been shipped into the state many more times without being reported.

Consequences of Introduction

1) **Climate/Host Interaction:** Score is **High (3)**

Eichhornia crassipes occurs in California floating on freshwater ponds, lakes, sloughs, rivers and streams, canals, or ditches where the water is not rapidly flowing. The plant has a low tolerance for salinity (Penfound and Earle, 1948). The leaves are killed by frost, but stem bases can survive and regenerate (Bock, 1969; DiTomaso and Healy, 2003). In the northern U.S. the plant is killed by prolonged freezing temperatures.

- Low (1) Not likely to establish in California; or likely to establish in very limited areas
- Medium (2) may be able to establish in a larger but limited part of California
- **High (3) likely to establish a widespread distribution in California**

2) **Known Pest Host Range:** Score is **High (3)**

Eichhornia crassipes can occur wherever general ecological conditions exist that are conducive to its survival.

- Low (1) has a very limited host range
- Medium (2) has a moderate host range
- **High (3) has a wide host range**

3) **Pest Dispersal Potential: Score is High (3)**

Water hyacinth can reproduce very rapidly by vegetative propagation and can be spread long distances by flow of water or by movement by human activities. Under favorable conditions the number of plants can increase rapidly in a few weeks by vegetative propagation followed by decay of the connecting stolons. Several hundred seeds or more can be produced in an individual capsule fruit, which floats with the mat of plants and can potentially lodge in wet soil at the edges of smaller bodies of water. Seeds are known to be produced in California and can potentially be spread on the feet or feathers of waterfowl (DiTomaso and Healy, 2003). Although the species exhibits style length polymorphism (heterostyly) among plants in the populations in its native range in Amazonia, it has been under selection for reduced heterostyly

and greater ease of self-pollination in its temperate introduced range where pollinators may be more limiting (Barrett, 1977; Rosatti, 1987).

Evaluate the natural and artificial dispersal potential of the pest.

- Low (1) does not have high reproductive or dispersal potential
- Medium (2) has either high reproductive or dispersal potential
- **High (3) has both high reproduction and dispersal potential**

4) **Economic Impact:** Score is **Medium (2)**

Eichhornia crassipes can form dense mats on rivers, ponds, lakes, and canals that can block bodies of water and interfere with navigation, water flow, and hydropower generation (NIWA, 2020; Penfound and Earle, 1948; UF/IFAS, 2022).

A. The pest could lower crop yield.
B. The pest could lower crop value (includes increasing crop production costs).
C. The pest could trigger the loss of markets (includes quarantines).
D. The pest could negatively change normal cultural practices.
E. The pest can vector, or is vectored, by another pestiferous organism.
F. The organism is injurious or poisonous to agriculturally important animals.
G. The organism can interfere with the delivery or supply of water for agricultural uses.

Economic Impact D, G:
- Low (1) causes 0 or 1 of these impacts
- **Medium (2) causes 2 of these impacts**
- High (3) causes 3 or more of these impacts

5) **Environmental Impact:** Score is **High (3)**

Because of its rapid mat formation and growth on bodies of water, water hyacinth can exclude other species of floating aquatic plants and reduce the amount of oxygen available to aquatic organisms in the water below. It can also provide suitable habitat for the growth of mosquito populations.

A. The pest could have a significant environmental impact such as lowering biodiversity, disrupting natural communities, or changing ecosystem processes.
B. The pest could directly affect threatened or endangered species.
C. The pest could impact threatened or endangered species by disrupting critical habitats.
D. The pest could trigger additional official or private treatment programs.
E. The pest significantly impacts cultural practices, home/urban gardening or ornamental plantings.

Environmental Impact A, C, D:
- Low (1) causes none of the above to occur

- Medium (2) causes one of the above to occur
- **High (3) causes two or more of the above to occur**

Consequences of introduction to California for *Eichhornia crassipes:* **High (14)**

Low = 5-8 points
Medium = 9-12 points
High = 13-15 points

1) Post Entry Distribution and Survey Information: Score is **High (-3)**

-Not established (0) Pest never detected in California or known only from incursions.
-Low (-1) Pest has a localized distribution in California or is established in one suitable climate/host area (region).
-Medium (-2) Pest is widespread in California but not fully established in the endangered area, or pest established in two contiguous suitable climate/host areas.
-**High (-3) Pest has fully established in the endangered area, or pest is reported in more than two contiguous or non-contiguous suitable climate/host areas.**

7) Final Score: Medium 11 (14-3=11)

Uncertainty: *Eichhornia crassipes* is a well-documented aggressive weed in the waters of the Central Valley and many coastal counties in California, so there is little uncertainty concerning the species.

Conclusion and Rating Justification: *Eichhornia crassipes* is a serious aquatic environmental weed in California under long-term control by the Division of Boating and Waterways to limit its numbers, particularly in the waters of the Central Valley. Spread from plants cultivated in water gardens is probably much less frequent than from the widespread naturalized populations in the state, but sale and growing of the species is strongly discouraged by the PlantRight website. Because of the very high abundance and wide distribution of the species in California options for statewide control are limited. Continued management by harvesting, elimination of new local infestations, and attempts at biocontrol (CABI, 2022) are very appropriate to help mitigate the detrimental effects of the species. Because of the very widespread distribution in California, a "C"-rating is recommended.

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***Comment Period: 02/13/2023 through 03/30/2023**

***NOTE:**

You must be registered and logged in to post a comment. If you have registered and have not received the registration confirmation, please contact us at permits[@]cdfa.ca.gov.

Comment Format:

- Comments should refer to the appropriate California Pest Rating Proposal Form subsection(s) being commented on, as shown below.

  Example Comment:

  Consequences of Introduction: 1. Climate/Host Interaction: [Your comment that relates to "Climate/Host Interaction" here.]

- Posted comments will not be able to be viewed immediately.

- Comments may not be posted if they:

  Contain inappropriate language which is not germane to the pest rating proposal;

  Contains defamatory, false, inaccurate, abusive, obscene, pornographic, sexually oriented, threatening, racially offensive, discriminatory or illegal material;

  Violates agency regulations prohibiting sexual harassment or other forms of discrimination;

  Violates agency regulations prohibiting workplace violence, including threats.

- Comments may be edited prior to posting to ensure they are entirely germane.
- Posted comments shall be those which have been approved in content and posted to the website to be viewed, not just submitted.

Proposed Pest Rating: [C]