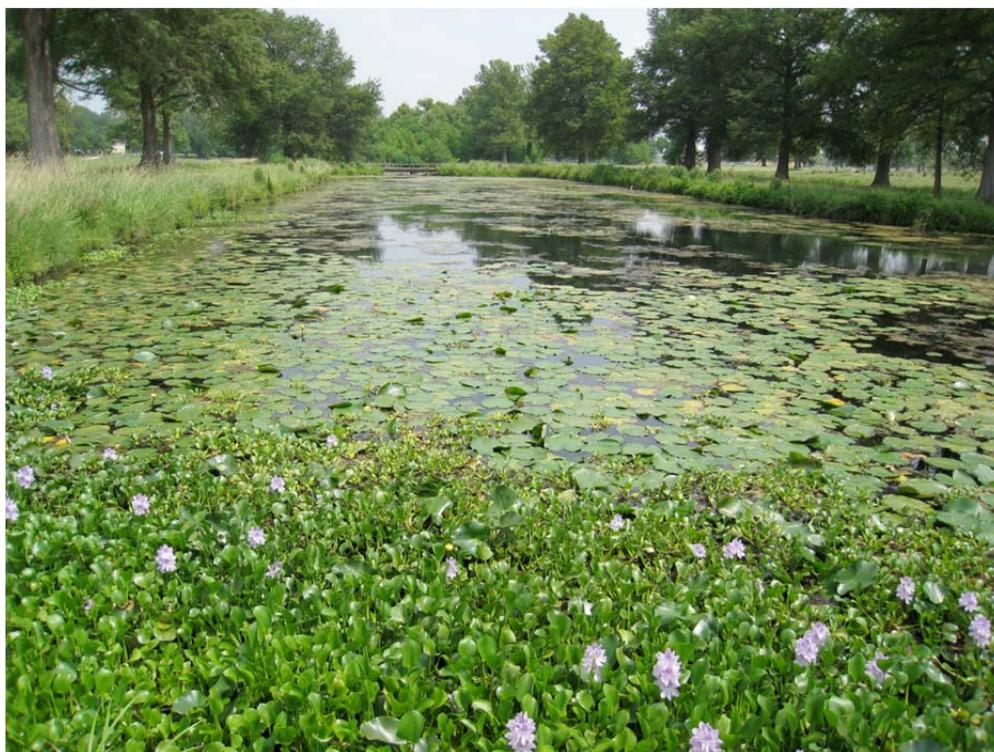


Invasive Species Profile

**Water Hyacinth, *Eichhornia crassipes***

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## Diagnostic Information

Scientific name: *Eichhorcia crassipes*

Order: Commelinales

Family: Pontederiaceae

Genus: Eichhorcia

Species: Crassipes

Common names include: The Water hyacinth, lechuguilla, Floating water hyacinth, jacinthe d'eau, Wasserhyazinthe, jacinto-aquatico, (As the distribution is wide, common names are found in different languages)

## Identification

Described to have dark, thick leaves that flatten out to make a mat on top of the water. It is a floating leaf or free-floating macrophyte with its reproductive organs on top as a purple flower on top of its mat. The Water hyacinth's roots are thick and dense that is used by many macro and micro invertebrates and small or juvenile fish. The plant creates colonies and is likely that one will never see *E. crassipes* as a single standing plant.

## Life history and Basic ecology

### *Life cycle*

The life cycle of the *E. crassipes* is typical to most plants of the world. The water hyacinth germinates in the spring, in which the seeds will fall onto various substrates depending



on luck. The seed will drop either on the mat of the water hyacinth or into the body of water in which it will not take long for the plant to take root and grow. The plant will grow and create colonies through the year until winter in which, depending on the climate, will cease growth or die. Then, after the climate has warmed, the Water hyacinth will rebound and continue growing until spring in which the germination process begins again (Penpound and Earle 1948).

### *Reproductive strategies*

*E. crassipes* is a flowering plant that germinates seeds during the spring, which is also its highest growing season. The Ovary of the plant, incased in hypathium, will produce about 500 ovules but only 50 seeds per capsule once fertilized (Penpound and Earle 1948). The seeds are released by the "spitting of the hypathium, and seeds are caught in the mat of the plant or

sink to the bottom of the water body (Penpound and Earle 1948). *E. crassipes* is a colonizing plant with a rapid rate of growth. Any damage to the colony is repaired by re-growth and re-sprouting. Though *E. crassipes* is an aquatic plant, it has the ability to grow on land, though not as successful as being in an aquatic environment.

