Common name
Brazilian-waterweed (English), Brazilian waterweed (English), dense waterweed (English), South American waterweed (English), leafy elodea (English), egeria (English), common waterweed (English), Brazilian elodea (English)

Synonym
Anacharis densa, (Planch.) Victorin
Elodea densa, (Planch.) Caspary
Philotria densa, (Planch.) Small & St. John

Similar species
Hydrilla verticillata, Elodea canadensis

Summary
Egeria densa is a submersed, freshwater perennial herb that forms dense monospecific stands that restrict water movement, trap sediment, and cause fluctuations in water quality. It has also affected the status of certain threatened species. It has been introduced worldwide through the aquarium trade, and even in its native range can become a nuisance species causing local economic impacts. Chemical control is the most effective option for management of E. densa. Mechanical control is not recommended because fragments of the plant left behind can readily re-colonize and move downstream. The introduction of grass carp offers biological control of this species, but care must be taken because carp can introduce their own negative effects on the environment.

view this species on IUCN Red List

Species Description
The leaves and stems of E. densa generally are a bright green, short internodes frequently give the plant a very leafy appearance. Leaves which are are minutely serrated and linear, are 1-3cm long, up to 5mm broad, and found in whorls of four to eight. The lowest leaves are opposite or in whorls of 3, while the middle and upper leaves are in whorls of 4 to 8. Stems are erect, cylindrical, simple or branched, and grow until they reach the surface of the water where they form dense mats. The 18-25mm white flowers have three petals, are dioecious and float on or rise above the water's surface on thread-like hypanthiums produced from apical double nodes. White or pale, slender roots are unbranched. Adventitious roots are freely produced from double nodes on the stem (The Washington State Department of Ecology, 2003).
Notes
The Washington State Department of Ecology (2003) observes that, *Elodea canadensis* an attractive aquarium plant, could be used as a good substitute for *E. densa* since it is native to Washington's lakes, ponds, and rivers. They however point out due to *Elodea canadensis* availability in the aquarium trade, it has been introduced to several countries where it is not native, and is now considered a noxious weed in those regions (parts of Europe, Australia, Africa, Asia, and New Zealand).

Lifecycle Stages
In North America the Washington State Department of Ecology (2003) states that, "*E. densa* initiate growth when water temperatures reach 10 degrees centigrade. Getsinger describes the life cycle of *Egeria densa* in Lake Marion, South Carolina as follows: Two major growth flushes occur in spring and fall. Each of these flushes are followed by periods of senescence, with a loss of biomass through sloughing and decay of tips and branches. Flowers are produced in late spring and again in the fall. The intensity of flowering varies from year to year. During the summer, profuse branching forms a canopy. The branches form dense, tangled mats on the water's surface." In Japan the following Life cycle stages were noted in a scientific study by Haramoto and Ikusima (1998): "The seasonal activity of photosynthesis and respiration was measured in March, August and December. The optimum temperature of net photosynthesis of the summer-type plants reached a high 35°C similar to that of the C4 plant. The compensation for light intensity at 35°C was 340 lux. Each photosynthesis-temperature curve suggested that Egeria had the ability to adapt to the seasonal changes in temperature in the natural habitat. The maximum starch concentrations reached 25.4% in the leaf and 22.6% in the stem in December. The shortage in the balance of organic matter for over-wintering was found to be maintained by stored starch in the leaf and the stem."

Uses
*E. densa* has been introduced worldwide through the aquarium trade. *E. densa* until 1996 was commonly sold in Washington pet stores under the name 'anacharis' as an aquarium species. *E. densa* was firsts offered for sale in the United States in 1915, where it was recommended as a good "oxygenator" plant (The Washington State Department of Ecology, 2003). Lara *et al.* (2002) states that, "Among the higher aquatic plants, *E. densa* has been the preferred material for a number of different studies in plant physiology. One of the main reasons is that its leaves contain a single longitudinal vascular bundle and the blade consists of two layers of cells only, allowing studies of the whole undamaged organ in a natural environment. In this plant, heterogeneity is reduced to a minimum; all leaf cells are in direct contact with the external medium and at the same developmental stage and thus in similar physiological condition. These properties, together with the leaf polarity displayed by *E. densa*, represent an advantage for different kinds of research and make this species one of the model organisms of the plant kingdom for experiments, such as electro-physiology."
Habitat Description
Pierini and Thomaz (2004) state that, "E. densa is primarily invasive in temperate environments."
The Washington State Department of Ecology (2003) states that, "E. densa is a submersed, freshwater perennial herb, generally rooted on the bottom in depths of up to 20 feet or drifting. It is found in both still and flowing waters, in lakes, ponds, pools, ditches, and quiet streams."

Reproduction
The Washington State Department of Ecology (2003) states that, "The absence of sexual reproduction in introduced populations of E. densa emphasizes the importance of the vegetative growth phase of the plant. Specialized nodal regions described as double nodes occur at intervals of 6 to 12 nodes along a shoot. A double node consists of 2 single nodes separated by a greatly shortened internode. Double nodes produce lateral buds, branches, and adventitious roots. Only shoot fragments of E. densa, which contain double node regions, can develop into new plants. The plant fragments readily and each fragment containing a double node has the potential to develop into a new plant. Plant root crowns also develop from double nodes along an old shoot. When a shoot sinks to the bottom during fall and winter senescence, a new root crown may develop at one or several double nodes along the new shoot. Egeria densa lacks specialized storage organs such as rhizomes or tubers and stores carbohydrates in stem tissues."

