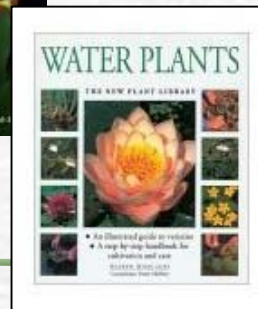
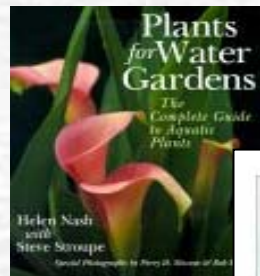


Water Gardening: Pathway to Paradise or Plant Invasion?



The Popularity of Water Gardening is Steadily Increasing

- The number of U.S. households engaged in water gardening has jumped from 4 to 16 million in the last 5 yrs.
- Water gardening retail sales reached \$1.56 billion in 2003



Water Gardens Are Versatile

- ✿ inside or outside
- ✿ large or small
- ✿ formal or informal



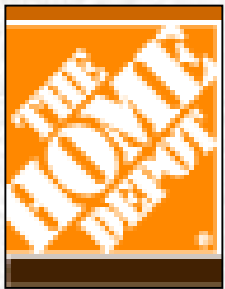
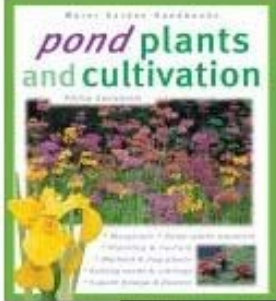
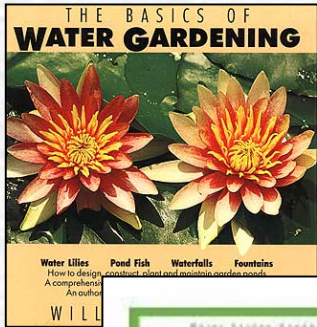
Aquatic Plants are Beneficial and Beautiful



Response to Market Demands

Aquatic plants and/or water garden supplies now widely available through:

- nurseries and garden centers
- hardware/home center chains
- mail order catalogues
- internet sites



12 Popular Water Garden Plants of Concern

- *Cabomba caroliniana* (fanwort)
- *Egeria densa* (Brazilian waterweed)
- *Eichhornia crassipes* (water hyacinth)
- *Hydrilla verticillata* (hydrilla)
- *Iris pseudacorus* (yellow flag iris)
- *Lythrum salicaria* (purple loosestrife)
- *Myriophyllum aquaticum* (parrot-feather)
- *Myriophyllum spicatum* (Eurasian watermilfoil)
- *Nymphoides peltata* (yellow floating heart)
- *Pistia statiotes* (water lettuce)
- *Salvinia molesta* (giant salvinia)
- *Trapa natans* (water chestnut)

Cabomba caroliniana (fanwort)



- sold for aquariums and ornamental ponds
- native to southeastern U.S.
- spreads by stem fragments, seeds and roots

Egeria densa (Brazilian waterweed)



- native to eastern South America
- sold for aquariums and ornamental ponds
- earliest record in U.S. from NY in 1893
- has been in Delta for several decades

Eichhornia crassipes (water hyacinth)



- native to tropical South America (Brazil)
- known to exist in CA since 1904
- frequently sold for ornamental ponds
- dubbed world's worst aquatic weed

Hydrilla verticillata (hydrilla)



- native to warm regions of Asia
- introduced to FL in 1958 as an aquarium plant
- has spread to all continents except Antarctica
- came to CA as contaminant in aquatic nursery stock

Iris pseudacorus (yellow flag iris)



- native to Europe
- grown as an ornamental – escaped cultivation
- reproduces by seed and creeping rhizomes

Lythrum salicaria (purple loosestrife)



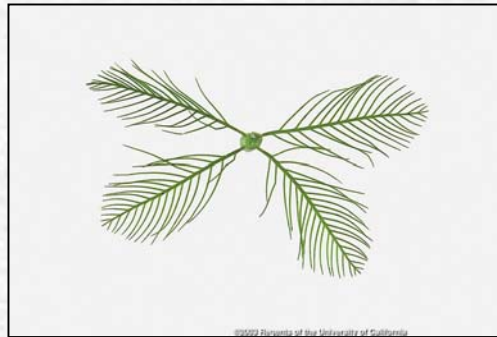
- native to Eurasia
- grown as an ornamental – escaped cultivation
- 2 million viable seeds per large plant
- spread to nearly all states in U.S. and Canada

Myriophyllum aquaticum (parrot-feather)



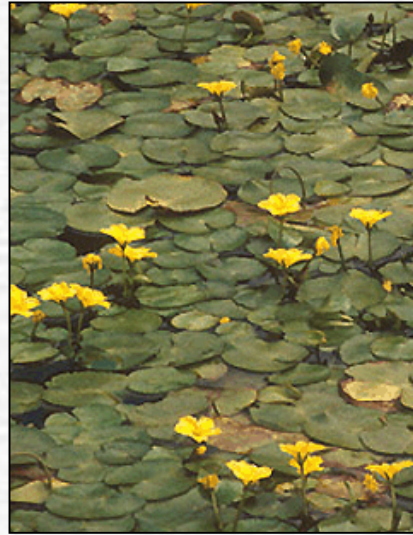
- native to South America
- earliest specimen collected from NJ in 1890
- can survive freezing conditions

Myriophyllum spicatum (Eurasian watermilfoil)