#### *Environmental optima and tolerances*

The water hyacinth is a potentially damaging plant to the Pacific NW, however the temperature tolerance of the plant is weak to the cold as the tolerance ends at  $-6.67^{\circ}\text{C}$  (below freezing). The rhizome portion of the roots is the plants weakness to surviving, as when they are destroyed by frost, the entire plant will die. Yet, cold weather above the minimum tolerance will only cease the plants growth and will look “dead” until the weather warms. In contrast, the tropical plant’s maximum temperature tolerance is about  $34^{\circ}\text{C}$  for only 4 weeks before it dies (Penpound and Earle 1948). Since it is a tropical plant, locations with warmer climate are much more vulnerable to invasions than colder climates. This explains why *E. crassipes* is such a problem in the Southern US, which have climates that are much more similar to their native region. In addition to this, the water hyacinth is more successful in regions of development. This is most likely because of its ability to out-compete other plants, and is able to be successful in developmental conditions that other native plants cannot.

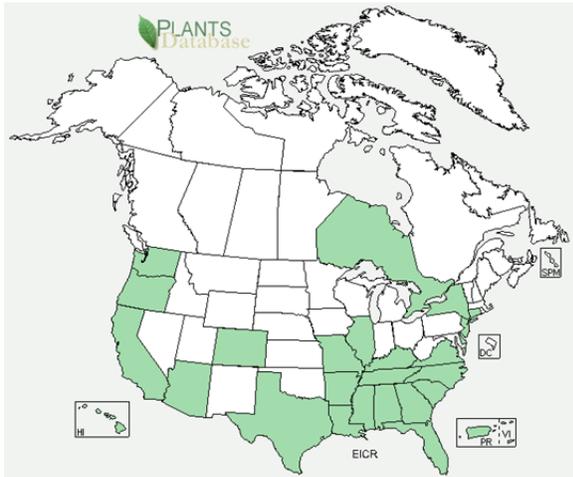
The Water hyacinth is a freshwater plant but it does have tolerance to a certain degree of salinity with a limit of withstanding 0.2 percent of salt in water (Penpound and Earle 1948). Above this concentration, the osmoregulation of the plant will only cause it to shrivel and die. In contrast the plant also has the ability to grow on land, though the size of the plant is small compared to those growing in aquatic environment, which is more favorable (Penpound and Earle 1948).

#### *Biotic associations*

The roots of the water hyacinth make home to many macroinvertebrates and small fish that are able to withstand the low dissolved oxygen under the plant’s mats (Penpound and Earle 1948). Though the impact of water hyacinth can damage the food web greatly, it can be seen that the plant can actually increase diversity of the macroinvertebrate community and house a nursery for small and juvenile fish (Kateregga and Sternerb 2007).

Another biotic association that the water hyacinth has is the ability to allow other plants colonize on top of its mats. Such a example is the colonization of *Vossia cuspidate* on the water hyacinth in Lake Victoria. (Masifwa et al. 2001). Other plants that are more associated to the United States have also been seen to colonized the water hyacinth, such as the Blackberry (Penpound and Earle 1948)

## Current Geographical location



\*Map courtesy of the USGS

Overall distribution is wide across the United States, mainly in the Southeast and very limited distribution in Oregon and Washington State. In Oregon State, Wasco and Josephine County have been reported to have Water hyacinth while Cowlitz in Washington State is the only country to report to have water hyacinth. The geographic distribution does not just include the United States but also in Southern Africa, Australia, Indo-China and Japan (Penpound and Earle 1948).

## History of Invasiveness

The Water hyacinth is native to South America, Brasil, and was transported deliberately through horticulture to sell as ornamental plants (USGS). The first introduction occurred in 1884 in the southern United States, though the timing is variable

depending on the source. One account was recorded in New Orleans, that is was grown in a green house not long after the civil war. Because of its attractive blooming purple flower, and popularity, the Water hyacinth was transplanted to many different lakes and grew easily. By the 1900s the plants was all ready distributed up the East coast of the U.S. (Penpound and Earle 1948).

The Water hyacinth did not invade the Pacific Northwest until after 2008, when reports of the invasive plant from a few counties. *E. crassipes* is not officially considered a noxious weed in the state of Oregon and is legal to actively sell and trade the plant. This is different for many of the southern states such as Texas, were it is a noxious weed and is illegal to posses or transport the plant.

## Invasion Process

### *Pathways, vectors and routes of introduction*

The main vector of the water hyacinth today is the horticulture trade. The plant is an ornamental or lakes and rivers due to their attractive purple flower and the ability to grow well and fast. One can buy the water hyacinth online, which technically cannot stop a person, who resides in a state where it is considered a noxious weed, of purchasing the plant, unless the vendor does not allow them to.

Another vector of the establishment of the water hyacinth is recreational boating. Plants can get caught on the boats engine, or stuck to its hull

and can piggyback on the boat to another lake or river if the owner does not properly clean his boat. The boat can carry the seeds to another water body, and the water hyacinth will most likely be successful and grow very fast in its colonies.

