

Water Chestnut

An Emerging Aquatic Invasive Species in New Jersey

Prepared by the
NJ Water Chestnut Task
Force

<http://morris.njaes.rutgers.edu/ag>

April 2010



Native Plants



Trillium grandiflorum

(White trillium or white wake-robin)

- **Native plants are plants that have developed or occur naturally, or have existed for many years in an area. Typically, they have existed since the pre-European colonization period.**

Naturalized Plants



Echinacea purpurea
(Purple coneflower)

- Introduced in a region after the European colonization.
- Have become successfully established.

Invasive Plant Species



Rosa multiflora
(Multiflora rose)

- Have been introduced from outside the region.
- Have no natural controls or competitors.
- Reproduce better and outcompete regional native species.
- Disrupt balance of regional ecosystem.

Aquatic Invasive Species

- Adapt easily to a broad range of conditions.
- Produce many offspring.
- Multiple methods to spread or reproduce (seeds, turions, fragments, rhizomes, etc.).
- Are free of natural controls.
- Native aquatic plants are unable to compete for needed habitat, nutrients and/or light.



Photographs from Invasive species website

Ecosystem Impacts - Fish

- Although aquatic plants are important to the maintenance of a healthy fishery, an overabundance of plants, especially a monoculture of one plant is usually harmful.
- Dense vegetation makes it difficult for predators to spot and capture prey.
- A decline in predator/prey interactions leads to an increase in prey species and can negatively impact the growth and vigor of the prey species...results in an imbalanced fishery of lower recreational value.
- Nesting and spawning success may also decline due to an overabundance of vegetation.

Impacts to Ecosystem- Birds

- Dabbling and diving ducks prefer native pondweed and eel grass.
- Dense submerged vegetation impacts birds that must swim through water to catch prey.
- Dense floating vegetation impacts birds that hunt by sight.



An osprey preparing to dive
Photograph courtesy NASA

Water Chestnut – *Trapa natans*

Floating rosette of water chestnut in Lake Musconetcong, NJ 2009.

Photo courtesy of Chris Mikolajczyk, Senior Scientist Princeton Hydro



Water Chestnut Is Not A Food

- *Trapa natans* should not be confused with the water chestnut sold in stores or served with Asian cuisine.
- That particular edible water chestnut is *Eleocharis dulcis*, pictured at right.

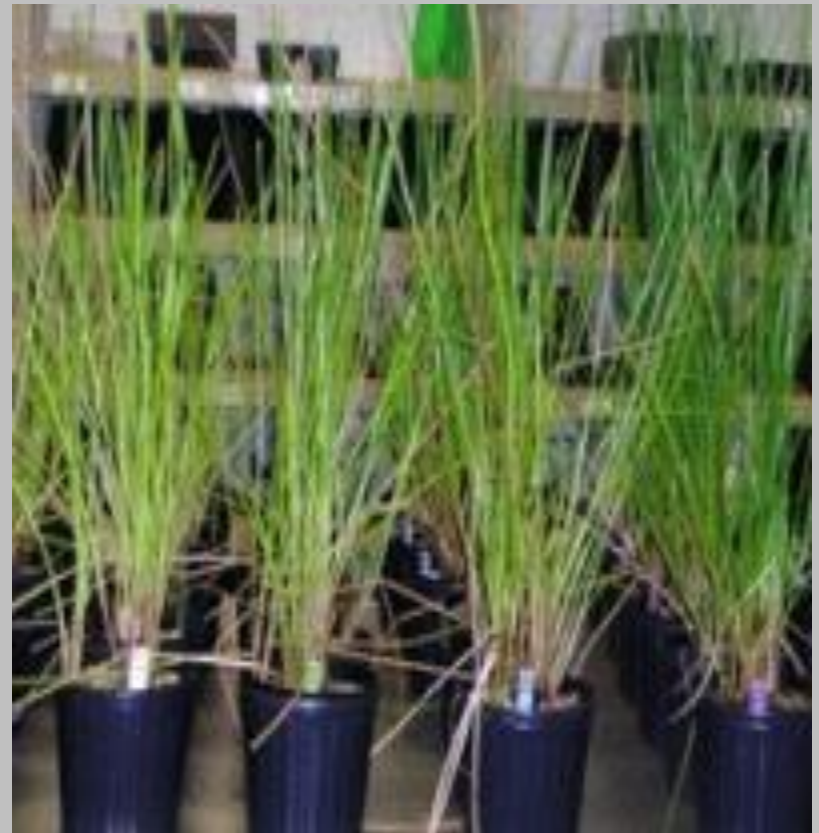
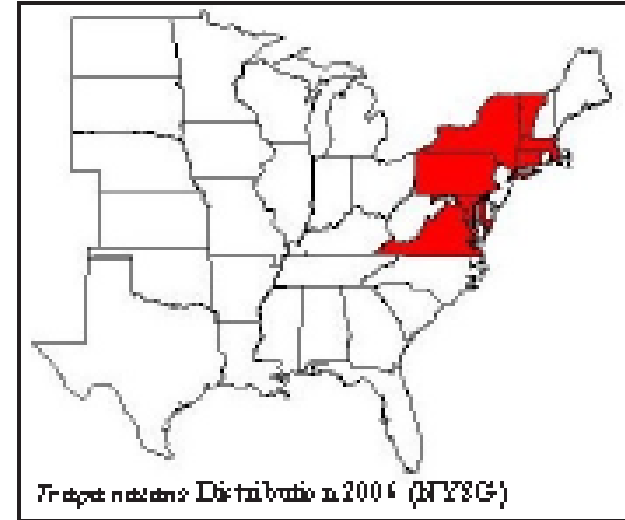


Photo courtesy Clemson University

Why Focus on Water Chestnut?