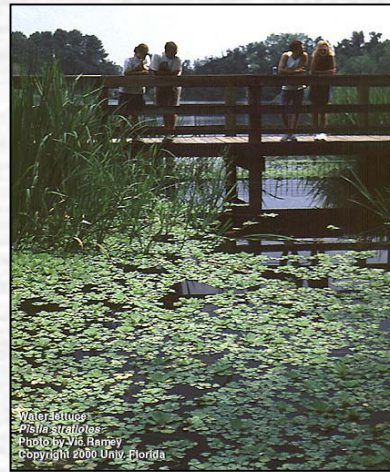
- native to Europe and Asia
- sold for aquariums and ornamental ponds
- has spread to at least 45 states and Canada

Nymphoides peltata (yellow floating heart)



- native to Europe
- grown as an ornamental since at least 1882
- spread by seed, rhizomes and fragments

Pistia stratiotes (water lettuce)



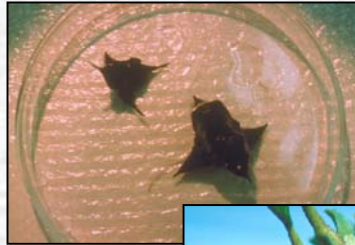
- native to tropical South America
- sold for ornamental ponds and aquariums
- free-floating; spreads by offsets and seeds

Salvinia molesta (giant salvinia)



- aquatic fern native to tropical South America
- plants can double biomass in 2-3 days
- sold as an aquatic ornamental
- spreads through stem fragmentation

Trapa natans (water chestnut)



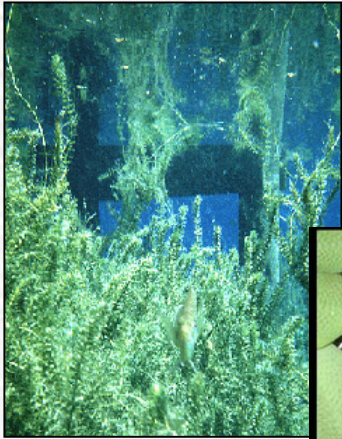
- native to Europe, Asia and Africa
- introduced in late 1800s as a pond ornamental
- has woody, nut-like seeds with barbed spines

Hyacinth and Egeria Control in the Delta

- DBW program implemented in 1987 (hyacinth) and 2001 (egeria)
- over \$45 million spent on control - management continues annually



CDFA Aquatic Plant Control



hydrilla

giant salvinia



The California Dept. of Food and Agriculture has spent over \$35 million on aquatic weed control since the 1970s -- mostly on hydrilla eradication



alligatorweed



purple loosestrife

Movement of Aquatic Plants Through the Horticultural Trade

- in s. New England 76% of non-native aquatic plants are escapes from cultivation (Les and Mehrhoff, 1999)
- in NZ 75% of aquatic invasive plants are of horticultural origin (Champion and Clayton, 2000)
- the 1st monoecious hydrilla in CA was traced to a contaminated lily shipment



Limnophila sessiliflora
Photo by David Sutton
Copyright 1996 University of Florida

Findings of Maki and Galatowitsch, 2003

- 92% - Fed. Noxious Weeds acquired
- 93% - plant/animal not requested
- 18% - misidentified plants
- 43% - unordered seeds
- plants received but not ordered: purple loosestrife, hydrilla, giant salvinia, curly-leaf PW
- aquatic inverts found in 30 of 40 plant orders; fish found in two orders



Invasive Aquatic Plants Available on the Internet



- water lettuce – 85%
- parrot feather – 80%
- water hyacinth – 70%
- egeria – 65%
- fanwort/YF Iris – 55%
- yellow floating heart – 50%
- salvinia – 35%
- milfoil – 25%
- purple loosestrife – 5%
- hydrilla/chestnut – 0%

Education, Education, Education

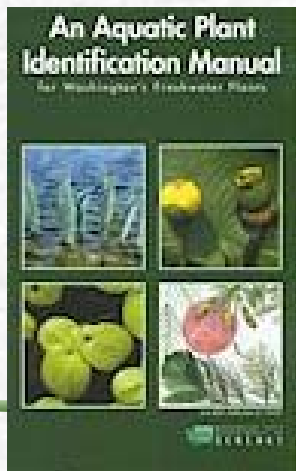
There is a correlation between familiarity w/ issue and a preference NOT to buy invasive plants (Reichard and White 2001).

- work with media & publishers
- reach bigger and broader audiences
 - Botanical Gardens
 - Master Gardeners
 - Garden Clubs



What Can Water Gardeners Do to Help?

- **DO NOT RELEASE** plants near or into a water body
- Build your water garden away from natural waterways
- Site your pond away from areas that flood
- Learn which plants are likely to be invasive
- Request non-invasive plants from your nursery
- Inspect your plant purchases for hitchhikers



Role of a Responsive Nursery

- Know which species are regionally/federally regulated
- Abide by all laws governing plant importation, sale, etc.
- Verify the scientific name of what you purchase
- Inspect shipments to make sure they are not contaminated
- Educate staff/customers – promote *Don't Release* message
- Provide a selection of non-invasive plants for consumers



A New National Campaign

Habitattitude:

The message is...

DON'T RELEASE

www.habitattitude.net



RIDNIS Project

Reducing the Introduction and Distribution of
Non-native Aquatic Invasive Species Through
Outreach and Education

- develop Best Practice Guidelines with industry
- produce outreach materials in Spanish & Chinese
- publish articles in trade magazines
- partner with others

<http://www.ridnis.ucdavis.edu>



Thank you!