Lastly, the simple natural canals and pathways can spread the water hyacinth. Such as an example is that major canal in Louisiana was heavily depended on by traders to move goods, and were blocked by the natural spread of the water hyacinth and had to physically cut into the colonies in order to pass. This would lead to the other vector of piggybacking on boats as mentioned before. Natural pathways such as canals are still a pathway to the spread of the water hyacinth even in the Pacific Northwest, despite the difference in climate.

#### *Factors influencing establishment and spread*

The simple fact that people want to beautify their river front property will feed into the horticulture trade and also the spread of the water hyacinth. The States of Oregon and Washington do not have the water hyacinth listed as a noxious weed simply because the established populations found have not spread to the rate of invasiveness. This allows ownership and trade of the water hyacinth still legal in these states and allow for the possibility of more invasions around the state.

#### *Potential ecological or economic damages*

The large colonies of the water hyacinth

block waterways and can affect transports and recreational boating activities due to the physical barrier. Another effect is when the water hyacinth is abundant, can increase backwater and flood conditions, which would be negative for the farming community that need the runoff from their farms to be transported. This could also impede the transport and drainage of sewage that cannot be moved because of the thick roots that the water hyacinth have (Penpound and Earle 1948). These are all not only ecological damages but economical damage as not the cost to remove hyacinth is high, but the damage to boats and farms, as well as the drainage of sewage can be costly to fix and can have potential health risks to the surrounding people. Raw sewage that cannot be moved or cleared will propagate and promote the growth of different algae, like blue-green that can decrease the dissolved oxygen in the water body. If that body of water is a source that feeds the surrounding people, it can cause illnesses due to the blue-green algae being consumed.

Other ecological effects are, the out competing of water hyacinth on other native species of plants. Such an example is the out competing of the native *Pistia stratiotes* in Lake Victoria (Masifwa et al.). Water hyacinth, like many plants, are more effective with the presence of nitrogen and phosphate, and as a result, are more successful at germination (Perex et al.). Shading out of the aquatic plants below the water hyacinth, due to the colonies of mats it produces. This leads to a decrease in dissolved oxygen in

the water, decreasing abundance of animals that cannot tolerate low dissolved oxygen, including large fish, which will damage the recreational fishing community and its economic value. This leave only macro-invertebrates that can withstand low oxygen conditions to live in the roots of the water hyacinth and small and juvenile fish (Masifwa et al.2001). Though there are some cases were the water hyacinth can actually increase macroinvertebrate diversity as the more vegetation there is, the more invertebrates there will be present and utilizing the environment (Brown and Lodge 1993).

#### *Management strategies and control methods*

Biological controls: Insects. An example is the introduction of two weevils in Lake Victoria seem to have a success at pushing back the water hyacinth to were is it much less a nuisance (Masifwa et al. 2001). The introduction of non-native insects however can be risky as you may also damage the native populations of the region and may end up as becoming a nuisance species itself.

Mechanical means of management is possible by raking the ponds surface, however, this is not the most useful method as the water hyacinth is very good and reporting damage parts of the plant body.

There are also several chemical controls for the water hyacinth. Such examples are penoxsulam, glyphosate, imazamox and many more that are listed as Texas A&M describes. Though one risk as to using this method is the killing of

native plants along with the noxious weed. One other risk would be the increase of dead or decaying organic material in the body of water, changing the chemistry and health.

#### **Literature cited**

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Villamagna A.M . and Murphy B R, (2010)  
Ecological and socio-economic impacts of invasive water hyacinth (*Eichhornia crassipes*): a review, Freshwater Biology 55, 282–298

#### **Other key sources of information and bibliographies (web sites)**

Oregon invasive species hotline, an organization where they receive reports on different invasive species in Oregon State.

<http://oregoninvasiveshotline.org/reports/907>

USDA National Agriculture Library (including map)

<http://www.invasivespeciesinfo.gov/aquatics/waterhyacinth.shtml>

Texas A&M Invasive species website (picture as well)

<http://aquaplant.tamu.edu/plant-identification/alphabetical-index/water-hyacinth/>

Picture of lake with Water hyacinth

<http://invasive.org>

#### **Expert contact information in the Pacific North West**

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#### **Current research and Management efforts**

Current research is currently concentrated in the Southern United States and African countries, both, which the water hyacinth is a damaging and nuisance species. There is however research in Oregon in laboratory experiments, on the water hyacinth though it is very limited as the water hyacinth has not been classified as a noxious weed in the Pacific NW.

The largest management effort is prevention of the establishment and spread of the water hyacinth by monitoring and reporting signs of the plant. The Oregon hotline is such examples were people can report such sightings.