- Recent invasive to NJ, not yet fully established (“horse not all the way out of the barn”).
- Spreads aggressively.
- Highly disruptive.
- Easy to find and identify.
- With early detection can be successfully managed.





Flower of water chestnut, 2009.

Photo courtesy of Lauren Theis, Senior Scientist Upper Raritan Watershed Association.



Air bladder of water chestnut, 2009.

Photo courtesy of Lauren Theis, Senior Scientist Upper Raritan Watershed Association.



Seed pods of water chestnut.

Photo courtesy of Lauren Theis, Senior Scientist Upper Raritan Watershed Association.

Water Chestnut Seed or Fruit





**Dense stand of water chestnut, Lake Musconetcong, NJ,
2009.**

Photo courtesy of Chris Mikolajczyk, Senior Scientist Princeton Hydro

This Is Not Water Chestnut



Kidney mudplantain 2009.

Photo courtesy of Mike Haberland, Rutgers Cooperative Extension

Water Chestnut's Preferred Habitat

- Occurs in lakes, ponds, reservoirs and in slow moving rivers and streams.
- Shallow, (less than 16-foot deep) waters
- Optimum depth is 1-6 foot deep
- Nutrient-rich lakes and rivers
- A pH range of 6.7 to 8.2.
- Soft sediment bottoms.

Prevention

- When dealing with any invasive plant prevention is the best management measure.
- Controlling spread of water chestnut in NJ.
 - Check boat and remove any plants or plant fragments (inspect prop, hull, trailer, live box, bilge, etc.)
 - Thoroughly wash or steam clean boat and trailer before re-launching.
 - Do not empty bait buckets after fishing.

Early Detection

- Sentinel - “A person that stands watch; sentry.”¹
- Enlisting watershed groups, lake managers, lake associations, watershed ambassadors, fishing clubs, boating associations, lake commissions, monitoring groups and others regularly on water.
- Learn more about the threat, impact and control of water chestnut, report sightings, aid in control.
- Report any sighting to local lake manager or use Rutgers Cooperative Extension website <http://morris.njaes.rutgers.edu/ag/>
- If possible, take a picture and note the extent of coverage.

¹ Webster's Universal College Dictionary

Rapid Response - Early Detection

- Due to increased occurrence of plant in NJ tracking is critical to prevent its further spread.
- Starts with communication and knowing where water chestnut has been sighted.
- Lake managers, residents and users of nearby waterbodies can utilize the knowledge to raise awareness and implement preventative and/or control measures.

Rapid Response – Physical Control

- Water chestnut weakly rooted and can be hand pulled from the sediment.
- Hand pulling is a practical control tactic.
- Accomplished using trained volunteers.
- Relatively inexpensive, costs dependent on the extent of infestation.



Picture courtesy Lake Musconetcong
Regional Planning Board
<http://www.lakemusconetcong.com/>

Rapid Response – Physical Control

- Can be supplemented with mechanical harvesting using specially designed machines.
- No permit is required for hand pulling, hydro-raking, mechanical weed harvesting or disposal.
- Key to success is rapid response, vigilance, consistency, and continued monitoring.



Picture courtesy Lake Musconetcong
Regional Planning Board
<http://www.lakemusconetcong.com/>

Disposal of Harvested Plants

- Make sure to move the harvested water chestnut, especially the seeds/fruits, away from the shoreline.
- On a small scale, the harvested plants can be recycled and composted similar to grass clippings or other aquatic plants.
- For large scale operations involving the disposal of the plant material at a licensed composting facility, ensure that the facility can accept aquatic plants ...check for pricing, and any specific transport and disposal procedures.

Other Control Methods

- Aquatic herbicides
 - Such chemical treatment requires a NJDEP permit and must be conducted by a NJDEP Category V licensed applicator.
 - Costs vary, but can be expensive when treating large expanses of water chestnut.
- Biological controls
 - Grass carp are not effective; their preference is not to consume water chestnut. Additionally grass carp cannot be stocked in NJ in flowing waters or ponds/lakes greater than 10 acres in size.
 - A beetle, *Galerucella birmanica* has been investigated but may not be species specific.

How Do We Control This Pest?

- Prevention is the best management measure.
- Know the plant and its habitat preferences.
- When leaving a lake, conduct a thorough inspection of your boat, boat bilge, live wells and trailer to prevent any “hitchhikers”.
- Before you re-launch wash your boat (*or better, steam clean*) it and the trailer.
- Do not empty bait buckets in a lake.
- Do not import or plant any non-native aquatic plant species for use in water gardens and back yard fish ponds.

What To Do If You Observe Water Chestnut

- For small infestations, hand pull making sure to remove the roots and properly dispose of harvested plant material
- Contact Rutgers Cooperative Extension, Pat Rector, rector@njaes.rutgers.edu
- Complete the on-line reporting form on the Rutgers website <http://morris.njaes.rutgers.edu/ag> .
- Make the local lake manager aware.
- Photodocument (even with cell phone), and note the extent of coverage.
- Check and wash all equipment to assure you do not transport the plant.

Acknowledgements

- Ewing Environmental Commission
- Knee Deep Club
- New Jersey Coalition of Lakes Association
- New Jersey Water Supply Authority
- Princeton Hydro, LLC
- NJDEP, Division of Parks and Forestry
- NJDEP, Pesticide Control Program
- NJDEP, Volunteer Monitoring Program
- NJDEP, Bureau of Water Quality and Assessment
- NJDEP, Division of Watershed Management
- Princeton Hydro, LLC
- Rutgers Cooperative Extension
- Rutgers Water Resources Program
- Upper Raritan Watershed Association

Thank You

