GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Trapa natans***

Trapa natans 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Myrtales	Trapaceae

Common name European water chestnut (English), bull nut (English), water chestnut (English), water nut (English)

Synonym

Similar species *Trapa bispinosa*

Summary Trapa natans, commomly known as water chestnut, is an annual plant introduced from Asia and has become abundant in the northeastern United States where it creates a nuisance in lakes, ponds, canals and other slow-moving water. Trapa natans grows best in shallow, nutrient-rich lakes and rivers and is generally found in waters with a pH range of 6.7 to 8.2 and alkalinity of 12 to 128 mg/L of calcium carbonate. Trapa natans out-competes native plants for sunlight and spreads either by the rosettes detaching from their stems and floating to another area, or more often by the nuts being swept by currents or waves to other parts of the lake or river.

view this species on IUCN Red List

Species Description
According to Methe *et al.* (1993, in CBP, 2002), *T. natans* is an annual aquatic plant with a submerged flexuous stem that anchors into the mud and extends upward to the surface of the water. *T. natans* features a rosette of floating, fan-shaped leaves, each leaf having a slightly inflated petiole (stem); the roots are fine, long and profuse. The small, 4-petalled flower is white and the fruit is a large nut with four sharp spines.

Lifecycle Stages
VDEC (2002) states that as a true annual, *T. natans* reproduces by overwintering seeds. Ungerminated seeds may remain viable for up to 12 years. However, most seeds probably germinate in the first two years.

Uses
Trapa natans produces a nut-like fruit that can be cooked, eaten out of hand, or used in other foods (Magness *et al.* 1971).

Habitat Description
Trapa natans can be found in lakes, ponds, canals, and slow water. *T. natans* grows best in shallow, nutrient-rich lakes and rivers and is generally found in waters with a pH range of 6.7 to 8.2 and alkalinity of 12 to 128 mg/L of calcium carbonate (Methe *et al.* 1993, in CBP 2002).

Reproduction
According to Haber (1999), flowers are produced singly on stalks arising from the center of the floating rosette of leaves. Each flower is bisexual, bearing a two-chambered ovary, four stamens and four white petals. Four triangular sepals surround the flower and develop into barbed spines in the mature fruit. Once the ovules of the insect pollinated flowers are fertilized, the flower stalks curve downward with the result that the fruit develops under water. The fruit matures into a nut-like, barbed spiny fruit. VDEC (2002) states that the single-seeded woody fruits produced from the previous year germinate in early spring. A single seed may give rise to 10 to 15 plant rosettes. Each rosette can produce up to 15 to 20 seeds.

General Impacts
According to VDEC (2002), *T. natans* is a fierce competitor in shallow waters with soft, muddy bottoms. Uncontrolled, it creates nearly impenetrable mats across wide areas of water. In Vermont, USA, many previously fished bays of southern Lake Champlain are now inaccessible, and floating mats of *T. natans* can create a hazard for boaters. It is also a human nuisance because mature *T. natans* nuts drift to shore where their sharp spines may hurt bare feet (Haber, 1999). VDEC (2002) states that this noxious plant also severely limits the passage of light into the water, a critical element of a well-functioning aquatic ecosystem. It reduces oxygen levels, which may increase the potential for fish kills. *T. natans* outcompetes native vegetation and is of little value to wildfowl.

Management Info
Physical: According to CBP (2002), hand removal is an effective means for eradication of smaller populations; *T. natans* roots are easily uplifted. Their removal is imperative because floating uplifted plants can further spread seeds downstream. The potential of *T. natans* seeds to lay dormant for up to 12 years makes total eradication difficult. Hand harvesting from canoes and raking have been effective and are a means to promote community involvement.
Chemical: For large-scale control of *T. natans* populations, which can form dense, thick mats capable of covering miles, herbicides and mechanical harvesting can both be effective. Aquatic plant harvesting boats are often employed in instances where waterways are blocked and herbicide (2,4-D) has been tested and deemed safe for use by federal and state agencies.

Principal source: Invasive Species in the Chesapeake Watershed: Water Chestnut (CBP, 2002)

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

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ALIEN RANGE

[1] AUSTRALIA
[1] BURKINA FASO
[1] GERMANY
[1] SWEDEN
[1] BELGIUM
[1] CANADA
[1] NETHERLANDS
[8] UNITED STATES

BIBLIOGRAPHY
15 references found for **Trapa natans**

Managment information
CBP (Chesapeake Bay Program). 2002. *Invasive Species in the Chesapeake Watershed: Water Chestnut*. Maryland Sea Grant.
Summary: A detailed report on the invasive species, *Trapa natans*, in the Chesapeake Bay watershed.
Available from: http://www.mdsg.umd.edu/exotics/workshop/water_chestnut.html [Accessed 6 June 2003]