Nutrition
In Japan the following nutritional and environmental requirements were noted in a scientific study by Haramoto and Ikusima (1998): "The seasonal activity of photosynthesis and respiration was measured in March, August and December. The optimum temperature of net photosynthesis of the summer-type plants reached a high 35°C similar to that of the C4 plant. The compensation for light intensity at 35°C was 340 lux. Each photosynthesis-temperature curve suggested that E. densa had the ability to adapt to the seasonal changes in temperature in the natural habitat. The maximum starch concentrations reached 25.4% in the leaf and 22.6% in the stem in December. The shortage in the balance of organic matter for over-wintering was found to be maintained by stored starch in the leaf and the stem."

General Impacts
Barreto et al. (2000) state that, "In southeast Brazil E. densa, together with E. najas, causes great annual losses to the hydroelectric companies. Interruptions of electricity generation and damage to grids and equipment are common in reservoirs belonging to CESP in São Paulo." The Washington State Department of Ecology (2003) states that, "E. densa forms dense monospecific stands that restrict water movement, trap sediment, and cause fluctuations in water quality. Dense beds interfere with recreational uses of a water body by interfering with navigation, fishing, swimming, and water skiing." Champion and Tanner (2000) state that in New Zealand, "E. densa exhibited the ability to rapidly recolonise de-vegetated areas following floods in the Whakapipi Stream and may be considered to be 'adversity selected' (Whittaker & Goodman, 1979, in Champion and Tanner 2000)."
Management Info
A Risk assessment of *Egeria densa* for Australia was prepared by Pacific Island Ecosystems at Risk (PIER) using the Australian risk assessment system (Pheloung, 1995). The result is a score of 22 and a recommendation of: reject the plant for import (Australia) or species likely to be a pest (Pacific).
For details on chemical, physical, biological control options, please see management information.

Principal source: Washington State Department of Ecology, 2003 Technical Information about *Egeria densa* (Brazilian elodea)

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG) with support from the Terrestrial and Freshwater Biodiversity Information System (TFBIS) Programme (Copyright statement)

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Publication date: 2006-04-11

ALIEN RANGE

| [1] SWAZILAND | [36] UNITED STATES |

BIBLIOGRAPHY

44 references found for *Egeria densa*

Management information

Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.


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]

**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.


**Collins, J.N, May M, Grosso C., 2003.** Brazilian waterweed *Egeria densa*. Practical Guidebook to the Control of Invasive Aquatic and Wetland Plants of the San Francisco Bay - Delta Region.

**Summary:** Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.


The Guidebook is available from: [http://legacy.sfei.org/nis/index.html](http://legacy.sfei.org/nis/index.html)


**Summary:** A scientific study conducted in France on a drinking water reservoir with detailed management information regarding species.


**Summary:** The EPPO Reporting Service is a monthly information report on events of phytosanitary concern. It focuses on new geographical records, new host plants, new pests (including invasive alien plants), pests to be added to the EPPO Alert List, detection and identification methods etc. The EPPO Reporting Service is published in English and French.


**Summary:** Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.


**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.


**Summary:** Information on description, habitat, history, and growth of species.


**Swaziland s Alien Plants Database., Undated.** *Egeria densa*

**Summary:** A database of Swaziland s alien plant species.


**Taranaki Regional Council. 2003.** Oxygen weed (*Lagarosiphon major, Egeria densa*). The Pest Plant Management Section.

**Tasman District Council (TDC) 2001.** Tasman-Nelson Regional Pest Management Strategy

GLOBAL INVASIVE SPECIES DATABASE
FULL ACCOUNT FOR: Egeria densa

Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.

General information
Summary: An article containing distribution information on species in Brazil.
Summary: Scientific study containing information regarding general impacts of species.
Freshwater Biodata Information System New Zealand (FBIS), 2005
Summary: The Freshwater Biodata Information System (FBIS) contains fish, algae, aquatic plant and invertebrate data and metadata gathered from New Zealand’s freshwater streams, rivers and lakes. FBIS provides different ways to search for biodata: choose a predefined search from a list of common searches; use the map view to draw a box on a map and search for biodata; or create your own search for maximum search flexibility. FBIS is offered as a nationally available resource for the New Zealand public, institutions and companies who need access to a well-maintained long-term data repository.
Summary: An article containing distribution information on species.
Summary: An article containing distribution information on species.
Summary: An article containing distribution information on species.
Summary: An article containing distribution information on species.
Summary: An article containing distribution information on species.
Summary: An article containing distribution, lifecycle, and nutritional information on species.
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.

**Summary:** An article containing habitat and distribution information on species.  
**Summary:** An article containing location specific impact and distribution information on species.  
**Summary:** Available from: from: http://www.rsnz.org/publish/nzjb/1986/35.pdf [Accessed December 14 2004]  
**Summary:** Information on common names, synonmys, and the distributional range of species.  
**Summary:** Available from: http://plants.usda.gov/java/nameSearch?keywordquery=Egeria+densa&node=sciname [Accessed 07 January 2006]  
**Summary:** An article containing distribution information on species.