Champion, P.D.; Clayton, J.S. 2000. Border control for potential aquatic weeds. Stage 1. Weed risk model. Science for Conservation 141. .
Summary: This report is the first stage in a three-stage development of a Border Control Programme for aquatic plants that have the potential to become ecological weeds in New Zealand.
Available from: http://www.doc.govt.nz/upload/documents/science-and-technical/sfc141.pdf [Accessed 13 June 2007]
Champion, P.D.; Clayton, J.S. 2001. Border control for potential aquatic weeds. Stage 2. Weed risk assessment. Science for Conservation 185. 30 p.
Summary: This report is the second stage in the development of a Border Control Programme for aquatic plants that have the potential to become ecological weeds in New Zealand. Importers and traders in aquatic plants were surveyed to identify the plant species known or likely to be present in New Zealand. The Aquatic Plant Weed Risk Assessment Model was used to help assess the level of risk posed by these species. The report presents evidence of the various entry pathways and considers the impact that new invasive aquatic weed species may have on vulnerable native aquatic species and communities.
Available from: http://www.doc.govt.nz/upload/documents/science-and-technical/SFC185.pdf [Accessed 13 June 2007]
National Pest Plant Accord, 2001. Biosecurity New Zealand.
Summary: The National Pest Plant Accord is a cooperative agreement between regional councils and government departments with biosecurity responsibilities. Under the accord, regional councils will undertake surveillance to prevent the commercial sale and/or distribution of an agreed list of pest plants.
Available from: http://www.biosecurity.govt.nz/pests-diseases/plants/accord.htm [Accessed 11 August 2005]
New Zealand Plant Conservation Network, 2005. Unwanted Organisms. Factsheet *Trapa natans*
O'Neill, Jr. Charles R., February 2006. Water Chestnut (*Trapa natans*) in the Northeast NYSG Invasive Species Factsheet Series: 06-1 Invasive Species Specialist New York Sea Grant
Summary: Available from: http://www.nysgextension.org/ans/anspages/pdf/Water%20Chestnut%20Factsheet.pdf [Accessed 3 January 2007]
Royal New Zealand Institute of Horticulture (RNZIH), 2005. Water chestnut *Trapa natans*
Summary: Available from: http://www.rnzih.org.nz/pages/nppa_088.pdf [Accessed 1 October 2005]

General information

Caraco, N.F and Cole, J.J., 2002. Contrasting impacts of a native and alien macrophyte on dissolved oxygen in a large river. Ecological Applications. 12(5). October 2002. 1496-1509.
Haber, E. 1999. *Invasive Exotic Plants of Canada* National Botanical Services.
Summary: A detailed report on the biology, ecology and distribution of *T. natans*.
Available from: http://24.43.24.85/nbs/ipcan/factnut.html [Accessed 6 June 2003]
ITIS (Integrated Taxonomic Information System), 2005. Online Database *Trapa natans*
Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.
Available from: http://www.cbif.gc.ca/pls/itisca/taxastep?king=every&p_action=containing&taxa=Trapa+natans&p_format=&p_ifx=plglt&p_lang= [Accessed March 2005]
Strayer, D.L; Lutz, C; Malcolm, H.M; Munger, K and Shaw, W.H., 2003. Invertebrate communities associated with a native (*Vallisneria americana*) and an alien (*Trapa natans*) macrophyte in a large river. Freshwater Biology. 48(11). 1938-1949.
Titus, J. E., 2003. Submersed plant invasions and declines in New York. Lake & Reservoir Management. 10(1). 1994. 25-28.
USDA-ARS (United States Department of Agriculture, Agricultural Research Service). UNDATED. Taxon: *Trapa natans* L. National Genetic Resources Program. Germplasm Resources Information Network (GRIN). [Online Database] National Germplasm Resources Laboratory, Beltsville, Maryland.
Summary: Information on common names, synonyms, and distribution.
Available from: http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl?Trapa+natans [Accessed 25 June 2003]
USDA-NRCS (Natural Resource Conservation Service). 2005. *Trapa natans*. The PLANTS Database Version 3.5 [Online Database] National Plant Data Center, Baton Rouge, LA.
Summary: Available from: http://plants.usda.gov/java/profile?symbol=TRNA [Accessed 6 March 2006]
Vermont Department of Enviornmental Conservation (VDEC). 2002. *Water Chestnut*. Water Quality Division.
Summary: A report on aquatic nuisance species, specifically the Water chestnut. It contains information on the ecology and biology of *Trapa natans*.
Available from: http://www.anr.state.vt.us/dec/waterq/ans/wcpage.htm [Accessed 6 June 2003]